Indoor Pool Design and Dehumidification

Mike Herwald

Regional Sales Manager

March 7, 2011

Munters

Summary of Critical Design Parameters

- Design temperature approximately 2° higher than water temperature
- Design relative humidity 40-60%
- 4-8 Air changes/hour
- Design space pressure slightly negative
- Design 0.5 CFM/sq. ft. deck and pool area
- “Wash” exterior walls and windows with supplied conditioned air

DES CHAMPS TECHNOLOGIES
P.O. Box 220 • Natural Bridge Station, VA 24579
Ph (540) 291 - 1111 • Fax (540) 291 - 2222
www.deschamps.com

PSYCHROMETRIC CHART

Normal Temperature

I-P Units

SEA LEVEL

BAROMETRIC PRESSURE: 29.921 in. HG

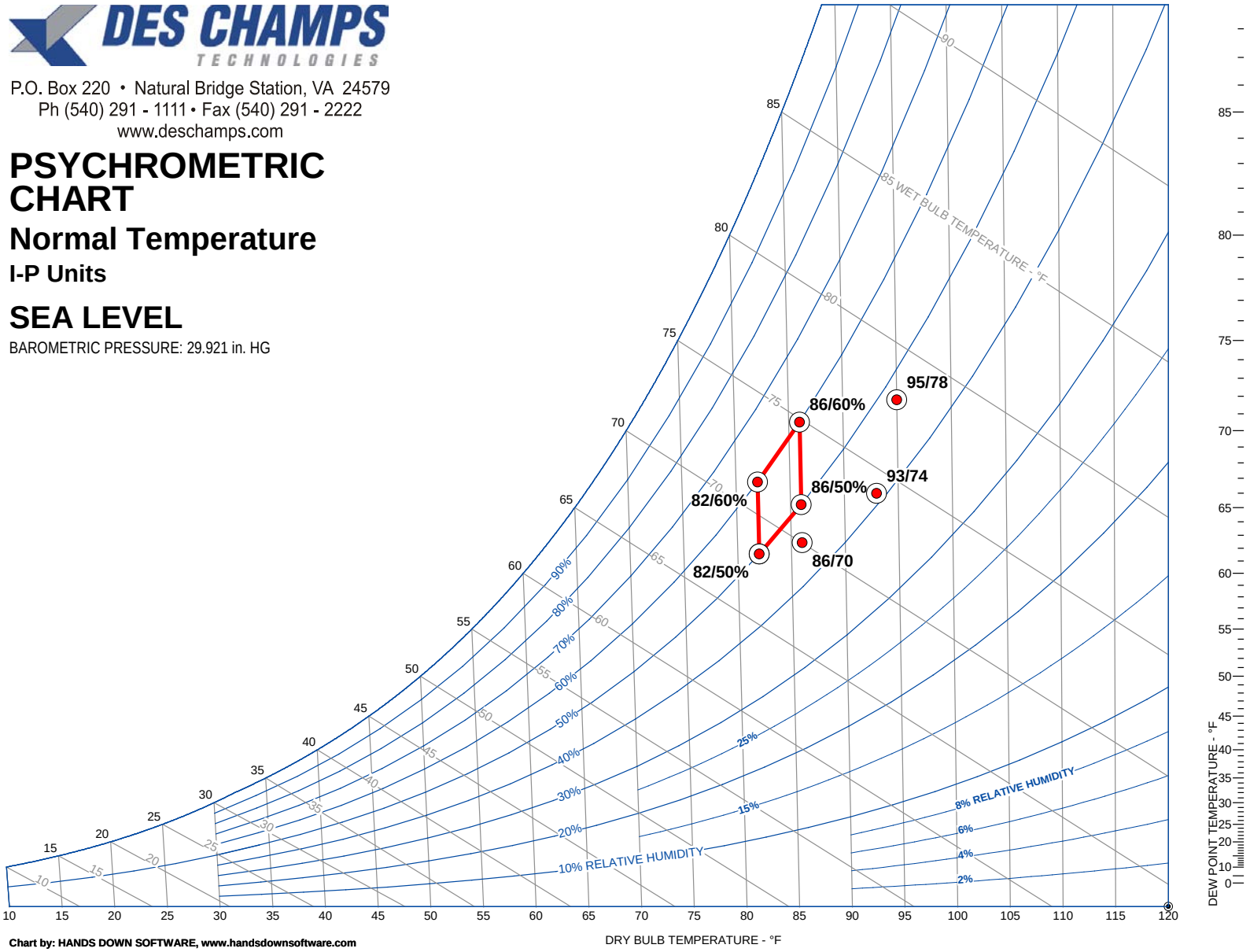


Chart by: HANDS DOWN SOFTWARE, www.handsdownsoftware.com

Consider this…

- Introduction of fresh air, in a controlled manner, will positively control indoor pool humidity when it is most important: **WHEN IT IS COLD OUT** and when building structures are coldest and most susceptible for condensation formation

TMY Data

	Annual Hours DP<60	Percent of Total	Annual Hours DB<82	Percent of Total
Daytona, FL	3235	36.9%	7538	86.1%
Charleston, SC	4598	52.5%	7839	89.5%
Greenville, SC	5912	67.5%	8073	92.2%
Roanoke, VA	6475	73.9%	8299	94.7%
Philadelphia, PA	6720	76.7%	8317	94.9%
Detroit, MI	7475	85.3%	8557	97.7%
Minneapolis, MN	7556	86.3%	8504	97.1%
St Louis, MO	6212	70.9%	8011	91.4%
San Diego, CA	7044	80.4%	8675	99.0%
Anchorage, AK	8759	100.0%	8760	100.0%

DESIGN PARAMETERS

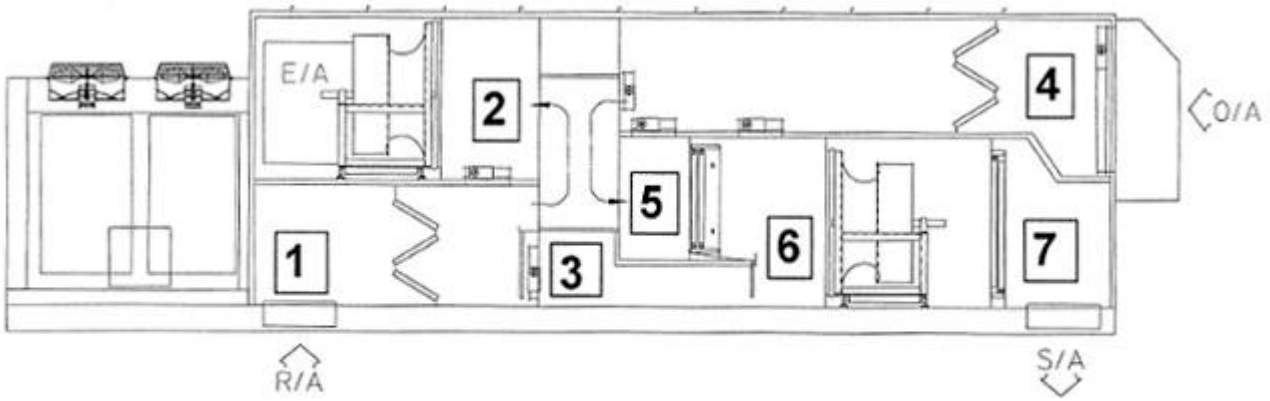
VT McComas Hall

DES CHAMPS TECHNOLOGIES

VT McComas Hall
FRESH AIR POOL UNIT

Supply SCFM:	25000	Pool Air Design Temp. (F):	86
Return SCFM:	26250	Pool Design RH:	54
Air Changes/Hr:	4.1	Outside air design DB:	-10
Pool Area #1/#2(ft^2):	4965.5/	Activity Factor:	1.54
Pool Water Temp #1/#2	84/	Pool Evaporation Rate #/Hr.:	282.7
Deck Area (ft^2):	3653	Additional Latent Load MBH:	10
Avg Ceiling Height (ft^2):	42.70	Ashrae Min. Outside Air SCFM:	4309.25
Altitude (ft)	2150		

FAP WINTER MODE

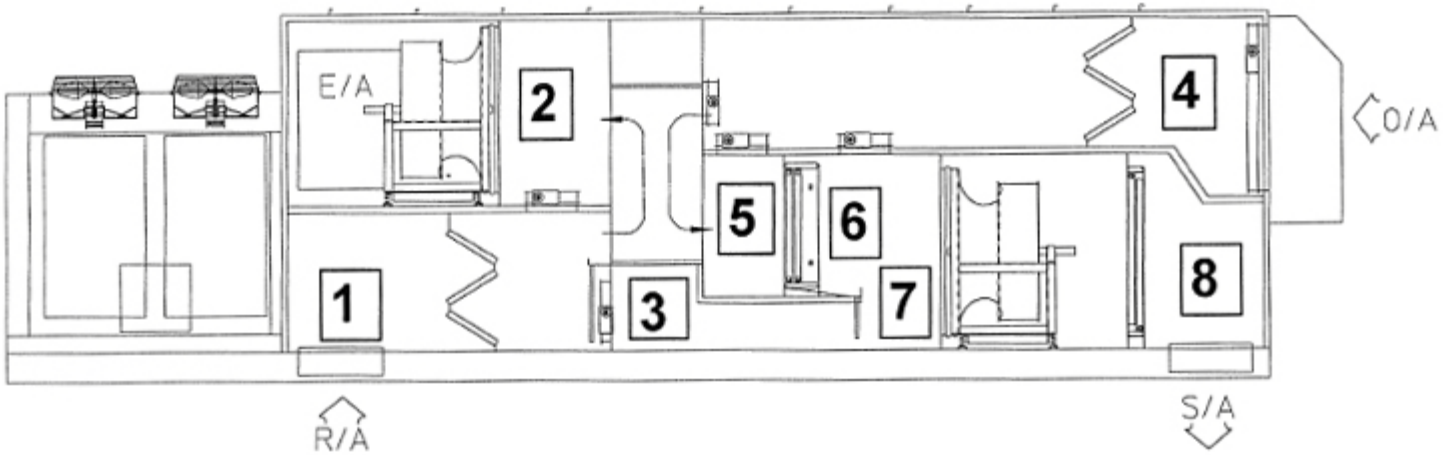


Change Over Dewpoint: 55.1DB/WB

	WINTER DESIGN DAY			WINTER CHANGE OVER		
	Temperature		Flow Rate	Temperature		Flow Rate
1. Return Air:	86/54% RH		26250	86/54% RH		26250
2. Exhaust Air:	86/54% RH		5923	86/54% RH		13750
3. Recirculated Air:	86/54% RH		20327	86/54% RH		12500
4. Outside Air:	-10/-9.99 WB		4673	55.1DB/WB		12500
5. Preheat O/A:	**65.0**	DB	4673	**74.3**	DB	12500
	40.9	WB		**62.3**	WB	
6. Mixed Air:	82/68.3 WB		25000	80.1/67.8 WB		25000
7. Supply Air:	96/72.4 WB		25000	96/72.5 WB		25000

Heater BTUH required Design Day: 377841
Heater BTUH required Change Over: 429611
Maximum space sensible heating (MBH): 271

FAP SUMMER MODE



	Temperature		Flow Rate
1. Return Air:	86/54% RH		26250
2. Exhaust Air:	86/54% RH		13750
3. Recirculated Air:	86/54% RH		12500
4. Outside Air:	91/74WB		12500
5. Precool O/A:	**87.9**	DB	12500
	73.1	WB	
6. Cooling Coil:	55.1DB/WB		12500
7. Mixed Air:	70.6/64.8WB		25000
8. Supply (w/ fan heat):	73.6/65.8WB		25000

Cooling tons required:	63.2
Maximum Space Sensible Cooling (MBH):	338

FAP Cost to Operate

OCCUPIED HOURS

TEMPERATURES			TOTAL HOURS*	OUTSIDE	DEHUMID	DEHUMID	Condenser Heat	Required	No Heat
DRY BULB	MCWB*	DP	AT CONDITION	AIR	COIL TONS	COIL COST	Available BTUH	Supply Air Temp	Supply Air Temp Deg. F
97.5	77	69.1	2	12500	71.73	$8	1,075,975	76.1	73.6
92.5	74.2	66.5	42	12500	62.69	$145	940,340	77.2	73.6
87.5	72.6	66.2	113	12500	59.48	$370	892,222	78.3	73.6
82.5	69.2	62.8	338	12500	46.82	$872	702,375	79.4	73.6
77.5	65.8	59.6	359	12500	34.14	$675	512,080	80.6	73.6
72.5	63	57.6	369	12500	24.42	$496	366,273	81.9	73.6
67.5	59.2	53.9	302	10491	0.00	$0	0	83.0	83.0
62.5	54.3	48.0	393	8008	0.00	$0	0	84.4	83.1
57.5	50.2	43.8	262	6995	0.00	$0	0	85.7	83.0
52.5	45.3	37.7	231	6070	0.00	$0	0	87.0	82.9
47.5	40.9	32.8	223	5574	0.00	$0	0	88.3	82.7
42.5	37.5	30.9	199	5414	0.00	$0	0	89.7	82.4
37.5	32.7	25.7	220	5053	0.00	$0	0	91.0	82.3
32.5	28.2	20.6	161	4803	0.00	$0	0	92.3	82.1
27.5	22.7	11.0	117	4497	0.00	$0	0	93.6	82.0
22.5	18.2	4.9	47	4375	0.00	$0	0	94.9	81.8
17.5	14.3	3.0	34	4344	0.00	$0	0	96.3	81.5
12.5	10	-0.6	16	4294	0.00	$0	0	97.6	81.2
7.5	6.3	1.0	4	4314	0.00	$0	0	98.9	80.9

Weather Bin Data, Roanoke Va.

$2,566

FAP Cost to Operate

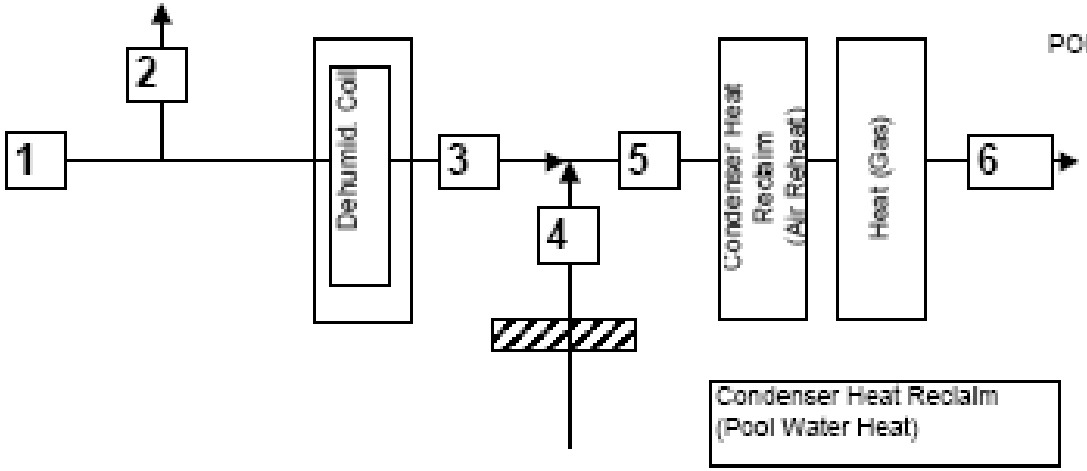
OCCUPIED HOURS

TEMPERATURES DRY BULB	MCWB*	DP	TOTAL HOURS* AT CONDITION	Cost to Heat Supply Air	Condenser Air Reheat Credit	Condenser Water Heat Credit
97.5	77	69.1	2	$1	$1	$4.08
92.5	74.2	66.5	42	$43	$43	$85.66
87.5	72.6	66.2	113	$152	$152	$230.47
82.5	69.2	62.8	338	$559	$559	$689.38
77.5	65.8	59.6	359	$719	$719	$732.21
72.5	63	57.6	369	$871	$871	$545.95
67.5	59.2	53.9	302	$0	$0	$0.00
62.5	54.3	48.0	393	$138	$0	$0.00
57.5	50.2	43.8	262	$203	$0	$0.00
52.5	45.3	37.7	231	$270	$0	$0.00
47.5	40.9	32.8	223	$355	$0	$0.00
42.5	37.5	30.9	199	$410	$0	$0.00
37.5	32.7	25.7	220	$545	$0	$0.00
32.5	28.2	20.6	161	$467	$0	$0.00
27.5	22.7	11.0	117	$387	$0	$0.00
22.5	18.2	4.9	47	$176	$0	$0.00
17.5	14.3	3.0	34	$143	$0	$0.00
12.5	10	-0.6	16	$75	$0	$0.00
7.5	6.3	1.0	4	$21	$0	$0.00
				$5,533	**$2,346**	**$2,288**

Weather Bin Data, Roanoke Va.

Dehum Coil Costs	**$2,566**
Heating Costs	**$5,533**
Cond. Air Credit	**$2,346**
Cond. Water Credit	**$2,288**
TOTAL	**$3,465**

Conventional Dehumidifier



POINT DEFINITION

#1 POOL RETURN AIR
#2 POOL EXHAUST AIR
#3 DEHUM COIL LAT
#4 OUTSIDE AIR
#5 REHEAT COIL EAT
#6 REHEAT COL LAT (SUPPLY AIR)

MECH Cost to Operate

OCCUPIED HOURS

TEMPERATURES DRY BULB	MCWB*	DP	TOTAL HOURS* AT CONDITION	OUTSIDE AIR	DEHUMID COIL LAT / TONS	DEHUMID COIL COST	Condenser Heat Available BTUH	Required Supply Air Temp	No Heat Supply Air Temp Deg. F
97.5	77	69.1	2	4309	60.8 / 73.5	$8	1,103,279	76.1	70.2
92.5	74.2	66.5	42	4309	61.4 / 70	$162	1,050,474	77.2	66.8
87.5	72.6	66.2	113	4309	61.5 / 69.5	$433	1,043,104	78.3	66.1
82.5	69.2	62.8	338	4309	62.3 / 65.3	$1,217	980,291	79.4	65.8
77.5	65.8	59.6	359	4309	62.9 / 61.7	$1,222	926,585	80.6	65.5
72.5	63	57.6	369	4309	63.3 / 59.7	$1,214	896,043	81.9	64.9
67.5	59.2	53.9	302	4309	63.9 / 56.3	$937	844,601	83.0	64.6
62.5	54.3	48.0	393	4309	64.7 / 51.7	$1,121	776,700	84.4	64.3
57.5	50.2	43.8	262	4309	65.1 / 49	$707	735,216	85.7	63.9
52.5	45.3	37.7	231	4309	65.7 / 45.6	$581	685,218	87.0	63.5
47.5	40.9	32.8	223	4309	66.1 / 43.4	$534	651,840	88.3	62.9
42.5	37.5	30.9	199	4309	66.2 / 42.6	$468	640,046	89.7	62.2
37.5	32.7	25.7	220	4309	66.5 / 40.6	$493	609,954	91.0	61.6
32.5	28.2	20.6	161	4309	66.8 / 39.1	$347	587,009	92.3	60.9
27.5	22.7	11.0	117	4309	67.1 / 36.9	$238	553,739	93.6	60.4
22.5	18.2	4.9	47	4309	67.3 / 36.1	$93	541,658	94.9	59.6
17.5	14.3	3.0	34	4309	67.3 / 35.8	$67	537,934	96.3	58.8
12.5	12	10.5	16	4309	67.1 / 36.9	$33	553,739	97.6	57.8
7.5	6.3	1.0	4	4309	67.4 / 35.6	$8	534,206	98.9	57.1
					TOTALS	**$9,882**			

Weather Bin Data, Roanoke Va.

MECH Cost to Operate

OCCUPIED HOURS

TEMPERATURES			TOTAL HOURS*	Cost to Heat	Condenser Air	Condenser Water
DRY BULB	MCWB*	DP	AT CONDITION	Supply Air	Reheat Credit	Heat Credit
97.5	77	69.1	2	$3	$3	$6.16
92.5	74.2	66.5	42	$123	$123	$129.34
87.5	72.6	66.2	113	$392	$392	$347.98
82.5	69.2	62.8	338	$1,302	$1,302	$1,040.87
77.5	65.8	59.6	359	$1,542	$1,542	$1,105.54
72.5	63	57.6	369	$1,777	$1,777	$1,136.34
67.5	59.2	53.9	302	$1,588	$1,588	$930.01
62.5	54.3	48.0	393	$2,239	$2,239	$962.44
57.5	50.2	43.8	262	$1,626	$1,626	$393.93
52.5	45.3	37.7	231	$1,547	$1,547	$113.21
47.5	40.9	32.8	223	$1,612	$1,524	$0.00
42.5	37.5	30.9	199	$1,556	$1,336	$0.00
37.5	32.7	25.7	220	$1,840	$1,407	$0.00
32.5	28.2	20.6	161	$1,437	$991	$0.00
27.5	22.7	11.0	117	$1,107	$679	$0.00
22.5	18.2	4.9	47	$472	$267	$0.00
17.5	14.3	3.0	34	$363	$192	$0.00
12.5	10	-0.6	16	$181	$93	$0.00
7.5	6.3	1.0	4	$48	$22	$0.00
				$20,757	**$18,653**	**$6,166**

Weather Bin Data, Roanoke Va.

Dehum Coil Costs **$9,882**

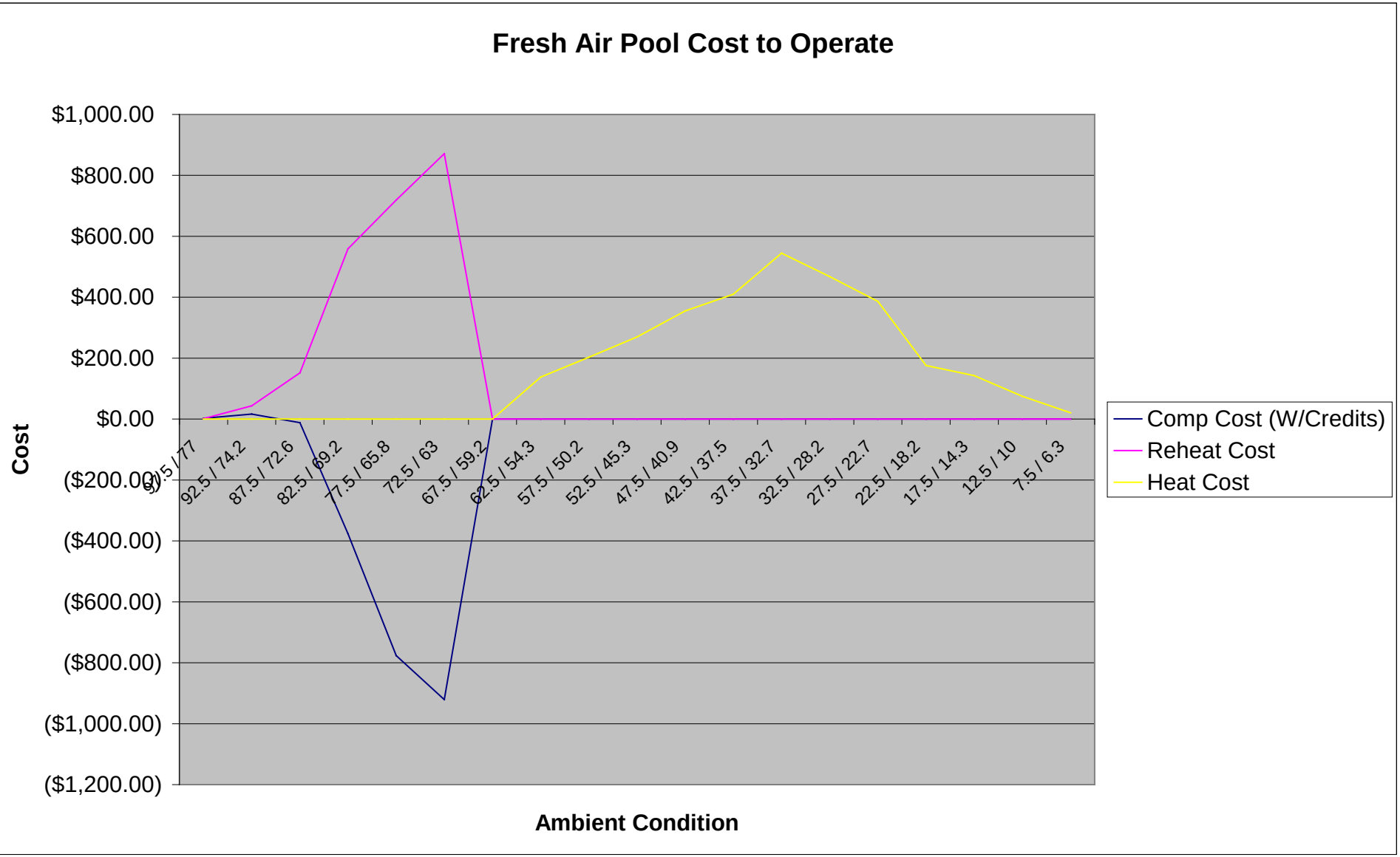
Heating Costs **$20,757**

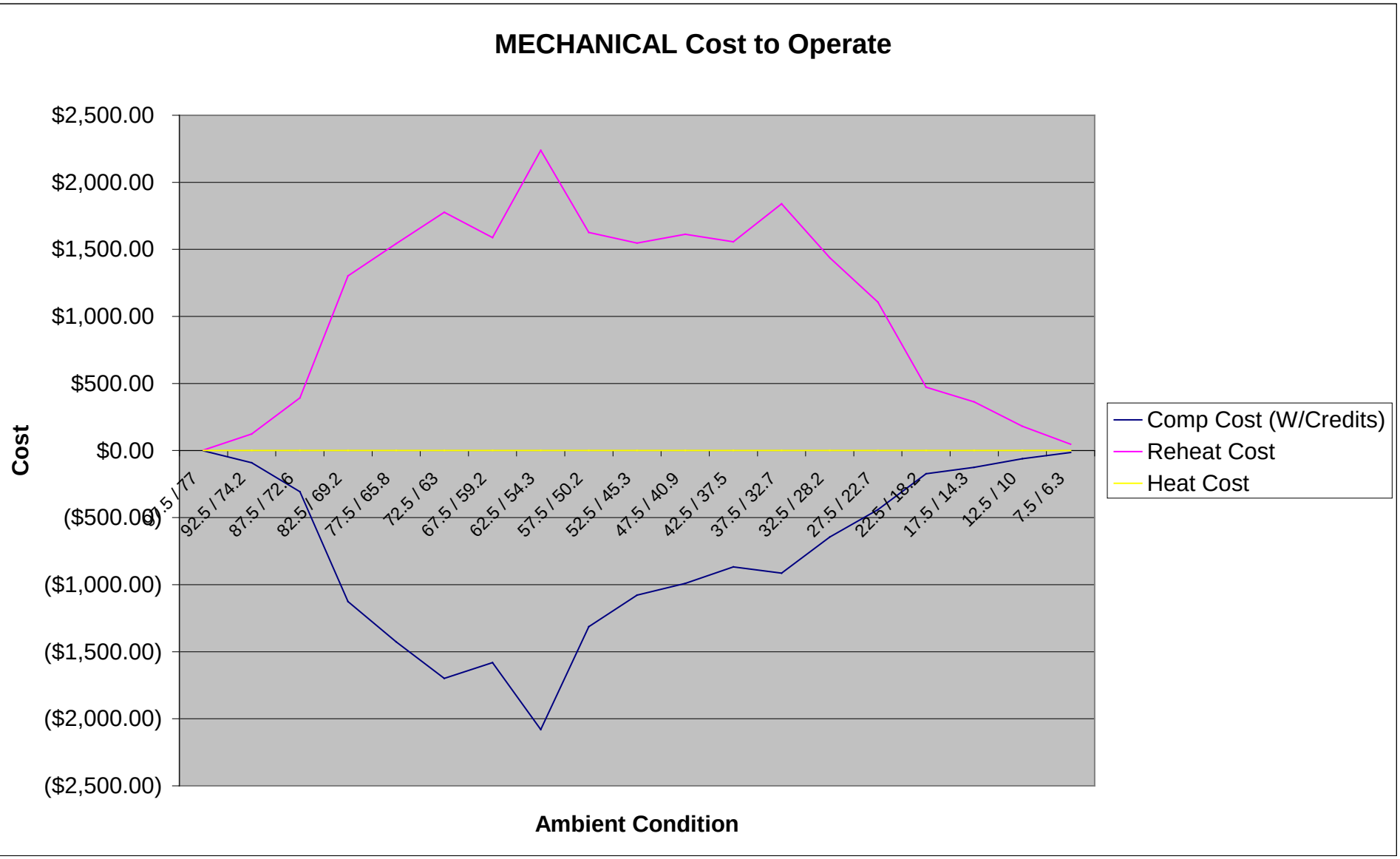
Cond. Air Credit **$18,653**

Cond. Water Credit **$6,166**

TOTAL $5,820

68% MORE


Fresh Air Pool Cost to Operate
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
($600.00)
($800.00)
($1,000.00)
($1,200.00)
Cost
97.5 / 77
92.5 / 74.2
87.5 / 72.6
82.5 / 69.2
77.5 / 65.8
72.5 / 63
67.5 / 59.2
62.5 / 54.3
57.5 / 50.2
52.5 / 45.3
47.5 / 40.9
42.5 / 37.5
37.5 / 32.7
32.5 / 28.2
27.5 / 22.7
22.5 / 18.2
17.5 / 14.3
12.5 / 10
7.5 / 6.3
Ambient Condition
Comp Cost (W/Credits)
Reheat Cost
Heat Cost


MECHANICAL Cost to Operate
$2,500.00
$2,000.00
$1,500.00
$1,000.00
$500.00
$0.00
($500.00)
($1,000.00)
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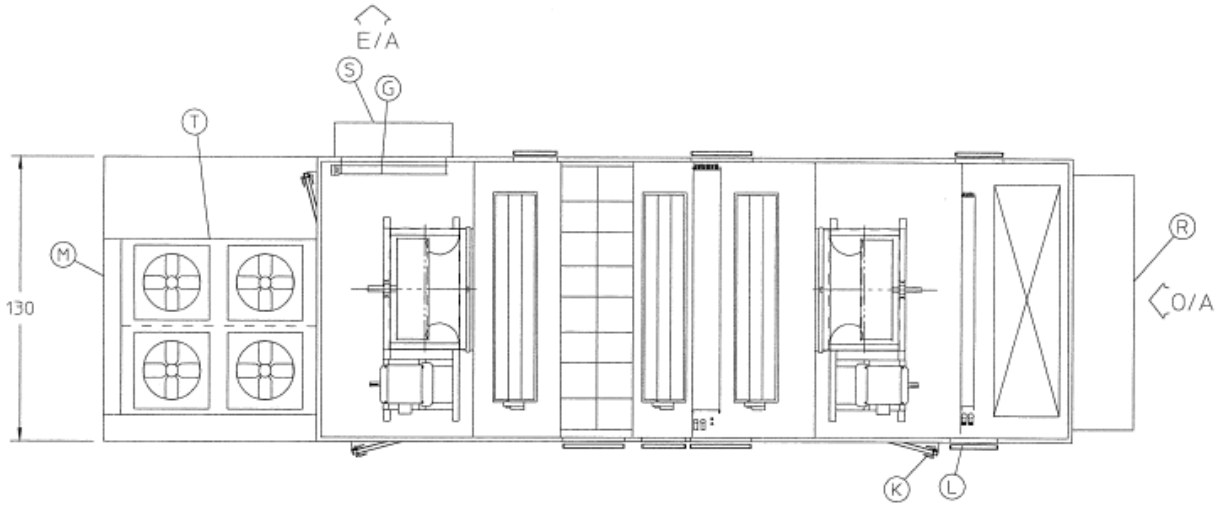
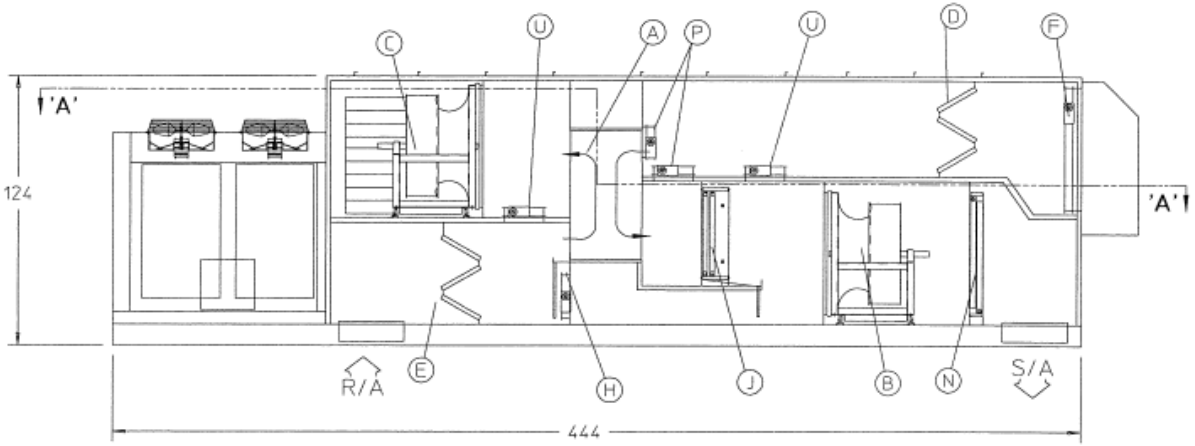
($2,000.00)
($2,500.00)
Cost
97.5 / 77
92.5 / 74.2
87.5 / 72.6
82.5 / 69.2
77.5 / 65.8
72.5 / 63
67.5 / 59.2
62.5 / 54.3
57.5 / 50.2
52.5 / 45.3
47.5 / 40.9
42.5 / 37.5
37.5 / 32.7
32.5 / 28.2
27.5 / 22.7
22.5 / 18.2
17.5 / 14.3
12.5 / 10
7.5 / 6.3
Ambient Condition
Comp Cost (W/Credits)
Reheat Cost
Heat Cost

VT McComas Hall, 25,000 CFM



PLAN VIEW

SECTION 'A-A'

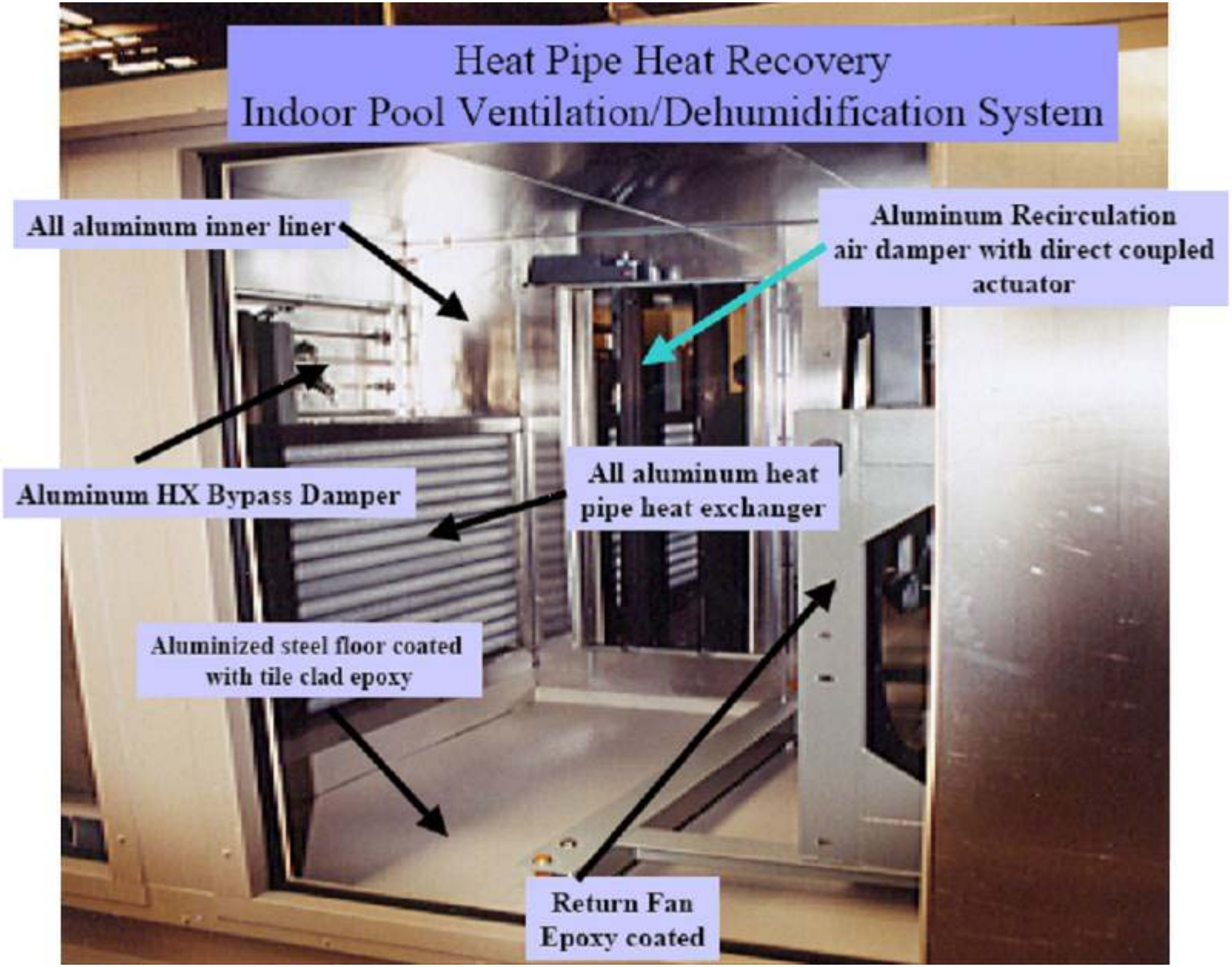


ELEVATION VIEW

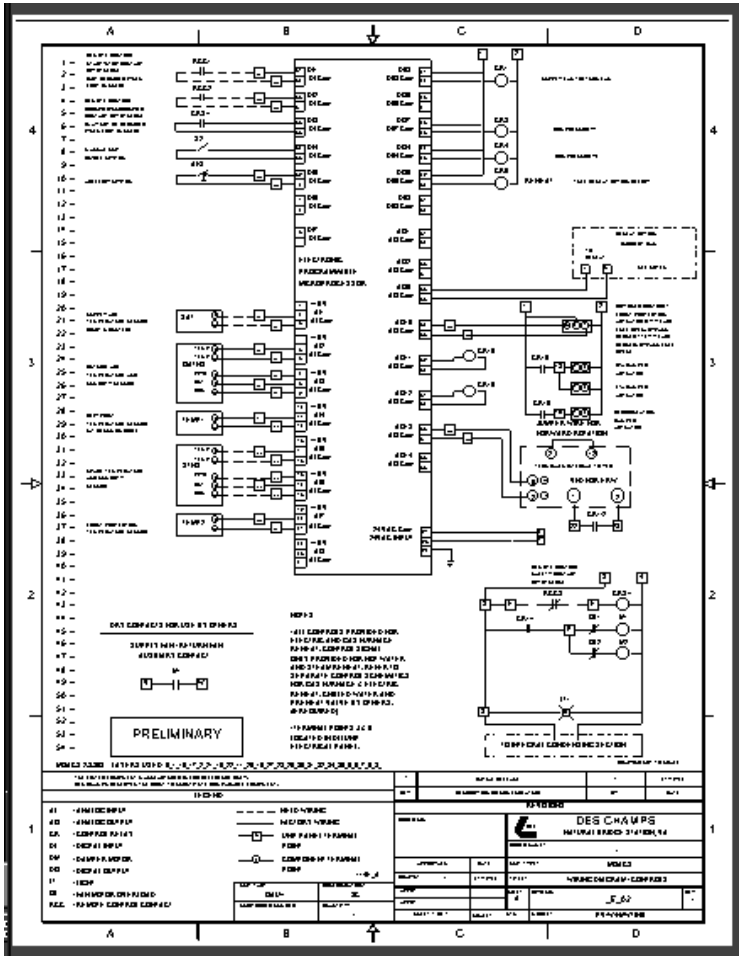
WALL REMOVED

Pool Unit Construction

- Structural Steel Base Frame
- All Welded Floor, Phenolic Coated
- Double Wall Construction, Aluminum Interior
- Fully welded Drain Pans, Rubberized Coating
- All aluminum Dampers
- Epoxy Coated Fan Assemblies
- Baked Phenolic Coated Coils


Heat Pipe Heat Recovery
Indoor Pool Ventilation/Dehumidification System
All aluminum inner liner
Aluminum Recirculation air damper with direct coupled actuator
Aluminum HX Bypass Damper
All aluminum heat pipe heat exchanger
Aluminized steel floor coated with tile clad epoxy
Return Fan Epoxy coated

CONTROLS



Refrigeration Capabilities

- Air Cooled – No Hot Gas Bypass
- Water Cooled
- Water Cooled heat pump
- R-22 /
  R-407C /
  R-410A

Key Advantages

- Increased fresh air (12500 CFM) – Lower compressor run time (off 75% of the time)
- Higher capacity when cold out (most important during cold outside conditions)
- Better construction – Lower corrosion issues
- Compressors isolated from pool air
- More reliable with lower cost to operate
- Mfg. and service close

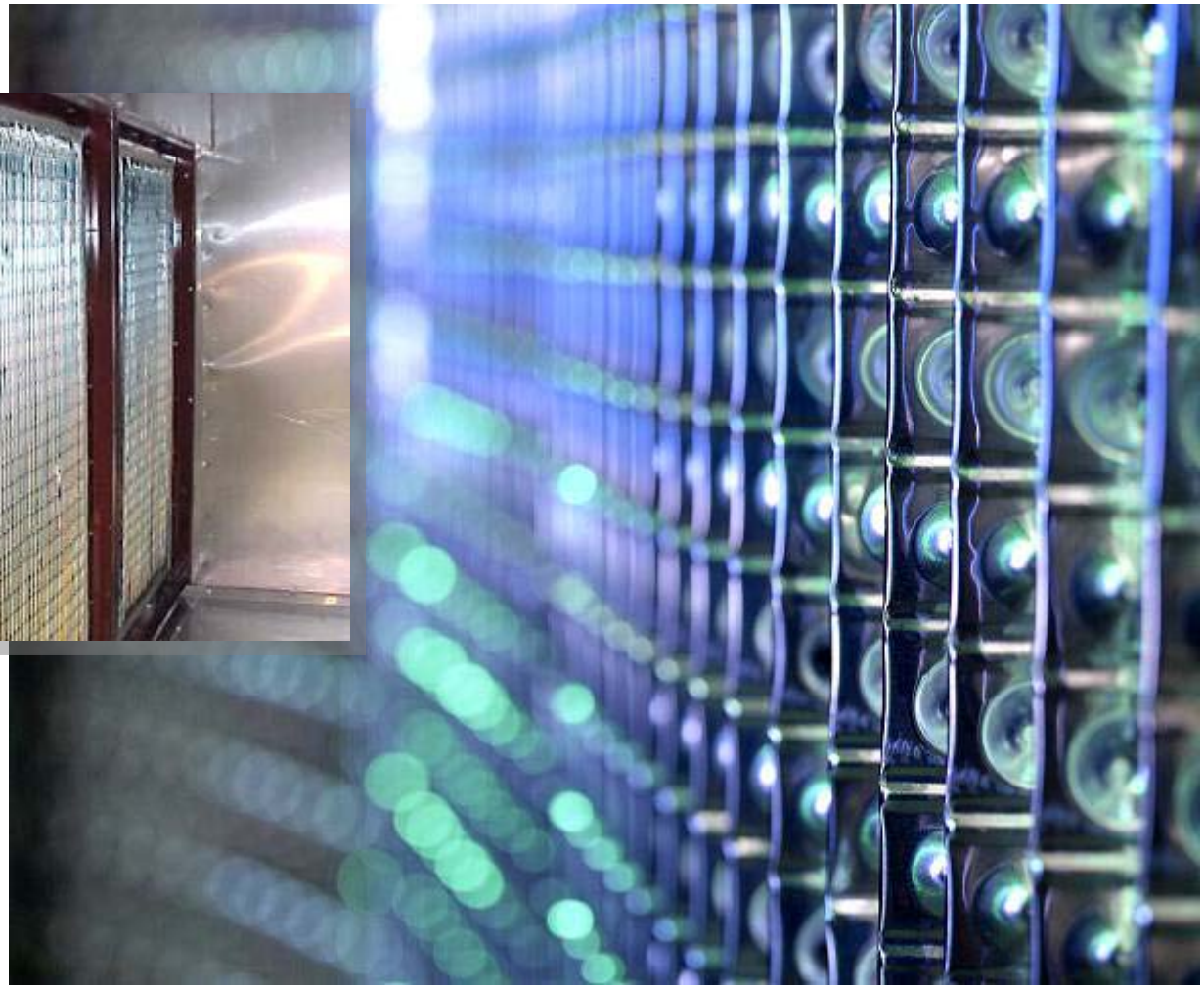

DES CHAMPS


50,000 CFM FRESH AIR HEAT RECOVERY
POOL DEHUMIDIFIER FOR SEVEN CLANS
CASINO AND WATER RESORT

Epoxy Coated Fan Assemblies

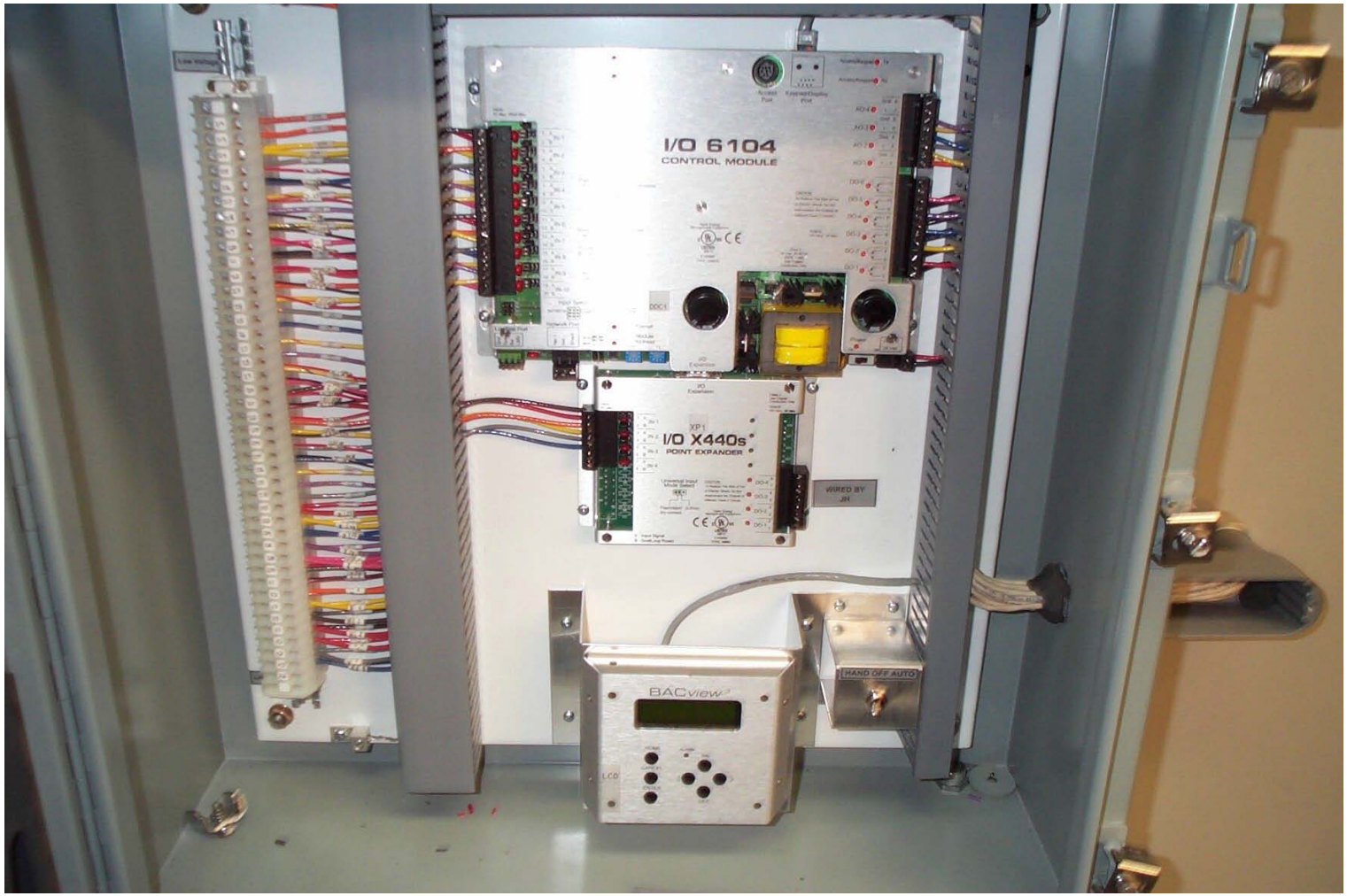
Coated Coils

Aluminum Heat Exchanger



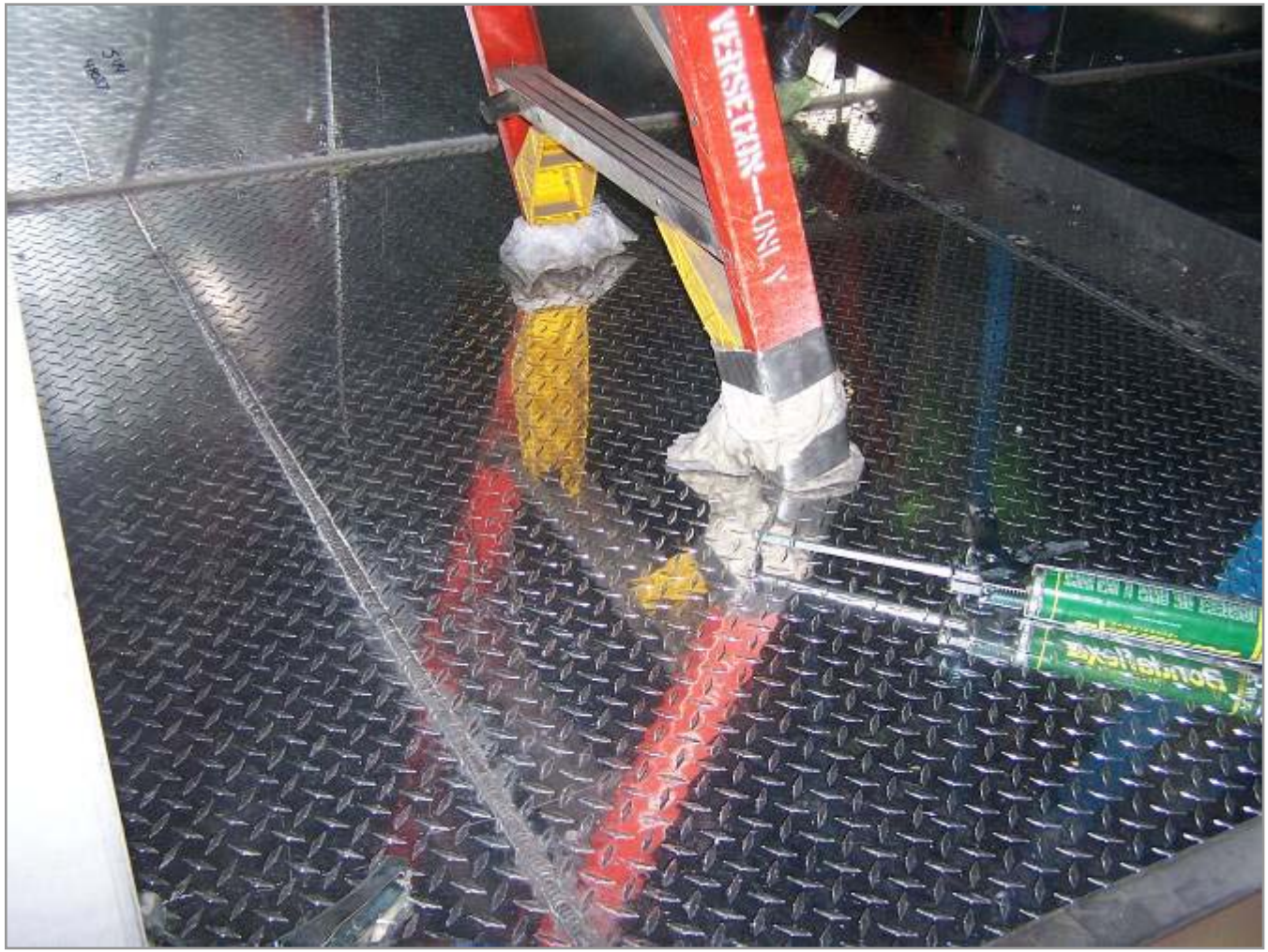
All Aluminum Dampers

Wiring Methods



Base Frame

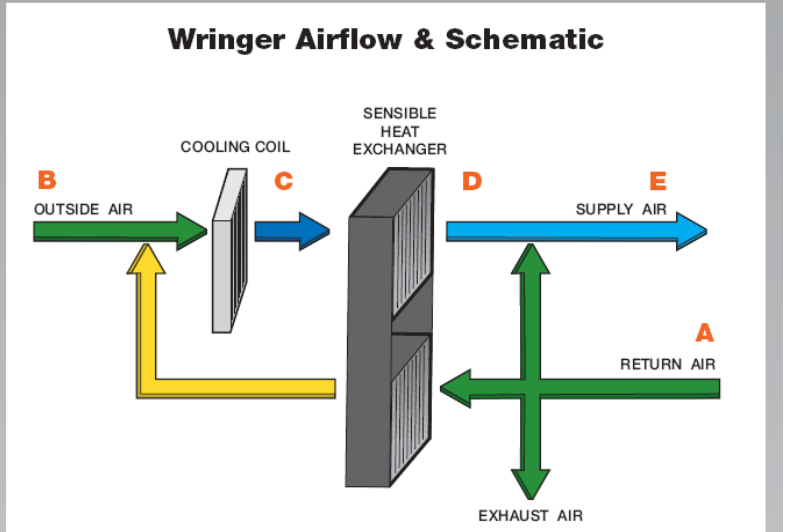
Aluminum Tread Plate Floor



Coated Floor

Wringer Pool

- Wringer and Wringer Plus configurations for pools
- Able to integrate building exhaust
- Larger Sizes, over 200 lbs/hr
- Humid markets
- Custom options, pool hot water heating, controls



State		Summer			Winter		
Point		CFM	°F	Grains	CFM	°F	Grains
A	Return	10,000	84	104	10,000	84	77
B	Post Cooling Coil	9,000	93	65	2,000	-13	2
C	Post Desiccant Wheel	9,000	89	65	2,000	55	4
D	Outside Air	9,000	70	65	2,000	55	4
E	Supply Air	9,000	70	65	9,000	105	61

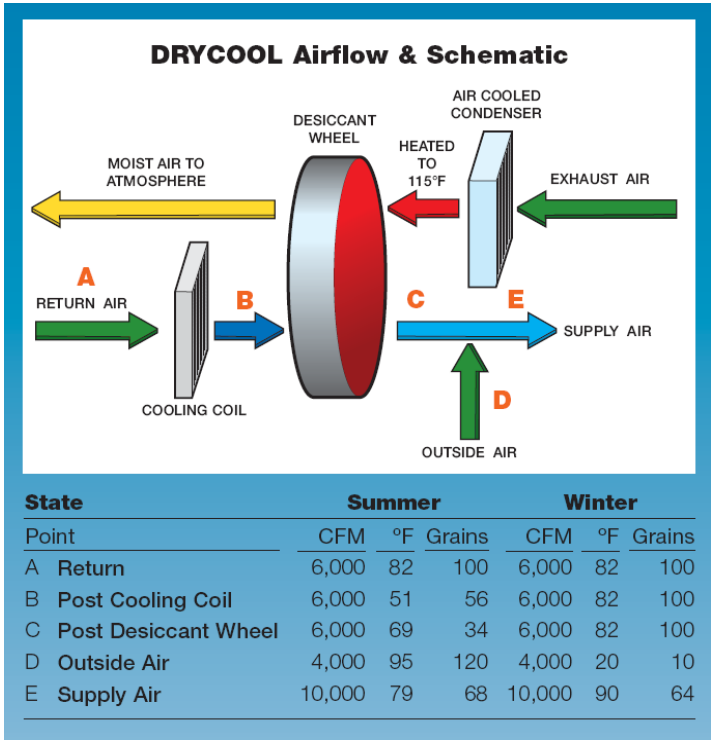
DryCool

- New Product, extends DryCool Systems
- Meant for small – midsize pools
- Standard Configurations
- Capacity Range 70 – 300 lbs/hr
- Price Range, base unit $ 25 – $ 65 K

DryCool Pool Capacity

Unit	Maximum CFM			Minimum Exhaust	Maximum Exhaust	Tons	Dehumid lbs/hr
	OA	Return	Total				
HCU-V 1005	1,000	1,200	2,200	250	1,200	5	40 lbs/hr
HCUc-2410	1,350	2,400	3,750	500	1,500	10	70 lbs/hr
HCUc-3412	2,250	3,400	5,650	833	2,500	12	90 lbs/hr
HCUc-3415	2,700	3,400	6,100	1,000	3,000	15	105 lbs/hr
HCUc-4015	2,700	4,000	6,700	1,000	3,000	15	115 lbs/hr
HCUc-4020	2,700	4,000	7,600	1,333	4,000	20	145 lbs/hr
HCUc-6020	3,600	6,000	9,600	1,333	4,000	20	160 lbs/hr
HCUc-6030	5,400	6,000	11,400	2,000	6,000	30	225 lbs/hr
HCUc-8030	5,400	8,000	13,400	2,000	6,000	30	240 lbs/hr
HCUc-8040	7,200	8,000	15,200	2,667	8,000	40	315 lbs/hr

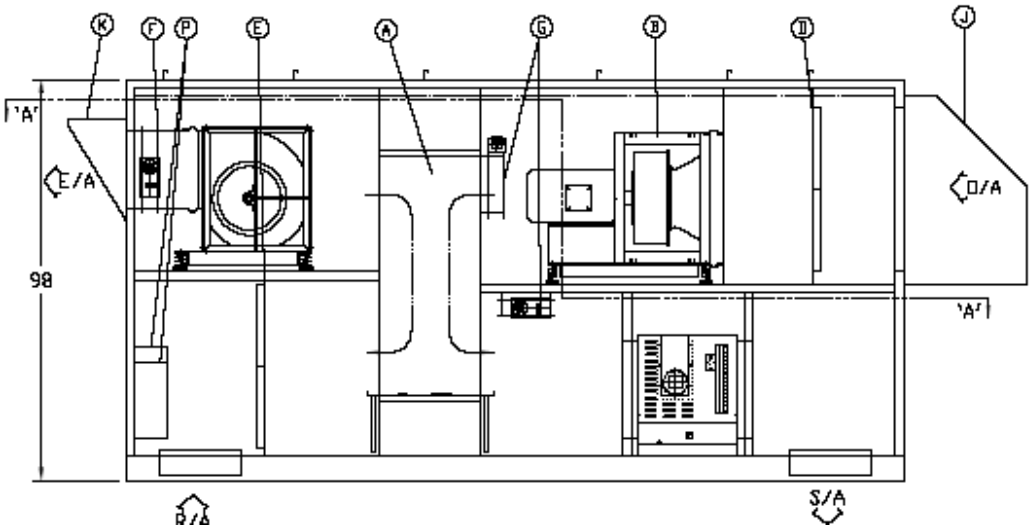
Capacity based on 82F 60% RH space condition

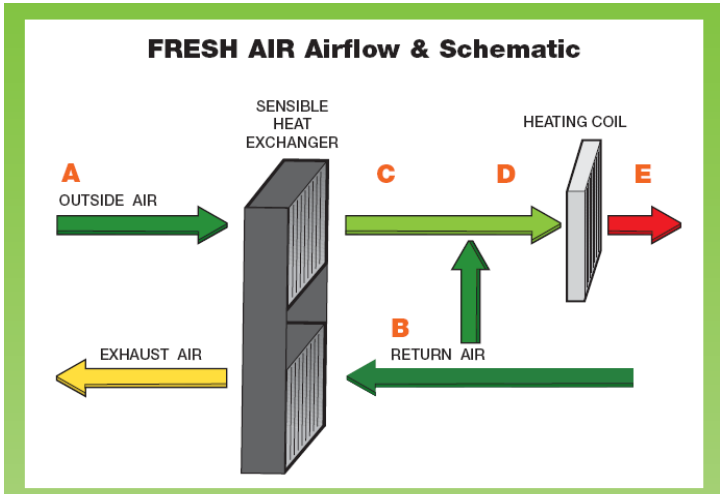


State	Summer			Winter		
Point	CFM	°F	Grains	CFM	°F	Grains
A Return	6,000	82	100	6,000	82	100
B Post Cooling Coil	6,000	51	56	6,000	82	100
C Post Desiccant Wheel	6,000	69	34	6,000	82	100
D Outside Air	4,000	95	120	4,000	20	10
E Supply Air	10,000	79	68	10,000	90	64

Fresh Air Pool

- Plate Heat Exchanger, with / without refrigeration
- Western Markets





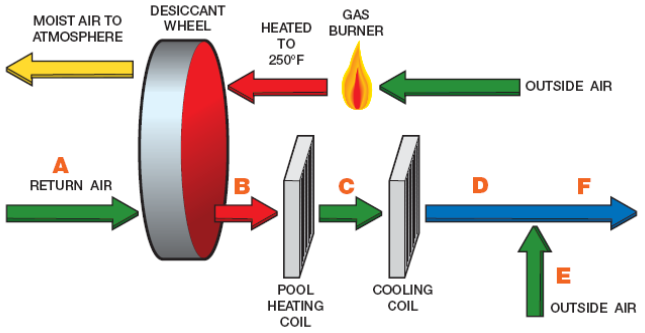
State		Summer			Winter		
Point		CFM	°F	Grains	CFM	°F	Grains
A	Return	10,500	84	104	10,500	84	77
B	Post Cooling Coil	2,000	95	118	2,000	0	4
C	Post Desiccant Wheel	7,000	61	80	2,000	0	4
D	Outside Air	7,000	68	80	2,000	71	4
E	Supply Air	10,000	76	80	10,000	98	55

Gas Fired Desiccants - Pools

Dryden Arena & Recreation Complex Swim Center

"The new dehumidification system is working awesomely. It takes the moist, damp air out of the natatorium, dries it, pre-heats it, and mixes it with pre-heated fresh air from outside."

DDS Airflow & Schematic



State		Summer			Winter		
Point		CFM	°F	Grains	CFM	°F	Grains
A	Return	10,000	80	100	10,000	82	100
B	Post Desiccant Wheel	10,000	119	54	10,000	82	100
C	Post Heating Coil	10,000	119	54	10,000	125	100
D	Post Cooling Coil	10,000	65	54	10,000	125	100
E	Outside Air	5,000	95	120	5,000	20	10
F	Supply Air	15,000	75	76	15,000	90	70

Selecting the Right System

1 *Where is the building located and what is the local climate?*

Hot and Humid: Southeast U.S.
Humid, but with cold winter climate: Northeast U.S.
Hot and Dry: Southwest U.S.
Dry, but with cold winter climate: Northwest U.S.

2 *What are the priorities of the system required?*

1. **Reliability**
2. **First Cost**
3. **Operating Cost**
4. **Increased Ventilation during most of the year**

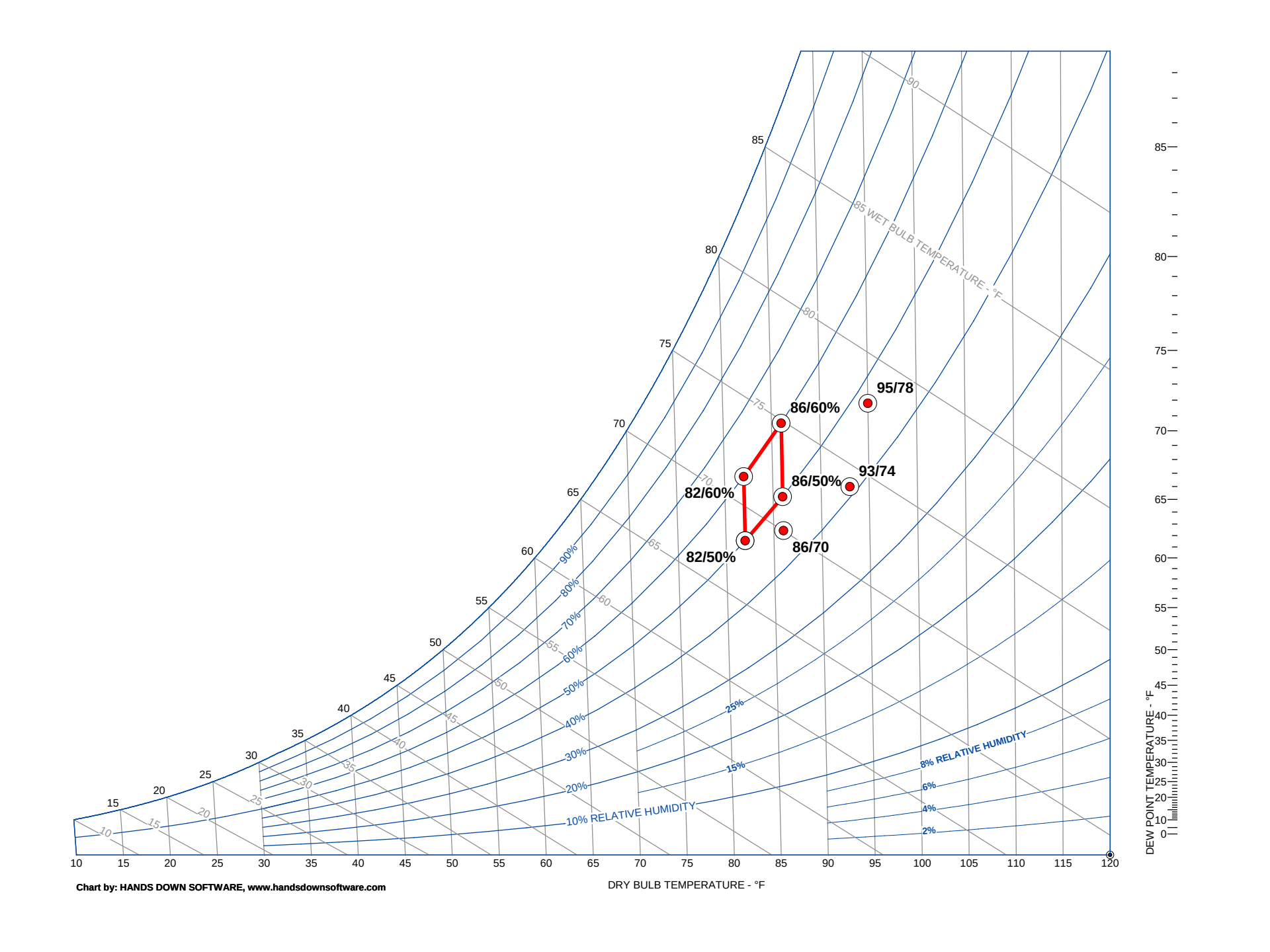
3 *What is the system size requirement?*

Small - **< 150 lbs/hr**
Medium - **> 150 lbs/hr, < 300 lbs/hr**
Large - **> 300 lbs/hr**

System Types and Features

	Wringer Pool	DryCool Pool	Ventilation Pool	Pool Desiccant
Climate	Southeast, Northeast, Southwest, Northwest	Southeast, Northeast	Southwest, Northwest	Southeast, Northeast
Priority	Reduced compressor runtime for enhanced reliability, Low operating cost, Increased ventilation	Low first cost	Eliminated compressor runtime for enhanced reliability, Low operating cost, Increased ventilation	Reduced compressor runtime for enhanced reliability
System Size	Small, Medium, Large	Small, Medium	Small, Medium, Large	Medium, Large

The system features listed do not outline the extent of the product line availability, rather they outline the features of the systems in competitive environments.See the specific system description on the following pages to see the available capacities of each product.


95/78
86/60%
93/74
86/50%
82/60%
86/70
82/50%
85 WET BULB TEMPERATURE - °F
90%
80%
70%
60%
50%
40%
30%
25%
20%
15%
10% RELATIVE HUMIDITY
8% RELATIVE HUMIDITY
6%
4%
2%
DRY BULB TEMPERATURE - °F
DEW POINT TEMPERATURE - °F
Chart by: HANDS DOWN SOFTWARE, www.handsdownsoftware.com

Consider…

- Introduction of fresh air, in a controlled manner, will positively control indoor pool humidity when it is most critical…WHEN IT IS COLD OUT, and building structures are coldest and most susceptible for condensation formation.

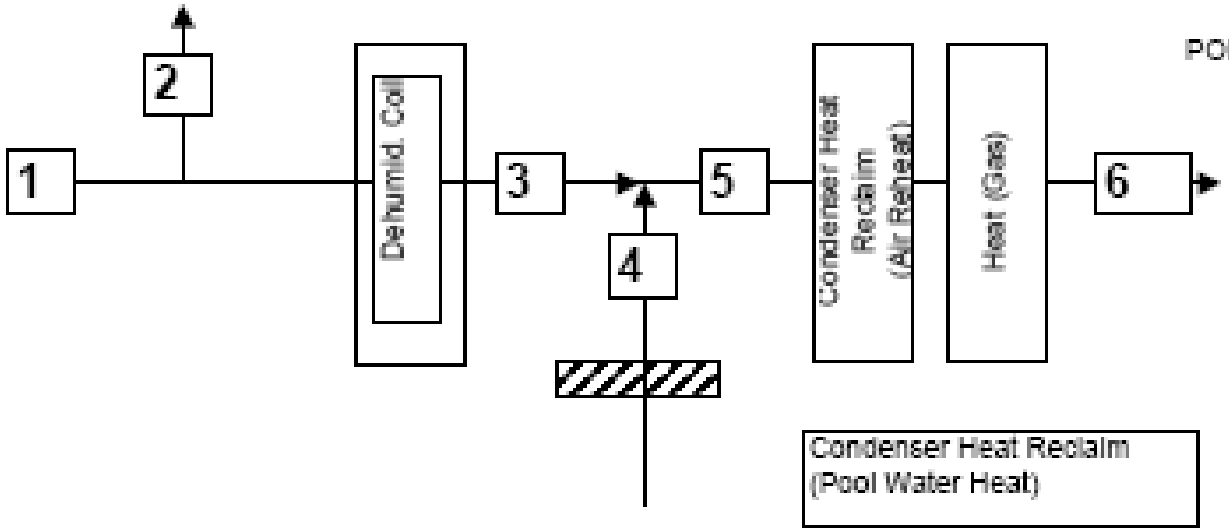
TMY Data

	Annual Hours DP<60	Percent of Total	Annual Hours DB<82	Percent of Total
Daytona, FL	3235	36.9%	7538	86.1%
Charleston, SC	4598	52.5%	7839	89.5%
Greenville, SC	5912	67.5%	8073	92.2%
Roanoke, VA	6475	73.9%	8299	94.7%
Philadelphia, PA	6720	76.7%	8317	94.9%
Detroit, MI	7475	85.3%	8557	97.7%
Minneapolis, MN	7556	86.3%	8504	97.1%
St Louis, MO	6212	70.9%	8011	91.4%
San Diego, CA	7044	80.4%	8675	99.0%
Anchorage, AK	8759	100.0%	8760	100.0%

Design Parameters – USA POOL

DES CHAMPS TECHNOLOGIES	USA Pool FRESH AIR POOL UNIT				Sheet 1 of 2
Supply SCFM:	36000	Pool Air Design Temp. (F):	84		
Return SCFM:	37800	Pool Design RH:	55		
Air Changes/Hr:	6.1	Outside air design DB:	12 W	92/73 S	
Pool Area #1/#2(ft^2):	6016/	Activity Factor:	1.5		
Pool Water Temp #1/#2	82/	Pool Evaporation Rate #/Hr.:	304.6		
Deck Area (ft^2):	5884.2	Additional Latent Load MBH:	0		
Avg Ceiling Height (ft^2):	30	Ashrae Min. Outside Air SCFM:	5950.1		

Conventional Dehumidifier



POINT DEFINITION

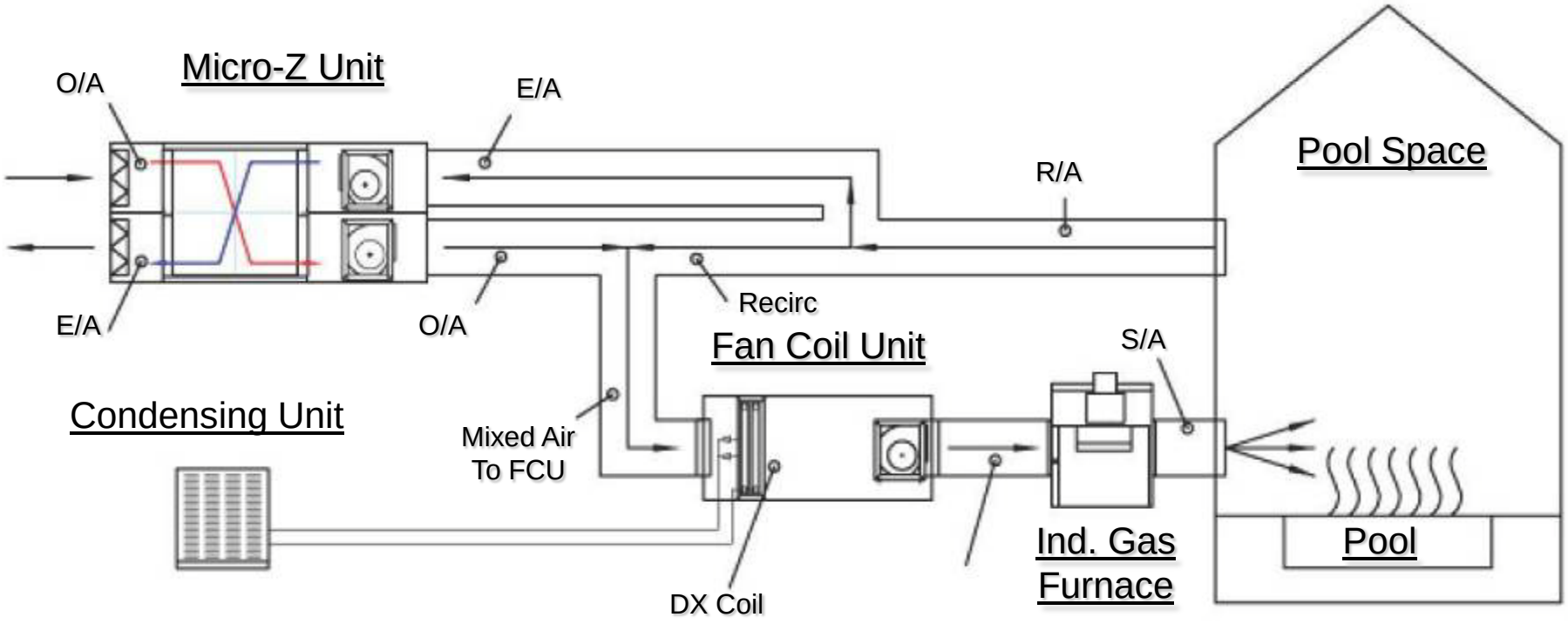
#1 POOL RETURN AIR
#2 POOL EXHAUST AIR
#3 DEHUM COIL LAT
#4 OUTSIDE AIR
#5 REHEAT COIL EAT
#6 REHEAT COL LAT (SUPPLY AIR)

Summary of Operating Costs

	Conventional Pool Dehumidifier	Des Champs FAP Dehumidifier
Dehumidification Coil Costs	$51,095	$12,234
Air Heat Costs	$68,903	$20,376
Air Heat Credit (Condenser Heat Reclaim)	$60,873	N/A
Water Heat Credit (Condenser Heat Reclair	$15,002	N/A
TOTAL COSTS	$44,123	$32,610
Savings		$11,513

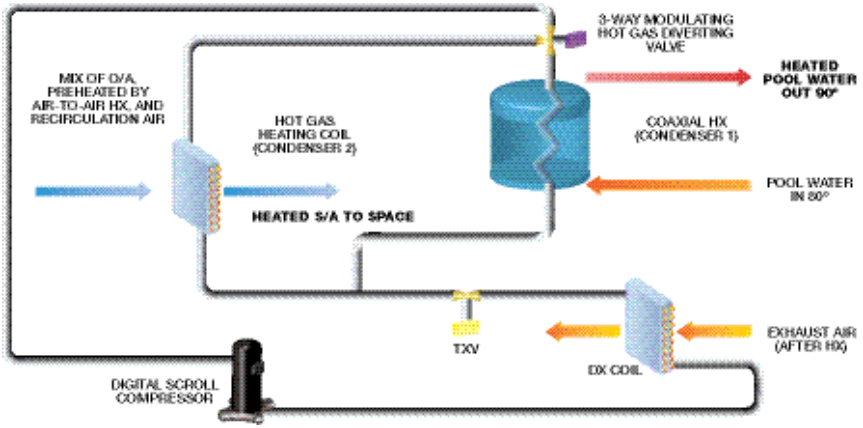
Fresh Air Pool Retrofit

- Hampton Inn Pool
  - 700 L/s OA; 2 speed; VFD
  - 1,900 L/s SA; Hybrid System



Fresh Air Case Study

- Marshall Pool (Vancouver)
  - Reduced Energy Costs
  - Winter Heat Recovery
  - Improved Occupant Comfort
  - Structural Integrity Protected
  - Reduced Maintenance Cost



Annual Total Costs (Air-to-Air HX only)	
Air Heating ($)	5,559
Pool Water Heating ($)	22,242.56
Fan Energy ($)	5,847.31
Total ($)	33,826.30

Annual Total costs (Air-to-Air HX +Heat Pump)	
Air Heating ($)	2,003.80
Pool Water Heating ($)	7,592.82
Fan Energy ($)	5,931.48
Total ($)	15,705.54
Savings ($)	**18,120.76**

Totals reflect miscellaneous power consumption, pumps, controls, etc.

Indoor Pools/Natatoriums

- Estimated 250,000 commercial indoor pools in continental U.S.
- Value is between $2 and $2.5 billion
- **70% of market is hotel/motel/apartment/condo** (HMAC)
  - Tend to be smaller pools – market similar to residential
- **30% of market is institutional** (university and similar)
  - Tend to be larger pools – typically would have a construction/bid specification
- **It is estimated that 50% of recreational indoor pool facilities in North America are not delivering IAQ that is considered healthy**

Indoor Pools/Natatoriums

- Physical fitness facilities are expected to continue to grow, even during recession ~4% growth is expected in 2009
- Almost 50,000 facilities are in operation
- Newest opportunity is indoor aquatic parks
- New/planned aquatic facilities are feeling impact of economic crisis
  - 132 open in U.S. and Canada – number of new projects expected to decline in 2009
  - Projected opening of 13 indoor waterparks and 5 expansions of existing parks
  - Approximately 300 proposals for new indoor waterpark resorts or indoor waterpark additions to existing properties
- Regulations/standards are in the process of being defined for indoor aquatic facilities