Psychrometric Analysis Professional Edition

User Manual

Version Released Aug-2011

MIX

ROOM





PROGRAM FEATURES

NEW VERSION 7 FEATURES!

OTHER PROFESSIONAL EDITION FEATURES

VERSION AND RELEASE HISTORY

VERSION 7 – RELEASE DATE AND FEATURE SUMMARY

VERSION 6 – RELEASE DATE AND FEATURE SUMMARY VERSION 5 – RELEASE DATE AND FEATURE SUMMARY VERSION 4 – RELEASE DATE AND FEATURE SUMMARY

PROGRAM SUPPORT

TECHNICAL SUPPORT CONTACT US REGISTRATION (REQUIRED FOR VERSION 6 AND HIGHER)

MENU & TOOLBARS

MENU & TOOLBARS CUSTOM USER-DEFINED MENU TOOLBAR CONTROL

PRESENTATION SETTINGS

IP OR SI UNIT CONTROL CHART AND REPORT LANGUAGE CONTROL PAGE SETUP CONTROL CHART AXIS RANGE CONTROL CUSTOM ALTITUDE AND/OR PRESSURE CONTROL CHART LINE ON/OFF CONTROL HUMIDITY RATIO UNIT OF MEASURE CONTROL PROCESS LINE AND STATE POINT COLOR & SIZE CONTROL SUMMER & WINTER COMFORT ZONE CONTROL PAPER AND CHART AREA COLOR CONTROL DATA PROCESSING ENVIRONMENT AREA DISPLAY CONTROL COLOR OR B&W CHART CONTROL MOUSE POINTER CONTROL

PSYCHROMETRIC ANALYSIS

STATE POINTS & PROCESS ANALYSIS CONSTANT LINE CONTROL WEATHER DATA PRESENTATION CONTROL COIL LEAVING AIR CALCULATOR AIR COLLECTION CALCULATOR SENSIBLE HEAT RATIO LINE PLOTTING DELTA-h/DELTA-W LINE PLOTTING

NOTE CONTROLS

CHART NOTES PROJECT INFORMATION NOTE USER INFORMATION NOTE NOTE ON/OFF CONTROL

VIEW CONTROLS

ZOOMING AND PANNING

ZOOM WINDOW

REPORTS

PRINT ALL PRINT CHART PRINT REPORT PRINT FLOWCHART

DATA EXCHANGE

EXPORTING / COPYING CHART EXPORTING / COPYING REPORT EXPORTING / CREATING CHART PDF EPORTING / CREATING REPORT PDF EXPORT / COPYING FLOW CHART EXPORTING / COPYING REPORT DATA IMPORTING DATA

TOOLBOX PROGRAMS

CLIMATIC DATA PSYCHROMETRIC CALCULATOR OUTSIDE AIR ESTIMATOR STEAM PROPERTY CALCULATOR MOTOR HEAT CALCULATOR UNIT OF MEASURE CONVERSION CALCULATOR DUCT DESIGNER CALCULATOR FAN LAW CALCULATOR WIND CHILL CALCULATOR THERMAL COMFORT CALCULATOR SINGLE & DOUBLE INTERPOLATION – EXTRAPOLATION CALCULATOR FINANCIAL LOAN CALCULATOR WEATHER TERM GLOSSARY REFERENCE

EXAMPLE PROCESSES

EXAMPLE 1: Moist Air Sensible Heating EXAMPLE 2: Moist Air Cooling and Dehumidification EXAMPLE 3: Moist Air Cooling and Dehumidification below freezing EXAMPLE 4: Adiabatic Mixing of Two Moist Airstreams EXAMPLE 5: Adiabatic Mixing of Water Injected into Moist Air

TERMINOLOGY

PSYCHROMETRIC TERM DEFINITIONS

ALGORITHMS

PSYCHROMETRIC ALGORITHMS

LEGAL NOTICES

LICENSE INFORMATION DISCLAIMER OF WARRANTIES



NEW VERSION 7 FEATURES!

NEW!! Updated ASHRAE Datacenter Zones to 2011 Thermal Guidelines!!

Now with ASHRAE Class A1, Class A2, Class A3, Class A4, Class B & Class C!



NEW !! Updated ASHRAE 2010 Comfort Zones!!

Now with the new ASHRAE 2010 Comfort Zone plotting capability!!



NEW !! Re-arrange or Re-order Points on the Fly with One Button Click!!

Now You Can Re-arrange or Re-order Points on the Fly with One Button Click!!

🥜 Psy	Psychrometric Processes												
	<u>}</u>	dd Point	Climatic Data	Apply	Delete 🦻 H	lelp	× <u>C</u> lose	•					
Proces	s Ca	Ic Mass Flow: 🤅	Use START F	Point 🔿 Use Cl	JRRENT Point								
Move		POINT	LABEL	AIR FLOW	UOM	PRO	DCESS	GIVEN					
Point		OA	AR	7000	STD CFM	Add S	tate	POINT					
		RA	BR	8000	STD CFM	Connect		POINT					
		MIX1	BR	15000	STD CFM	Air Mb	xing	POINT					
	▶	CC	AL	15000	STD CFM	Coolin	g	POINT					
		DD	BR	9000	STD CFM	Desico	cant	POINT					
		Bypass	BL	6000	STD CFM	Add S	state	POINT					
Move		MIX2	BL	15000	STD CFM	Air Mb	xing	POINT					
Point	.	ISC	BL	15000	STD CFM	Sensit	ble	POINT					
Down								•					
	St	art Point	Process Current Point										
MD	(1	-	Cooling Coil		• I	DB	50.000						
			Line Color Line Width State Point Label Off RH V 98.00000										
			- 0 4 = 0 50 0 ArrowEnd										
Air	Flov	v 15000	Total Cooling		.88.7		Air Flow	15000					
DB		82.066					DB	50.000					
WE	3	72.181	Total Energy		-1,064,421		WB	49.699					
RH		62.53	🔲 Sensible Ene	rgy	-526,674		RH	98.00					
W		0.01476	Latent Energy	r	-537,747		W	0.00751					
v		13.976			400.0		v	12.999					
h		35.899	Denumidificat	ion	-490.0		h	20.130					
DP		68.010	Sensible Heat	t Ratio	0.495		DP	49.450					
d		0.0726	Enthalpy/Hur	midity Ratio	2,172		d	0.0775					
vp		0.6909		,			vp	0.3553					
AN	/	7.395					AW	4.042					
_													
	_					_							

NEW !! TMY2 & TMY3 Bin Weather USA Locations Added!! TMY2 & TMY3 Bin Weather USA Locations Added!!

🐼 Weather Data			
Open Weather File C Import Location	Weather File	Apply	× Close
Country USA Country USA State OKLAHOMA City Weather AMUNICIPA MCALESTER, MUNICIPA MCALESTER, MUNICIPA MINICIPA MONTA, CITY W MINICIPA MONTA, CITY W MINICIPA MONTA, CITY MUNICIPA MONTA,	CWEC CIWEC	b 2 y Ratio 5 Hours per V 01 V V 02 V V 03 V V 04 V V 05 V V 06 V V 06 V V 07 V V 08 V Check Un-Ch	[°] F gr/lb Day 09 ↓ 17 10 ↓ 18 11 ↓ 19 12 ↓ 20 13 ↓ 21 14 ↓ 22 15 ↓ 23 16 ↓ 24 4ALL eck ALL

NEW !! Ability to Select Days Per Week for Bin Weather Data & Plots!!

Ability to Select Days Per Week for Bin Weather Data & Plots!!

e.

• Upen W	<pre>/eather File ○ Impo ○ TMY2 ● TMY3</pre>	I C CWEC C IWEC	Apply X Clos
Country	USA	•	3 🛛 🙇
State	OKLAHOMA	-	3 🏼 🌌
City	OKLAHOMA_CITY_	WILL_ROGERS_WOF	
Weather	Plot Style		
C None	Bin Plot Lege	nd Bin Si:	ze
C Data Plo	ot 🔽 On 🔄	X 0 in. Dry-Br	ulb 2 °F
C Data Ta	able Colors 🔞	Y 5 in. Humic	dity Ratio 5 gr/lb
- Months p	er Year	Days per Week	Hours per Day —
🔽 Januar	y 🔽 July	C 1 Day/Week	V 01 V 09 V 17
🔽 Februa	ary 🔽 August	© 2 Days/Week	
March	September	O 3 Davs/Week	
I April	Uctober	C 4 Davs/Week	
	December		🔽 06 🔽 14 🔽 23
		C 6 Days/Week	🔽 07 🔽 15 🔽 2
	heck ALL	C 7 Days/Week	V 08 V 16 V 2
📗 🗖 υ	n-Check ALL	dyor week	🔽 Check ALL

NEW !! World-Wide Climatic Data Updated to 2009 ASHRAE Fundamentals!!

World-Wide Climatic Data Updated to 2009 ASHRAE Fundamentals!!

	🟠 HDClimatic - ASHRAE 2009 Fundamentals	CEA.							
7		▼ 1,306 Elevatio	n, Feet 🚑 Print 🗙 Close						
	HEATING OK	→ 35.39 North Latitude							
		10GERS_W ▼ 97.6 West Longitude () Metric (
	WM0#723530 Hours +/- UTC -6.00 Time Zone	NAC Period 8206	Hrs 8-4 PM, 55-69°F 712						
	SUMMER COOLING E	vaporation	Dehumidification						
	DB MWB °F °F db ▼ °F	MDB °F db ▼	DP MDB °F °F ■						
	0.4% 99.5 74.1 99.5 77.7	90.8 90.8	74.1 83.7 83.7						
	1% 96.8 74.1 96.8 76.7	89.9 89.9	73.0 82.4 82.4						
	2% 94.0 73.8 94.0 75.7	88.8 88.8	72.1 81.4 81.4						
	Extr. Annual Max. DB °F 102.7 Std. Dev	v. °F 3.6 Mear	n Daily Range DB °F 20.3						
	WINTER HEATING Co	Idest Month	Extreme Annual Daily						
	DB RH °F % [°] F db ▼	WS MCDB mph °F	DB Std. Dev.						
	99.6% 11.4 50 11.4 0.4%	31.6 42.4	°F °F						
	99% 17.4 50 17.4 1%	28.3 41.6	6.1 5.9						
	WIND Coincident with 0.4% DR (cooling)	MCW/S 12.4 mph	DCWD 170 °						
	Coincident with 99.6% DB (heating)	MCWS 13.6 mph	PCWD 0 °						
	Extreme Wind Speed 1% 27.2 r	mph 2.5% 24.7 m	nph 5% 22.2 mph						

NEW !! Import Your Own Weather Data File Locations into the Chart!!

Import Your Own Weather Data File Locations into the Chart!!

🖉 Weather Data							
C Open Weather File 💿 Import Weather File 🖉 Appt	ly X Close					X	3
Import Weather File (*.csv)			and the second se				_
Note: *.csv file MUST be structured properly		with this progra	am called "Exa	mple Weather Im	port File.	.csv"	
Click Here to See File Format Structure		own Below					3
Target File Name:		port Filo cov					
C:\Program Files (x86)\ASHRAE Psychrometric		port rife.csv					
Weather Plot Style		s <u>D</u> ata <u>W</u> indow	Help Adobe PDF				
O None Bin Plot Legend Bin Size		🔁 = 🏈 🔊 = C	- 🧕 Σ - <u>A</u>	🚺 🛍 🛷 100% ,	0	 Security. 	
C Data Plot 🔽 On X 0 in. Dry-Bulb 2	*F		€ 0/ . €.0 .00		Δ	/ 🙈 🗟 🗆 🗖	ar
Colors 🚱 Y 5 in. Humidity Batio 5			₽ /0 / .00 ≫.0			⊆ ⊡ · •€- M	
		🕞 🛯 Reply with 🗅	ianges E <u>n</u> d Review			🖄 🕶 🖽 🗉	
Import Weather File (*.csv)							
Microsoft Excel - Example Weather Import File.csv		С	D	E	F	G	ł
iel Die Ent yew Duert Fyrnst Ioni Data yendow Heb Addenf0# □ 29 24 - 1 24 24 72 12, 14 24 26 + 27 17 + 0 + 0, Σ + 14 54 124 125 120% + 00 20 1 + 0 20 1 + 0 0 20 1 + 0 0 2		<u> </u>					_
							_
1 Units (P or St) P 2 Country USA							
3 State: CA 4 City: Ahambra 4 City: Ahambra		Hour No. (1 to 24)	DryBulb (°E or °C)	DewPoint (°E or °C)			-
Amount (1) A		1	53.0	19.2			-
8 1 1 2 500 202 9 1 1 3 430 220		2	50.0	20.2			-
10 470 220 11 1 5 470 219 12 1 6 470 229		3	48.0	22.0			-
13 1 1 7 460 252 14 1 1 8 500 229		4	47.0	22.0			_
151 1 2 600 281		5	47.0	21.9			
	· · · · ·	6	47.0	22.9			
13 1	1	7	46.0	25.2			
14 1	1	8	50.0	22.9			
15 1	1	9	60.0	28.1			
16 1	1	10	65.0	26.7			
17 1	1	11	/1.0	26.0			
	1	1 10	76.11	2010		1	

NEW !! Optional Process Directional Arrowheads on Process Lines!!

Optional Process Directional Arrowheads on Process Lines!!



NEW !! Ability to Print-All or PDF-All (Psy+Flow+Report) into ONE File!!

Ability to Print-All or PDF-All (Psy+Flow+Report) into ONE File!!





NEW !! User Program Quantity Expanded from 15 to 25 Programs!!

User Program Quantity Expanded from 15 to 25 Programs!!

anguage

Settings Vuser Programs • Register I	Now Hel	. Q. Q. 🔲 100% →	
👻 🣭 🍫 User Program Mana	ger		
🍓 User Program Manage	er 👋		
	Program Name	Program Path	💭 Apply 🗙 Close
Delete 🎭 User Program	n1		Browse
Delete 🤷 User Program	n 2	1	Browse
Delete 🤷 User Program	n 3		Browse
Delete 🍫 User Program	n 4		Browse
Delete 🍖 User Program	n 5		Browse
🛛 🚺 Delete 🎨 User Program	n 6 🗌		Browse
🛛 🚺 Delete 🍓 User Program	n 7		Browse
Delete 🍓 User Program	n 8		Browse
🔹 🚺 Delete 🛛 🍓 User Program	m 9		Browse
🔹 🚺 Delete 💁 User Program	n 10		Browse
Delete 🌯 User Program	n 11		Browse
Delete 🌄 User Program	n 12		Browse
Delete 🌄 User Program	n 13		Browse
Delete 🎨 User Program	n 14		Browse
Delete 🍢 User Program	n 15		Browse
Delete 🌇 User Program	n 16		Browse
Delete 🎨 User Program	n 17		Browse
Delete 🌄 User Program	n 18		Browse
Delete 🌄 User Program	n 19		Browse
Delete 10 User Program	m 20 j		Browse
Delete S User Program	m 21 j		Browse
Delete 🧐 User Program	n 22 j n 22 j		Browse
Delete Togra	n 23 j		Browse
Delete So User Program	11 24 j		Browse
Delete Not Program	ir 20 j	1	Blowse

NEW !! Evaporative Cooling Detailed Performance Calculator!!

Evaporative Cooling Detailed Performance Calculator!!



NEW !! Electric Heater Detailed Performance Calculator!! Electric Heater Detailed Performance Calculator!!



NEW !! Indoor Pool & Spa Evaporation Calculator!!

Indoor Pool & Spa Evaporation Calculator!!



NEW !! SMACNA Air Leak Class Calculator!!

SMACNA Air Leak Class Calculator!!



NEW !! Center of Gravity - Corner Load Calculator!!

Center of Gravity - Corner Load Calculator!!



NEW !! Pump Law Calculator!!

Pump Law Calculator!!



NEW !! Complete Inter-Active Element Periodic Chart!!

Complete Inter-Active Element Periodic Chart!!



NEW !! System Efficiency COP-EER-kW/ton Calculator!!

System Efficiency COP-EER-kW/ton Calculator!!

PSYCHRO	METRIC	ANAL	YSIS	CD - F	PsyCha	rt1										
<u>File - E</u> dit -	Analysis	s∓ <u>N</u> ot	tes▼	Tools	• Tools	sV <u>7</u> ▼ <u>V</u> iew	▼ Languag	je ⊤ <u>S</u>ettings	▼ <u>U</u> ser Prog	ams▼ <u>R</u> egister Now <u>H</u> elp) ≁	Q	2, 🗟 🔲	100%	•	
₀ + €	I 🔲 🖡	2 0) 🔼	<u>a</u> (🤌 😭 🍝	SHRAE NO.	.1 •	IP SI 🔳	English -						
77.743		3 ∾ ∎ •∕•		2		📅 Gene	eralized Sys	tem Efficier	ncy Calculato	r and Converter	10	2		100		X
WB (°F)		∎ √ ⊇ √		7					.,			or De	- E			
61.581		م ا		+							IP	SI 🖷	Сору 🚭	Print 🍾	About	Close
RH (%)		*	Ø	$\overline{\odot}$		Ef	ficienc	y Conv	verter	EEF	र an	d CO	P Calc	ulato	r	
39.5	- 	<u>\</u> ∎	Ø	Ð			Based on ,	AHRI condi	itions	Calcu	lation	should b	e at AHRI c	ondition	s	
W (lb/lb)	8	2 🗖	٦				EER	13.0	_	Component Name		Bhp	Efficiency	Qty		KW
.00802		₽ 🕹	¥	X			СОР	3.8	_	Example-1	_ •	15	0.92	2	0	24.33
v (cu.ft/lb)	- 4	1	•			<u> </u>	kW/ton	0.923	_	Example-2	_ ●	7.5	0.92	2	0	12.16
13.718								1			0				0	
n (Btu/Ib) 27.443	1	a 🖸				C In	put Energy	36.92	kW		0				0	
DP (°F)		/				• C:	apacity	40	tons		0				0	
51.210						Notes:					[0 [0	
d (lb/cu.ft)						1	. EER app	lies to cooli	ng only,		[o [0	
0.0735						2	COP can	apply to co	oris only. Iolina or							
VP (in.HG)							heating.	app., 10 00			_ ⊂ĺ		Í			
0.3793						3	kW/ton or cooling o	r kW/kW ca r heatinɑ.	n apply to		- lo		í] o [
AW (gr/cu.ft)										<u>p</u>	_		, ,			
4.082	9								Capacit	y 35	ton	S	Total Syst	em kW	3	6.49
X (in.)	•							C	alculate Ef	ficiency EER 1	1.51	COF	3.37	kW	/ton [1.04
5.613								1					~ 1 ~			
Y (IN.)						11	مسبه آيجا شدسه	~1.28~1				15- I	$\sim 1/\mathcal{P}$		1	1.000

NEW !! Total & Sensible Wheel Energy Recovery Performance Calculator!!

Total & Sensible Wheel Energy Recovery Performance Calculator!!



NEW !! Plate Heat Exchanger Energy Recovery Performance Calculator!! Plate Heat Exchanger Energy Recovery Performance Calculator!!



NEW !! Fluid & Mixture Thermo-Physical Property Calculator!!

Fluid & Mixture Thermo-Physical Property Calculator!!



NEW !! Rectangle & Round Duct Fittings added to HDDuctDesigner!!

Rectangle & Round Duct Fittings added to HDDuctDesigner!!



NEW !! Duct Temp Gain/Loss Calculator added to HDDuctDesigner!!

Duct Temp Gain/Loss Calculator added to HDDuctDesigner!!



NEW !! Duct Pitot Airflow Calculator added to HDDuctDesigner!! Duct Pitot Airflow Calculator added to HDDuctDesigner!!



NEW !! Ability to Turn Logo On & Off, for ASHRAE Meeting "Generic" Presentations!!

Ability to Turn Logo On & Off, for ASHRAE Meeting "Generic" Presentations!!



NEW !! Customize Psychrometric Charts with your own Colors!!

Customize Psychrometric Charts with your own Colors!!



NEW !! Change Any Chart Property Lines to Any COLOR You Choose!! Change Any Chart Property Lines to Any COLOR You Choose!!

NEW !! Change Any Chart Property Lines to Any Line TYPE You Choose!! Change Any Chart Property Lines to Any Line TYPE You Choose!!

NEW !! Change Any Chart Property Lines to Any Line THICKNESS You Choose!!

Change Any Chart Property Lines to Any Line THICKNESS You Choose!!



NEW !! Improved Toolbar and Menu Control Setup!!

Improved Toolbar and Menu Control Setup!!



NEW !! User-Defined Custom Area Shading right on the Chart!!

User-Defined Custom Area Shading right on the Chart!!



NEW !! Ability to Hide State Point Label on a Point-By-Point basis!!

Ability to Hide State Point Label on a Point-By-Point basis!!

	Add Point	Climatic Data	Apply	X	Delete	Help	X <u>C</u> I	ose
Process Ca	alc Mass Flow:	Use START	Point C Us	e CUI	RRENT Poi	nt		
Move	POINT	LABEL	AIR FLOV	N	UOM	1	ROCESS	GIVE
Point	OA	AR	2000		STD CFM	Ad	d State	POINT
	RA	BR	8000	1	STD CFM	Co	nnect	POINT
	MIX	BR	10000	:	STD CFM	Air	Mixing	POINT
	CC	BL	10000	1	STD CFM	Co	oling	POINT
More								
Point								
S	tart Point		tic Mixing (Se	cond	Point)	_	(c	urrent Point
OA.	•							82.024
								10.1 1/2 4
		Line Color, Lin	e Width Sta	te Po		-1.04		03.024
Airflow	[%] 100	Line Color Lin	e Width Sta	te Po	Lab	el Off	w	.01235
Airflow	(%) 100	Line Color Lin	e Width Sta	te Po 50	it 🔽 Lab	el Off	w	.01235
Airflow	(%) 100 w 2000	Line Color Lin	e Width Sta 4 I IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	te Poi	Lab ↓ ↓ Lab	el Off owEnd	W Air Fl	v .01235
Airflow Air Flor DB	(%) 100 w 2000 95.000	Line Color Lin Air Flow DB	e Width Sta 4	te Poi	Lab	el Off	Air FI DB	01235 0W 10000 83.024
Airflow Air Flor DB WB	(%) 100 w 2000 95.000 78.000	Line Color Lin Air Flow DB WB	e Width Sta 4	te Po	V Lab	el Off owEnd	W Air Fl DB WB	▼ .01235
Airflow Air Flor DB WB RH	(%) 100 95.000 78.000 47.29	Line Color Lin Air Flow DB WB RH	e Width Sta 4	te Po	I I I Lab	el Off	W Air FI DB WB RH	0.024 0.01235 0.0125 0.012
Airflow Air Flor DB WB RH W	(%) 100 95.000 78.000 47.29 0.01686	Line Color Lin Air Flow DB WB RH W	ee Width Sta 4 ■ ◎ 8000 80.000 67.000 51.14 0.01123	te Po	Lab	el Off	W Air FI DB WB RH W	03.024 0 01235 0 0 10000 83.024 69.430 50.90 0.0123
Airflow Air Flor DB WB RH W	(%) 100 95.000 78.000 47.29 0.01686 14.356	Line Color Lin Air Flow DB WB RH W V V	e Width Sta 4 ■ ◎ 8000 67.000 51.14 0.01123 13.845	te Po	Lab	el Off	Air FI DB WB RH W v	0.01235 0 10000 83.024 69.434 50.90 0.0123 13.944
Airflow DB WB RH W v	 (%) 100 95.000 78.000 47.29 0.01686 14.356 41.396 	Line Color Lin Air Flow DB WB RH W V h	e Width Sta 4 ■ ◎ 1 8000 80.000 67.000 51.14 0.01123 13.845 31.510	te Po	I I Lab	el Off owEnd	Air Fl DB WB RH W v h	03.024 000 10000 03.024 69.430 50.90 0.0123 13.948 33.484
Airflow DB WB RH W v h DP	 (%) 100 95.000 78.000 47.29 0.01686 14.356 41.396 71.800 	Line Color Lin Air Flow DB WB RH W v h DP	e Width Sta 4 ■ ◎ 1 8000 80.000 67.000 51.14 0.01123 13.845 31.510 60.340	te Po	I I Lab	el Off owEnd	Air FI DB WB RH W v h DP	0.01235 0 W 10000 83.024 69.430 50.90 0.0123 13.948 33.484 62.990
Air Flor DB WB RH W v h DP d	 (%) 100 95.000 78.000 47.29 0.01686 14.356 41.396 71.800 0.0708 	Line Color Lin Air Flow DB WB RH W v h DP d	e Width Sta 4 ■ ◎ 8000 80.000 67.000 51.14 0.01123 13.845 31.510 60.340 0.0730	te Po	I v Lab	el Off	Air FI DB WB RH W v h DP d	0.01235 0 W 10000 83.024 69.431 50.90 0.0122 13.944 33.48 62.991 0.0724
Airflow I Air Flor DB WB RH W v h DP d VP	 (%) 100 95.000 95.000 47.29 0.01686 14.356 41.396 71.800 0.0708 0.7063 	Line Color Lin Air Flow DB WB RH W v h DP d vp	e Width Sta 4 ■ ◎ 8000 80.000 67.000 51.14 0.01123 13.845 31.510 60.340 0.0730 0.5283	te Po	Lab	el Off	Air FI DB WB RH W v h DP d vp	0.024 0.01235 0.01235 0.01235 0.024 0.01235 0.0123 0.0123 0.0123 0.0123 0.0123 0.0123 0.0123 0.01235 0.0125 0

NEW !! Draw Your Own Lines Anywhere You Want!!

Draw Your Own Lines Anywhere You Want!!



NEW !! Draw Your Own Ellipses Anywhere You Want!! Draw Your Own Ellipses Anywhere You Want!!



NEW !! Draw Your Own Rectangles Anywhere You Want!!

Draw Your Own Rectangles Anywhere You Want!!



NEW !! Draw Your Own Circles Anywhere You Want!!

Draw Your Own Circles Anywhere You Want!!



NEW !! Insert Your Own Pictures Anywhere You Want!!

Insert Your Own Pictures Anywhere You Want!!



NEW !! Languages, Now with (19) Different Languages on Charts and Reports with one button click!!

Languages, Now with (19) Different Languages on Charts and Reports with one button click!!



- NEW !! Point Color Control when Importing Data from Excel (*.csv) files!! Point Color Control when Importing Data from Excel (*.csv) files!!
- NEW !! Point Size Control when Importing Data from Excel (*.csv) files!! Point Size Control when Importing Data from Excel (*.csv) files!!
- **NEW !! Process Line Color Control when Importing Data from Excel (*.csv) files!!** Process Line Color Control when Importing Data from Excel (*.csv) files!!
- **NEW !! Process Line Width Control when Importing Data from Excel (*.csv) files!!** Process Line Width Control when Importing Data from Excel (*.csv) files!!



NEW !! Point property toolbar display now includes units of measure!!

Point property toolbar display now includes units of measure!!



NEW !! Thermal Comfort Terms Definition PDF Manual!!

Thermal Comfort Terms Definition PDF Manual!!





MORE PROFESSIONAL EDITION FEATURES!

Auto Flow Chart Diagram!

Now you can get a Complete Flow Diagram Schematic with all Process and Thermo-Physical properties with One-Button-Click! Flow diagram and/or data can be copied with One-Button-Click to the clipboard for pasting into your reports and presentations!



Weather Data Plotting with Complete Global Weather Files!!

Now you can see the weather data plotted right on the chart with one click!!

🦽 Weather Data		
Location		
Country USA		
State OKLAHOMA	A.	50
City Oklahoma City		in the second
Mosther Plot Style		
C None		
• Data Plot		
C Bin Plot		
Maatha ta Plat	Haura ta Blat	15 A A A A A A A A A A A A A A A A A A A
V Sunday	▼ 02 ▼ 10 ▼ 18	
I March I September I Monday	🔽 03 🔽 11 🔽 19	
🔽 April 🔽 October 🔽 Tuesday		
I May I November I Wednesday		
Jo June Jo December Jo Thursday	▼ 07 ▼ 15 ▼ 23	
Check ALL	☑ 08 ☑ 16 ☑ 24	
Un-Check ALL Saturday	Check ALL	
Total Hours Selected: 8760	Un-Check ALL	
1		
artin it		
	10% RELA	
Juniperson and a second		and the second

Weather Bin Shade Plotting with Complete Control!!

Now you can display Bin Weather data right on the chart and specify the bin size and colors!!...even displays a bin legend that you can locate where you want!!



Global Weather Data Table Access!!...CREATE YOUR OWN BIN TABLES!!

Now you have access to world-wide weather data at your fingertips!...create a complete weather data file that you can modify, import to Excel, etc. with One-Click!!



Mouse Icon Control!!

Now you can change the mouse icon to Arrow, Target or Cross-Hair!!





Individual Process Line Color Control!

Now you can control the color and thickness of EACH Individual Process Line!!



Individual Point Color, Shape and Size Control!

Now you can control the icon, color and size of EACH Individual State Point!!



Winter "V" Air Mixing Capability!

Now you can plot mixing processes that cross the saturation line!!



Fog Region Property Display!

Now you can read fog region properties!!



Humidity Ratio Unit of Measure Control!!

Now you can select the Humidity Ratio units displayed on the chart and used in Psychrometric Analysis with one button click!!



Constant h, WB, HR, DB, VP, DP, SHR & dW/dh Line Control!!

Now you can specify exact individual property lines to be displayed!!



Complete Thermal Comfort Calculator!!

Now you can perform thermal comfort modeling calculations on the fly!!

🔊 Thermal Comfort Calcu	ulator		
- Environmental Conditions -			IP SI A Print Close Results ET* 78.8 *F
Air Temperature MRT ▼ Link with Air Air Velocity Relative Humidity ⊙ Summer ○	78.8	*F *F ft/min %	SET* 75.9 *F TSENS 0.2 DISC 0.2 PMV -0.32
- Activity			PPD 7 % PD 26 % PS 53 %
Metabolic Rate	1.0	met	TS 0.3 Nuetral
- Clothing			Tnuetral 74.8 *F (Auliciems)
User Defined	0.5	▼	Comfortable
Other Details			Comfort Zone Calculation
External Work	0.0	met	Summer Comfort
Turbulence Intensity	70	%	Humidity Level
Mean Mo. Outdoor Temp	15.0	*C	In Zone-
Exposure Time	60	min	
Barometric Pressure	760	torr	
Weight	70	kg	Dry-Bulb Temperature
Surface Area	1.2	sq.m	InZone

ASHRAE Class 1 through 4 Datacenter Zones (allowed & recommended) and NEBS Datacenter Zones (allowed & recommended)!!

Now you can display the Data Processing Environment regions right on the psychrometric chart!!!...the regions are calculated and are displayed dynamically with elevation!!!



Process Control added to Data Import Function!! Now when you're importing data text or Excel spreadsheet data, you can specify processes with the data!!

1		-0.5		IDD	et	Dete	A- 10																						
	ncro	OIT E	xcei - r	iDPSy	Chart	Poin	its if	P.CS	v																	-			
:B)	Eile	Edit	⊻iew	Insert	Forr	mat	Tool	ls [<u>D</u> ata	<u>W</u> in	dow	Help										Т	ype a qu	estion fo	ir help	• .	-8×		
		2 14	Arial			- 10	-	B	I	U	E	= =	•3	a+	\$ %	• • .0 .0		*	- 👌	• <u>A</u> •			Secu	rity	23	P 🔽	I 🛷 📃		
_	N1		-	fx		_	_							_					_	_					_			E E	ngl
		Δ.	В	C	D	F	F	G	н		.1	ĸ			М		N			0	Р		Q		R	2		-	-
1	IP .	•		- V		-		~				15		-	111				7	Ŭ.							<u>^</u>		
2	 ALTI	UDE	750						-				+	-															
3	LAB	EL	OA1	CFM	2000	DB	50	RH	50	UOM	0 3	STD AIR	₹Т	PF	ROCESS	Add Sta	te Po	int	STAF		тο	MIX S	SECON		πо	O LAB	ELF		
4	LAB	EL	OA2	CFM	2002	DB	52	RH	50 1	UOM	0 3	STD AIR	R F	PF	ROCESS	Connect	Stat	e Points	STAF		T 1	MIX S	SECON		IT (O LAB	EL F		
5	LAB	EL	0A3	CFM	2004	DB	54	RH	50 I	UOM	1 8	STD AIF	₹T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	тο	MIX 9	SECON		п	0 LAB	EL F		
6	LAB	EL	OA4	CFM	2006	DB	56	RH	50	UOM	2 3	STD AIR	₹T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (0 LAB	EL F	lee e	Ż
7	LAB	EL	OA5	CFM	2008	DB	58	RH	50 I	UOM	0 3	STD AIR	₹T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (0 LAB	EL F	~ /	Ľ
8	LABE	EL	OA6	CFM	2010	DB	60	RH	50 I	UOM	0 8	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (0 LAB	EL F	\rightarrow	<
9	LAB	EL	OA7	CFM	2012	DB	62	RH	50	UOM	03	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (D LAB	EL F	1	_
10	LAB	EL	OA8	CFM	2014	DB	64	RH	50 I	UOM	03	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (D LAB	EL F	\checkmark	-
11	LABE	EL	OA9	CFM	2016	DB	66	RH	50	UOM	0 8	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX S	SECON	D POIN	IT (0 LAB	EL F 🔳	Α_	
12	LABE	EL	0A10	CFM	2018	DB	68	RH	50	UOM	03	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX S	SECON	D POIN	IT (0 LAB	EL F	\rightarrow	1
13	LABE	EL	0A11	CFM	2020	DB	70	RH	50	UOM	03	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (0 LAB	EL F	WET BUILD	(
14	LABE	EL	0A12	CFM	2022	DB	72	RH	50	UOM	0 8	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (O LAB	ELF	TĨ	(R)
15	LABE	EL	0A13	CFM	2024	DB	74	RH	50	UOM	0 8	STD AIF	R T	P	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (O LAB	EL F	/	$^{+}$
16	LAB	EL	0A14	CFM	2026	DB	76	RH	50	UOM	0 8	STD AIF	R T	PF	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX 9	SECON	D POIN	IT (O LAB	EL F	<u> </u>	_
17	LABE	EL.	OA15	CFM	2028	DB	78	RH	50	UOM	0 8	STD AIF	R T	P	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX S	SECON	D POIN	IT (O LAB	ELF		_
18	LABE	EL.	OA16	CFM	2030	DB	80	RH	50	UOM	0 8	STD AIF	R T	P	ROCESS	Add Sta	te Po	int	STAF	RT POIN	ΤO	MIX S	SECON	D POIN	IT (O LAB	ELF		/
19	LAB	:L	0A17	CEM	2032	DB	82	RH	50 1	UOM	0.8	STD AI	<u> </u>	HH .	ROCESS	Add Sta	te Po	unt	STAF	RI POIN	1 0	MIX 8	SECON			U LAB		X	Ξ
20	LAB	=L	OA18	CEM	2034	DB	84	RH	50 1	UOM	0.8	STD AIF	<u> </u>	H P	ROCESS	Add Sta	te Po	unt	STAF	RI POIN	IU	MIX 3	SECON					7~	Ĵ.
21	LAB	:L	UA19	CEM	2036	DB	86	кн	50 1	UUM	03	STD AI	(PF	RUCESS	Air Mixi	ng		STAF	RI POIN	15	MIX 3	SECON	D POIN	11 18	B LAB		1	_
22													-	-							_								_
23		_																								-	~		/
H 4		\HD	PsyCha	art Po	ints Il	Р/												<				1111						$\overline{\mathbf{\nabla}}$	
Reac	ly																							NU	M			\mathbf{x}	\leq
															STN.	Æ			36	X	7	\leftarrow	/	×.		4	= /	1 ×	
															and the			<u></u>	\$¥	¥.)	4	-A	/		×	~~~	\vdash		
															Barry A				7 /	\simeq	A:~	6		6	OA1	18	<u>K</u>		7
															Æ			ST.	3%		K	~.4		6 ~0	A17	/	1	\mathbf{I}	1
																		Y V			\Box		×ø.	0A16	X	, 	12	15	$\overline{}$
														en k			57		80%	0A1	9		0	A15 🔀	4		13	1	1
							-						Å	æ			۲Þ	4. X	\geq	- 7	Q	<u>A</u>	0A14	\leftarrow	÷.	/	<u>-</u> 6_		
						×							Æ			37 J	<u> </u>	$ \simeq $	6	\succeq	ģ	0A12			\square	×.	382		_
						5.8	04					- A	20			r.	A	\square	65%	s O	<u>70</u> /	A11	A				1	\downarrow	
						Y	·				,						X			O A9	ATO	\sim		X.,			\square	Fin.	
						-0.1	52				Æ		10	≫	72		₽	50	047	0A8	1	~~~	\rightarrow		1	-	1	1-	4
						-0.1	-			£	4	3	3	S	-	- Jord			DA6	1	┢	~.	-7-		4			-	_
										1000	Š	F-	H	2	> 10	_ } @		3 ^{0A4}	\rightarrow	ł.	+		Lim	1	\rightarrow		1	+	_
										- t	\leq	12		~	\rightarrow	<0A1	JA2	t	30.20	1				124			<u></u>	1.1	_
										F		1	-1	5	24-	\rightarrow	.T	1	20%	+			$1 - \overline{2}$	1	F	<u> </u>	$\langle \ \rangle$		1
											2	t	5	÷				557	STORE FOR	ATIVE HUM	IDITY-		1	7		<u> </u>	4		さ
											Þ	÷.	1	Ë	SE	<u>it</u>			1018 104	+	1.		+ >	\$. 10		+	1	-
													2	2	فستشتع		- 6		it.	<u></u>	Ĕ.	die .	5	El-			<u> </u>	dire.	_
													-		70					15			-	-	-20	0			

SI units added to text file & Excel Data Exchange!!

Now when you're exporting data text or Excel spreadsheet data, you can export out in SI units of measure!!

2	Microsoft Excel - Book1														ĺ
:1] <u>File E</u> dit <u>V</u> iew Insert F <u>o</u> rma	at <u>T</u> ools (Data Wind	low <u>H</u> elp								Тур	pe a question	for help 🖉 👻	
10	η 😝 🗐 🚽 Σ + 🔞	🖞 : Arial		• 10 •	BIU		≣ 🔤 \$	% , *	.0000	€E 00 -	3 - A -		Security	1 A 320 k	2
-	F6 • f			and and	_						_				l
	A	В	C	D	E	F	G	Н		J	K	L	M	N	Ĩ
1	Project Name														Ī
2	Date	2/11/2007		1										1	
3															
4	Altitude (m)	228.6	i												
5	Barometric Pressure (mm. Hg)	739.6283													
6	Atmospheric Pressure (kPa)	98.60886	i												
7															
8	Point Name	Airflow	Condition	Airflow UO	Dry Bulb (Wet Bulb	Relative Hu	Humidity F	Humidity F	Specific Vi	Enthalpy (Dew Point	Density (k)	Vapor Pres	1
9	UAT	943.9006	Standard	I/S	10	5.4612/3	50	3.912268	3.91E-03	0.8291	19.91235	6.11E-02	1.205113	4.604868	
10	UAZ	944.8445	Actual	I/S	11.11111	5.382722	50	4.215314	4.22E-03	0.032/56	21.80106	1.083334	1.199825	4.958115	-
17	043	909.0002	Standard	kg/min.	12.22222	0 002022	50	4.539035 4.004CEE	4.54E-03	0.030442	23.74321	2.111111	1.194539	5.337209 E 72000E	-
12	0.45	909.9074	Standard	Kg/rir.	13.33333	0.220222	50	4.004000 E DEDAEE	4.00E-03	0.040101	25.742	3.100000 4.1EEEEE	1.109200	5.739005 6.169661	-
14	045	947.0702	Standard	Ve	15 55556	10 05197	50	5.646786	5.20E-00	0.043315	27.00002	4.100000	1.103504	6,62834	
15	047	949.564	Standard	l/e	16.66667	10.05134	50	6.066063	6.07E-03	0.851536	32 11293	6 205554	1.170072	7 115307	
16	048	950 5079	Standard	1/e	17 77778	11.87981	50	6.512775	6.51E-03	0.855407	34 37391	7 227777	1.168062	7,633608	
17	049	951 4518	Standard	1/s	18 88889	12 79282	50	6 988486	6.99E-03	0.859323	36 71027	8 249999	1.162741	8 184956	
18	OA10	952 3958	Standard	Vs	20	13 7055	50	7 494835	7 49E-03	0.863286	39 12635	9 272222	1 157405	8 771137	
19	OA11	953.3397	Standard	l/s	21.11111	14.61803	50	8.033548	8.03E-03	0.867298	41.62674	10.29444	1.152051	9.394016	ĩ
20	OA12	954.2835	Standard	l/s	22.22222	15.53061	50	8.606433	8.61E-03	0.871364	44.21622	11.31667	1.146678	10.05554	Î
21	OA13	955.2274	Standard	l/s	23.33333	16.44339	50	9.21539	9.22E-03	0.875485	46.89986	12.33333	1.141281	10.7538	
22	OA14	956.1713	Standard	l/s	24.44444	17.35658	50	9.862413	9.86E-03	0.879665	49.68293	13.35556	1.135858	11.49853	
23	OA15	957.1152	Standard	l/s	25.55556	18.27028	50	10.5496	0.01055	0.883908	52.57104	14.37222	1.130406	12.28382	
24	OA16	958.0591	Standard	l/s	26.66667	19.18466	50	11.27915	1.13E-02	0.888218	55.57002	15.39444	1.124922	13.12052	
25	OA17	959.0031	Standard	l/s	27.77778	20.09983	50	12.05337	1.21E-02	0.892598	58.68605	16.41111	1.119402	14.00189	
26	OA18	959.947	Standard	l/s	28.88889	21.01593	50	12.87469	1.29E-02	0.897052	61.92561	17.43333	1.113844	14.94003	
27	OA19	1907.623	Standard	l/s	21.71312	15.76618	54.42597	9.088584	9.09E-03	0.870526	44.92181	12.12778	1.147779	10.60928	
28															
H	Sheet1 / Sheet2 /	et3 /							<						
Rea	dy													NUM	Ì
					30	1.11	SXX	\rightarrow	0.040		A15 ————————————————————————————————————		X	T	2
					AS	E B	Z/4)	ΣX^{is}	ATS OL	@ 0A14	\prec	1X		A	-
		X		A	222	SS	\triangle	X		0A13			100	\geq	_
		18.572		A	222	\$X	$\vee $	X	0A1	1		\sum	\rightarrow	T.	
		Y		AS	23	XV	Part		0A9	1.2	\sim	17	$< \square$	Ch:	
		11.290		AR	X	\rightarrow	Xa	OAT OA	8	\rightarrow	C.S.			- Land	1

Export Data in EITHER *.txt format or *.csv format!!

Now you can export your psychrometric analysis data in either text file (*.txt) format or an Excel friendly comma delimited format (*.csv) for easy data exchange!!


Outdoor Air Estimator UPDATED to Standard 62-2004!!

Now you can quickly and easily obtain updated values from Table-16 from ASHRAE Standard 62-2004 with associated Notes and Air Classifications!!

🅮 Outside Air Est	timator - RE: ASHRAI	E Standard 62	2-2004			×						
Application Group	Educational Facilities		•	🛛 📭 SI 🚑 Print 🗙 Cl								
Specific Application	Media center											
	cfm per Person 10	cfm per sq.ft.	0.12									
	No. of People 22	Area (sq.ft.)	7500	_AIR C	LASS —							
	People OA Rate 220	Area OA Rate	900		Air Class = "	1						
	TOTAL Suggested Fresh Airflow (cfm) 1120 Ø Class Definition											
For high school and c	ollege libraries, use values	shown for Public	: Spaces -	Library.								
GENERAL NOTES (1.) Related Requirem ASHRAE Standard 62	ents: The rates in this prog 2-2004 being met.	gram are based o	n all other	applicable	requiremen	ts of						
(2.) Smoking: This program applies to no-smoking areas. Rates for smoking-permitted spaces must be determined using other methods. See ASHRAE Standard 62-2004, Section 6.2.9 for ventilation requirements in smoking areas.												
(3.) Air Density: Volumetric airflow rates are based on an air density of 0.075 lbda/ft3 (1.2 kgda/m3), which corresponds to dry air at a barometricpressure of 1 atm (101.3 kPa) and an air temperature of 70°F (21°C). Rates may be adjusted for actual density but such adjustmentis not required for compliance with												

Weather Term Glossary!!

Now you can quickly and easily look up any almost any weather term or phrase in seconds!!



Wind Chill Factor Calculator!!

Now you wind chill and frost bite times are at your fingertips and can be calculated in seconds!!



Climatic Data **PRINTING** Capability Added!!

Instead of just viewing design data or adding it to your psychrometric system, now you can print all the design data for your location as well!!

			🞒 Print 🗙 Close						
🔽 COOLIN	G USA		vation, feet 💿 💽 English (IP)						
	Oklahoma	▼ 35.40 Nor	th Latitude 💦 🦳 Metric (SI)						
	Oklahama City Mill Pagar	Airport 97.60 We	st Longitude						
SU	MMER COOLING	Evaporation	Dehumidification						
[DB MVVB ■Fdb 💌	VVB MDB Fdb 🔽	DP MDB Fdb 🔽						
0.4% 9	9 74 @ 99.14	77 91 91.04	73 83 83.12						
1% 9	6 74 0 96.26	76 90 90.32	72 82 82.04						
	4 73 03.56	75 89 89 24							
2% 3	4 73 0 55.50	03 03.24							
Extr. Annua	I Max. DB ° F 103	Std. Dev. "F 3 Mea	an Daily Range DB ° F 21						
W	NTER HEATING	Coldest Month	Extreme Annual Daily						
L C	B RH	VVS MCDB	DB Std Dev						
		mpn 7	°F °F						
99.6%	, 50 (9.32	0.4% 23 33	4 5						
99% 1	5 50 C 14.72	1% 26 37							
	Coincident with 0.4% DB (cool	ing) MCVVS 13 mph	PVVD 180 deg.						
	Coincident with 99.6% DB (he	ating) MCVVS 15 mph	PVVD 360 deg.						
E	Extreme Wind Speed 19	6 29 mph 2.5% 25	mph 5% 23 mph						

Cooling Coil Performance Line Control!!

Now you can display cooling coil modeled curves right on the psychrometric chart!!



Greek, Japanese and Dutch Languages Added!!

Now Psychrometric Analysis supports (13) Languages!!



Page and Chart Area Color Control!!

Now you can customize the appearance of the psychrometric chart and select virtually any color for the page and chart area!!



Black & White <=> Color Display & Print Control!! Now you can select Black and White only or Color display!!



Heading On/Off Control!!

Now you can turn Headings On or Off!!

🖀 Profile Presentation Control								
🖏 Apply	🗙 Close							
Comfort Zones Paper-Chart Colors Data Processing	Zones							
Page Setup Chart Settings Chart Lines Point/Proces	ss Lines							
Heading Control								
Show Heading Text on Chart								

Psychrometric Chart Outline Control!! Now you can turn the Chart Outline On or Off!!



Zoom Window Control!!

Now you can Zoom using a Window to specify where you want to Zoom!!



Ability to add user defined "ToolBox" Programs under menu item tools!!

Now you can ADD your other Engineering Tools to the Psychrometric Analysis menu so you can access them easily and quickly!!

<u>U</u> ser Progra	ms <u>R</u> egister Now	Help					
Ser Pr	ogram Manager	🧔 💋 🖉	ASHRAE N	D.1 - IP S	SI 🔚 English	- • 🛛 🗨 🖯) 🕀 🗐 1 00
	🌯 User Progr	ram Manager				(
			Program Name	Program Path		Apply	× Close
	Delete 🏾 🍫 U	lser Program 1					Browse
	Delete 🍖 U	lser Program 2					Browse
	Delete 🍓 U	lser Program 3					Browse
	Delete 🍓 U	lser Program 4					Browse
1	Delete 🍓 U	lser Program 5					Browse
	Delete 🍓 U	lser Program 6					Browse
	Delete 🍓 U	lser Program 7					Browse
	Delete 🍓 U	lser Program 8					Browse
	Delete 🍓 U	lser Program 9					Browse
	Delete 🍓 U	lser Program 10					Browse
	Delete 🍓 U	lser Program 11					Browse
	Delete 🍓 U	lser Program 12					Browse
	Delete 🍓 U	lser Program 13					Browse
	Delete 🍓 U	lser Program 14					Browse
	Delete 🍫 U	lser Program 15			175 00 5		Browse

Single & Double Interpolation and Extrapolation Calculator!!

Now single and even double Interpolation and Extrapolation is performed easily and quickly!!

💋 Interpol	ate Calculator	
		Print 🗙 Close
Y2	++++	
v		
		C Single C Double
¥1		Interpolation C Extrapolation
×1	x X2	C Linear Analysis
- Series 1 -	Low Point1 N	Mid Point1 - High Point1 -
Value	X1 2 X	×2 4
2000	Y1 1 Y	2 Y2 3
Series Mid	-Low MidN	Mid Mid High Mid
Value	X 3 X	(4 × 5
2250	Y 2 Y	Y 4
Series 2	Low Point2	Hid Point2 High Point2 -
Value	X1 4 X	5 ×2 6
2500	Y1 3 Y	Y 4 Y2 5

Fan Law Calculator!!

Now when you're estimating fan motor heat for an unknown condition, you can quickly calculate the new power and heat required!!

💿 Fan Law Calculator 📃 🗖 🔀											
CALCULATE	SI 🚑 Print	🗙 Close									
Current Fan Performance											
Airflow 10000 cfm											
Static Pressure	2.50	in. WC									
Power	8.4	bhp									
Speed	1150	rpm									
Pulley Size	12	in.									
🕞 💿 New Fan Performance											
 Airflow 	12000	cfm									
O Static Pressure	3.60	in. WC									
C Power	14.5	bhp									
C Speed	1380	rpm									
C Pulley Size	10.0	in.									

Duct Sizing Calculator!!

Now when you need to estimate duct design static pressures for fan performance, required motor power and motor heat, you can use this tool to quickly determine duct pressure drops!!

🖌 Duct Designer										
📕 CALCULATE I IP SI 🖨 Print 🗙 Close										
Air Condition										
Airflow 2000 cfm										
💿 STD Air 🔿 ACTUAL Air										
Density 0.0750 lb/cu.ft.										
Duct Material Uncoated Carbon Steel, Clean										
Roughness Factor 0.00015 ft										
- 🖓 Rectangular Duct										
Side 1 12 in. Side 2 12 in. Duct Length 100 ft										
Equal Diameter 13.1 in. Area 1.0 sq.ft. Velocity 2000 ft/min										
Pressure Drop 0.415 in.WC/100ft Total Pressure Drop 0.41 in.WC										
🔿 Round Duct										
Diameter 12 in. Duct Length 100 ft										
Area 0.8 sq.ft. Velocity 2376 ft/min										
Pressure Drop 0.638 in.WC/100ft Total Pressure Drop 0.64 in.WC										
Oval Duct										
Side 1 12 in. Side 2 12 in. Duct Length 100 ft										
Equal Diameter 12.0 in. Area 0.8 sq.ft. Velocity 2376 ft/min										
Pressure Drop 0.638 in.WC/100ft Total Pressure Drop 0.64 in.WC										

Financial Loan / Payment Calculator!!

Great for when you need to quickly estimate a payment or generate an amortization table!



Complete State Point & Process Report!!

Complete state point and process report with the ability to copy EITHER the report IMAGE or the DATA to the clipboard so you can paste it right into your proposals, presentations or the data into spreadsheets!!

Report Date Project Infor Altitude: O (I Barometric I Almospheric	Report Date: Saturday, June 12, 2004 Project Intermation: Altifude: 0 (Feet) Barometric Pressure: 25 921 (In.Hg) Almospheric Pressure: 14, 566 (psia)							Prepared By: Robert Hanna Company: Hands Down Software Phone: (JdoS) 844-6314 Fax: (405) 844-6314 errail: selescithandsdownsoftware.com							
1. RA															
STATE POINT D Air Flow (Standard) (citrr)	Dry Bulb ("F)	Wat Bulb ("F)	Relative Humidity (%)	Humidity Ratio (Ib/Ib)	Specific Volume (cu.ft./lb)	Entholpy (Btu/Ib)	Dew Point ("F)	Density (Ib/cu.ft.)	Vapor Pressure (In.Hg)	Absoluta Humidity (gr/cu.fl.)					
1,000	75.000	63.940	55.0	0.01022	13.695	29.181	57.7592	0.0729	0.4817	5.222					
2. DH STATE POINT D	ATA														
Air Flow [Standard]	Dry Bulb	Wat Bulb	Relative Humidity	Humidity Rato	Specific Volume	Enthalpy	Dew Point	Density	Vapor Pressure	Absolute Humidity					
(cfm) 1,000	("F) 90.000	("E) 63.940	(%) 22.6	(lb/lb) 0.00678	(cu.ft./lb) 14.003	(Btu/lb) 29.067	("F) 46.7887	(lb/cu.ft.) 0.0713	(In.Hg) 0.3215	(ar/su.ft.) 3.390					
Process: Desid	cant Dehumidit	teation													
Start Pol	nt Name	Total Energy	Sensible Energy	Latent Energy	Dehumid- Reston	Sensible Heat Ratio	Ent Humid	halpy/ lity Ratio	Sensibi Per Dehu	e Energy midification					
R	A	(Btu/hr) -514	(Btu/hr) 16,403	(Btu/fir) -16,917	(Ib/fr) -15.5	-31.912	(B t 14	5 / 10/10] 33	(Bt -1,0	u/lb))61.1					
3. SC STATE POINT D	ATA														
Air Flow (Standard)	Bulb	Bulb	Relative	Rato	Volume	Entholpy	Point	Density	Pressure	Absolute Humidity					
(ctm) 1,000	("F) 85.000	("F) 60,449	(%) 77.4	(Ib/Ib) 0.01022	(cu.ft./lb) 13.439	(Btu/lb) 26.735	("F) 57.7592	(lb/cu.ft.) 0.0743	(In.Hg) 0.4817	(gr/ou.fl.) 5.322					
Process: Sens	ble Cooling														
Start Pol	nt Name	Total	Total	Sensible	Latent	Mois	ture	Heat Ratio		nalpy/					
		(tons)	(Btu/n)	Energy (Blu/hr)	Energy (Etu/hr)	Diffet (Ib)	ence hr)		Humidity Ratio (Btu/lb / Ib/lb)						
R	A	-0.9	-11,005	-11,005	0	0.	0	1.008	N	A					
4. SH															
Air Flow	Dry	Wet	Relative	Humidity	Specific	Enthalpy	Dew	Density	Vapor	Absolute					
(cfm)	("F]	(°F)	(%)	(b/b)	(cu.ft./lb)	(Btu/Ib)	("F]	(lb/cu.ft.)	(In.Hg)	(gr/cu.fl.)					
1,000 Promote: Sonte	90.000	68.746	33.8	0.01022	14.0/9	32.849	57.759/2	0.0/10	0.4817	5.080					
Floores Della	Lis realing			-	1 at and			Sensible							
staft Pol	nt Name	Heating	Energy	Energy	Energy	Differ	ence	HeatHeatto	Humid	ty Ratio					
R	A	(tons) 1.4	(Btu/rr) 16,506	(Btu/hr) 16,506	(Btu/hr) 0	(lb/ 0.	tir) 0	1.000	(Btu/t	o / Ib/Ib) NA					
5. CC					•										
STATE POINT D	ATA	01-4	Solativa	Harrister	Speaks	Enthelese	- Press	Donatu	Views	Abrohit					
(Standard)	Bulb	Bulb	Humidity	Rato	Volume	interpy	Point	Contrary (Pressure	Humidity					
1,000	55.000	54,800	(%) 98.8	0.00912	13,160	23.097	54.6642	0.0759	0.4306	4.850					
Process: Cool	ng Coll							Garable							
Start Pol	nt Name	Total Cooling	Total Energy	Sensible Energy	Latent Energy	Detumic	ifeation	Heat Ratio	Ent Humid	nalpy/ ty Ratio					
R	A	-2.3	(Bturn) -27,379	(BIU/III) -21,965	-5,414	(D/ -4	(bhr) -4.9		(Btu/k 5,	533					
6. EC															
STATE POINT D	ATA	Wet	Relativo	Humidito	Specific	Entholm	Dew	gnetu	Vator	Absoluto					
	Bulb	Bub	Humidity	Rato	Volume	(DA: DO	Point	(block)	Pressure	Humidity					
(Standard)		E 3	 rmin 	 UD/851 	(CU.ft. (ID)	[BIII/ID]	CF1	(ID/CU.T.)	0.0.HQ3	(01/00.1L)					

Complete Project Information & Note Control!!

Complete project information and note capabilities!! Notes are individually controlled allowing for font, color, border, background, etc to all be specific to each note. Complete Drag-n-drop functionality as well as new-edit-delete note management!!



Complete User Data Control for Reports and Graphs!!

User information and auto note display capability!! User information is added only once and is automatically available for displaying on both the chart and/or the state point and process report!!

40

				AND NO.		4	Ì	1	
😫 User I	SUser Information								Name: Robert Hanna Company: Hands Down Software
	Always ADD to Show on repor	Projects on Open t	Add User Data to Current Chart		8			X	Tel: (405) 844-6314 Fax: (405) 844-6314 email: sales@handsdownsoftware.com
Use	er Name :	Robert Hanna					X		Date: 6/12/2004
Con	npany Name :	Hands Down Softw	are			4		Y	
Tek	ephone No. :	(405) 844-6314				Ņ	X		
Fax	: No. :	(405) 844-6314				A			
ema	al address :	sales@handsdown	software.com			1		X	

Complete Chart Presentation Control!!

Complete Chart control including virtually any Altitude or Pressure, Dry-Bulb and Humidity Ratio Axis Limit Control, turning Lines ON & OFF, Process line color and width, state point icon and size, state point label font control, Comfort & Data Center Zones, Page Setup and more!!



Sensible Heat Ratio Line Plotting!!

Sensible Heat Ratio Line Plotting is available with one simple button click!! Type the desired SHR and click the button and instantly, the requested SHR line is displayed on the chart!!

		1.0		- 1	- सि क			1.1		~~~		- 1	- 1X*	<u> </u>	+-+	-
Constitute the st Dester Line Dist.			1	474	-	١v			- 1	. 🗅	2.1	5	743	5	1	
📝 Sensible Heat Ratio Line Plot	X	IM≏-	<u>h</u>	7 1	- 1	Vľ	÷.	1 1	Ŧ٢	$s_{e^{-1}}$	۴ ۲	-7	4	\}	, 1	t st
	24		147		-11	4 4		14.4	-			F 4	-			
		Phe-	1 26	4-1	- PA	1-1	-	100	<u>~</u> +-		183	16 	\rightarrow	-112-	÷	
	146		100 a		24		- N	<u> </u>	- T	-	1.8		<u></u>	17		16
			4.20		ZÞ		_ 2			- · ·	ж I	\rightarrow			1	-
	_	1 - K-		17.8		134	2	-	het.		· ·	<u>k</u> +	-		÷С	-
			1.1	VP 1	S. 10	1 11	~÷		N. P	1		<u>n 1</u>			A	
Chart Dainty D.A.	- 1		1.1	4	- 12	4.4		4	- ¥.,	<u> 7</u>		-H-	4.	¥	++	<u></u>
I Start Point: TRA	T	liète.		- A -		100	<u> </u>		- 24	-	÷.	L 1	-	7 -	++	-
		THE REAL	NZ		· .	7-	1.12	-	VΡ	-		- 3		-	1-1	\square
i		16-V-	* *	- 1	- 10	∕0⊣	+	124	€ +	rr	÷.		æn-	- <u>+</u>	+	₩÷-
Constitute User Dette /CUDV 75			<u>3 1</u>	- 4	1		- 1	Y	134	<u> - 172</u>		57	<u> </u>		-	t t
i Sensible Heat Ratio (SHR): 170					1.1		- X.,		Ľ	100		27	. 1	_	1.2	77
		KH 1	+ +		R F	<u></u>	- 20	1 -		- 1	ъ.	3 		-	+	+
			<u>u i</u>	<u>71 - </u>	<u>K 1</u>	-	<u> </u>		151		1	13	C D	12	\mathbf{t}	
			1.1		1	. /		ų –		- 72	9	12	5	£₽-		₽
Dist SHD Line		PH.	- 14-1	÷ .	<u>l k</u>	- X -	\vdash	- 1		-1	4	\leftarrow		<u>- 1</u> -	d₹	42
FIUL SHK LINE			23.1	_	• D	-			- 4	· -	- K.			- 1-	1	1
÷		њж	-1 \3	-	1.4	ч.	-	-R/	44	2	12	1.5		- 74	-	-
		1273	Si 4	15	* 1	\P ~		124	$\alpha = 1$			_		211	. –	+~
			15		1.5.	1	74	-			1.4	7.2	12		Υ.	
	- k. A	k		× .		В.	ES.	<u> </u>		- N - N	-	47	Ref	-	*	+-
CONTRACTOR CONTRACTOR CONTRACTOR	- P 15				1.1	17			13.1		1.5	<u>_</u> Q7		1	-	
	- C		100	- 1	1 4			_	1.0	×.,		46	9		-12	-
22222222222222222222222222222222222222		* *	4			21	4	-	. N		4	+2	2-4	-	-174	संस
		- 121	- N.		15.8		1.54		1.0	14		13	8 T	-		4
22222222222222 1 1 1 1 1 1 1 1 1 1 1 1	4.	44		243	×.	<u> </u>	17.2	20		S	_	<u>+</u>	1. H	_	<u> </u>	
	- CX	1 1	26.	H P	8.	-1-	• \ 	- 12	×	H	· .	+	-94	. t	\pm	÷₩
	1.76	1.1		100	1.1	_	12			10.1		-	<u>450</u>	-	-	-
CONTRACTOR OF A CONTRACT OF A	R. L. P.	<u>+</u>	464	(⁻	- 1-	-	+ 3	Z.,		1 1	-	+-	433		44	4-
2 22222311311131113113113113113113	• 1 + 1	461	31 -	+ +	10.4		চৰ	+	1.5	1 7	-P	*	1 -2	्म	+	+
SSSSS AND A PROPERTY AND A REAL PROPERTY.	W al	12	-1-	1.1	11	- 22		2		1.51		157	<u>37'</u>	-QE	× .	
SASAN ALKAL MALLANCE AND A	4. 1 E	<i>.</i>	- 1	H T	1.1	-	I	4	<u>ال</u>		- L -	72	1-2	NF.	÷	-
															11	

Humidification Delta-Enthalpy / Delta-Humidity Ratio Line Plotting!!

Humidification Delta-Enthalpy / Delta-Humidity Ratio Line Plotting is available with one simple button click!! Steam Flow rate is automatically calculated based on desired Final Dew Point Temperature!!

		<u> </u>	1	A . 1	1	31 -	Ť
📝 dh/dW Ratio Line Plot 🛛 🔀		•	Å			X	Į
Start Point: RA 💽 🎒 🎒		X			X	₹ ‡	ł
dh/dW Line Plotting	NILK	Ì	Z	4	Ķ		¥
Steam Temp (°F or °C): 250							
dEnthalpy/dHumidityRatio (dh/dW): 1163	THINK			ľ	-		Į
Plot dh/dW Line		X		R	Å		
Humidification Process Calculator	NATTRI						
Dew Point Temp (°F or °C): 95				ł			
Final Dry-Bulb Temp (°F or °C): 86.57							
Steam Flow Rate (lb/hr or kg/hr): 114.9				Ň			•
Calculate	NH.U						
				K			
	Image: Constraint of the process calculator With the process calculator Image: Constraint of the process calculator Ima	Image: Constraint of the provided state of the provided s	Image: dh/dW Ratio Line Plot Start Point: RA Image: dh/dW Line Plotting Steam Temp (°F or °C): 250 dEnthalpy/dHumidityRatio (dh/dVV): 1163 Plot dh/dW Line Humidification Process Calculator Dew Point Temp (°F or °C): 95 Final Dry-Bulb Temp (°F or °C): Steam Flow Rate (lb/hr or kg/hr): 114.9 Calculate	Image: Why of the second system Image: Weight of the second system Start Point: RA Image: Weight of the second system Start Point: RA Image: Weight of the second system Steam Temp (°F or °C): 250 dEnthalpy/dHumidityRatio (dh/dW): 1163 Image: Plot dh/dW Line Image: Weight of the second system Humidification Process Calculator Image: Weight of the second system Dew Point Temp (°F or °C): 95 Final Dry-Bulb Temp (°F or °C): 86.57 Steam Flow Rate (lb/hr or kg/hr): 114.9 Calculate Image: Weight of the second system	Image: Why of the second state of t	Image: dh/dW Ratio Line Plot Start Point: RA Image: dh/dW Line Plotting Steam Temp (°F or °C): 250 Image: dh/dW Line Image: dh/dW Line <	dh/dW Ratio Line Plot Start Point: RA dh/dW Line Plotting Steam Temp (°F or °C): 250 dEnthalpy/dHumidityRatio (dh/dVV): Intraction Process Calculator Dew Point Temp (°F or °C): 95 Final Dry-Bulb Temp (°F or °C): Steam Flow Rate (lb/hr or kg/hr): Intervention

Complete State-Point and System Process Analysis Control!!

Complete State-Point and System Process Analysis capable. Process modeling includes AIR MIXING, COOLING COIL, EVAPORATIVE COOLING, DESICCANT DEHUMIDIFICATION, HUMIDIFICATION and SENSIBLE HEATING & COOLING!! All processes can either have END POINT specified, CALCULATING PROCESS DATA or PROCESS DATA specified, CALCULATING END POINT result!

ZPsychrometric Processes											
ą	Apply	🗋 <u>A</u> dd P	oint 🛛 🏠	Climatic Data	. 🗙 <u>D</u> elete	🖨 Print	8	Help			
	POINT	LABEL	AIR FLOW	UOM	PRO	CESS		GIVEN			
	RA	AR	1000	STD	Add State Poin	t		POINT			
	DH	AR	1000	STD	Desiccant Deh	umidify		POINT			
	SC	AR	1000	STD	Sensible Coolin	g		POINT			
Ì	SH	AR	1000	STD	Sensible Heatir	ng		ENERGY 🗾 💌			
	cc	AR	1000	STD	Cooling Coil			POINT			
	EC	AR	1000	STD	Evaporative Co	oling		POINT			
	НН	AR	1000	STD	Humidification a	and Heatin	g	POINT			
	CS	AR	1000	STD	Connect State	Points		POINT			
	MIX	AR	2000	STD	Air Mixing			POINT			
◀			Þ								
Γ	Start Point Process							Current Point			
F	λA	-	Sensib	e Heating		<u>_</u>	W	0.010217			
Air Flow 1000 DB 75.0 WB 63.9 RH 55.0 W 0.011 v 13.6 h 29.11 DP 57.73 d 0.073 vp 0.48 AW 5.223		1000 75.000 63.940 55.0 0.01022 13.695 29.181 57.759 0.0738 0.4817 5.222	Total Total Sensi Laten Moist Sensi	Heating Energy b le Energy t Energy ure Difference ble Heat Ratio lpy/ Humidity R:	1.4 16,5 0 0.0 1.00	506	Air FI DB WB RH VV h DP d Vp AVV	ow 1000 89.999 68.746 33.8 0.01022 14.079 32.849 57.759 0.0718 0.4817 5.080			

Complete IP & SI Unit of Measure Control with ONE Button Click!!

All Charts, state-points and process data are converted automatically between <u>IP and/or SI</u> with the click of a button!!



Save Charts and Report as PDF Files that can be easily shared or emailed!! Ability to export chart and reports out in PDF format automatically!!



Select any of (10) Different Languages for Charts and Reports!!

Automatically convert between (10) different Languages just by Clicking a button!!



Easy-to-Use Right-Click Pop-Up Menu Control!!

Right-Click Pop-Up menus allow for easy control of the chart whether it's moving state-point labels or managing chart notes!! Left Double-Click automatically ZOOMS-IN and Right Double-Click automatically ZOOMS-OUT. Hold the left buttom down and Drag allows you FULL PANNING of the chart!!



Complete Stand Alone Psychrometric Property Calculator!!

Complete Psychrometric Calculator with File-Open-Save capabilities and outputs in either IP or SI units!!

Psychrometric Calcul	SI C	roje	A +	×	.	3									×
Attude Barometric Pressure Atmospheric Pressure	0 29.921 14.696		Description		Dry Bulb (*F)	VVet Bulb (*F)	Relative Humidity (%)	Humidity Ratio (gr/lb)	Humidity Ratio (Ib/Ib)	Specific Volume (cu.ft/lb)	Enthalpy (Btu/lb)	Dew Point (*F)	Density (lb/cu.ft.)	Vapor Pressure (in. Hg)	Ab HL (g
Dry Bulb Temp	55		OA RA		95.000 80.000	78.000 67.000	47.294 51.140	0.01686	0.000000	14.3564 13.8453	41.3955 31.5098	71.800 60.347	0.070850 0.073047	0.78631 0.52840	
Wet Bulb Temp Relative Humidity	54.8 98.784	1	ccl		55.000	54.800	98.784	0.00912	0.00000	13.1600	23.0967	54.664	0.076687	0.43061	
Humidity Ratio C gr (* Ib Specific Volume	0.00912														
Enthaloy Dew Point Temp	23.0967 54.664														
Density Vapor Pressure	0.076687														
Abs. Humidity C gr (* 10 Parts Per Million by Weight	0.00069														
Parts Per Million by Volume	14,658	-													

Complete World-Wide Climatic Outside Air Design Data!!

Complete Climatic Outside Air Design Data for over 1,000 cities throughout the WORLD for <u>either</u> <u>IP or SI units</u>!!

😂 Climatic I	ata - ASHRAE 1997 Fundameni	als		_ 🗆 ×
COOLING	USA	▼ 676	Elevation, Feet	English (IP)
HEATING	Oklahoma	36.2	North Latitude	O Metric (SI)
VMND	Tulsa	95.9	West Longitude	
SUMMER DE	MVB F wb VB	MDB F db	DP MDB	⁰F db 💌
0.4% 100	76 76.00 79	92 92.00	1 76 87	87.00
1% 97	76 76.00 78	92 92.00	74 85	85.00
2% 94	75 75.00 77	90 90.00	1 73 84	84.00
Average Ann	ial Max. DB °F 103 Std. De	v. °F 4 Mea	n Daily Range DB	" F 19
WINTER HEATING D 99.6% 9 99% 14	RH *F wb Coldest % 6.72 11.23	WS MCDB mph *F 0.4% 24 46 1% 22 40	Average Annual DI Min. °F 2	B Std. Dev. °F
WIND Coinc Coinc Annu	ident with 0.4% DB (cooling) ident with 99.6% DB (heating) al Design Values 1% 25 m	MCVVS 12 MCVVS 11 ph 2% 23	mph PVVD mph PVVD mph 59	180 deg. 360 deg. 6 21 mph

Cooling Coil Design Calculator!!

Complete Cooling Coil Leaving air condition calculator!!! Automatically calculate the Leaving air temperature or the airflow for cooling coils!!

Coil Leaving	Air Conditi	ion Calculat	or		2
Calculate	Apply	Print 🗙	Close		
Room (Zone)	RA	*	Load Data (selec	t any two)	r.
Airflow	10,000	SCFM	Total Heat	375000	Btu/hr
Dry-Bulb Temp	80.00	"F	C Sensible Heat	270000	Btu/hr
Humidity Ratio	0.01123	b/b	Latent Heat	105000	Bhu/hr
Enthalpy	31,51	Btu/lb	SHR	.72	Qs/Qt
Leaving Coil	CC	•	Leaving Coil Co	ndition	Apply
· Airflow (use)	10,000	SCFM	Airflow	10,000	SCFM
C Dry-Bulb (use)	55.00	"F	Dry-Bulb Temp	55.414	°F
Humidity Ratio	0.00904	lb/lb	Humidity Ratio	0.00910	lb/lb
Enthalpy	23.02	Btu/lb	Enthalpy	23.18	Btu/Ib

Room (Zone)	RA	*	Load Data (selec	t any two)	6
Airflow	10.000	SCFM	Total Heat	375000	Btu/hr
Dry-Bulb Temp	80.00	Ŧ	F Sensible Heat	270000	Btu/hr
Humidity Ratio	0.01123	lb/lb	Latent Heat	105000	Btu/hr
Enthalpy	31.51	Btu/lb	SHR	.72	Qs/Qt
Leaving Coil	CC	-	Leaving Coil Co	ndition	Apply
C Airflow (use)	10,000	SCFM	Airflow	9,812	SCFM
· Dry-Bulb (use)	55.00	"F	Dry-Bulb Temp	55.00	*F
Humidity Ratio	0.00904	lb/lb	Humidity Ratio	0.00904	lb/lb
Enthalpy	23.02	Bhu/b	Enthalpy	23.02	Btu/lb

Complete Air Collection Calculator!!

Integral Air Collection Calculator!! Simply click on the combo box drop downs and select the state points desired for collection, and with one "Calculate =>' button click, your system collection point is automatically displayed, available to be added to your system, chart and report!!

Air Collection	n Calculato	r				
Selected Point	1 RA	-			Print	Close
Airflow	1,000	SCFM				
Dry-Bulb Temp	75.00	۴F				
Humidity Ratio	0.01022	lb/lb				
Enthalpy	29.18	Btu/lb				
Selected Point	2 DH	•				
Airflow	1,000	SCFM				
Dry-Bulb Temp	90.00	۴F				
Humidity Ratio	0.00678	lb/lb	 -			
Enthalpy	29.07	Btu/Ib		a	poly Point to D	hart
Selected Point	3 CC	•		Collection Del	Particip	d Horo
Airflow	1,000	SCFM		Airflow	5 000	SCEM
Dry-Bulb Temp	55.00	۴F	Robins	Dru-Rub Temp	71.00	*E
Humidity Ratio	0.00912	lb/lb	Laiculate => ·	Lumiditu Ratio	0.00813	b/b
Enthalpy	23.10	Btu/Ib		Enthalpy	25.92	Btu/Ib
Selected Point	4 EC					
Airflow	1,000	SCFM				
Dry-Bulb Temp	65.00	°F				
Humidity Ratio	0.01253	lb/lb				
Enthalpy	29.26	Btu/lb				
Selected Point	5 CS					
Airflow	1,000	SCFM				
Dry-Bulb Temp	70.00	۴F				
			 and the second se			
Humidity Ratio	0.00200	lb/lb				

Stand Alone Universal Unit of Measure Conversion Calculator!!

Complete unit of conversion calculator for quick and easy IP<>SI unit conversions!!

🐪 Unit Conversion Calculator	_ 🗆 ×				
Eile 🕶 Help 🕶 🔛 🍋					
Force Light Mass Power Pressure Specific V	/olume				
Acceleration Angle Area Density Distance Energy	Flow				
Temperature Time Velocity Volume Volum	e-Dry				
Input Celsius Fahrenheit Kelvin Bankine Input 95.76 Celsius Fahrenheit Kelvin Bankine Fahrenheit Kelvin Bankine					
Input: 35.76 Fahrenheit					
Output: 35.42222222222 Celsius					

Complete Data Exchange Capabilities with Microsoft Excel, Word, etc!!

Complete Data Exchange Capabilities!! You can export data, charts and reports either by Edit-Copy copying to the clip board, or by automatically exporting out to a PDF file!!

Importing of Data is accomplished with comma delimited ".csv" files which can easily be generated with any text editor or spreadsheet program such as Microsoft Excel!!!



Motor Heat Calculator!!

Motor heat calculation is one button click away!! Simply type in the motor size (power) and the efficiency and instantly get the resulting sensible heat generated by the motor along with the corresponding temperature rise!!

📴 Motor Heat Calculator 🛛 🔀						
💵 SI 📕 Calculate 🚑 Print 🖺 Copy						
-Given Data						
Airflow	15000	cfm				
Motor Size	10	hp				
Efficiency	91.4	%				
Sensible Air Heating						
Sensible Heat	27835	Btu/hr				
Approx Temp Rise	e 1.71	۴F				

Steam Property Calculator!!

Complete Steam Property Calculator in both IP and SI units of measure!!!

💧 Steam Property Calculator 🛛 🔹 🕨					
IP SI 🔚 Calcula	te 🛃 Print	🖺 Сору			
Temperature	325	۴F			
Absolute Pressure	96.3000	psi			
Absolute Pressure	196.0688	in.Hg			
Specific Volume - vf	0.01771	cu.ft./lb			
Specific Volume - vfg	4.598	cu.ft./lb			
Specific Volume - vg	4.616	cu.ft./lb			
Specific Enthalpy - hf	295.64	Btu/lb			
Specific Enthalpy - hfg	891.47	Btu/lb			
Specific Enthalpy - hg	1187.10	Btu/lb			
Specific Entropy - sf	0.4706	Btu/lb -*F			
Specific Entropy - sfg	1.1361	Btu/lb -°F			
Specific Entropy - sg	1.6067	Btu/lb -*F			

WERSION AND RELEASE HISTORY

VERSION 7 – NEW FEATURES (Release Aug-2011)

NEW PROCESS ANALYSIS CAPABILITIES

- NEW! Updated ASHRAE Datacenter Zones to 2011 Thermal Guidelines!
- NEW! Updated ASHRAE 2010 Comfort Zones!
- NEW! Re-arrange or Re-order Points on the Fly with One Button Click!
- NEW! TMY2 & TMY3 Bin Weather USA Locations Added!
- NEW! Ability to Select Days Per Week for Bin Weather Data & Plots!
- NEW! HDClimatic Updated to 2009 ASHRAE Fundamentals!
- NEW! Import Your Own Weather Data File Locations into the Chart!
- NEW! Optional Process Directional Arrowheads on Process Lines!
- NEW! Ability to Print-All or PDF-All (Psy+Flow+Report) into ONE File!
- NEW! Cooling Coil Apparatus Dew Point (ADP) Calculator!
- NEW! Cooling Coil Air Bypass Factor (ABF) Calculator!
- NEW! Improved Air Mixing Algorithm with both Mass and Energy Balance!
- NEW! User Program Quantity Expanded from 15 to 25 Programs!

NEW TOOLS

- NEW! Evaporative Cooling Detailed Performance Calculator!
- NEW! Electric Heater Detailed Performance Calculator!
- NEW! Indoor Pool Evaporation Calculator!
- NEW! SMACNA Air Leak Class Calculator!
- NEW! Center of Gravity Corner Load Calculator!
- NEW! Pump Law Calculator!
- NEW! Complete Inter-Active Element Periodic Chart!
- NEW! System Efficiency COP-EER-kW/ton Calculator!
- NEW! Total & Sensible Wheel Energy Recovery Performance Calculator!
- NEW! Plate Heat Exchanger Energy Recovery Performance Calculator!
- NEW! Fluid & Mixture Thermo-Physical Property Calculator!
- NEW! Rectangle & Round Duct Fittings added to HDDuctDesigner!
- NEW! Duct Temp Gain/Loss Calculator added to HDDuctDesigner!
- NEW! Duct Pitot Airflow Calculator added to HDDuctDesigner!

NEW PRESENTATION CONTROL

- NEW! Ability to Turn Logo On & Off, for ASHRAE Meeting "Generic" Presentations!
- NEW! Customize Psychrometric Charts with your own Colors!

- NEW! Change Any Chart Property Lines to Any COLOR You Choose!
- NEW! Change Any Chart Property Lines to Any Line TYPE You Choose!
- NEW! Change Any Chart Property Lines to Any Line THICKNESS You Choose!
- NEW! Improved Toolbar and Menu Control Setup!
- NEW! User-Defined Custom Area Shading right on the Chart!
- NEW! Updated ASHRAE 2010 Comfort Zones!
- NEW! Optional Process Directional Arrowheads on Process Lines!
- NEW! Ability to Hide State Point Label on a Point-By-Point basis!!
- NEW! Draw Your Own Lines Anywhere You Want!
- NEW! Draw Your Own Ellipses Anywhere You Want!
- NEW! Draw Your Own Rectangles Anywhere You Want!
- NEW! Draw Your Own Circles Anywhere You Want!
- NEW! Insert Your Own Pictures Anywhere You Want!

NEW LANGUAGES

- NEW! Languages, Now with (19) Different Languages on Charts and Reports with one button click!

- NEW! Croatia Language!
- NEW! Czech Language!
- NEW! Finish Language!
- NEW! Latin Language!
- NEW! Polish Language!
- NEW! Turkish Language!

NEW DATA EXCHANGE

- NEW Point Color Control when Importing Data from Excel (*.csv) files!
- NEW Point Size Control when Importing Data from Excel (*.csv) files!
- NEW Process Line Color Control when Importing Data from Excel (*.csv) files!
- NEW Process Line Thickness Control when Importing Data from Excel (*.csv) files!
- NEW! Import Your Own Weather Data File Locations into the Chart!

NEW NOTES

- NEW! Improved Note Controls!

GENERAL IMPROVEMENTS

- NEW! Added Apparatus Dew Point (ADP) to Cooling Coil Leaving Air Calculator!
- NEW! Added Air Bypass Factor (ABF) to Cooling Coil Leaving Air Calculator!
- NEW! Point property toolbar display now includes units of measure!
- NEW! Thermal Comfort Terms Definition PDF Manual!
- NEW! Improved Air Density Property Calculation!

- NEW! Many minor bugs and improvements implemented! VERSION 6 – NEW FEATURES (Release Jan-2007)

NEW PROCESS ANALYSIS CAPABILITIES

- New Auto Flow Chart Diagram

- New Individual Process Line Color Control
- New Individual Point Color, Shape and Size Control
- New Winter "V" Air Mixing Capability with Condensation
- New Fog Region Property Display
- Constant h, WB, HR, DB Line Control

NEW TOOLS

- New Complete Thermal Comfort Calculator
- New Weather Data Plotting with Complete Global Weather Files
- New Weather Bin Shade Plotting with Complete Control
- New Global Weather Data Table Access
- New Weather Term Glossary
- New Wind Chill Factor Calculator
- New Climatic Data Printing Capability Added
- New Outside Air Estimator UPDATED to ASHRAE Standard 62-2004
- NEW PRESENTATION CONTROL
 - New Humidity Ratio Unit of Measure Control
- New Mouse Cross-Hair (Like CAD!!) or Target Control
- New Cooling Coil Performance Line Control
- New Page Color Control
- New Chart Area Color Control
- New ASHRAE Class 1 through 4 Datacenter Zones (allowed & recommended)
- New NEBS Datacenter Zones (allowed & recommended)
- New Black & White <=> Color Display & Print Control
- New Heading On/Off Control
- New Outline On/Off Control
- New Zoom Window Control

NEW TOOLBOX ANALYSIS

- New Ability to add user defined "ToolBox" Programs under menu item tools
- New Single & Double Interpolation Calculator
- New Fan Law Calculator
- New Duct Sizing Calculator
- New Loan Calculator

NEW ADDITIONAL CAPABILITIES

- New High Pressure Capability up to 100 PSI
- New Auto-Altitude Change with Climatic Location Selection
- New Fog Region Thermo-Physical Property Display

NEW LANGUAGES

- Now with (13) Different Languages on Charts and Reports with one button click

- New Greek Language
- New Japanese Language
- New Dutch Language

- Improved Italian Language Updated NEW DATA EXCHANGE

- New REAL-TIME Data Monitoring Capability
- New Process Control added to Data Import Function
- New Complete Weather Data Export to Excel or Text File
- SI units added to text file & Excel Data Exchange
- New Export-As Excel *.csv File
- New Export-As Notepad *.txt File
- NEW NOTES
 - Improved Note Control Update

VERSION 5 – FEATURES (Release Jan-2005)

NEW PRESENTATION CONTROL

- New Custom Axis Range Control
- New Chart Altitude or Pressure Control
- New Lines ON/OFF Control
- New Process Line Color & Width Control
- New State Point Icon, Size Control, Color & Label Control
- New Comfort Zone Area Plotting
- New User information Saved/Displayed on Charts & Reports
- New Page Setup Control

NEW PROCESS ANALYSIS CAPABILITIES

- New Sensible Heat Ratio Line Plotting
- New Humidification Delta-Enthalpy / Delta-Humidity Ratio Line Plotting
- New Partial Mixing of Airstreams Allows for Component Mixing Bypass
- New Cooling Coil Leaving Air Calculator / Auto-Plotting
- New Organized Toolbar Menu Setup

NEW TOOLS

- New Air Collection Calculator with Auto-Plotting

- New Integral IP<=>SI Unit of Measure Calculator
- New Fresh Air Estimator Updated to 62-2001
- New Motor Heat Calculator
- New Steam Property Calculator
- NEW ADDITIONAL CAPABILITIES

- New Easy Auto-Create / Export PDF Files of Charts & Reports NEW LANGUAGES

- Now (10) Languages including CHINESE

NEW DATA EXCHANGE

- New Complete Data Exchange Capabilities NEW NOTES

- New Add/Edit/Delete Note Control with Drag-Drop Positioning

- New Project Information Control Displayed on Chart & Report

VERSION 4 – FEATURES (Release Jan-2003)

NEW PRESENTATION CONTROL

- New State Point and Process Report

- New Universal IP <=> SI Unit Control

NEW PROCESS ANALYSIS CAPABILITIES

- New Air Mixing Process
- New Cooling Coil Process (with REAL Cooling Coil Curves!)
- New Desiccant Dehumidification Process
- New Sensible Heating Process
- New Heating & Humidification Process
- New Evaporative Cooling Process
- New Sensible Only Cooling Process

NEW TOOLS

- New Stand Alone Psychrometric Calculator

- New Stand Alone World-Wide Climatic Data
- New Stand Alone Outside Air Calculator based on ASHRAE Standard 62-89 NEW ADDITIONAL CAPABILITIES

- New State Point Label Positioning Control

- New Zoom & Pan Control

- New Mouse-Move Thermo-Physical Property Display

NEW LANGUAGES

- New (7) Different Languages on Charts & Reports with one-button click NEW DATA EXCHANGE

- New Ability to Copy Chart to Clipboard

- New Ability to Copy Report to Clipboard



Technical Support

Technical support is **free of charge** and available by fax, mail, email and through our World Wide Web site.

It is our policy to respond to all inquires within 48 hours from receipt.

Please include Version number found in the "About" box under the Help menu with your inquiry.

Email: support@handsdownsoftware.com

Phone: 405.844.6314 Fax: 405.844.6314 Write: Hands Down Software 1108 Olde Bridge Road Edmond, OK 73034 USA Web: http://www.handsdownsoftware.com

Contact Us

HANDS DOWN SOFTWARE

1108 Olde Bridge Road Edmond, OK 73034 USA Off: 405.844.6314 Fax: 405.844.6314 Email: info@handsdownsoftware.com

OFFICE HOURS

8:00 am - 5:00 pm Central Standard Time Monday through Friday

HOLIDAYS

New Year's Day Memorial Day July 4th Labor Day Thanksgiving Christmas

V7 Registration

Version 7 requires a registration code for EACH Seat, (1) Seat is licensed per CD, unless you have purchased a site license.

Psychrometric Analysis Suite	REGISTRATION CODE REQUEST
Release 7.0.0	Print / Fax Section E-Mail × Close
Registration is REQUIRED for Version 7	amail or fax to 405 944 6314
* Note: HDPsyChart Psychrometric Analysis will only run for a few days without registration and will stop functioning without notice. Registration is required for this version.	Installation Code: 12405.99 Version: ASHRAE Psychrometric Chart Version Type: Professional Edition
User Registration	Belease 7.0.0
When you register as a User of this program, your contact information will be included in email notification broadcasts of:	Your Name:
=> Corrective patches when issued	Lompany:
=> New Features update links as they	Address 1:
become available	Address 2:
=> New Versions as they become available	City: State/Prov.:
=> Periodic Tips and Use Examples	Postal Code: Country
Enter Registration Complete Form and	Phone: Fax:
Code Below: Receive	* E-Mail
Registration Code	* Noto: This is where your registration
Click Here to Validate and Save Registration Code	code will be sent. (1) code is provided per CD. Please contact us for additional seat
Register Later End without Registering	purchases if necessary.

General Registration

When you register as a User of this program, your contact information is included in email notification broadcasts of Corrective Patches, New Features, New Versions, Tips, etc., everything you need to stay current.

Menu Path	
A PSYCHROMETRIC ANALYSIS CD - PsyChart1	
Elle Edit Analysis Notes Tools View Language Settings Register Now	Help
🗅 😅 📹 🔲 🖬 🕼 🐧 📇 🖓 🥵 😭 🕐 😭 💡	ΑE
◊ ᄽ ✔ ↗ 빠 ☞ 않 ▦ ፡፡ ◊ ♦ ቋ % ◙ ▣ 뿌 두 ⊑]
User Registration Form	
email or fax to 405.844.6314	
Your Name:	
Company.	
Version:	
Address 1:	
Address 2:	
City: State/Prov.	
Postal Code Country	
Phone Fax	
E-Mail	



Menus and Toolbars

You can access the Psychrometric Analysis services via a standard Windows menu and tool bar system. Each component of the system can be dragged and docked to the top, bottom, left or right sides of the Psychrometric Chart Window, or can become floating menus positioned anywhere within the Psychrometric Window.



In addition to accessing these services, a constant display of the mouse position in psychrometric property terms is available at all times. The values are displayed in a button bar that can be docked or floating just as the Psychrometric Analysis's other button bars. See the graphic to the left. Let the mouse pointer hover over a value for just a couple of seconds and the engineering units for that value are displayed. The values can be configured for your own needs via the button bar customize option as described above.

Custom User-Defined Menu Toolbars

To add your favorite engineering tools to the Psychrometric Analysis Menu Toolbars, simple click User Programs => User Program Manager and provide a Program Name and locate the program using the "Browse..." button.

User Progra	ms <u>R</u> egist	ter Now <u>H</u> elp				
🎨 User Pr	ogram Mar	nager 🛛 🖉 🄏	ASHRAE NO	D.1 🔹 IP SI	🧮 English	- 🔍 🔍 🗟 🔲 10
\ <i>&</i> 🕢 .	🍫 User	Program Manage				
			Program Name	Program Path		🖏 Apply 🗙 Close
	Delete	🎨 User Program 1				Browse
	Delete	\delta User Program 2				Browse
	Delete	🎨 User Program 3				Browse
	Delete	🎨 User Program 4				Browse
	Delete	🎨 User Program 5				Browse
	Delete	🎨 User Program 6				Browse
	Delete	🎨 User Program 7				Browse
	Delete	🎨 User Program 8				Browse
	Delete	🎨 User Program 9				Browse
	Delete	🛯 🎨 User Program 10				Browse
	Delete	🔖 User Program 11				Browse
	Delete	🔖 User Program 12				Browse
	Delete	🍓 User Program 13				Browse
	Delete	\delta User Program 14				Browse
	Delete	🛛 🍫 User Program 15				Browse



IP OR SI UNIT CONTROL

You can switch from IP to SI and back with one button click. All State Points and Processes are dynamically recalculated on the fly!!



CHART & REPORT LANGUAGE CONTROL

Change your charts and reports to any of (13) different languages with one button click!!



PAGE SETUP CONTROL

Complete page setup control supporting both IP and SI units of measure!



CHART AXIS RANGE CONTROL

Complete Dry-Bulb and Humidity Ratio Range Control!!

🔽 Use Custom Axis	Use Custom Axis
Minimum Dry-Bulb Temp: 32 °F	Minimum Dry-Bulb Temp: 0 °C
Maximum Dry-Bulb Temp: 120 °F	Maximum Dry-Bulb Temp: 50 °C
Maximum Humidity Ratio: 0.0300 Ib/Ib	Maximum Humidity Ratio: 0.0300 kg/kg
Load Axis Range Defaults	Load Axis Range Defaults

ALTITUDE & PRESSURE CONTROL

Generate Charts and Perform Analysis at virtually any Altitude or Pressure!!

✓ Use Custom Altitude (in. HG)	Use Custom Altitude (kPA)		
29.921 Barometric 💌	101.325 Barometric 💌		
Altitude	Altitude		
Barometric	Barometric		
Atmospheric	Atmospheric		

CHART LINE ON/OFF CONTROL

Improved and Enhanced Line Property and Feature On/Off Control!!

Chart Property Line Control		Major	Minor	
	Dry Bulb	V		
	Wet Bulb	V		
	Humidity Ratio	•		
	Specific Volume	•	•	
	Enthalpy	•		
	Relative Humidity			
	Extended Enthalpy	◄		
	Perimeter Enthalpy	◄		
2	SHR Index	◄		
	Dew Point	◄		
\square	Vapor Pressure	◄		
	Cooling Coil Lines	◄		
	Chart Perimeter Outline	V		
Check ALL Un-Check ALL				

HUMIDITY RATIO UNIT CONTROL

Complete Humidity Ratio Unit of Measure Control!!

Humidity Ratio Units C Small Units (gr/lb or g/kg)
C Large Units (lb/lb or kg/kg)

PROCESS LINE & STATE POINT COLOR & SIZE CONTROL

Now you can specify the colors, size, thickness and icons for each individual state point and process!!


SUMMER & WINTER COMFORT ZONE CONTROL

Seeing the Summer and Winter Comfort Zones is just a button click away, and you can format the line color, weight and area fill color too!!

1	Profile Presentation Control			_/
		🖏 Apply 🗙 Close		7~
	Page Setup Chart Settings Chart Lines	Point/Process Lines	P65	
	Comfort Zones Paper-Chart Colors Data P	rocessing Zones		1111
	Show Summer Comfort Zone			
	Mininmum Dewpoint Temp. 36.0 "F			
	Maximum DP Dry-Bulb 81.0 °F		65	
	Minimum DP Dry-Bulb 74.0 °F			<u> </u>
	Maximum Wet-Bulb Temp. 68.0 °F	Sultan BC COMFORTA		
	Maximum WB Dry-Bulb 79.0 *F			
	Minimum WB Dry-Buib 73.0 -			
	Load Summer Zone Defaults		60.	\sim
	Ran Calar - R Ran Vilaiaht 10 =	Dil Calas 🔲 🚱		_
		FILLOIOF MUSICE		
			COMFORT	
	Show Winter Comfort Zone		WINTER COMFORT	
	Show Winter Comfort Zone		VIOLONIA COMFORT	
	✓ Show Winter Comfort Zone Mininmum Dewpoint Temp. 36.0 Maximum DP Dry-Bulb 76.0		Old COMFORT VINTER ZONE Old ZONE	
	Image: Show Winter Comfort Zone Minimum Dewpoint Temp. 36.0 "F Maximum DP Dry-Bulb 76.0 "F Minimum DP Dry-Bulb 69.0		olo COMFORT ZONE	
	Image: Show Winter Comfort Zone Mininmum Dewpoint Temp. 36.0 Maximum DP Dry-Bulb 76.0 Minimum DP Dry-Bulb 63.0 "F Maximum VVet-Bulb Temp. 64.0		olo olo olo olo olo	
	Image: Show Winter Comfort Zone Mininmum Dewpoint Temp. 36.0 Maximum DP Dry-Bulb 76.0 Minimum DP Dry-Bulb 63.0 *F Maximum Wet-Bulb Temp. 64.0 *F Maximum WB Dry-Bulb 74.0		Plo COMFORT VINTER ZONE Plo ZONE Plo S	
	✓ Show Winter Comfort Zone Minimum Dewpoint Temp. 36.0 °F Maximum DP Dry-Bulb 76.0 °F Minimum DP Dry-Bulb 69.0 °F Maximum VVet-Bulb Temp. 64.0 °F Maximum VVB Dry-Bulb 74.0 °F Minimum VVB Dry-Bulb 68.0 °F		olo Olo Olo Olo Olo Olo Olo Olo	
	✓ Show Winter Comfort Zone Minimum Dewpoint Temp. 36.0 °F Maximum DP Dry-Bulb 76.0 °F Minimum DP Dry-Bulb 69.0 °F Maximum Wet-Bulb Temp. 64.0 °F Maximum WB Dry-Bulb 74.0 °F Minimum WB Dry-Bulb 68.0 °F Load Winter Zone Defaults 68.0 °F		plo COMFORT ZONE COMFORT ZONE	
	✓ Show Winter Comfort Zone Minimum Devopoint Temp. 36.0 *F Maximum DP Dry-Bulb 76.0 *F Minimum DP Dry-Bulb 69.0 *F Maximum VVet-Bulb Temp. 64.0 *F Maximum VVB Dry-Bulb 76.0 *F Maximum VVet-Bulb Temp. 64.0 *F Maximum VVB Dry-Bulb 68.0 *F Load Winter Zone Defaults Pen Weight 10		olo Olo Olo Olo Olo Olo Olo Olo	
	✓ Show Winter Comfort Zone Minimum Dewpoint Temp. 36.0 °F Maximum DP Dry-Bulb 76.0 °F Minimum DP Dry-Bulb 63.0 °F Maximum Wet-Bulb Temp. 64.0 °F Maximum WB Dry-Bulb 74.0 °F Minimum WB Dry-Bulb 68.0 °F Load Winter Zone Defaults Pen Weight 10	Fill Color	Display COMFORT Display COMFORT Display COMFORT Display Component Display Componen	
2 N VI V 2 V V	✓ Show Winter Comfort Zone Minimum Dewpoint Temp. 36.0 °F Maximum DP Dry-Bulb 76.0 °F Minimum DP Dry-Bulb 63.0 °F Maximum Wet-Bulb Temp. 64.0 °F Maximum WB Dry-Bulb 74.0 °F Minimum WB Dry-Bulb 68.0 °F Load Winter Zone Defaults Pen Weight 10	Fill Color	plo COMFORT ZONE plo COMFORT ZONE	

PAPER & CHART AREA COLOR CONTROL

Specifying the chart area and paper area colors is a snap!!



DATA PROCESSING ENVIRONMENT AREA DISPLAY CONTROL

Take the mystery out of the ASHRAE Data Processing Environment Class Areas with one button click!!...Dynamically adjusts the areas based on altitude or pressure too!!



COLOR OR B&W CHART CONTROL

Switch from Color to Black & White and back with just one button click!!!



MOUSE POINTER CONTROL

Simply click the icon on the toolbar to select the mouse tracking icon preference!!!





STATE POINT & PROCESS ANALYSIS

1. Activate "State Point and Processes" by any of the three methods shown below:



2. The Psychrometric Processes window appears with blank data fields.

2	Psychro	ometric F	Processe	25					
٩	Apply	Add	Point	X <u>D</u> elete	🖨 Print	62	<u>W</u> eather	💡 <u>H</u> el	o 🅨
	PC	DINT	LABEL	AIR FLOW	UOM		PROCES	s	GIVEN
•									
F									

3. To enter a new point, click the Add Point button. Fill in the grid information as needed (point name, point label location, enter the airflow, select air flow units, select process and select given option). If this is the first point, the only process offered is "Add State Point" since there are no other points to create a process with. Click on the "Current Point" panel and enter dry bulb temperature, enter moisture value and select moisture property from the drop-down box.

🖉 Apply 🕒 Add Point 🗙 Delete 🖾 Print 🧖 Weather 🤗 Help 🗙 Close	
Contraction Contraction Contraction Contraction Contraction Contraction	
POINT LABEL AIR FLOW UOM PROCESS GIVEN	
Return Air AR 1500 ACT CFM Add State Point POINT	
	Þ
Current Point	1
DB 80	1
	-1
	4
Air Flow 1500	
DB 80.0	
VVB 67.0	
RH 51.1	
W 0.0112	
v 13.85	
h 31.51	
DP 60.3	
d 0.0730	
vp 0.528	
AW 5.676	

4. Click on the Apply button and the point is plotted to the chart.



5. Click the Add Point button again to continue adding new points. Adding more than one point enables additional PROCESSES to be selected in the grid. The GIVEN column will also be enabled, after the first point is entered, to allow entering either the end point (POINT), calculating the process energy or entering the process energy (ENERGY) and calculating the end point. After each successive point, click the Apply button to plot the point and process to the chart.

					×n ~ 1				20	200	22	X		1×1
	Psychro	metric Pr	ocesso	15					×B	222	22	1-1		Κľ
₽	Apply	Add F	Point	× Delete	Brint	Weather	😵 Help	X Close	TR	555G	37			2.
	PO	INT	LABEL	AIR FLOW	UOM	PROCES	S	GIVEN	TE		Y		X	
	Return A	Vir /	AR	1500	ACT CFM	Add State Poi	nt F	OINT		2222°				
>	Cooling	Coil	BL.	1500	ACT CFM	Cooling Coll	F	OINT	R	2000 X	11	1/		1
•									WWW	ST.		(K
-	Start	Point		tion Coll	Process	4	DB	55	WINNY				4	
1 R	(eturn Air	•		ling Coll		<u>_</u>	RH	1 98	T I			As	A	
4	Air Flow	1500	E	Total Cooling		-4.9	Air Fk	w 1500	IE		V-	1	1	1
D	Ð	80.0		and Engen		20 010	DB	55.0	-	XII	- 1	-	X	4
V	MB	67.0		iotal criengy		-50,610	WB	54.7	E			*	A	(···
R	ЯH	51.1		Sentible Energy	t i	-42,106	RH	98.0	1E	L A	-	-C	25-	+
V	N.	0.0112		atent Energy		-16,512	w	0.0090		TX-	-	X	11	-
Ľ	(13.85	E	Pehumidification		15.1	Y	13.16	E					
	NP.	31.51		Sumitive Mant D		0.740	h	23.02	4	KA	X	1-		X
l a	1	0.0730	1.00	sensive risd. N	ato	0.00	DP	0.0767	1		×		17	-
	(D)	0.528	160	Enthalpy/Humid	ity Ratio	3,893	un un	0.427	A			-	X	-
	ww	5.676					AW	4 811	1	270-	10	Þ.K	1	-
							0.000		1		1	1	1	-
-	-			AT COMPANY			1	1 1.51			X	1-1		
E	222	<u> </u>		CH2	222	X-1 X			X	1.				X
2		222	22	222	<u> </u>	1 1 1						1-1	Z	T.
2			22	<u>A</u>	SX-			Sac			-	Ret	urn	Air
23	22	222	22	2260,7	11-1	Not Not		WH "		1. 1	0	44	-	=
2	222	777	22	22	1-1-0		X		A	1	X			
2			24	SX11	-		X.		1-1			-	1	-
3	22	222	SA		- in	010			-	VEK P	15		1	
3	22	255	X	TAN	1 X	1 60.	Y D			XIII	1/1-			-
\geq	99	\leq	AU		2.		N.K.	-	12		TE	K	- A	
ol	ing (Coil	X		1 70	Son Berly	1	C.X	· · · · ·	1	A		×.,	
2	3	129			1		s. V.	1.1.1	- 1	- VX		1000		1

Additional processes can be added to complete any system. If you need to make changes you may do so to any point by just clicking on the proper grid row, make any desired changes and simply click "Apply" and the point and connecting processes are automatically updated.

6. To apply a Climatic Data weather point to the chart, simply click on the Weather icon to access the Climatic Data Window.

Psychr	ometric F	Processe	s						
🖏 Apply	Add	Point	<mark>≻</mark> <u>D</u> elete	🖨 Print	Ē,	<u>} W</u> eather	🦿 <u>H</u> e	lp 🗙	<u>C</u> lose
PC	DINT	LABEL	AIR FLOW	UOM		PROCES	s	G	IVEN
🖉 Outside	e Air	AR	1000	STD CFM		Add State Poi	nt	POINT	
•									Þ
							(Current	Point
							DB	Γ	
							WB	•	
							_		

7. Select the geographic location by country, state and city. Select the desired outside design condition (for Summer Cooling: 0.4%, 1% or 2%) (for Winter Heating: 99.6% or 99%).



8. To apply this design condition as a State Point, simply click the Apply button in the upper left hand of the Window and then close the Climatic Data Window to return to State Points & Processes.

Pays firminetric. Princesee		A A A A A A A A A A A A A A A A A A A
🖷 Apply 🗋 Add Point 🗙 Delete 🎯 Bint 😭 Weather	😵 Hela 🗙 Close	
PONT LABEL AR FLOW UOM PROCESS	OIVEN	ERA THE AVERA
Cutside Air AR 1000 STD CFM. Add State Point	POINT	
411		
	County Print	
	Current Point	STRATE AT A THE PROVED IN
	Le 80	
	V49 * 75	REPERSION PROFILENT AND REPORT
	Air Flow 1000	Climatic Data - ASHRAE 1997 Fundamentals
	00 93.0	COOLING USA 1,033 Bevation, Feet (* English (P)
	VIB 75.0	THEATING Georgia T 33.05 North Lattude Metric (SI)
	RH 43.7	F WIND Atlanta B4.42 West Longitude Apply
	W 0.0146	
	v 14.25	
	h 38.42	0.4% 83 75 7 53.00 77 88 88.00 74 82 82.00
	0 877	1% 91 74 91.00 76 67 87.00 73 91 91.00
	0 0,012	- 2% 88 73 C 88.00 75 85 65.00 72 80 80.00
	AW 7,173	Average Annual Max DB * 96 Still Dev. * 3 Mean Dally Range DB * 17
	19 Still 650 Sec.	
ACCOUNT OF THE PARTY		WINTER DO RH F do . Coklent V/S MCDB Average
CONTRACTOR A CONTRACTOR		agen 18 50 C 1800 04% 21 117 Mn. DB Std Dev.
		97% 22 50 C 2100 1% D D
	A N	WIND Calacident with 0.4% DB (cooling) MOVS [3 mph PMD [300 deg
		Concident with 99.6% DB (weeting) MOVS 12 Inch PMD 320 deg
ATTAK AND		Amust Design Values 1% 22 mph 2% is mph 5% 17 mph
A CARLON AND A COMPANY		

CONSTANT LINE CONTROL

Click the Constant Line Icon on the toolbar, select the line type and specifics, and click "Apply" to see the specified line displayed on the chart!!

Constant Line Control Image: Constant Line Cont Image: C	
Image: Construction of the second of the	ne Control
	pe Control Apply Close rt Vapor Pressue io Enthalpy Specific Volume Relative Humidly div/dw/Lines Dry Builb Wet Bulb (Dpional) r - ℓ 5 = - − ℓ 40 = - − ℓ = -

WEATHER DATA PRESENTATION CONTROL

Simply click the Weather Icon on the toolbar and select the location, style and bins desired and with one button click, you can SEE the weather data on the chart as data dots, colored bins or even CREATE your OWN Bin Weather Table!!!



COIL LEAVING AIR CALCULATOR

1. **<u>NOTE</u>**: You need to have the Room Zone state point and Coil state point created for reference by the Coil Airflow/LAT Calculator **<u>BEFORE continuing</u>**.

2. Activate "Coil Airflow / LAT Calculator" by either of the two methods shown below:



3. The Coil Airflow / LAT Calculator window appears with blank data fields.

Coil Leaving Air Condition Calculate	pr	
	📕 Calculate 🛛 🐺 Apply	🎒 Print 🗙 Close
Room (Zone)	Leaving Coil	•
Airflow	C Airflow (use)	
Dry-Bulb Temp	O Dry-Bulb (use)	
Humidity Ratio	Humidity Ratio	
Enthalpy	Enthalpy	
Load Data (select any Total Heat Sensible Heat Latent Heat SHR	two) Btu/hr Btu/hr Btu/hr Gtu/hr Gtu/hr	🔲 Calculate
	Leaving Coil (Airflow Dry-Bulb Temp Humidity Ratio Enthalpy	Condition 🛛 Apply

4. Click the Room (Zone) and Coil combo box drop-downs and select the desired points that you've already created with the State Point and Process dialog.

Coil Leaving Air Condition Calculator								
			📕 Calcu	ilate 🛛 🐺 Ap	ply 🚭	Print 🗙 Close		
Room (Zone)	RA	•	Leavi	ng Coil	CC	•		
Airflow	8,000	SCFM	C Ai	rflow (use)	10,000	SCFM		
Dry-Bulb Temp	80.00	°F	O D	ry-Bulb (use)	55.00	۴F		
Humidity Ratio	0.01123	ІЬ/ІЬ	Humi	dity Ratio	0.00736	ІЬ/ІЬ		
Enthalpy	31.51	Btu/lb	Entha	alpy	21.19	Btu/lb		
Load Data (select any two) Total Heat Btu/hr Sensible Heat Btu/hr Latent Heat Btu/hr SHB Qs/Qt								
		e Max. RA		Leaving Co Airflow Dry-Bulb Te Humidity Ra Enthalpy	pil Conditi emp atio	on (Apply SCFM °F Ib/Ib Btu/Ib		

5. To calculate coil leaving airflow, click the "Dry-Bulb (use)" option.

Coil Leaving Ai	ir Conditio	n Calcı	ılato	r			
				Calcula	ite 🏼 🐺 Ap	ply 🎒 l	Print 🗙 Close
Room (Zone)	RA		•	Leaving	g Coil 🛛	CC	•
Airflow	8,000	SCFM		C Airfl	ow (use)	10,000	SCFM
Dry-Bulb Temp	80.00	۴F		Dry	Bulb (use)	55.00	۴F
Humidity Ratio	0.01123	lb/lb		Humidi	ty Ratio	0.00736	lb/lb
Enthalpy	31.51	Btu/lb		Enthalp	у	21.19	Btu/lb
Total Heat Btu/hr Sensible Heat Latent Heat SHR Qs/Qt							Calculate
Call Looking Air Calminian	Æ	XZ	\Rightarrow		eaving Cr	oil Conditio	n 🖉 Apply

Coil Leaving	Air Conditi	ion Calc	ulato	r			
				📕 Calculate 🕔	🌄 Apply	/ 🖨	Print 🗙 Clos
Room (Zone)	RA		•	Leaving Coi	i [Ci	C	•
Airflow	8,000	SCFM		 Airflow (u 	sej 1	0,000	SCFM
Dry-Bulb Temp	80.00	۴F		C Dry-Bulb	(use) 5	5.00	۴F
Humidity Ratio	0.01123	ІЬ/ІЬ		Humidity Ra	tio O	.00736	lb/lb
Enthalpy	31.51	Btu/lb		Enthalpy	2	1.19	Btu/lb
	☐ Sensi ☐ Laten ☐ SHR	ble Heat t Heat		Btu. Btu. Btu. Qs/	rnr /hr Qt		Calculate
				Leavi Airflov Dry-B	ng Coil v ulb Tem	Conditi 10,00	i on 4 9 App 00 SCFM °F

6. To calculate coil leaving dry-bulb, click the "Airflow (use)" option.

7. Click any two of the Load Data variables you wish to specify and input the appropriate values.

Coil Leaving A	ir Conditior	n Calculat	or		
			📕 Calculate 🛛 App	oly 🎒 Pi	rint 🗙 Close
Room (Zone)	BA	•	Leaving Coil	CC	-
Airflow	8,000	SCFM	C Airflow (use)	10,000	SCFM
Dry-Bulb Temp	80.00	۴F	Ory-Bulb (use)	55.00	۴F
Humidity Ratio	0.01123	ІБ/ІБ	Humidity Ratio	0.00736	lb/lb
Enthalpy	31.51	Btu/lb	Enthalpy	21.19	Btu/lb
	I Total He I Sensible □ Latent H I SHR	eat Heat 250 leat .7	Btu/hr 000 Btu/hr Btu/hr Qs/Qt		Calculate
		X	Leaving Co Airflow Dry-Bulb Te	mp 55.00	n (Apply SCFM °F

8. Lastly, click "Calculate" to see the results.

Coil Leaving A	ir Conditia	on Calc	ulato	r			×
				📕 Calcula	ite 🏼 🐺 Ap	ply 🎒 I	Print 🗙 Close
Room (Zone)	RA		•	Leaving	g Coil 🛛	CC	•
Airflow	8,000	SCFM		C Airf	ow (use)	10,000	SCFM
Dry-Bulb Temp	80.00	۴F		💿 Dry	Bulb (use)	55.00	۴F
Humidity Ratio	0.01123	lb/lb		Humidi	ty Ratio	0.00736	lb/lb
Enthalpy	31.51	Btu/lb		Enthalp	y.	21.19	Btu/lb
Load Data (select any two) Total Heat 357143 Btu/hr ✓ Sensible Heat 250000 Btu/hr ✓ Latent Heat 107143 Btu/hr ✓ SHR .7 Qs/Qt							
		RA RA	X		Leaving Co Airflow Dry-Bulb Te Humidity Ra	9,071 9,071 9,071 9,071 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000 9,000	on Rapply SCFM I °F I81 Ib/Ib
			ž/		Enthalpy	21.19	Btu/b

9. To Update the Coil LAT point created with the calculated result, simply click "Apply" on the menu and the point and chart are automatically updated.



AIR COLLECTION CALCULATOR

1. NOTE: You need to have two or more points created BEFORE calculation of a collection point can be performed.

2. Activate "Air Collection Calculator" by either of the two methods shown below:

Menu Path	
A PSYCHROMETRIC ANALYSIS CD - ALL	
Eile Edit Analysis Notes Tools View Language	Settings Register Now Help
🗈 🖙 🔒 🚫 💷 🖓	🖄 🦿 ASHRAE NO.1 🔹 🎹 SI 📟 En
State Point and Processes F2	🗞 🔤 📋 🗏 🖵 🞴 🛛 🛇 🏏 🥕 🕂 🔳 💷
Sensible Heat Ratio Line Plot	
Air Collection Calculator	Tashaslan
WB Coil Airflow / LAT Calculator	l oolbar icon '
RH RH	

3. The Air Collection Calculator window appears with blank data fields.



4. Click the Selected point combo box drop-downs to specify the points you wish to collect, then click "Calculate =>" to see the Collection Point result.

Air Callection	Calculator					>
Selected Point 1	BA	_			🚑 Prin	t 🗙 Close
Airflow	1,000	SCFM				
Dry-Bulb Temp	75.00	۴F				
Humidity Ratio	0.01022	lb/lb				
Enthalpy	29.18	Btu/lb				
Folgeted Doint 1	lou.	-				
Airflow	1.000	SCEM				
Dru-Rulb Temp	90.00	SCEM SE				
Humiditu Ristio	0.00679	г Њ/Њ				
Enthalpu	29.07	Bhu/lb		_		
Entrapy	20.01	Diano		. Α	pply Point to C	hart
Selected Point 3	SC	•		Collection Poi	nt Point Lab	el Here
Airflow	1,000	SCFM		Airflow	5,000	SCFM
Dry-Bulb Temp	65.00	۴- 	 — 📕 Calcula:e => —	Dry-Bulb Temp	75.00	۴F
Humidity Hatio	0.01022	Ib/Ib	_	Humidity Ratio	0.00931	Ib/Ib
Enthalpy	26.74	Btu/Ib		Enthalpy	28.19	Btu/lb
Selected Point 4	SH	•				
Airflow	1,000	SCFM				
Dry-Bulb Temp	90.00	°F				
Humidity Ratio	0.01022	lb/lb				
Enthalpy	32.85	Btu/lb				
Selected Point 5	CC	•				
Airflow	1,000	SCFM				
Dry-Bulb Temp	55.00	۴F				
Humidity Ratio	0.00912	Ib/Ib				
Enthalpy	23.10	Btu/lb				

5. Type in the desired Point Label and click "Apply Point to Chart" to add the Collection Point to the chart and report.

Air Collectio	n Calculato	r				
Selected Point	1 BA	.			🚑 Print	
Airflow	1,000	SCFM				
Dry-Bulb Temp	75.00	۴F				
Humidity Ratio	0.01022	ІБ/ІБ				
Enthalpy	29.18	Btu/lb				
Selected Point	2 DH	•				
Airflow	1,000	SCFM				
Dry-Bulb Temp	90.00	۴F				
Humidity Ratio	0.00678	ІБ/ІБ				
Enthalpy	29.07	Btu/lb		a .	polu Point to Cl	
Selected Point	3 SC	•				
Airflow	, 1,000	SCFM		Collection Pol Airflow	E 000	
Dry-Bulb Temp	65.00	۴F		Dru-Bulb Temp	75.00	
Humidity Ratio	0.01022	lb/lb	— 🧱 Laicula:e => —	Humiditu Ratio	0.00921	
Enthalpy	26.74	Btu/lb		Enthalpy	28.19	
Selected Point	4 SH	•				
Airflow	1,000	SCFM				
Dry-Bulb Temp	90.00	۴F				
Humidity Ratio	0.01022	ІБ/ІБ				
Enthalpy	32.85	Btu/lb				
Selected Point	5 CC	•				
Airflow	1,000	SCFM				
Dry-Bulb Temp	55.00	۴F				
Humidity Ratio	0.00912	16716				
Enthalpy	23.10	Btu/lb				

SENSIBLE HEAT RATIO LINE PLOTTING

1. NOTE: You need to have at least ONE point created BEFORE calculation of a constant sensible heat ratio line can be performed.

2. Activate "Sensible Heat Ratio Line Plot" by either of the two methods shown below:



3. The Sensible Heat Ratio Line window appears with blank data fields.

🏸 Sensible	Heat Ratio Line Plot	Х
		#
Start Point:		•
Sensible Hea	at Ratio (SHR):	
	Plot SHR Line	

4. Click the Start Point combo box drop-down to select a reference state point to plot through. Then type in the desired sensible heat ratio in the space provided.

🏸 Sensible	Heat Ratio Line Plot	Х
		#
Start Point:	New 1	•
Sensible Hea	at Ratio (SHR): 7	
	Plot SHR Line	

5. Click the "Plot SHR Line" and the SHR Line is automatically plotted across the chart.



DELTA-h / DELTA-W LINE PLOTTING

1. NOTE: You need to have at least ONE point created BEFORE calculation of a constant delta-h / delta-W line can be performed.

2. Activate "Delta-h / Delta-W Line Plot" by either of the two methods shown below:



3. The Delta-h / Delta-W Line window appears with blank data fields.

🗾 dh/dW Ratio Line Plot 🛛 🔀
Start Point:
┌ dh/dW Line Plotting
Steam Temp (°F or °C):
dEnthalpy/dHumidityRatio (dh/dW):
Plot dh/dW Line
Humidification Process Calculator
Dew Point Temp (°F or °C):
Final Dry-Bulb Temp (°F or °C):
Steam Flow Rate (lb/hr or kg/hr):
Calculate

4. Click the Start Point combo box drop-down to select the desired reference point and enter the "Steam Temperature" or "dh/dW" values in the space provided. Please note that which ever value isn't provided, is automatically calculated real-time.

룱 dh/dW Ratio Line Plot 🛛 🔀
Start Point: New 1 💽 🎒 🎒
┌ dh/dW Line Plotting
Steam Temp (°F or °C): 250
dEnthalpy/dHumidityRatio (dh/dW): 1163
Plot dh/dW Line
-Humidification Process Calculator
Dew Point Temp (°F or °C):
Final Dry-Bulb Temp (°F or °C):
Steam Flow Rate (lb/hr or kg/hr):
Calculate

5. Click the "Plot dh/dW Line" and the Delta-h/Delta-W Line is automatically plotted across the chart.



6. Type the desired final Dew Point Temperature and click the "Calculate" button to see the resulting Final Dry-Bulb Temperature and Steam Flow Rate.

1	dh/dW Ratio Line Plot	Х
Sta	rt Point: New 1 🗾 🚭	
_ dl	n/dW Line Plotting	
St	eam Temp (°F or °C): 250	
dE	inthalpy/dHumidityRatio (dh/dVV): 1163	
	Plot dh/dW Line	
_ H	umidification Process Calculator	
D	ew Point Temp (°F or °C): 75	
F	inal Dry-Bulb Temp (°F or °C): 82.02	
s	team Flow Rate (lb/hr or kg/hr): 34.2	
	Calculate	



CHART NOTES

1. Activate "Notes" by any of the three methods shown below or press 'F3': Menu Path,



2. The Notes window appears with New Note #1 as the current note.

📮 Notes		
Apply	🗋 Add Note 🛛 🗙 Delete 🛛 😵 Help 🛛 🗙 Close	•
Arial	• 9.75 • B I <u>U</u> 🖉 🖉	• 0 0
Note 1		•
Note 1		<u> </u>
		Ŧ

3. To create a new note, enter the desired note text in the "Note Text" field.



4. To edit an existing note, click the "Selected Note Name" drop-down and select the desired existing Note to be edited from the list. Enter the "Note Text" field to make any text revisions.

📮 Notes		
🖏 Apply	🗋 Add Note 🛛 🗙 Delete 🛛 🦓 Help 🛛 🗙 Close	
Arial	• 9.75 • B I <u>U</u> 🖉 🗸 • 0	0.151388
Note 2		•
Example Not	esDDFor Help File	
Note 2		
		-

5. Adjust the font settings (Font Name, Font Size, Bold, Italic, Underline, Color) as desired.

🗏 Notes	
🖏 Apply 📄 Add Note 🗙 Delete 😵 Help 🗙 Close	
Book Antiqua • 24 • B I U I • 0 0	
Example NotesDDFor Help File	•
Example Notes	4
For Help File	
	Y

6. Enter the Note X & Y location by either typing the X & Y coordinates in to the appropriate fields or use the left mouse button and click once on the chart, move the mouse to see the coordinates track the mouse location and when the mouse is at the desired location, perform a left mouse button single click again to set the coordinates. See Above graphic.

同 Notes						
🕏 Apply 📄 Add Note 🔀 Delete 💡 Help 🔀 Close						
Book Antiqua - 24 - B I U 2 - 0.953	3.707					
Example NotesDDFor Help File	-					
Example Notes						
For Help File						
	~					

7. Click the "Apply" button and the note will appear on the chart:

	Apply Add Note X Delete & Help X Dose	12
	Book Antiqua • 24 • B I U & - 0.953 3.707	
1. 1.	Example NotesDDFor Help File	
imple Notes	S Example Notes	1
Holn File	Lample Notes	
map I man	For Help File	

8. The Note window remains open. To add additional notes, simply click the "New" button and you're ready to begin your next note.

Potes						
Apply	ld Note >	C <u>D</u> elete	🎖 <u>H</u> elp	o 🗙 <u>C</u> lose		
Book Antiqua	- 24	• B	ΙŪ	<i>a a</i>	0.953	4.077833
Note 2						-
Note 2						<u> </u>
11010 2						
						-

9. Psychrometric Analysis allows an unlimited amount of notes to be entered. Each note can have its own properties. All information is saved to the project file. The Notes window accepts the information you want to place on the chart, allows font changes and provides a means to position the information.

10. Enter your notes in the text box. Use any of the font buttons to adjust the settings. Set the position by clicking on the chart or using the X and Y position settings provided in text box. Now click "Apply" to add the project information to the chart.

11. You may want to change the position of the information on the chart after you see it. While the Notes window is open you may do so by making a single click on the information and then another single click at the new location. To edit the information, make the changes in the Notes window and click "Apply".

12. You may edit this information, change its font or position at any time. Simply open the Notes window and make the changes.

PROJECT INFORMATION NOTE

1. Activate "Project Information" by any of the two methods shown below.

	/	denu	Path					
A PSYCHROMETRIC ANALYSIS CD - PsyChart1								
Eile Edit Analysis	Notes	<u>T</u> ools	⊻iew	Language	Settings Register Now Help			
🗋 🖻 🚔 🔳	🗒 Pro	🛃 🤋 💼 ASHRAE NO						
	Ed Red	it Note: Ites On	s /Off	F3	🍢 📾 🛛 🗒 📮 🗖 🔝			
DB	🔔 Us	er Info	rmatio	n	Toolbar Icon			

2. The Project Information window appears ready to receive the Project Name as the current note. Please note that this note will appear on the state point reports as the Project Name.



3. Type in the project name you wish, adjust fonts, location, etc. When finished, click the "Apply" button to automatically place on the chart.



USER INFORMATION NOTE

1. Activate "User Information" by either of the two methods shown below.

Menu Path



2. The User Information window appears as shown below:

📙 U:	ser Information							IX
	Always ADD to	o Projects on Open it	🛛 Add	l User Da	ta to Cur	rent Cha	art	Ŷ
E	User Name :							
	Company Name :							
3	Telephone No. :							
	Fax No. :							
1	email address :							

3. Type in your information in the space providing. Check the display options you wish to choose for your default.

📙 Us	ser Information			_ 0	×
12.2	Always ADD to Show on report) Projects on Open t	🛃 Add User Data to Current Chart		Ŷ
	User Name :	Robert Hanna			
Ξ	Company Name :	Hands Down Softw	vare		
1	Telephone No. :	(405) 844-6314]
	Fax No. :	(405) 844-6314			
E	email address :	sales@handsdown	software.com		

4. Click the "Save" button in the upper right hand corner. You may also click the "Add User Data to Current Chart" button to have your user information displayed on the current chart.



NOTE ON/OFF CONTROL

Simply click the Note icon on the toolbar to turn Notes On/Off.







ZOOMING AND PANNING

<u>Zoom IN</u>

🔍 Zoom In

1. Click View on the menu bar, then click the Zoom In icon.

2. Click the Zoom In icon on the toolbar.

3. Enter the Zoom Percent into the zoom factor dropdown on the toolbar.

100% -

4. Move your mouse so the cursor is on the chart and **Double-Click the LEFT mouse button**.

Zoom OUT

🔍 Zoom Qut

- 1. Click View on the menu bar, then click the Zoom Out icon.
- 2. Click the Zoom Out icon on the toolbar.
- 3. Enter the Zoom Percent into the zoom factor dropdown on the toolbar.

100% 🔹

4. Move your mouse so the cursor is on the chart and **Double-Click the RIGHT mouse button**.

Zoom ALL

🔲 Zoom All

- 1. Click View on the menu bar, then click the Zoom All icon.
- 2. Click the Zoom All icon on the toolbar.
- 3. Enter 100 into the zoom factor dropdown on the toolbar.

100% -
Zoom MENU

1. Move your mouse so the cursor is on the chart and **Single-Click** the **RIGHT** mouse button and click the Zoom action icon on the pop-up menu.



Panning

If you are **<u>ZOOMED IN</u>** on the chart, simply position your mouse on the chart and <u>hold the LEFT</u> <u>mouse button down and move your mouse</u>. When you have panned to the desired position, release the left mouse button.

Zoom WINDOW

Simply click the Zoom Window icon on the tool bar, then click the first corner of the window on the chart, move the mouse and click the other window corner.





PRINT ALL

There are four different choices when printing:

1. Print BOTH the Chart and Report. Click on the Print All icon on the toolbar.



PRINT CHART

2. Print ONLY the Chart. Click on the Print Chart icon on the toolbar.



PRINT REPORT

3. Print ONLY the Report. Click on the Print Report icon on the toolbar.

📣 PSYCHROMETRIC ANALYSIS CD - PsyChart1
∐ Eile Edit View ⊆hart Units Language Help
🛛 🗅 🚔 🖬 🖪 🖪 🖪 🕹 😹 🎒 Q. Q. 🔲 100% 📑 😫 🥅 S
DB Print Report

4. Print Preview ONLY the Report. Click on the Report Print Preview icon on the toolbar.



PRINT FLOWCHART

Click the FlowChart icon on the toolbar, and then click the print icon on the flowchart window to print the flowchart.

A PSY	HROMETRIC ANALYSIS CD - CoilCalc
Eile E	it <u>A</u> nalysis <u>N</u> otes <u>T</u> ools <u>Vi</u> ew <u>Language</u> <u>S</u> ettings <u>U</u> ser Programs <u>R</u> egister Now <u>H</u> elp
	🖆 🖼 📲 🖬 🕼 🗃 🗃 🎒 👙 🎒 🖄 🖄 🖄 👔 👔 ト 🕂 🕀 🔲 🕅 🥔 💋 🔊 🖆 🗛
0%	
DB	
115.675	Psychrometric Process Flow Chart
WB	🛛 🔍 🔹 1 of 1 🔺 🚽 🍘 🕅 🏭 🏭 Whole Page 🔹 100% 🔹
73.931	
RH	
13.1	
W	SYSTEM FLOW DIAGRAM - S
.00846	Report Date: Sunday, February 18, 2007
v	Project Information: Basic Process Attitude: 0 (Feet)
14.696	Barom etric Pressure: 29.921 (in.Hg) Atmospheric Pressure: 14.696 (psia)
h	
57.170	
52.640	RA
d	Ar Flow
0.0680	DryBulb S0.0 °F
vp	WetBulb 67.0 °F
0.3998	
AW	78.6 gr/b Enthalov
4.028	(31.5 Btu/b Dewpoint
	Ar Row Ar Row Ar Flow
	2,000 cfm t 10,000
	800 1 830 1 1 830 1 1 1 100 14



EXPORT/COPY CHART

From the menu, click on <u>E</u>dit, and then click Copy <u>C</u>hart Image. The psychrometric chart image is automatically placed on your clipboard for you to paste into your reports, presentations, proposals, etc.



EXPORT/COPY REPORT

From the toolbar, click the Report Print Preview icon.



Then from the toolbar on the Report Print Preview, click the Copy Report Data to Clipboard icon. The complete state-point and process report image is automatically placed on your clipboard for you to paste into your reports, presentations, proposals, etc.

~								
I I	•	1 of 1	►) 🖨 🗋	🖹 📳 Page Width	▼ 100%	•	
					Copy Report Ima	ge to Clipboard		
								ST
					-			
						Report Date: Wed	nesid <i>a</i> y, June 19,	, 2002

EXPORT/CREATE CHART PDF

1. Activate "Save Chart PDF As..." by either of the two methods shown below:



2. Navigate to where you want to save the file, type in the file name and click the "Save" button.

Save Chart PDF	and the second			? ×
Save in:	DPsyChart	•	+ 🗈 📸 🖬 +	
My Recent	ChartTest.pdf	f		
Documents Desktop				
My Documents				
My Computer				
S		-		
My Network	File name:	ChartTest.pdf	<u> </u>	Save
Fidues	Save as type:	PSYCHROMETRIC ANALYSIS CD *.	PDF 💌	Cancel

EXPORT/COPY REPORT PDF

1. Activate "Save Report PDF As..." by either of the two methods shown below:



2. Navigate to where you want to save the file, type in the file name and click the "Save" button.

Save Report PDF							? X
Save in:	HDPsyChart			•	+ 🗈	r 🖬	
My Recent Documents	ChartTest.pdf	F					
Desktop							
Documents							
My Computer							
(
My Network	File name:	ReportTest	.pdf			•	Save
riaces	Save as type:	PSYCHRO	METRIC ANA	LYSIS CD '	.PDF	•	Cancel

EXPORT/COPY FLOWCHART

From the toolbar, click the Flow Chart icon.



Then from the toolbar on the Flow Chart, click the Copy Report Image to Clipboard icon. The complete flow chart report image is automatically placed on your clipboard for you to paste into your reports, presentations, spreadsheets, etc.

•••	Psyc	rometric Process Flow Chart
		1 of 1 🕨 🗏 🚔 🛅 🗐 🍘 Whole Page 🔹 100% 🔹
		Copy Report Image
		SYSTEM FLOW DIAGRAM -
		Report Date: Sunday, February 18, 2007 Project Information: Basic Process Attitude: 0 (Feet) Barom etric Pressure: 29.921 (in.Hg) Atmospheric Pressure: 14.696 (psia)
		RA Arr Flow

EXPORT/COPY REPORT DATA

From the toolbar, click the Report Print Preview icon.

Then from the toolbar on the Report Print Preview, click the Copy Report Data to Clipboard icon. The complete state-point and process report data is automatically placed on your clipboard for you to paste into your reports, presentations, spreadsheets, etc.



IMPORTING DATA

From the toolbar, click the Import Data File icon.

Menu Path		
M PSYCHROMETRIC ANALY	SIS CD - PsyCha	rt1
<u> </u>	<u>T</u> ools <u>V</u> iew <u>L</u> ang	uage <u>S</u> ettings <u>R</u> egister Now <u>H</u> elp
II 🗋 <u>N</u> ew	Ctrl+N	glish 🔹 🛛 🗅 🚘 💼 🗐
📅 😂 Open	Ctrl+O	
📕 Save		Taalhaalaan
😭 Save <u>A</u> s		100lbar icon /
📕 🗐 Save Image As		
🗾 Load Point Data File		
🖄 Save Chart PDF As		

Then navigate to the ".csv" file with the data you wish to import. ".csv" file format is a comma delimited file format, which is an export option for spreadsheet programs such as Microsoft Excel.

Open Point Data	File				<u>? ×</u>
Look in:	🗀 HDPsyChart		•	🕂 🗈 🖆 🎟	
My Recent Documents	MHDPsyChart Po	oints.csv			
Desktop					
My Documents					
My Computer					
My Network	File name:	HDPsyChart Points.c	:SV	•	Open
Places	Files of type:	PSYCHROMETRIC	ANALYSIS CD F	Projects (*.c	Cancel

Then Click the "Open" button and the data points will be imported and displayed on the chart. Below is an example shipped with this program:



If using a Spreadsheet to create the ".csv" file, data points must be set up with the following structure:

M	🔀 Microsoft Excel - HDPsyChart Points.csv												
	<u>F</u> ile <u>E</u> dit	<u>V</u> iew <u>I</u> nse	ert F <u>o</u> rmat	<u>T</u> ools <u>D</u> a	ata <u>W</u> indow	v <u>H</u> elp A	cro <u>b</u> at						
	🖻 目 🔒) 🔁 🖨	🗟 🚏 🕹	🖻 🛍 •	🝼 ю +	CH + 🔒	$\Sigma \cdot \frac{A}{Z} \downarrow \frac{Z}{A}$	1 🛍 🚯	1				
1	to to 2	1 🔁 🖄	2 🖪 🖻	Reply v	with Changes.	E <u>n</u> d Revie	w 🗸						
	J25	•	fx										
	A	В	C	D	E	F	G	H					
1	ALTITUDE	750											
2	LABEL	OA1	CFM	2000	DB	50	RH	50					
3	LABEL	0A2	CFM	2002	DB	52	RH	50					
4	LABEL	OA3	CFM	2004	DB	54	RH	50					
5	LABEL	OA4	CFM	2006	DB	56	RH	50					
6	LABEL	OA5	CFM	2008	DB	58	RH	50					
7	LAREI	OA6	CEM	2010	DB	60	RH	50					
				Th	is column	can be: /	1						

This column can be: / RH, WB, W, V, H or DP and can change from one point to another If using a text editor to create the ".csv" file, data points must be set up with the following structure:

This column can be: / RH, WB, W, V, H or DP and can change from one point to another



CLIMATIC DATA

Climatic Data provides ambient design conditions for over 1,000 locations in either IP or SI units of measure. Ambient data is from ASHRAE 1997 Fundamentals.

🍰 Clin	natic D	ata - AS	HRAE 19	997 Fun	damer	ntals					_	
🖸 со	OLING	USA					-	676	Elevation	, Feet	💽 Eng	lish (IP)
💌 HEA	ATING	Oklahor	na				٦r	36.2	North Lai	itude	O Me	tric (SI)
VMP	ND	Tulsa					Ī	95.9	West Lor	ngitude		
SUMM COOLI	ER DB NG "F	MV/B °F	*F wb	•	WB ⁼F	MDB °F	⁰F db	•	DP "F	MDB °F	⁰F db	•
0.4%	100	76		76.00	79	92		92.00	76	87		87.00
1%	97	76		76.00	78	92		92.00	74	85		85.00
2%	94	75		75.00	77	90		90.00	73	84		84.00
Averag	je Annu	al Max. Di	∃ °F	103	Std. D	ev. "f	- 4	Mear	n Daily Ra	ange DB	۴F	19
WINTE HEATII 99.6%	R DB NG "F 6 9 14	RH % 50 50	°F wb	• 6.72 11.23	Coldest Month	t 0.4% 1%	VVS I mph 24 22	MCDB °F 46 40	Averaj Annua Min.	ge I D PF 2	98 Std	. Dev. °F 6
WIND	Coincia Coincia Annua	dent with dent with I Design ^v	0.4% DB 99.6% D ∕alues	l (cooling B (heatir 1%	1) ng) 25 I	t t nph	VICVVS VICVVS 2%	12 11 23	mph mph mph	PVVD PVVD 51	180 360 % 21	deg. deg. mph

PSYCHROMETRIC CALCULATOR

Complete stand-alone psychrometric calculator is one of the tools provided. This psychrometric wonder has full File-Open-Save-SaveAs capabilities.

Attude	0		Description	Altitude	Barometric	Atmospheric	Dry	Wet	Relative	Humidity	Humidity	Specific
Barometric Pressure	29.921			(17)	(in, Hg)	Pressure	Bulb (*F)	Bulb (*F)	Humidity (%)	Ratio (gr/lb)	(ib/ib)	(cu.ft./ib)
Atmospheric Pressure	14.695	-	Cudalida Alla		20.024	(neia)	05.000	70.000	47.004	0.04000	0.00000	
Dry Bulb Temp	55	0	Dutside Air	0	28.921	14.090	90.000	78.000	41.294	0.01080	0.00000	14.3004
Net Bulb Terrip	54.8	-	Return Air	0	28.921	14.696	000.08	67.000	51,140	0.01123	0.00000	13.845
Relative Hamidty	99.784	-	Cooling Coll	0	28.921	14.090	000.000	54.800	38,784	0.00912	0.00000	13.160
turnidity Ratio C or G to	0.00912											
Specific Volume	13.1600											
inthalpy	23.0967											
New Point Temp	54.664											
Density	0.076687											
/apor Pressure	0.43061											
	0.00000											
Abs. Humidity C gr 🕫 Ib	0.00069											
Abs. Humidity C gr 🕞 Ib Parts Per Million by Weight	9,117											

The program also has a data report for printing and the ability to copy all data points to the clipboard so you can paste them into your reports or spreadsheets.

MM	licrosoft Exce	el - Book1							
8	<u>Eile E</u> dit	<u>V</u> iew <u>I</u> nsert	F <u>o</u> rmat <u>T</u> o	ools <u>D</u> ata	<u>W</u> indow <u>H</u> elp	p Acro <u>b</u> at			
D	🖻 🖬 🔒	۵ 🖨 🕼	. 🌮 🕺 🖻	a 🛍 • 🚿	KO + CH +	🍓 Σ 🗕 🛓		🚯 100% ,	• 🔹
č a	ta ta 2	🔁 🙋 🗹	B 🖉 🔻	Reply with ⊆h	anges E <u>n</u> d	Review 🖕			
	D18	▼ fx							
	A	В	С	D	E	F	G	Н	
1	Description	Altitude (ft)	Barometric Pressure (in. Hg)	Atmospheri c Pressure (psia)	Dry Bulb (°F)	Wet Bulb (°F)	Relative Humidity (%)	Humidity Ratio (gr/lb)	Humid Ratio (Ił
2	0Å	Ő	29.921	14.696	95	78	47.294	117.9941	0.0168
3	RA	0	29.921	14.696	80	67	51.14	78.5834	0.01122
4	CC	0	29.921	14.696	55	54.671	98	63.311	9.04E-
5									
6									
7									
8									
	1 2 3 4 5 6 7 8	Microsoft Exco File Edit C C D C C D C D C D C C C C C C	Increase of Excel - Book1 Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure Image: Second structure <th>Image: Microsoft Excel - Book1Image: FileEditViewInsertFormatIImage: FileEditViewInsertFormatIImage: FileEditViewImage: FileImage: File<</th> <th>Microsoft Excel - Book1Image: Second structureFileEditViewInsertFormatIoolsDataImage: Second structureImage: Second structu</th> <th>Microsoft Excel - Book1 Image: Second sec</th> <th>Microsoft Excel - Book1Image: Second se</th> <th>Microsoft Excel - Book1Image: Second second</th> <th>Microsoft Excel - Book1Image: Second Second</th>	Image: Microsoft Excel - Book1Image: FileEditViewInsertFormatIImage: FileEditViewInsertFormatIImage: FileEditViewImage: FileImage: File<	Microsoft Excel - Book1Image: Second structureFileEditViewInsertFormatIoolsDataImage: Second structureImage: Second structu	Microsoft Excel - Book1 Image: Second sec	Microsoft Excel - Book1Image: Second se	Microsoft Excel - Book1Image: Second	Microsoft Excel - Book1Image: Second

OUTSIDE AIR ESTIMATOR

Complete stand-alone fresh air estimator is one of the tools provided. This tool has many of the applications listed in ASHRAE Standard 62-2004.

🌮 Outside Air Est	timator - RE: ASHRAE	Standard 62-	2004			
Application Group	Educational Facilities		•	IP SI	🚑 Print	× Close
Specific Application	Media center		-			
	cfm per Person 10	cfm per sq.ft.	0.12			
	No. of People 22	Area (sq.ft.)	7500	- AIR CI	LASS —	
	People OA Rate 220	Area OA Rate	900		Air Class = '	1
	TOTAL Suggested Fresh	Airflow (cfm)	1120	🕜 C	lass Definit	ion
For high school and c	ollege libraries, use values	shown for Public S	Spaces - L	.ibrary.		
GENERAL NOTES (1.) Related Requirem ASHRAE Standard 62	ents: The rates in this prog 2-2004 being met.	gram are based on a	all other a	pplicable	requiremen	ts of
(2.) Smoking: This pro determined using othe requirements in smokir	gram applies to no-smokin r methods. See ASHRAE ng areas.	g areas. Rates for s Standard 62-2004,	smoking-p . Section E	permitted s 5.2.9 for v	spaces mus entilation	tbe 🔄
(3.) Air Density: Volum which corresponds to (21°C). Rates may be	etric airflow rates are base dry air at a barometricpres adjusted for actual density	d on an air density sure of 1 atm (101.3 but such adjustme	of 0.075 3 kPa) an entis not re	lbda/ft3 (1 id an air te equired for	1.2 kgda/m3 emperature r compliance	3), of 70°F e with 🔽

STEAM PROPERTY CALCULATOR

Complete steam property calculator is one of the tools provided. This tool provides complete thermophysical properties of steam for both IP & SI units of measure.

💧 Steam Property (Calculator	×
IP SI 📕 Calcula	ite 🛃 Print	Ê ⊇ Copy
Temperature	325	۴F
Absolute Pressure	96.3000	psi
Absolute Pressure	196.0688	in.Hg
Specific Volume - vf	0.01771	cu.ft./lb
Specific Volume - vfg	4.598	cu.ft./lb
Specific Volume - vg	4.616	cu.ft./lb
Specific Enthalpy - hf	295.64	Btu/lb
Specific Enthalpy - hfg	891.47	Btu/lb
Specific Enthalpy - hg	1187.10	Btu/lb
Specific Entropy - sf	0.4706	Btu/lb -*F
Specific Entropy - sfg	1.1361	Btu/lb -°F
Specific Entropy - sg	1.6067	Btu/lb -*F

MOTOR HEAT CALCULATOR

Sensible Heat generated by motors in the air stream can now be easily calculated. This Motor Heat Calculator is one of the tools provided. Simply input three variables and click calculate. Calculates sensible heat and temperature rise for both IP & SI units of measure.

💁 Motor Heat Cal	culator	×
IP SI 📃 Calcu	late 🚑 Print	B ≧Copy
- Given Data		
Airflow	15000	cfm
Motor Size	7.5	hp
Efficiency	89.5	%
-Sensible Air Heati	na	
Sensible Heat	21319	Btu/br
Approx Temp Rise	0.73	°F

UNIT CONVERSION CALCULATOR

Unit of Measure converter is one of the tools provided. Simply click on the unit category and then click on the source and target units of measure and type in your value, resulting in real time conversion. This tool also allows the user complete Category Tab Management, unit of measurement management and conversion equation management.

🐪 Unit Conversion Calculator	
Eile 🕶 Help 🕶 📴 🔜 🌾	
Force Light Mass Power	Pressure Specific Volume
Acceleration Angle Area Dens	ity Distance Energy Flow
Temperature Time Velocity	Volume Volume - Dry
Input Celsius Fahrenheit Kelvin Rankine	Uutput Celsius Fahrenheit Kelvin Rankine
Input: 78.6	Fahrenheit
Output: 25.8888888888888	Celsius

DUCT DESIGNER CALCULATOR

This Duct Designer tool aids in the design of duct system and associated pressure drops.



FAN LAW CALCULATOR

The Fan Law Calculator is a very useful tool for modeling "what-if" scenarios.

💽 Fan Law Calculator		
CALCULATE IP	SI 🎒 Print	🗙 Close
– 💽 Current Fan Performar	nce	
Airflow	10000	cfm
Static Pressure	2.50	in. WC
Power	8.4	bhp
Speed	1150	rpm
Pulley Size	12	in.
🕞 🕢 New Fan Performance	•	
 Airflow 	12000	cfm
Static Pressure	3.60	in. WC
O Power	14.5	bhp
C Speed	1380	rpm
C Pulley Size	10.0	in.

WIND CHILL CALCULATOR

This Wind Chill calculator is a useful tool when considering outdoor thermal comfort conditions.



THERMAL COMFORT CALCULATOR

This Thermal Comfort Calculator models human comfort based on ASHRAE equations.

🔊 Thermal Comfort Calculator	
	IP SI 🚑 Print 🗙 Close
- Environmental Conditions	Results
Air Temperature 78.8 - *F	ET* 78.8 *F
MBT V Link with Air 788	SET* 75.9 *F
Air Velocity 39 4 ft/min	TSENS 0.2
Belative Humidity 50 4%	DISC 0.2
G Summer C Winter	PMV -0.32
Je Junnier S winter	PPD 7 %
Activity	PD 26 %
User Defined 🗨	PS 53 %
Metabolic Rate 1.0 met	TS 0.3 Nuetral
	Tnuetral 71.5 *F (Humphreys)
Clothing	Tnuetral 74.8 *F (Auliciems)
User Defined 💌	
Clothing level 0.5 clo	Comfortable
Other Details	Comfort Zone Calculation
External Work 0.0 met	Summer Comfort
Turbulence Intensity 70 %	Humidity Level
Mean Mo. Outdoor Temp 15.0 *C	In Zone
Exposure Time 60 min	
Barometric Pressure 760 torr	
Weight 70 kg	Dry-Bulb Temperature
Surface Area 1.2 sq.m	In Zone

SINGLE & DOUBLE INTERPOLATION AND EXTRAPOLATION CALCULATOR

This interpolation and extrapolation calculator is extremely useful when needing to determine data between known values. Linear interpolation and extrapolation is used.



FINANCIAL LOAN CALCULATOR

This tool is helpful for quick "cost of money" determinations for project work.

🔯 LoanCalc		🛛				
Loan Amount Percent Down	160000 10 %	,	Payment \$1,174.02	Principal Paid	Interest Paid	 I
Maximun Years	30		1	\$107.35	\$1,066.67	
Minimum Years	30		2	\$108.07	\$1,065.95	
Max Interest Rate	8.0 💌	%	3	\$108.79	\$1,065.23	
Min Interest Rate	4.0 🔻	%	4	\$109.51	\$1,064.51	
Show Payments		🕞 Copy	5	\$110.24	\$1,063.78	
		- сору	6	\$110.98	\$1,063.04	
Show Amortizatio	n Table	😂 Print 📗	7	\$111.72	\$1,062.30	
			8	\$112.46	\$1,061.56	
			9	\$113.21	\$1,060.81	
			10	\$113.97	\$1.060.05	~
			<			>

WEATHER TERM GLOSSARY REFERENCE

Meteorologist using Psychrometric Analysis will appreciate the complete weather term glossary provided with one button click.





EXAMPLE 1: Moist Air Sensible Heating

Saturated air at 35F enters a heating coil at 20,000cfm. Air leaves coil at 100F. Find the required rate of heat addition.

Solution: 1,503,224 Btu/h

Z Psychro	metric Pr	ocesses					_ 🗆 ×
🖏 Apply	🗋 <u>A</u> dd P	oint 🟠 C	limatic Data	X Delete	🖨 Print	t 🛛 🍞	Help
POINT	LABEL	AIR FLOW	UOM	PRC	CESS		GIVEN
1	A	20000	ACT	Add State Poin	rt		POINT
) 2	A	20000	ACT	Sensible Heatir	ng		POINT
Start	Point		Proc	Cess		C	Current Point
1	•	Sensible	Heating			W	0.00428
Air Flow DB WB RH W v h DP d vp	20000 35.000 35.000 100.0 0.00428 12.552 13.004 35.000 0.0800 0.2036	Total H Total E Sensibl Latent E Moistur Sensibl	eating nergy e Energy Energy e Difference e Heat Ratio y/ Humidity Rat	125 1,5 0 0.0 1.0	03,224 03,224 03,224 00 00	Air Fl DB WB RH W v h DP d vp	low 20000 100.000 63.586 10.5 0.00428 14.201 28.728 35.000 0.0707 0.2036 2.400

EXAMPLE 2: Moist Air Cooling & Dehumidification

Problem: Moist air at 85F dry bulb and 50% rh enters a cooling coil at 10,000 cfm and is processed to a final condition at 50F and 100% rh. Find the tons of refrigeration required. **Solution: 51.1 tons**

<mark>/</mark> Psychro	ometric Pr	ocesses					_ 🗆 ×
🖏 Apply	🗋 <u>A</u> dd P	oint 🏠 C	limatic Data	🗙 <u>D</u> elete	🖨 Print	8	Help ^I
POINT	LABEL	AIR FLOW	UOM	PRO	CESS		GIVEN
EAT	AR	10000	ACT	Add State Point			POINT
▶ LAT	AR	10000	ACT	Cooling Coil			POINT
Start	: Point		Proc	Cess		CL	urrent Point
EAT	•	Cooling	Coil		<u>⊿</u> ı	RH	▼ 100
Air Flow DB WB	10000 85.000 70.769	Total C	ooling nergy	-51.1	1	Air Flo DB	ow 10000 50.000

EXAMPLE 3: Moist Air Cooling & Dehumidification Below Freezing

Problem: Moist air at 31F dry bulb and 85% rh enters a cooling coil at 5,000 cfm and is processed to a final condition at 20F and 100% rh. Find the tons of refrigeration required.

Solution: 7.6 tons

2	Psychron	netric Pr	ocesses							<u>_ ×</u>
۹	Apply	🗋 <u>A</u> dd P	oint 🏠 C	limatic Data	. X Del	ete 🛛	🞒 Print	8	<u>H</u> elp)
	POINT	LABEL	AIR FLOW	UOM		PROCE	ESS			GIVEN
	EAT	AR	5000	ACT	Add State	Point			POIN	Т
	LAT	AR	5000	ACT	Cooling Co	bil			POIN	Т
	Start F AT Stir Flow	°oint ▼ \$000 31.000	Cooling Total C	Pro Coil ooling	cess	-7.6		DB RH Air Fl DB	urren	▶ t Point 20.000 100 5000 20.000
V	VB	29.480		- E		00,00		WB		20.000
R V	.n V	0.00307	Sensibi	e ⊏nergy		-63,99		RH		100.0
v		12.426	Latent B	Energy		-27,19	8	v		12.130
h		10.743	🔲 🗖 Dehum	idification		-22.2		h		7.104
D	P	27.487	📕 🗖 Sensibl	e Heat Ratio		0.702		DP		20.000
d		0.0807	Enthaln	v/Humidity_Ra	rtio	3,955		d		0.0826
V	р	0.1465	- Chardip	J. Hournonly Fo.	100	1.,		vp		0.1028
Δ	.w	1.731						AW		1.242

EXAMPLE 4: Adiabatic Mixing of Two Moist Airstreams

Problem: A stream of 5000 cfm outdoor air at 40F dry-bulb temperature and 35F wet-bulb temperature is adiabatically mixed with 15,000 cfm of 75F dry-bulb temperature air and 50% rh. Find the resulting dry-bulb and wet-bulb temperatures.

J	Apply	🗋 <u>A</u> dd P	'oint 🛛 🏠 C	limatic Data	. 🗙 <u>D</u> elete 🛛 🖨 P	rint	<u>H</u> elp
	POINT	LABEL	AIR FLOW	UOM	PROCESS		GIVEN
	P1	AR	5000	ACT	Add State Point		POINT
	P2	AR	15000	ACT	Add State Point		POINT
	M1	AR	19999	ACT	Air Mixing		POINT
		Deiet	1	Air Mixing (S	Second Point)	1 0	Summert Delet
	Start	PUIL		can navarig (e	second Point)		Jurrent Point
	Start	Point		Cill Mixing (s		DB	65.8
P	Start		P2			DB	65.8
P'	1 ir Flow	5000	P2 Air Flow	• 15000		DB	65.8 .0077
P' A Di	Start 1 ir Flow B	5000 40.000	P2 Air Flow DB	• 15000 75.000		DB VV Air Fl DB	65.8 0077 low 19999 65.80
P' A Di W	Start 1 ir Flow B	5000 40.000 35.000	Air Flow DB WB	15000 75.000 62.539		DB W Air F DB WB	65.8 0077 low 19999 65.80 56.63
P' A Di W Ri	Start 1 ir Flow B vB H	5000 40.000 35.000 60.7	Air Flow DB WB RH	15000 75.000 62.539 50.0		DB VV Air FI DB VVB RH	65.8 00077 low 19999 65.80 56.63 56.9
P' A Di W Ri W	Start 1 IFlow B VB H	5000 40.000 35.000 60.7 0.00315	Air Flow DB WB RH W	15000 75.000 62.539 50.0 0.00927	,	DB W Air F DB WB RH W	65.8 0077 low 19999 65.80 56.63 56.9 0.007
P D N R V V	Start 1 ir Flow B vB H	5000 40.000 35.000 60.7 0.00315 12.656	Air Flow DB WB RH W V	15000 75.000 62.539 50.0 0.00927 13.675	,	Air F DB WB RH WV v	65.8 0077 low 19999 65.80 56.63 56.9 0.007 13.40
P D N R V N N	Start 1 ir Flow B VB H V	5000 40.000 35.000 60.7 0.00315 12.656 13.002	P2 Air Flow DB WB RH W VV v h	15000 75.000 62.539 50.0 0.00927 13.675 28.149		Air F DB VVB RH VV v h	65.8 00077 19999 65.80 56.63 56.9 0.007 13.40 24.18
P D N N N N D	Start I II II B VB H V P	5000 40.000 35.000 60.7 0.00315 12.656 13.002 28.037	P2 Air Flow DB WB RH W V V h DP	15000 75.000 62.539 50.0 0.00927 13.675 28.149 55.125	,	Air F DB WB RH WV v h DP	low 19999 65.80 65.80 56.63 56.9 0.007 13.40 24.18 50.13
P [^] A D W R W V h D d	Start 1 ir Flow B VB H V P	5000 40.000 35.000 60.7 0.00315 12.656 13.002 28.037 0.0793	Air Flow DB WB RH W V h DP d	 15000 75.000 62.539 50.0 0.00927 13.675 28.149 55.125 0.0738 	,	DB Air FI DB WB RH W V h DP d	low 19999 65.80 65.80 56.63 56.9 0.007 13.40 24.18 50.13 0.075
P A D V R V V h D d V	Start 1 Jir Flow B V B H V P P	5000 40.000 35.000 60.7 0.00315 12.656 13.002 28.037 0.0793 0.1503	Air Flow DB VVB RH VV v h DP d vp	15000 75.000 62.539 50.0 0.00927 13.675 28.149 55.125 0.0738 0.4379		Air F DB VVB RH VV v h DP d vp	low 19999 65.80 65.80 56.63 56.9 0.007 13.40 24.18 50.13 0.075 0.364

Solution: 65.8°Fdb & 56.6°Fwb

EXAMPLE 5: Adiabatic Mixing of Water Injected into Moist Air

Problem: Moist Air at 70F dry-bulb and 45F wet-bulb is to be processed to a final dew-point temperature of 55F by adiabatic injection of saturated steam at 230F. The rate of dry airflow is 200lbda/min and the final dry-bulb temperature is 72.267. Find the rate of steam flow required. **Solution: 102.3 lb/h**

🖊 Psychrometric Processes 📃 🗆 🔀							
🖏 Apply	🗋 <u>A</u> dd P	oint 🏠 C	limatic Data	X <u>D</u> ele	te 🛛 🚑 Prin	t 🛛 🍞	Help
POINT	LABEL	AIR FLOW	UOM	PROCESS			GIVEN
P1	AR	200	LBS/MIN	Add State Point		POINT	
▶ P2	AR	200	LBS/MIN	Humidification and Heatin		ng	POINT
Start Point Process						DB	Current Point 72.267
	<u> </u>	Humidifi	cation and F	leating	<u> </u>		55.00000
Air Flow	200	Total E	nerav		118,362	Air Fl	low 200
DB	70.000	Consid	- Energy		0.040	DB	72.267
WB	45.000		e Energy		0,040	WB	61.516
RH	4.6	🔲 🔲 Latent B	Energy		111,722	RH	54.6
W	0.00071	📕 🔲 Humidit	ication Rate - N	lass	102.3	W	0.00923
V .	13.363	Humidi	Humidification Rate - Yolume			۷	13.604
h	17.572		100201111020 - 0			h	27.435
DP	-2.058	Enthalp	y/Humidity Ra	ntio	1,157	DP	55.000
d	0.0749	Sensible Sensible	e Energy Per		64.9	d	0.0742
vp	0.0338	Dehum	amcation			vp	0.4359
AW	0.370					AW	4.750



PSYCHROMETRIC TERM DEFINITIONS

Absolute Humidity

The ratio of the mass of water vapor to the total volume of a sample. The term "water vapor density" is also used for this value.



ASHRAE

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Atmospheric Air

Air containing water vapor and many gaseous components such as smoke, pollen, gaseous pollutants, etc.

Density

The ratio of the total mass of a sample to the total volume of the sample. For moist air, water vapor and air are included in the totals.



Dew Point Temperature

The temperature of moist air saturated at the same pressure and humidity ratio. Or more simply the temperature at which water vapor will begin to condense from a sample of air.



Dry Air

Atmospheric air with all water vapor and contaminants removed. The approximate percentage by volume of dry air is as follows:

78.084 % Nitrogen
20.9476 % Oxygen
0.934 % Argon
0.0314 % Carbon Dioxide
0.001818 % Neon
0.000524 % Helium
0.00015 % Methane
0.00010 % Sulfer Dioxide
0.00005 % Hydrogen
0.00020 % Other (Krypton, Xenon, Ozone, etc.)

Dry Bulb Temperature The temperature of air read on a standard thermometer indicating it's thermal state.



Enthalpy

The thermodynamic property defined as energy per unit mass commonly used to define the internal energy of moist air. The enthalpy of a sample of moist air is the sum of enthalpies of the air and the water vapor. On the psychrometric chart Enthalpy is expressed in terms of energy per weight of DRY air.



Humidity Ratio

The ratio of the mass of water vapor to the mass of dry air of a sample.



Moist Air

A binary (or two-component) mixture of dry air and water vapor.

Psychrometric Chart

A graphical presentation of the thermodynamic and physical properties of air and water vapor mixtures.

Relative Humidity

The ratio of mole fraction of water vapor in a given moist air sample to the mole fraction in a saturated air sample at the same temperature and pressure.



Saturation

A state of neutral equilibrium between moist air and the condensed water phase (liquid or solid). This state is often referred to as the maximum amount of water vapor in moist air at a given temperature and pressure.

Saturation Humidity Ratio

The humidity ratio of moist air saturated with respect to water (or ice) at the same temperature and pressure.

Specific Humidity

The ratio of the mass of water vapor to the total mass of moist air of a sample.

Specific Volume The ratio of the total volume of air to the mass of dry air in a sample.



Standard Atmosphere

The standard of reference for estimating properties at various altitudes.

For HVAC purposes standard air is taken as 68°F and 29.921 inches Hg atmospheric pressure.

Vapor Pressure Pressure exerted by a vapor.



Wet Bulb Temperature

The equilibrium temperature reached as water evaporates from a thoroughly wetted psychrometer wick into an airstream. While this process is not one of adiabatic saturation, by applying only small corrections one can obtain the thermodynamic wet-bulb temperature.




PSYCHROMETRIC ALGORITHMS

The following is the methodology the program uses in determining the psychrometric properties of moist air:

Atmospheric Pressure

 $p = Atm \times (1 - 6.8753 \times 10^{-6} \times Z)^{5.2559}$ p = inches of Mercury Atm = 29.921299597519Z = elevation in feet

Water Vapor Saturation Pressure

```
For 311.67°R <= T =< 491.67°R
pws = \exp(C_1 \div T + C_2 + C_3 \times T + C_4 \times T^2 + C_5 \times T^3 + C_6 \times T^4 + C_7 \times \ln(T))
    T = \text{absolute temperature}, \ ^\circ \text{R} = \ ^\circ \text{F} + 459.67
    C_1 = -1.0214165 \times E^4
    C_2 = -4.8932428 \times E^0
    C_3 = -5.3765794 \times E^{-3}
    C_{4} = 1.9202377 \times E^{-7}
    C_5 = 3.5575832 \times E^{-10}
    C_6 = -9.0344688 \times E^{-14}
    C_7 = 4.1635019 \times E^0
For 491.67°R < T =< 851.67°R
pws = \exp(C_8 \div T + C_9 + C_{10} \times T + C_{11} \times T^2 + C_{12} \times T^3 + C_{13} \times \ln(T))
    T = absolute temperature, °R = °F + 459.67
    C_8 = -1.0440397 \times E^4
    C_{9} = -1.1294650 \times E^{1}
    C_{10} = -2.7022355 \times E^{-2}
    C_{11} = 1.2890360 \times E^{-5}
    C_{12} = -2.4780681 \times E^{-9}
    C_{13} = 6.5459673 \times E^0
```

Saturated Humidity Ratio

 $W_{s} = \frac{0.62198 \times f \times p_{ws}}{p - f \times p_{ws}}$ p = total pressure of moist air f = enhancement factor $p_{ws} = \text{pressure of saturated pure water}$

Enhancement Factor

f = calculated in accordance with Hyland and Wexler (1973, "The Second")

Humidity Ratio

For
$$t^* > 32^{\circ}F$$

$$W = \frac{(1093 - 0.556 \times t^*) \times W_s^* - c_p \times (t - t^*)}{1002 - 0.444}$$

 $1093 + 0.444 \times t - t^*$

 t^* = thermodynamic wet-bulb temperature of moist air, °F

t = dry-bulb temperature of moist air, °F

 c_p = specific heat of moist air, Btu/lb°F

 W_s^* = humidity ratio of moist air at saturation at thermodynamic wet-bulb temperature For $t^* \le 32^{\circ}F$

$$W = \frac{(1061 + 0.444 \times t^* - (-143.34 + 0.5 \times (t^* - 32))) \times W_s^* - c_p \times (t - t^*)}{1061 + 0.444 \times t^* - (-143.34 + 0.5 \times (t^* - 32))}$$

 t^* = thermodynamic wet-bulb temperature of moist air, °F

t = dry-bulb temperature of moist air, °F

 c_n = specific heat of moist air, Btu/lb°F

 W_{s}^{*} = humidity ratio of moist air at saturation at thermodynamic wet-bulb temperature

Specific Heat

 $c_p = -2.0921943 \times 10^{-14} \times t^4 + 2.5588383 \times 10^{-11} \times t^3 + 1.2900877 \times 10^{-8} \times t^2 + 5.8045267 \times 10^{-6} \times t + 0.23955919$ t = dry-bulb temperature of moist air, °F

Specific Volume

 $v = \frac{0.7543 \times (t + 459.67) \times (1 + 1.6078 \times W)}{0.000}$

р

t = dry-bulb temperature of moist air, °F

W = humidity ratio of moist air, mass of water per unit mass of dry air

p = total pressure of moist air

Enthalpy

 $h = cp \times t + W \times (1061 + 0.444 \times t)$

t = dry-bulb temperature of moist air, °F

W = humidity ratio of moist air, mass of water per unit mass of dry air

 c_n = specific heat of moist air, Btu/lb°F

Wet Bulb

Iterative calculation calling Humidity Ratio function

Dew Point

Iterative calculation calling Saturated Humidity Ratio function



LICENSING

<u>Use License</u>

When you purchase a single user license, Hands Down Software grants you a non-exclusive license to install and operate this software on one computer. Should you choose to purchase a Network License, Hands Down Software will grant you a non-exclusive license to install this software on one network server and operate the software on not more than the user limit provided by the licensing you have purchased.

In addition, Hands Down Software grants you the right to make an archive copy of this software and to use that copy to reinstall the software in cases where the original copy has been corrupted or destroyed. The limits of your license to use this software must be understood prior to installation.

Program Ownership and Copyright Notice

This is a license agreement not a sale of the original program or copies thereof. Hands Down Software retains all rights to the program and any and all subsequent copies which exist regardless of their form. Reproduction of this software by parties other than Hands Down Software for reasons beyond that which is specifically stated in this license agreement is strictly prohibited by international copyright laws. Charts produced by this software are copyright the OEM Company whose logo appears on the chart.

HDPsyChart was written by Hands Down Software and associates and may be distributed under agreement between Hands Down Software and other parties. This software uses algorithms that are generally accepted by the Heating, Ventilation and Air Conditioning (HVAC) industry and as such the results of these calculations should yield acceptable results for use in general HVAC work.

DISCLAIMER OF WARRANTIES

Hands Down Software and the distributors of this software do not warrant that the information in this software is free of errors. The program is provided "as is" without warranty of any kind, either expressed or implied. The entire risk as to the quality and performance of the program and data is with you. In no event will Hands Down Software be liable to you for any damages; including without limitation any lost profits, lost savings, or other incidental or consequential damages arising out of the use or inability to use this program and data.