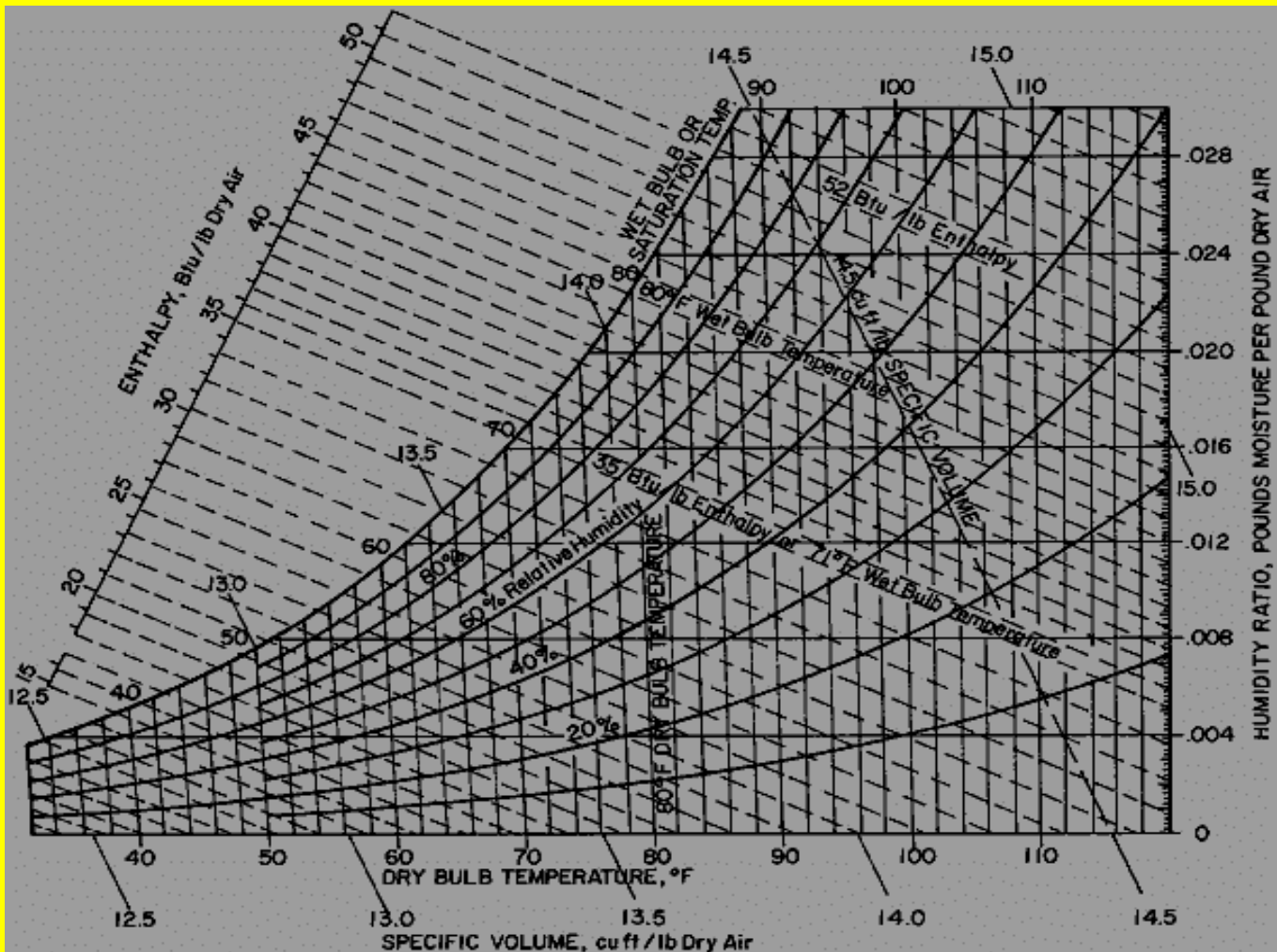


EZZE AIRE



EZZE AIRE PROVIDES QUICK ACCURATE ANSWERS TO YOUR AIR DRYING AND CONDITIONING QUESTIONS WITHOUT THE PROBLEM OF INTERPOLATING YOUR ANSWER FROM A COMPLICATED GRAPH WHICH IS CONFUSING TO USE .

EZZE AIRE USES A SIMPLE FILL IN THE BLANKS FORMAT TO DETERMINE AIR PROPERTIES AND SAMPLE PROBLEMS TO ASSIST YOU IN USING THE PROGRAM TO ITS FULL POTENTIAL.

THE PSYCHROMETRIC MODULE PROVIDES AIR PROPERTY VALUES IN IMPERIAL UNITS FOR USE IN YOUR APPLICATION PROBLEMS. IF YOU WISH TO WORK IN METRIC, CONVERSIONS ARE PROVIDED. FOR MORE INFORMATION GO TO HELP PAGE

SPECIAL NOTES FOR NEW USERS OF EZZE AIRE

WARRANTY

The author is not liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material. **All technical application software is inherently complex and users are cautioned to verify the results.**

TERMINOLOGY

In the EZZE AIRE program there is some terminology used which may not be familiar to you. Definitions and significance of calculated parameters can be found in the references listed below or the USER GUIDE.

TECHNOLOGY

EZZE AIRE is a utility designed to replace (supplement) the PSYCHROMETRIC CHARTS used by Engineers and HVAC specialists in heating, drying and air conditioning design and operations applications.

To determine air properties one needs to know two properties to determine the other 5 properties by using a ruler to extrapolate their values using a psychrometric chart. A very confusing and inconsistent means of determining values to use in your calculations.

EZZE AIRE removes inconsistencies by transforming the Psychrometric chart into a set of interlinked polynomial equations which with a few key strokes produces air properties quickly and with good reproducibility. To assist the user there are sample problems which cover the most common process and air conditioning applications solved using psychrometric charts.

REFERENCES

BASIC PRINCIPLES AND CALCULATIONS IN CHEMICAL ENGINEERING

David M. Himmelblau, Prentice-Hall , Englewood Cliffs NJ 1964

HUMIDITY CHART 1959 CARRIER CORPORATION

AIR CONDITIONING AND ENGINEERING

AMERICAN BLOWER CORP, 1935

COPYRIGHT

This template is the intellectual property of R. Cuthbert and is not to be copied in whole or in part without the author's permission. Permission is given by purchase of the template and /or by email from the author.

USER SUPPORT

bb646@yahoo.ca

R.CUTHBERT - HAMILTON, ONTARIO 2005

USER GUIDE

PRECAUTION

EZZE AIRE IS A UTILITY PROGRAM USED TO CALCULATE AIR PROPERTIES WITH ITS ELECTRONIC PSYCHROMETRIC CHART. IT IS MUCH QUICKER TO USE THEN CHARTS AND REMOVES THE INCONSISTENCY OF RESULTS DUE TO GRAPH INTERPOLATION ERROR IT HOWEVER DOESN'T HAVE THE ACCURACY OF CHARTS AND RESULTS SHOULD BE CHECKED WITH A CHART IN APPLICATIONS WHERE ACCURACY BETTER THEN +/-3% IS REQUIRED.

SPECIAL NOTE - TEMPERATURE RANGE FOR PROGRAM IS 45 TO 240 F

SPECIAL NOTE - PROGRAM USES IMPERIAL UNITS, TO USE METRIC UNITS (SEE BELOW)

HOW TO USE

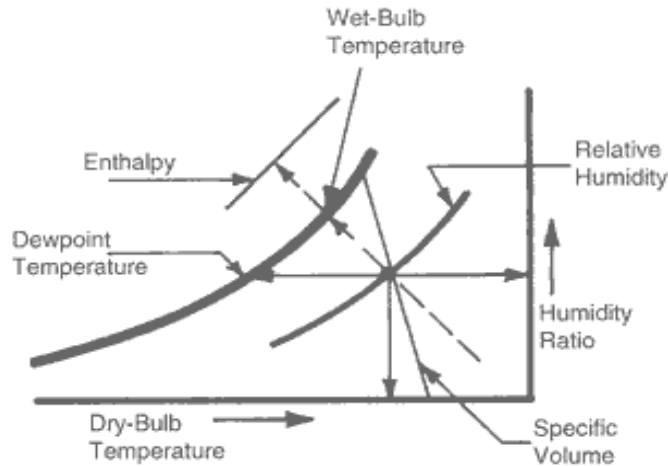
THERE IS NO TUTORIAL AS SUCH FOR USING EZZE AIRE.

WORK THROUGH THE SAMPLE PROBLEMS ON THE 'SOLUTION PAGE' AND YOU'LL LEARN HOW TO USE THE CHART AND SOME OF ITS APPLICATIONS

- PROPERTIES OF AIR DETERMINATION
- PROCESS HEATING AND COOLING APPLICATIONS
- AIR CONDITIONING

EZZE AIRE IS IN IMPERIAL UNITS . IF YOU WISH TO USE METRIC THERE IS A METRIC CONVERSION MODULE ON THE SOLUTION PAGE. INSTRUCTIONS FOR ITS USE ARE INCLUDED IN THE MODULE.

RFC - JUNE 2005



AIR PROPERTY SOLUTION MODULE - IMPERIAL UNITS

(45 F to 240F & RH>1%);

MACROS TO USE (LT-1 = ctrl p)(LT-2 = ctrl q)(LT-3 = ctrl r)(LT-4 = ctrl s)

LT - 1

INPUT DATA		CALCULATED PARAMETERS							
PARAMETER	DRY BULB TEMPERATURE	WET BULB TEMPERATURE	DRY BULB TEMPERATURE	WET BULB TEMPERATURE	DEW POINT TEMPERATURE	ENTHALPY	RELATIVE HUMIDITY	SPECIFIC VOLUME	# WATER PER # DRY AIR
UNITS	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	BTU PER # AIR	%	CU.FT. PER # AIR	##
VALUE	75	70	75	70	67	32.8	80	13.72	0.0137

LT - 2

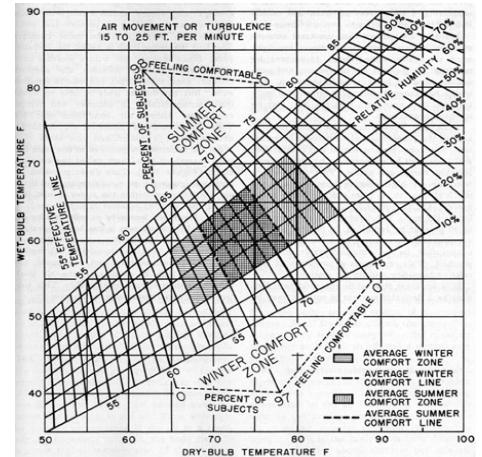
INPUT DATA		CALCULATED PARAMETERS							
PARAMETER	DRY BULB TEMPERATURE	RELATIVE HUMIDITY	DRY BULB TEMPERATURE	WET BULB TEMPERATURE	DEW POINT TEMPERATURE	ENTHALPY	RELATIVE HUMIDITY	SPECIFIC VOLUME	# WATER PER # DRY AIR
UNITS	FAHRENHEIT DEGREES	%	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	BTU PER # AIR	%	CU.FT. PER # AIR	##
VALUE	75	70	75	67	63.0	30.3	70	13.68	0.0120

LT - 3

INPUT DATA		CALCULATED PARAMETERS							
PARAMETER	DRY BULB TEMPERATURE	# WATER PER # DRY AIR	DRY BULB TEMPERATURE	WET BULB TEMPERATURE	DEW POINT TEMPERATURE	ENTHALPY	RELATIVE HUMIDITY	SPECIFIC VOLUME	# WATER PER # DRY AIR
UNITS	FAHRENHEIT DEGREES	##	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	BTU PER # AIR	%	CU.FT. PER # AIR	##
VALUE	150	0.0051	150	80	39	43.2	4	15.46	0.0051

LT - 4

INPUT DATA		CALCULATED PARAMETERS							
PARAMETER	DRY BULB TEMPERATURE	DEW POINT TEMPERATURE	DRY BULB TEMPERATURE	WET BULB TEMPERATURE	DEW POINT TEMPERATURE	ENTHALPY	RELATIVE HUMIDITY	SPECIFIC VOLUME	# WATER PER # DRY AIR
UNITS	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	BTU PER # AIR	%	CU.FT. PER # AIR	##
VALUE	160	90	160	101	87.8	73.5	14	16.13	0.0306



APPLICATION PROBLEM TEMPLATES

1 FINDING AIR PROPERTIES

WEATHER REPORT STATES THAT THE CURRENT TEMPERATURE IS 45 F AND RELATIVE HUMIDITY IS 80 % WHAT ARE THE OTHER AIR PROPERTIES ?
 ENTER DATA INTO LT-2 ACTIVATE MODULE BUTTON (MACRO ctrl-q)
 ANSWER DEW POINT IS 38 AND AIR CONTAINS .0056 LB WATER PER LB OF DRY AIR

2 HEATING AIR (10,000 CFM) FOR PROCESS DRYING

YOU HEAT AIR FROM 1. UP TO 150 F IN HEATING COILS BEFORE ENTERING THE DRYER WHAT ARE THE OTHER AIR PROPERTIES ?
 ENTER DATA INTO LT-4 ACTIVATE MODULE BUTTON (macro ctrl-s)
 ANSWER DEW POINT IS 38 AND AIR CONTAINS .0052 LB WATER PER LB OF DRY AIR RELATIVE HUMIDITY IS 4%
 SPECIFIC VOLUME IS 14.57 CUFT PER LB OF AIR NOTE WET BULB TEMPERATURE IS 80 F
 ENERGY REQUIRED FOR DRYING IS ENTHALPY COIL OUTLET(43.2) - ENTHALPY INLET?(15) X 10000/15.46 = 18241 BTU/MINUTE

3 PASSING THROUGH THE DRYER THE AIR IS COOLED TO 100 F DUE TO PICKING UP WATER DRYING THE PRODUCT

HOW MUCH WATER IS REMOVED IN THE DRYING PROCESS? DURING COOLING WET BULB TEMPERATURE IS CONSTANT
 ENTER DATA INTO LT-1 ACTIVATE MODULE BUTTON (macro ctrl-p)
 ANSWER EXHAUST GAS HAS 0.0177 LB/LB WATER THE INLET HAS 0.0052 ## DIFFERENCE IS 0.0125 ##
 ASSUME 10000 CFM AIR FLOW THROUGH THE DRYER HOW MUCH WATER IS REMOVED IN THE DRYING PROCESS
 SPECIFIC VOLUME = 14.52 CFM/# OF AIR THEREFORE WATER REMOVED PER MINUTE IS 10000/14.52 X .0101 = 7 LB OF WATER

4 AIR CONDITIONING

AMBIENT CONDITIONS ARE 90 F AND RELATIVE HUMIDITY OF 90% CHECK COMFORT ZONE CHART FOR COOLING/HEATING RANGE choose 70@70
 WE WISH TO COOL A PLANT CONTROL ROOM THAT IS 10FT X 20FT X 10 FT WE DETERMINE THAT WE WANT 6 AIR CHANGES PER HOUR
 VOLUME OF AIR REQUIRED ROOM(10X20X10) X AIR CHANGES/HOUR(6) = 12,000 CUFT/HOUR
 USE MODULE LT-2 TO DETERMINE AMBIENT AND CONDITIONED AIR PROPERTIES ALSO DEWPOINT PROPERTIES CONDITIONED AIR(58F@100%)
 WHY DO I NEED DEWPOINT CONDITIONS - TO REMOVE WATER FROM AIR MUST CONDENSE IT @DEWPOINT THEN REHEAT AIR BACK TO 70@70
 WATER TO REMOVE IS .0266(90@90) - .0102(70@ 70) WATER REMOVED PER HOUR IS 12000/13.52 X .0164 = 14.6
 REHEAT ENERGY REQUIRED 26.6(ENTHALPY70@70) - 24(ENTHALPY 58@100) X 12000/13.52(70@70) = 2308 BTU/H

UNIT CONVERSION

FROM METRIC		TO METRIC	
METRIC	IMPERIAL	IMPERIAL	METRIC
13	5.604182	ENTHALPY	50.5
KJ/KG	BTU/LB		117.1447
		SP VOL	0
			0
M^3.KG	FT^3/LB		M^3.KG
15	32	TEMP.	-17.7778
CELSIUS	FARENHEIT		FARENHEIT
15	33	WEIGHT	0
KG	LB		KG

METRIC CONVERSION MODULE

1 FOR METRIC TO IMPERIAL ENTER VALUE TO BE CONVERTED IN THE METRIC COLUMN UNDER THE HEADING FROM METRIC
 2 FOR IMPERIAL TO METRIC ENTER THE VALUE TO BE CONVERTED IN THE IMPERIAL COLUMN UNDER THE HEADING FROM IMPERIAL

SPECIAL PROGRAM NOTES

TEMPERATURE RANGE 45F TO 240F

MACRO BUTTONS OR MACROS MAY USED FOR INITIATING MODULE CALCULATIONS