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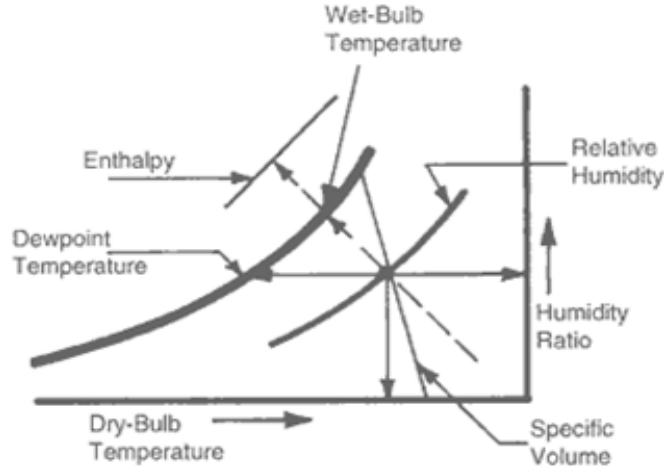
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***Content Based
Chemical Engineering***



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

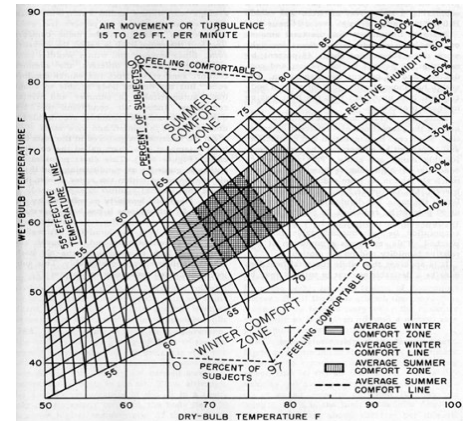
INPUT DATA		CALCULATED PARAMETERS							
PARAMETER	DRY BULB TEMPERATURE	RELATIVE HUMIDITY	DRY BULB TEMPERATURE	WET BULB TEMPERATURE	DEW POINT TEMPERATURE	ENTHALPY	RELATIVE HUMIDITY	SPECIFIC VOLUME	# WATER PER # DRY AIR
UNITS	FAHRENHEIT DEGREES	%	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	FAHRENHEIT DEGREES	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(7)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 BTUH

UNIT CONVERSION

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