USEFUL HVAC FORMULAS

ELECTRICAL:

POWER (WATTS) = VOLTS (V) x AMPS (A)

*IN SINGLE-PHASE (1ø) APPLICATIONS WITH NO POWER FACTOR CORRECTION.

POWER (WATTS) = VOLTS x AMPS x 1.73

*IN THREE-PHASE (3ø) APPLICATIONS WITH NO POWER FACTOR CORRECTION.

VOLTS = AMPS x RESISTANCE (OHMS LAW FOR DC OR RESISTIVE AC CIRCUITS)

1 KILOWATT (KW) = 1000 WATTS

1 WATT = 3.414 BRITISH THERMAL UNITS PER HOUR (BTUH)

CAPACITANCE (MICROFARADS): **MFD = CAPACITOR AMPS x 2654 / CAPACITOR VOLTS**

AIR AND HEAT:

HEAT RISE METHOD AIRFLOW CFM (CUBIC FEET PER MINUTE) TEST:

SINGLE-PHASE (1ø) APPLICATIONS: **CFM = V x A x 3.414 / 1.1 / ΔT** (ΔT = TEMP CHANGE)

THREE-PHASE (3ø) APPLICATIONS: **CFM = V x A x 1.73 x 3.414 / 1.1 / ΔT**

TOTAL HEAT TRANSFER (CONVECTION): **BTUHt = CFM x ΔH x 4.5** (ΔH = ENTHALPY CHANGE)

SENSIBLE HEAT TRANSFER (CONVECTION): **BTUHs = CFM x ΔT x 1.1**

LATENT HEAT TRANSFER (CONVECTION): **$BTUH_L$ = CFM x ΔGR x 0.68** (ΔGR = GRAINS/LB CHANGE)

VELOCITY METHOD AIRFLOW TEST: **CFM = FREE AREA (SQ. FT) x VELOCITY (FEET PER MINUTE)**
or **CFM = VELOCITY (FPM) x Ak FACTOR (from OEM Grille Data)**

DUCT PRESSURE DROP (SUPPLY-SIDE): **$PD = SSP_1 – SSP_2$**

(SSP_1 = SUPPLY STATIC PRESSURE ENTERING THE AIR-SIDE DEVICE OR DUCT SEGMENT)
(SSP_2 = SUPPLY STATIC PRESSURE LEAVING THE AIR-SIDE DEVICE OR DUCT SEGMENT)

DUCT PRESSURE DROP (RETURN-SIDE): **$PD = RSP_2 – RSP_1$** *DISREGARD NEGATIVE-PRESSURE SIGN

(RSP_1 = RETURN STATIC PRESSURE ENTERING THE AIR-SIDE DEVICE OR DUCT SEGMENT)
(RSP_2 = RETURN STATIC PRESSURE LEAVING THE AIR-SIDE DEVICE OR DUCT SEGMENT)

EXTERNAL STATIC PRESSURE (ESP) DIRECTLY ACROSS AIR HANDLER OR FURNACE:

$ESP = SSP_1 – RSP_1$ *TO SUBTRACT A NEGATIVE, CHANGE THE SIGN AND ADD THE REAL NUMBERS

USUALLY PD AND ESP ARE EXPRESSED IN INCHES WATER COLUMN (IWC) 1 IWC = 27.7 PSI

FRICTION RATE (IWC/100 FT.) = AVAILABLE STATIC PRESSURE (ASP) x 100 / TOTAL EFFECTIVE LENGTH (TEL)

*USED IN DUCT SIZING …. DO NOT USE A RULE OF THUMB LIKE “0.1” OR “0.08”…*CALCULATE THE FRICTION RATE*

