



Nimbus	ADIABATIC COOLERS
	Hybrid adiabatic cooling systems that reduce water consumption up to 75% and eliminate the primary breeding ground for Legionnaires' Disease. Made in the USA with materials to ensure reliability and advanced controls for maximum energy savings.
Peak +	Adiabatic pre-coolers designed to extend equipment life and lower energy usage by up to 30%. Complete with water softening system and cloud-based control network for real-time energy savings and seasonal optimization.
Berner	AIR CURTAINS/DOORS
	AMCA Certified, heated and unheated air curtains/doors. Architectural, commercial, and industrial styles for door heights up to 50' high.
TrueFIT	AIR FLOW MEASUREMENT
	Accurate and repeatable measurements for Outside, Supply, and Return airflow, unaffected by ambient weather, airborne pollutants, or bends and restriction in mechanical air delivery systems. Higher accuracy, better reliability, and more affordable than traditional air flow measurement systems.
Semco	AIR HANDLING
	Global Leader in air management with the industry's highest recovery performance (AHRI Certified) energy wheels. 3A Energy recovery air handlers 840 – 78,000 cfm. Acoustical thermal panels.
Multi-Aqua	AIR TERMINAL DEVICES
	Ductless hydronic fan coils/cassettes/high wall.
Thermal Solutions	BOILERS/BURNERS
	Extensive line of high efficiency condensing and non-condensing gas-fired, copper tube or stainless steel flexible water tube boilers to fit almost any commercial application 500MBh – 6,000 MBh.
Bryan	Steam and hot water boilers 6-600 BHP, gas, oil, dual fuel, and electric, forced draft and atmospheric, low NOx, and knockdown styles.
Sellers	Complete line of firetube boilers, D/A & feedwater systems, clean steam generators.
DuraVent	BOILER FLUE/STACKS
	Flues for every application, including grease duct.
Security	
Armstrong	BOOSTER SYSTEMS
	Quality engineered Design Envelope packaged booster systems.
Multi-Aqua	CHILLERS
	Small heat pump chillers.
Thermal Gas	Refrigerant monitors, alarms and safety equipment.
Systems	

Stulz	COMPUTER ROOM AIR CONDITIONING
	Designed specifically for the cooling of computer and electrical rooms. Floor-mounted, ceiling mounted, & in-row cooling units with chilled water, DX, redundancy & humidification.
Armstrong	COMMERCIAL PUMPS
	Design envelope solutions, including vertical inline pumps with factory-integrated VFDs with sensorless control. Large range of commercial pumps including vertical inline, base mounted/end suction, dual arm, and circulator pumps for many different applications.
Armstrong	CONTROLS
	Hartman loop central plant optimizer. KMC Tridium Niagara N4 open BACnet compliant systems. JCI FX (Facility Explorer) Tridium Niagara N4 open BACnet compliant systems. JCI Verasys Light commercial open BACnet building automation systems.
CanFab	CUSTOM HVAC ACCESSORIES & MODIFICATIONS
Thybar	Modifications and accessories for unitary packaged and split systems
Reznor	DEDICATED OSA UNITS
	High efficiency gas heat outdoor air units.
PoolPak	DEHUMIDIFICATION UNITS & POOL/NATATORIUM UNITS
	Specifically designed units for the crucial need of accurate temperature and humidity control for indoor pools using heat reclaim.
Wheels	ENERGY RECOVERY SYSTEMS
	SEMCO, CanFab, Thybar, MicroMetl 3 ANG, 4 ANG, plastic polymer technology offering total sensible, equal sensible and latent, and sensible only recovery. Available for new or retrofit projects for 840 – 78,000 cfm.
Genesis Air	HIGH EFFICIENCY IAQ SYSTEMS
	Photo-Catalytic Oxidation systems with near 0 PD. Ideal for the control of VOCs and biological contaminants in hospitals, schools, casinos, etc.
Carel	HUMIDIFIERS
	Isothermal and adiabatic humidification solutions for every application: electric, gas-fired, steam generators and distribution.

Hays	HYDRONIC SPECIALTIES
	Flow control valves for hydronic heating, circulation isolating flanges, and configured hydronic hookups.
Armstrong	Leader in HVAC expansion tanks, thermal expansion tanks, and vortex air separators.
Spirotherm	Leader in regular and high velocity air/dirt separators that are able to eliminate 100% of free air, 100% of entrained air, and up to 99.6% of dissolved air (microbubbles) in water. Particle separator down to 5 microns with a minimum pressure drop. Large & custom sizes available.
Sysstecon	PACKAGED CHILLER & BOILER PLANTS
	Custom-built modular central plants and packaged pumping systems for commercial and mission critical applications.
Armstrong	Pre-engineered packaged plants and pumping skids.
Armstrong	HEAT EXCHANGERS
	Shell & tube, plate and frame, and brazed plate heat exchangers for commercial and industrial applications covering a wide range of different fluids and operating pressures.
Gaylord	POLLUTION CONTROL UNITS & GREASE DUCT SUMPS
	Commercial kitchen ventilation systems including pollution control units with odor, grease and smoke removal. Grease duct sumps.
CanFab	ROOF CURBS
	One of the premier designer and manufacturers of commercial HVAC accessories.
Thybar	High quality roof curbs made by a leader in the sheet metal industry.
MicroMetl	High quality galvanized steel roof curbs.
Hitachi	VRF & DUCTLESS SYSTEM
	Global leader in VRF & ductless heating and cooling systems. Air and water cooled VRF heat recovery, heat pump, multi-zone, and mini-split systems. Ultra-efficient design, inverter technology, individual zoning control, and quiet operation throughout a wide range of operating conditions.
Century	Multi/single zone ductless mini-split system cooling & heat pump units up to 3 tons.
Cold Point	WATER SOURCE & AIR SOURCE PRODUCTS
	Mainstream replacement manufacturer of water source products: packaged heat pumps, vertical stack chassis, console products; and air source products: vertical and horizontal PAC units, and packaged A/C and heat pumps.
Adirondack Aire	

Useful Formulas

$$\begin{aligned} \text{BTUH}_{\text{total}} &= \text{BTUH}_{\text{sensible}} + \text{BTUH}_{\text{latent}} \\ \text{BTUH}_{\text{sensible}} &= 1.085 \cdot \text{SCFM} \cdot (\text{EAT}_{\text{db}} - \text{LAT}_{\text{db}}) \\ \text{BTUH}_{\text{latent}} &= \text{CFM}_t \cdot 0.68 \cdot (W_{\text{entering}} - W_{\text{leaving}}) \\ \text{BTUH}_{\text{total}} &= 500 \cdot \text{GPM} \cdot (\text{LWT} - \text{EWT}) \\ \text{BTUH}_{\text{total}} &= 4.5 \cdot \text{SCFM} \cdot (h_{\text{entering}} - h_{\text{leaving}}) \\ \text{Heat}_{\text{total}} &= \text{enthalpy (BTU per Pound of Dry Air)} \\ \text{Wet Bulb Depression} &= \text{EAT}_{\text{db}} - \text{EAT}_{\text{wb}} \\ \text{Evaporative Effectiveness} &= (\text{Wet Bulb Depression}) \cdot (\text{Media Efficiency}) \end{aligned}$$

Fan Laws

$$\begin{aligned} \text{CFM}_2 &= \text{CFM}_1 \cdot (\text{RPM}_2 / \text{RPM}_1) \\ P_2 &= P_1 \cdot (\text{RPM}_2 / \text{RPM}_1)^2 \\ P_2 &= P_1 \cdot (D_2 / D_1) \\ \text{HP}_2 &= \text{HP}_1 \cdot (\text{RPM}_2 / \text{RPM}_1)^3 \\ \text{HP}_2 &= \text{HP}_1 \cdot (D_2 / D_1) \end{aligned}$$

BAROMETRIC PRESSURE 27.61 in. HG at 2,100 ft. elevation

Legend for Formulas

BTUH_{total} = total heat
 BTUH_{sensible} = sensible heat
 BTUH_{latent} = latent heat
 SCFM = supply air CFM
 CFM_t = total CFM
 W = grains of water per lb. of dry air
 P = pressure
 D = density
 HP = horsepower
 h = enthalpy

Standard Conversions

1 BTUH = 0.293 Watts
 1 kWh = 3413 BTUH
 1 kW = 1.34 HP
 1 HP-hour = 2545 BTUH
 1" H₂O column = 0.03613 psi
 1 cubic foot = 7.481 Gallons
 1 cubic foot = 1728 cubic inches
 1 CFM = 0.472 Liters/sec
 1 Gallon = 8.43 Lbs.
 1 Gallon = 2.31 cubic inches
 1 Pound = 7000 Grains
 1 psi = 2.307 ft. of H₂O

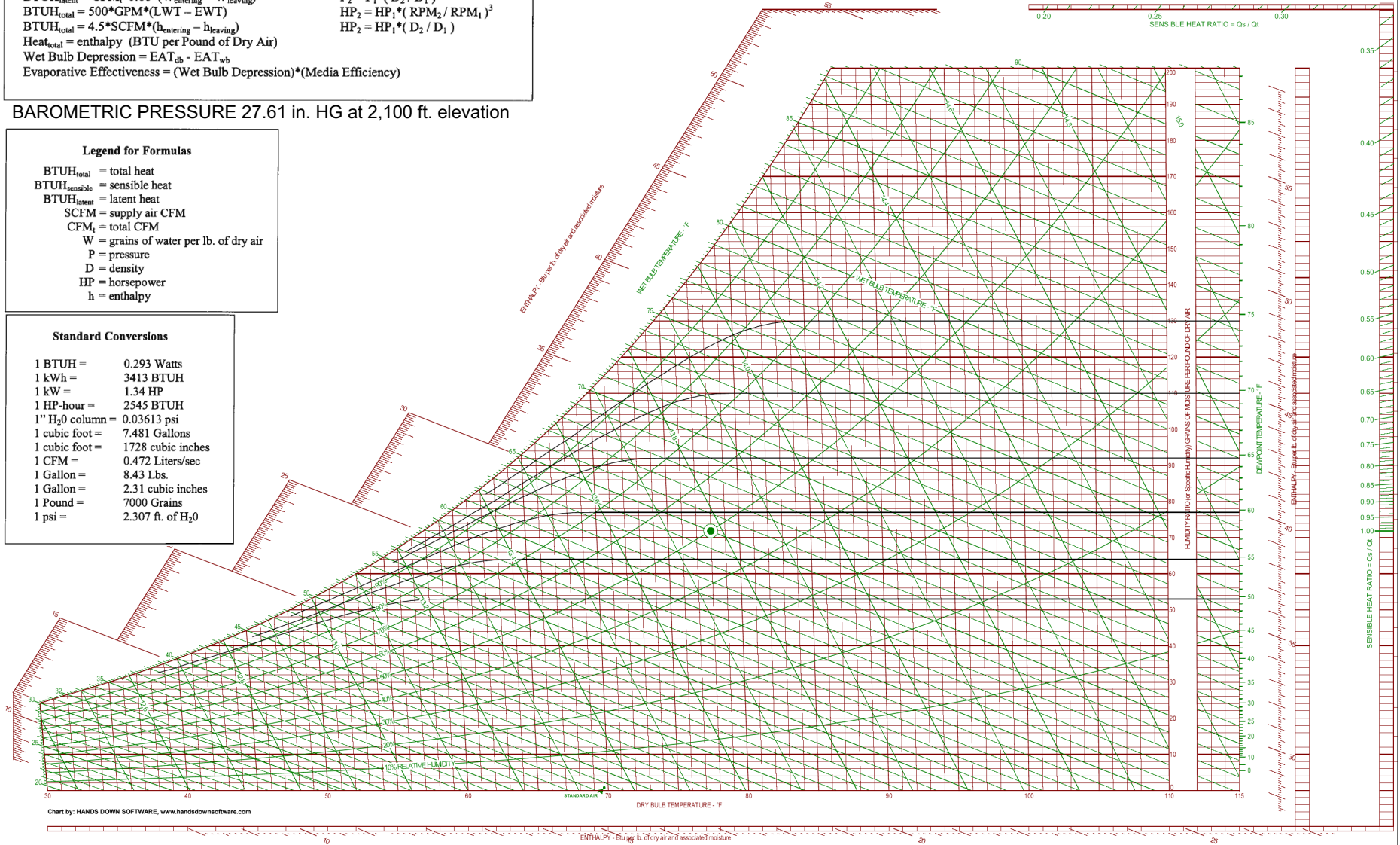


Chart by: HANDS DOWN SOFTWARE, www.handsdownsoftware.com