

ENERGY STUDY at NASA's Goddard Space Flight Center in Maryland

COMPARISON:

Comparing the humidifier energy cost in twelve laboratory rooms using ultrasonic humidifiers versus steam canister humidifiers.

METHOD:

Psychrometric calculations were done to determine the humidification load in each room. Then energy use was calculated to achieve and maintain RH levels in the rooms using Humidifirst ultrasonic humidifiers or Nortec steam canister systems.

BASIS OF CALCULATION:

The total humidification load in the combined twelve small laboratories was 95#/hr. NASA's KW cost is based on a Maryland campus rate of 12.4 cents/hr.

FINDINGS:

The energy cost to humidify those rooms using **steam canisters** was **\$6.09 per hour**.

The energy cost to humidify those rooms using **ultrasonic humidifiers** was **\$0.31 per hour**.

Additional finding: The steam systems led to energy consumption in creating the steam as well as in re-cooling the rooms.

CONCLUSION:

This study is consistent with the Department of Energy's 1998 study found at DOE EE-0180 and lends independent and impartial support for the energy savings associated with the use of ultrasonic humidifiers in critical operation facilities.

HUMIDIFICATION OF B 22 LABS BY USE OF ULTRASONIC HUMIDIFICATION OVER STEAM HUMIDIFICATION

ROOM	Actual ULTRA SONIC SIZE MAX CAPACITY	ACTUAL PSYCHOMETRIC SIZE REQ. PPH	BTUS IF STEAM USED FROM 60 DEGREE H2O	COOLING BTUS NEEDED IF STEAM USED	TOTAL BTUS PER POUNDS FOR STEAM HUMIDIFICATION	TOTAL KILOWATT PER POUND'S FOR STEAM PPH	COST PER KW IN MARYLAND AVG. 12.4 CENTS STEAM COST POWER	WATTS PER ULTRASONIC TOTAL PER UNITS MAXIMUM	COST PER KW IN MARYLAND AVG. 12.4 CENTS ULTRASONIC COST POWER IN TOTAL PPH
C079	15	12.5	14025	14015	28040	8.21572	\$ 1.02	420	\$ 0.05
C085	10	9	10098	10088	20186	5.914498	\$ 0.73	240	\$ 0.03
076	5	4	4488	4478	8966	2.627038	\$ 0.33	120	\$ 0.01
077	15	12	13464	13454	26918	7.886974	\$ 0.98	420	\$ 0.05
C075	5	3.7	4151.4	441.4	4592.8	1.3456904	\$ 0.17	120	\$ 0.01
C057	5	2.3	2580.6	2570.6	5151.2	1.5093016	\$ 0.19	120	\$ 0.01
C051	5	3.7	4151.4	4141.4	8292.8	2.4297904	\$ 0.30	120	\$ 0.01
C051A	5	3.2	3590.4	3580.4	7170.8	2.1010444	\$ 0.26	120	\$ 0.01
C051B	5	3.1	3478.2	3468.2	6946.4	2.0352952	\$ 0.25	120	\$ 0.01
C049	5	4.8	5385.6	5375.6	10761.2	3.1530316	\$ 0.39	120	\$ 0.01
C047A	15	13.9	15595.8	15585.8	31181.6	9.1362088	\$ 1.13	420	\$ 0.05
C070E	5	4.2	4712.4	4702.4	9414.8	2.7585364	\$ 0.34	120	\$ 0.01
Totals	95	76.4	85720.8	81900.8	167621.6	49.1131288	\$ 6.09	2460	\$ 0.31
ITEM	MAX POUNDS OF ULTRASONIC	REQUIRED PPH OF HUMIDITY TOTAL	BTUS REQUIRED PER POUND OF WATER TO PRODUCE STEAM	BTUS REQUIRED TO RID SPACE OF HEAT FROM STEAM 10 BTUS LOWER TO MAINTAIN 70 F	TOTAL BTUS REQUIRED FOR HUMIDIFICATION USING STEAM FOR STEAM HUMIDIFICATION	CONVERT BTUS TO KWH MULTIPLY BY 0.000293 FOR 47.6 KW	COST FOR STEAM HUMIDIFICATION (Cost per hour of operation)	TOTAL WATTS FOR ULTRASONIC OR 2.4 KW	TOTAL FOR ULTRASONIC IF FULL OUT PUT REQUIRED (Cost per hour of operation)

THE ABOVE CALCULATIONS FALL WITHIN THE STUDY GUIDELINES OF THE DOE PAPER PRESENTED IN 1998 DOE/EE-0180 Including the water cost generation of the DI Per Pound of water consumed has a payback of less than 1400 Hours of operation (ayear has 8760 hours) for a small DI / RO water generation System. and service life cost is about 60% greater for Steam Canisters based on cost of canisters alone. (Cost of canisters verses cost of water system Maintenance consumables with labor.)

Equipment Cost	Water Cost WCC	\$ 9.36	1 cubic Foot Water = 7.48052 Gallons
Steam Canister cost	Sewer Cost WCC	\$ 13.69	1 Gallon water = 8.34 Pounds