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How to Calculate BTU's on CHW System

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Thread: How to Calculate BTU's on CHW System

Search Thread Thread Tools Display #1 04-03-2008, 11:39 PM stopher9 o **Regular Guest** Nov 2005 Join Date: Location: Sacramento, ca Posts: Post Likes **How to Calculate BTU's on CHW System** Whats a good way to calculate BTU'S on a chilled water system.

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04-03-2008, 11:43 PM #2

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chillerfreak o **Professional Member**

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👥 Originally Posted by stopher9 ந

Whats a good way to calculate BTU'S on a chilled water system.

Tons= (GPM*delta T)/24

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04-04-2008, 07:11 AM

#3

idd67 o **Regular Guest**

> Join Date: Location: Posts:

Mar 2008 Baltimore

50 Post Likes

BTU/hr Calculation

You will need the mass flow rate and temperature differential.

The formula is Q(BTU/hr) = (Mdot)(Cp)(delta-T). Mdot can be solved for if you gave a GPM value by assuming that the treated chilled water weighs about 8.33 lbm/gal. Converting gallons to mass and coverting the time to hours yields a constant of 499. The formula would then reduce to:

Q(Btu/hr) = (GPM)(499)(delta-T)

Also as chillerfreak pointed out:

Q(tons) = [(GPM)(delta-T)]/24

or

Q(tons) = Q(BTU/hr)/12000

Units analysis:

Q(BTU/hr) = (Mdot)(Cp)(delta-T) $BTU/hr = \{(Gal/min)(60min/hr)(8.33lbm/gal)\}\{1$ BTU/(lbm-degF)}{degF}

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#4

amsolo • Regular Guest

Join Date: Posts: Oct 2006 193

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Or, if you're not really good in math,

get one of these;

http://www.onicon.com/System10.shtml

I have 3 tied into my ems system and bill the 3 users for their $\mbox{BTU}\mbox{'s}$

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04-04-2008, 09:18 AM

#5



chillerfreak • Professional Member

Join Date: Location: Posts: Dec 2007 Oregon 525

Post Likes

Coriginally Posted by jdd67 🔟

You will need the mass flow rate and temperature differential.

The formula is Q(BTU/hr) = (Mdot)(Cp)(delta-T). Mdot can be solved for if you gave a GPM value by assuming that the treated chilled water weighs about 8.33 lbm/gal. Converting gallons to mass and coverting the time to hours yields a constant of 499. The formula would then reduce to:

Q(Btu/hr) = (GPM)(499)(delta-T)

Also as chillerfreak pointed out:

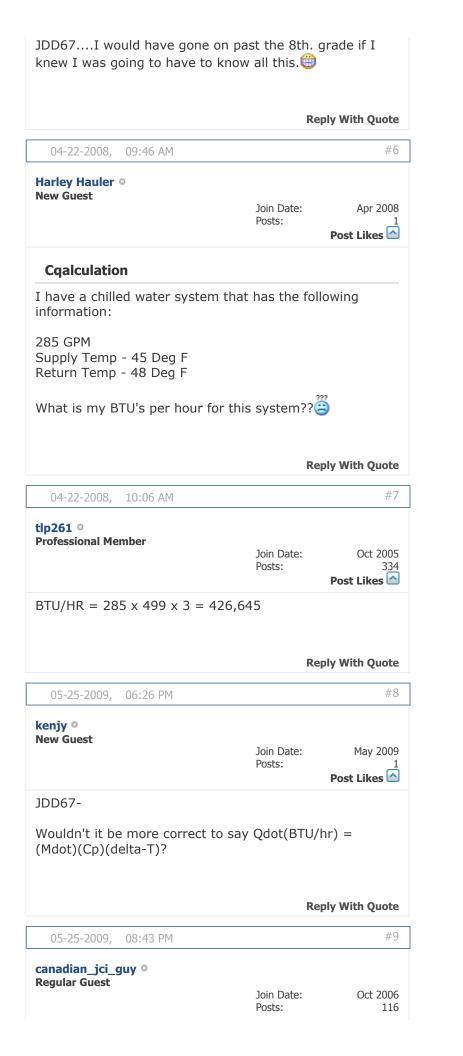
Q(tons) = [(GPM)(delta-T)]/24

or

Q(tons) = Q(BTU/hr)/12000

Units analysis:

Q(BTU/hr) = (Mdot)(Cp)(delta-T) $BTU/hr = {(Gal/min)(60min/hr)(8.33lbm/gal)}{1$ $BTU/(lbm-degF)}{degF}$



The formula is fairly simple BTU/Hr = FlowRate(in USGPM)*500(Weight of Water Constant) * Delta T.

The accuracy of the data is another thing.

- 1. You need a highly accurate flow meter, installed with the correct number of up stream & down stream straight runs of pipe. Personal experience, I like Mag meters because of the low up/downstream pipe runs and they have a much better turn down ratio than most other meters.
- 2. Matched(meaning calibrated and read the same value at the same time in the same medium) temperature probes. This is very important because it can make a large difference in the data. Just for an example if you use standard nickel 1k ohm transducers -50 Deg F to 250 Deg F range +/- 0.1 % accuracy.....the range of error is +/- 3 Deg F. So if you have two sensors for your CHWS & R that are at the opposite ends of the +/- you could have a 6 Deg F error!!

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07:17 PM 05-28-2009,

#10



jogas o **Professional Member**

> Join Date: Location: Posts:

Jun 2005 Ohio 1,784

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2. Matched(meaning calibrated and read the same *value at the same time in the same medium)* temperature probes. This is very important because it can make a large difference in the data. Just for an example if you use standard nickel 1k ohm transducers -50 Deg F to 250 Deg F range +/- 0.1 % accuracy.....the range of error is +/- 3 Deg F. So if you have two sensors for your CHWS & R that are at the opposite ends of the +/- you could have a 6 Deg F error!!

Good point.

When I commission a CHW or HW system, I always make sure to run the pump(s) for a while (longer the better) to see if my inlet and outlet sensors are close to each other.

More than a half degree difference and I'm looking for the cause.

Jogas

Four wheel therapy, my 1968 Camaro is gone and will be missed

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05-28-2010, 11:40 PM

#11

mileslong O Regular Guest

Join Date: Posts: May 2010

Post Likes 🛆

You dont have to have a flow meter to determine GPM. What you must have is the factory startup sheets that show design GPM and FTWG. Here is the equation if you have these variables.

GPM= dGPMx[square root (mFTWG/dFTWG)]

dGPM is design GPM mFTWG is measured feet of head dFTWG is design feet of head

To find the feet of head, measure preasure drop across cooler barrel in PSI and convert to feet of head.

example: 4PSI to feet of head is 4x2.31 or 8.4 feet of head. Multiply pressure drop by 2.31 to get feet of head.

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05-31-2010, 01:45 PM

#12



exwtk o Professional Member

> Join Date: Posts:

Mar 2007 297

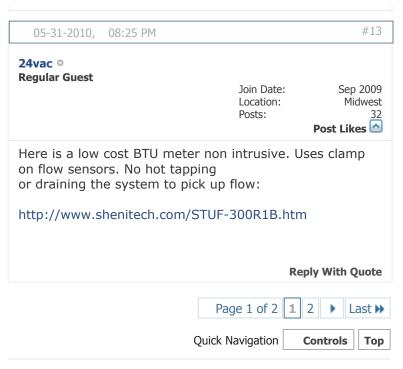
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Just for an example if you use standard nickel 1k ohm transducers -50 Deg F to 250 Deg F range +/-0.1 % accuracy.....the range of error is +/- 3 Deg F. So if you have two sensors for your CHWS & R that are at the opposite ends of the +/- you could have a 6 Deg F error!!

If the accuracy is 0.1 % wouldn't the range of error be +/- 0.3 Deg F instead of 3 Deg F ?????

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