Richard Hicks

From: Devlin, Thomas J CIV USARMY CENAP (USA) <Thomas.J.Devlin@usace.army.mil>
Sent: Friday, June 19, 2020 8:03 AM
To: Richard Hicks
Subject: RE: [Non-DoD Source] FW: VA049 CSS 21208 WO 10617 O&A Approval need - Glycol Job (UNCLASSIFIED)

Follow Up Flag: Follow up
Flag Status: Flagged

Rick -

FYI (from our Mechanical):

D. Edwards -

BLUF: I do not recommend adding glycol to the system. I recommend ensuring that the heat trace still works; confirming that the existing system volume is adequate for the chiller; reviewing the tuning parameters and set points in the chiller and making necessary modifications thereto; and I recommend reviewing the building automation system controls related to the chilled water system to ensure that those set points and tuning parameters are appropriate.

Unless there has been an undocumented renovation since 1996 (which I assume there was since the chiller model is a CGAM which came out some time in the first decade of 2000) where something changed with the system, there is nothing that indicates that this chilled water system contains glycol.

Drawing M-2 (filename VA049_487) is dated 1996. That project replaced the old chiller (see files 44 & 45). Neither project's drawings indicate glycol. The 1996 project even shows that the exterior chilled water piping is to be heat traced.

I do not recommend adding glycol to the system. I would ensure that the heat trace still works.

Additionally, the drawings that I have indicate that the chiller operates as a primary-only system. Based on how I interpret the drawings, the existing chilled water control valves are two-way throttling valves (i.e. they do not have bypasses) and are located on the supply line (I typically see control valves on the return side of the coil). As the cooling load decreases at an AHU, the cooling valve will throttle down in response. The chilled water circulating pump appears to be constant volume, that is, the drawing does not show a variable speed drive with the pump. This situation is known as "riding the curve". As the chilled water control valves throttle closed, the flow off the pump will automatically adjust by operating at a different

location on its pump curve. To protect the chiller, a bypass valve ("V-3") opens when the system flow rate drops below 100-gpm to ensure that a minimum of 100-gpm is circulated through the chiller's evaporator. If the rate of change in the flow rate is too quick, the chiller's controls may shut the chiller off.

Some other things that should also be determined is tuning parameters (e.g. how quickly the chiller will respond to various situations, when to stage a compressor on/off, etc.) of the existing chiller as well as ensuring that the system has enough volume to keep the chiller happy. The system volume may be inadequate or there may be too quick of a rate of change in the return water temperatures/flows that could be causing problems.

For a complete explanation of system volume considerations, Trane's literature describes it quite well:

"Adequate water volume is an important system design parameter because it provides for stable
chilled water temperature control and helps limit unacceptable short cycling of chiller
compressors.

"The chiller's temperature control sensor is located in the supply (outlet) water connection or pipe.
This location allows the building to act as a buffer to slow the rate of change of the system water
temperature. If there is not sufficient water volume in the system to provide an adequate buffer,
temperature control can suffer, resulting in erratic system operation and excessive compressor
cycling.

"Typically, a two-minute water loop circulation time is sufficient to prevent short water loop issues.
Therefore, as a guideline, ensure the volume of water in the chilled water loop is greater than or
equal to two times the evaporator flow rate. For systems with a rapidly changing load profile the
volume should be increased.

"If the installed system volume does not meet the above recommendations, the following items
should be given careful consideration to increase the volume of water in the system and, therefore,
reduce the rate of change of the return water temperature."

Thanks!

Tom

Thomas J. Devlin
Engineering Technician

Contract Administration Section
Construction Branch
U.S. Army Corps of Engineers, Philadelphia District

P: 215-656-6619
C: 215-313-1151

-----Original Message-----
From: Richard Hicks [mailto:richard.hicks@cmimgmt.com]
Sent: Tuesday, March 10, 2020 8:25 AM
To: Devlin, Thomas J CIV USARMY CENAP (USA) <Thomas.J.Devlin@usace.army.mil>
Subject: [Non-DoD Source] FW: VA049 CSS 21208 WO 10617 O&A Approval need - Glycol Job (UNCLASSIFIED)

Tom as requested see responses below .

Thanks
Rick

Rick Hicks
PM / Region 5
CMI Management
703-738-5301

-----Original Message-----
From: Jon Millller <jmiller@bondwater.com>
Sent: Monday, March 9, 2020 8:28 PM
To: Richard Hicks <richard.hicks@cmimgmt.com>
Subject: RE: VA049 CSS 21208 WO 10617 O&A Approval need - Glycol Job (UNCLASSIFIED)

Rick,

See me comments below, let me know if you need anything else.

Jon Miller, CWT
Account Manager
Bond Water Technologies
301-580-9820

Hi Tom,

I am confused. The quotes are for chilled water, but the picture included in the O&A quote is of 4 boilers. Are they replacing the chilled water or heating hot water?----------

Response- (This is for the chilled water system only)

Does the existing system have glycol? The "original description" intimates to me that the system does not currently have glycol in it.

Response-(the chiller water does not have glycol currently -the chiller is located on the roof and is recommended to stay online all year) mostly freeze protection -and cooling transfer for efficiency

If the system in question is indeed the chilled water system AND it does not already have a glycol mixture therein, then there will be performance degradation after adding the glycol. If the existing system contains glycol, then it shouldn't be an issue unless the percentages differ significantly (e.g. it has 20%, but is now 30%). If they really meant the hot water system, then, depending on the temperatures, there shouldn't be too much issue with performance. Again, that is temperature dependent. The colder a glycol solution is, the worse impact it has on pump performance and heat transfer.

Response- Any chilled water system that travels outside has a risk of freezing and rupturing the chiller, this is one of the only military chill water installations I've seen without glycol (and an exterior chiller.) Typically the sweet spot for glycol is in between 20-30% mixture, any larger volume and it will restrict heat transfer, any smaller and the glycol will be in danger of breaking down into glycolic acid and other harmful bi-products. I would also be extremely surprised if glycol was not originally specified into the building because of the danger of freezing, but lost the glycol at some point along the way.

De-ionized (DI) water can cause corrosion issues with certain metals. The KTR needs to be sure that none of the piping, chiller components, coils, pumps, etc. will be negatively affected by DI water. We did a project for the Navy that utilized DI water and all the components in contact with the water are stainless steel. DI water will leach ions from the materials in which it is in contact.

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Response - De-ionized water alone causes all sorts of corrosion with many metals. Ultra pure water is always very aggressive in and of itself, however when mixed in an inhibited glycol solution it has excellent corrosion rates. The glycol is mixed with De-ionized water and an excellent orthophosphate inhibitor package. On top of this, we also provide an extra

layer of corrosion protection with our molybdenum/tolytriazole inhibitor that we add to all loops per our contract. De-ionized water is simply added to glycols to aid in preventing them from breaking down. There is no need to worry about increased corrosion here because of the mix.

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Blockedhttp://gregknowswater.com/di-water-compatibility-chart/
Blockedhttps://www.eng-tips.com/viewthread.cfm?qid=29596

R/

Dan

-----Original Message-----
From: Richard Hicks [mailto:richard.hicks@cmimgmt.com]
Sent: Monday, March 9, 2020 3:47 PM
To: Jon Millller <jmiller@bondwater.com>
Subject: FW: VA049 CSS 21208 WO 10617 O&A Approval need - Glycol Job (UNCLASSIFIED)

-----Original Message-----
From: Devlin, Thomas J CIV USARMY CENAP (USA)
<Thomas.J.Devlin@usace.army.mil>
Sent: Monday, March 9, 2020 3:41 PM
To: Richard Hicks <richard.hicks@cmimgmt.com>
Subject: FW: VA049 CSS 21208 WO 10617 O&A Approval need - Glycol Job (UNCLASSIFIED)

Rick,

See questions / concerns from the Mech Engineering below. Please address so I can provide to the ME.

Thanks!

Tom

Thomas J. Devlin
Engineering Technician
Contract Administration Section
Construction Branch
U.S. Army Corps of Engineers, Philadelphia District

P: 215-656-6619
C: 215-313-1151

-----Original Message-----
From: Edwards, Daniel L CIV USARMY CENAP (US)

Sent: Monday, March 09, 2020 3:33 PM
To: Devlin, Thomas J CIV USARMY CENAP (USA) <Thomas.J.Devlin@usace.army.mil>
Subject: RE: VA049 CSS 21208 WO 10617 O&A Approval need - Glycol Job
(UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

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R/

Dan