

Aquatherm Technical Bulletin

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Aquatherm Water Testing

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When using PP-R or RP(RCT)² piping in a domestic hot water recirculating (DHWR) system which contains copper tubing or copper components, and in some cases adding PP-R or RP(RCT)² to a copper tube hot water supply system, the level of copper in the water should be tested to evaluate the system operation and potential corrosion of copper components. This technical bulletin provides Aquatherm's guidance for the water testing of these systems.

Water testing is recommended by Aquatherm prior to the planning and installation of the following systems:

- 1) Installing Aquatherm piping into any hot water circulating retrofit project where it is intended to remove partial sections of copper tubing from the hot water circulating system, replacing those sections with Aquatherm pipe, and placing the modified system in use, especially when the construction process is lengthy.
- 2) Installing Aquatherm piping in any installation where Aquatherm pipe is used in a hot water circulating system containing copper tubing or copper components (e.g., heat exchanger, solar heating tubing, etc) and portions of the copper tubing or components are intended to remain in place in the hot water circulating system.
- 3) Installing Aquatherm piping into any hot potable water supply system containing copper tubing known to have erosion/corrosion issues (aggressive water), or flow velocities higher than the recommendations of the Copper Development Association Handbook.

Water sampling results should be submitted to Aquatherm for any of the three above mentioned conditions. Results will be analyzed, and guidance will be provided to the engineer, owner and/or contractor who has submitted the laboratory results.

It is also recommended that this sampling be performed as part of a maintenance routine for the three systems described above as system design, operating conditions, hot water demands, pump speed settings, and water chemistry may change over the life of the system. Results from the maintenance sampling are recommended to be submitted to Aquatherm if copper levels are above the 0.1 ppm (0.1 mg/L, 100 ug/L) level.

Sampling Instructions:

Aquatherm can identify a laboratory to run the water analysis near the job location. The lab will provide sample bottles the sample bottles will need to be picked up from the laboratory along with a chain of custody form prior to sampling.

If the sample bottles are provided empty (no preservative), then rinse the cap and sample bottle 3 times with cold water at the job site where the water is to be sampled prior to collecting the sample. Samples should be taken at first draw, where the water is not allowed to run prior to sampling provided the sampling location is directly connected to the circulation system being evaluated. If the sample is pulled from a branch from the recirculating loop or has other stagnant areas in the sampling arrangement, the water should be run long enough to purge the line in order to observe the quality of circulated water. Approximately 2-3 minutes is usually sufficient.

Typically, a total of four water sample locations are recommended. Additional sample locations may be needed to identify copper level contributions in the system if there is more than one hot recirc return, or if there is more than one copper tube segment in the DHWR system. For questions pertaining to the number of sample locations recommended contact your Aquatherm representative prior to sampling.

Four Typical Sample Locations

- 1) Three samples should be taken from the cold water pipe supplying the building; one for pH, one for residual chlorine, and one for copper. The samples should be taken from a location located just as the water comes in the building. The water sample bottles shall be labeled "CW". Mark "CW" in the description section of the laboratory's chain of custody form for these three samples. Show the "CW" sample location on a marked up drawing or on a non-detailed sketch of the system. Provide a picture of the sample location where the samples were taken, label the photo "CW". If the site has never had the cold water tested before, it is recommended that the cold water supply be tested for lead as well. An additional sample bottle will not be required for the testing of lead, the laboratory will provide a sample bottle large enough to test for both copper and lead if they are made aware that lead testing will also be required. If cold water supply to the building is chlorinated by an onsite treatment process within the building the residual chlorine sample location will need to be taken from a location just downstream of the building's water treatment process (chlorinator).
- 2) One sample should be taken directly from the hot water supply line coming off the hot potable water supply tank, or the nearest hot water fixture off the hot water main. The water sample bottle shall be labeled "HWS". On the chain of custody form, document this sample with the description "HWS" and instruct the laboratory to analyze this sample for total copper. Mark the "HWS" sample location on a marked-up drawing or non-detailed sketch. Provide a photo of the sample location and label the photo "HWS".

- 3) One sample should be taken from the hot water return piping right before the hot water returns to the hot water potable water tank or cold water main, depending on where the hot water return connects to the hot water system. Mark the sample bottle with the label “HWR”. Use “HWR” as the sample description on the laboratory’s chain of custody form and instruct the laboratory to analyze this sample for total copper on the form. Indicate the “HWR” sample location on a marked up drawing or non-detailed sketch. Provide a picture of the sample location and label the photo “HWR”.
- 4) One sample should be taken from the hot potable water pipe at the far end of the loop just upstream of the return piping to determine the copper level developed in the return system. The water sample bottle shall be labeled “HWB”. The description “HWB” shall be used on the laboratory’s chain of custody form as the sample’s description. Instruct the laboratory to analyze this sample for total copper on the form. Indicate the “HWB” sample location on a marked-up drawing, or a non-detailed sketch. Provide a photo of the sample location and label the photo “HWB”.

If there is a concern with the non-recirculating portions of the piping, contact Aquatherm for further guidance on sampling procedures and locations.

Common Questions Pertaining to Water Sample Testing:

How much water in each sample is required?

The laboratory will provide the sample bottles. The bottles should be filled completely.

What do you need to know regarding chlorine testing?

When testing for chlorine the laboratory may provide a preservative for the residual chlorine analysis. The samples will need to be returned to the lab the same day on which they are drawn, typically within 4 hours. If not, the chlorine measurements will not be representative of what is actually in the water supply.

Does the lab need to be notified when the samples will be returned?

When requesting residual chlorine testing the lab should be advised when the samples will be returned to them so that the laboratory can plan accordingly and communicate scheduling issues, if any exist.

Who is responsible for paying the laboratory for the sample analysis?

The payment for the testing will be provided by the owner, contractor, or engineer as agreed by the three parties. Testing may also be paid by Aquatherm, but this must be confirmed in advance with Aquatherm prior to proceeding. Contact Aquatherm Engineering engineering@aquatherm.com

How long does it take to analyze the samples?

10 to 14 days is normal. The lab may provide more specific information at the time the water samples are returned.

Are there forms to be filled out prior to sending the samples off?

Yes, the “Chain of Custody” form is required by the lab. It must be filled out completely and returned to the lab with the samples. Additional instructions may be given by the lab at the time sample bottles are picked up. The Chain of Custody will need to be filled out with information indicating the water testing project name, its address, sample names, what each sample is being tested for, the date and time in which the samples were drawn, the name of the person who drew the sample, etc. See testing requirements above for what tests are to be performed for each sample.

Does Aquatherm automatically receive the test results from the lab?

No, the party paying for the analysis will receive the report. Results will need to be emailed to Aquatherm at engineering@aquatherm.com. Aquatherm will review the test results, indicate whether or not there may be a concern, advise as to the possibility of any additional testing, and indicate any next steps in the process.

Where do I find a lab capable of performing water testing?

The lab selected should be a state certified lab for drinking water. A listing of certified labs can be obtained using the EPA website below. Prior to the picking up sample bottles from the lab, the lab should be contacted to confirm it is capable of performing the testing and can schedule the required testing in a timely manner.

<https://www.epa.gov/dwlabcert/contact-information-certification-programs-and-certified-laboratories-drinking-water#state-labs>



Revisions

1. 11 Aug 2020 - Updated submittal email address for test results to engineering@aquatherm.com
2. 25 Oct 2021 - Added RP, minor corrections of grammar and style