

EFFECTS OF HARD WATER ON CIRCUIT SOLVER[®]



ONGOING TEST RESULTS OF CIRCUIT SOLVER IN HARD WATER SITUATIONS

THE STUDY

To determine the possible effects of hard water on Circuit Solver[®], ThermOmegaTech[®] has been conducting an ongoing test since 1/15/13. The test is at ThermOmegaTech[®]'s in-house lab in Warminster, PA which had been running for 5 years, 1 months, 1 week and 4 days at the time of the last inspection.

Samples of water were analyzed by QC Laboratories in Southampton, PA, an independent certified test laboratory, to determine exactly how hard the water is in each case.

Total hardness for ThermOmegaTech[®]'s water sample was reported as 229 mg/L, this is generally considered in the "very hard" range.

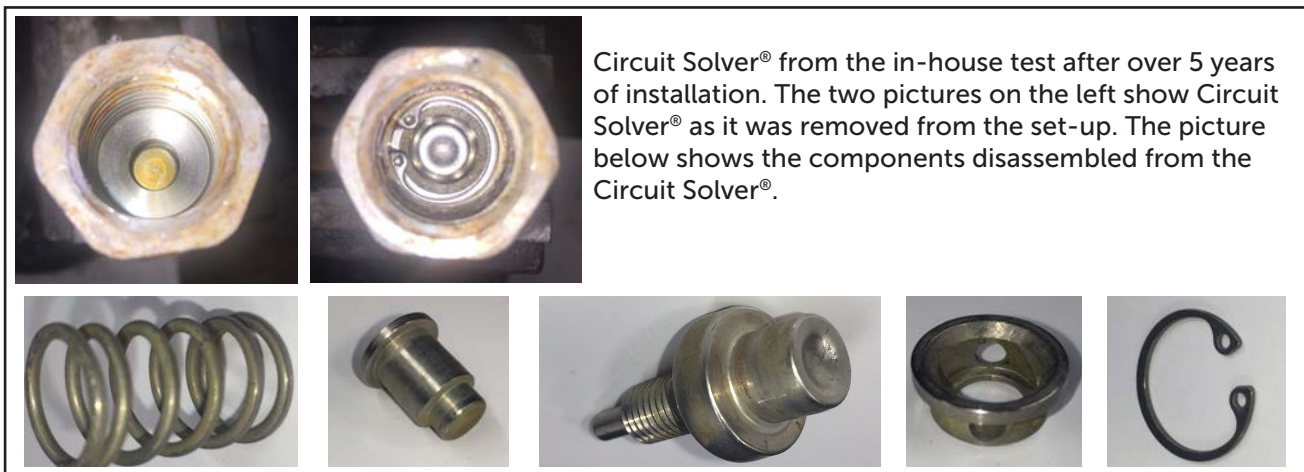
Below is a typical description of hardness level as defined by the U.S. Department of Interior and Water Quality Association and conforms to widely accepted guidelines on water hardness:

There is no universal agreement on what exact concentration is considered hard or soft. The following table shows the classifications used by the U.S. Department of Interior and Water Quality Association. Other organizations may use slightly different classifications.

Classification	mg/L	gpg
Soft	0 - 17	0 - 1
Slightly Hard	17 - 60	1 - 3.5
Moderately Hard	60 - 120	3.5 - 7.0
Hard	120 - 180	7.0 - 10.5
Very Hard	> 180	> 10.5

The hardness concentrations shown above are in terms of mg/L or gpg as CaCO₃

The following photographs show a sample of a Circuit Solver[®] removed from the last inspection.



Circuit Solver[®] from the in-house test after over 5 years of installation. The two pictures on the left show Circuit Solver[®] as it was removed from the set-up. The picture below shows the components disassembled from the Circuit Solver[®].

CONCLUSION

There was no visible signs of mineral deposits, wear, or fatigue in the installation. Circuit Solver[®] is cycling normally after approximately 122,880 modulations. After disassembly and inspection, parts were not cleaned but simply reassembled and Circuit Solver[®] was put back into service. There will be more follow up inspections and reports as these test installations continue to run. In addition to the tests presented, we will be incorporating data from other, older installations as it is received.