CircuitSolver®
A ThermOmegaTech® brand

EFFECTS OF HARD WATER ON CIRCUITSOLVER®

ONGOING TEST RESULTS OF CIRCUITSOLVER® IN HARD WATER SITUATIONS

THE STUDY

To determine the possible effects of hard water on CircuitSolver®, 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 12 years, 0 months, and 24 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		

CircuitSolver® from the in-house test after over 12 years of installation. Unit disassembled and photographed.

CONCLUSION

There was no visible signs of mineral deposits, wear, or fatigue in the installation. CircuitSolver® is cycling normally after approximately 231,040 modulations. After disassembly and inspection, parts were not cleaned but simply reassembled and the CircuitSolver® 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.