PACE **Technical Bulletin**

DISTRIBUTED BY: WATERTECH of America, Inc.

EndoTherm® *Energy Saving Additive for Hydronic Systems*

EndoTherm™ is an energy saving additive for hydronic HVAC systems, proven to reduce energy consumption up to 15%

Water is used in hydronic systems because it is cost effective and readily available, however in reality water alone is not the most efficient transporter of heat. **EndoTherm™** improves the heat transfer properties of the water within a heating system resulting in a significant effect on the overall system efficiency and reduction in;

- Heating & energy costs
- Energy consumption by 15%
- Carbon emissions & footprint
- Carbon tax payments
- Demand on heating system & plant

What is EndoTherm™?

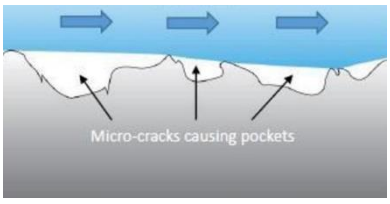
EndoTherm™ is a unique, eco-friendly formulation that greatly reduces the surface tension of water. This allows the bulk water to heat up quicker and improve the heat transfer, resulting in an increase in overall efficiency of the heating/cooling system.

CIBSE BUILDING PERFORMANCE AWARDS 2016 ENERGY SAVING PRODUCT OF THE YEAR

EndoTherm™ is the winner of the **CIBSE Energy Saving Product** of the Year and verified by the **Energy Saving Trust.**

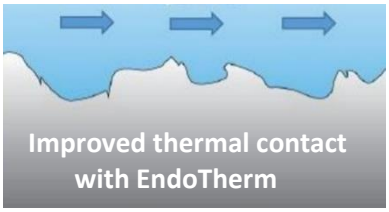
How does EndoTherm™ work?

The surface of the heating system metallurgy may appear smooth, however when viewed under a microscope, surfaces contain many imperfections. Due to the high surface tension of the water, optimal thermal contact is not achieved over these surface imperfections.



With the addition of **EndoTherm™** at the optimal concentration, the water hydrogen bonds are broken, thereby reducing the surface tension to as low as 27 mN/m, compared to 71 mN/m in untreated water. This alters the way steam bubbles form at the nucleated boiling sites along the imperfections found on the heating surfaces of fired boiler tubes.

Reducing the surface tension increases the thermal contact, improving the efficiency of heat transfer into a building.

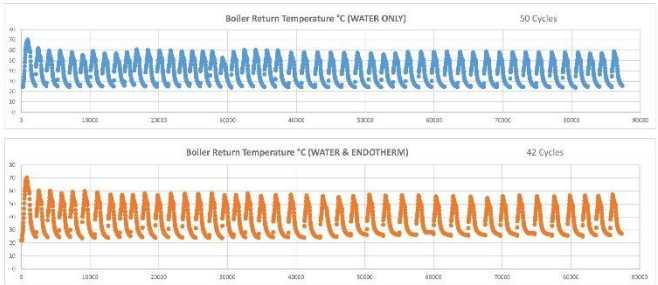


As more heat is transferred into the room, the water in the system has less energy and returns to the boiler cooler. This cooler return allows modern boilers to condensate more and recover more latent heat from the water, reducing the workload of the boiler to heat back up again. This means that even the most modern and energy efficient systems can use less fuel to maintain the desired or thermostatically set temperature when compared with water only systems.

How does this save energy?

Due to the improved thermal contact and heat transfer co-efficiency, the boiler operation time for each cycle is reduced. This results in less strain on the boiler operation and reduced fuel consumption.

(Graph indicates boiler cycling reduced by 16%)



Compatibility of EndoTherm™

EndoTherm™ is compatible with all types of metallurgies in heating systems, as well as with all PACE corrosion inhibitors and glycols. **EndoTherm™** is easy to install in a "ready to use" solution, with no requirement for additional equipment or maintenance. **EndoTherm™** is 100% organic and safe for sanitary sewer.

Proven Results of EndoTherm™

EndoTherm™ has been proven after extensive laboratory testing and studies in thousands of systems over the past 8 years, and has won multiple building and eco-friendly awards.

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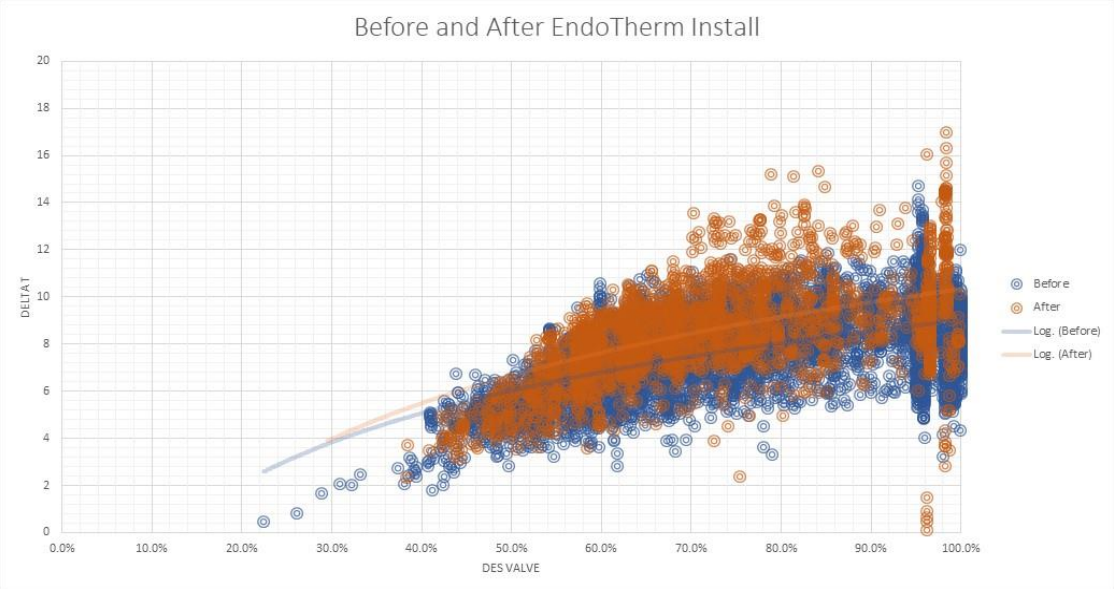
EndoTherm® Case Study Summary

Project Name	Authority	Savings % ($)	Case Study Period
Science Center	Allegany College of Maryland (MD)	18.8% ($3,668)	3 Months
Education Center	St. Joseph Mercy Hospital (MA)	10.43% ($2,057)	10 Months
Dillon Center (St. Joseph)	Aramark (NY)	10.3%% ($803)	4 Months
Whidbey Island (Blg 2641)	US Navy (WA)	12.54% ($522.98)	4 Months
Bedford Church	Real Life Church (PA)	12.7% ($430)	3 Months
The Victorian	Bentall Kennedy (AB)	21.26% ($653.7)	7 Months
Poirier Sports Complex	City of Coquitlam (BC)	13.56% ($5,409)	7 Months
Average (5 Sites)	Simon Fraser University (BC)	13.4% ($5,389)	12 Months
Spring Creek School	Sea to Sky School District (BC)	17.49% ($3,308)	14 Months
Chilliwack & Abbotsford Campus	University of the Fraser Valley (BC)	12.03% ($23,545)	12 Months
South Terminal	Vancouver Airport (BC)	17.32% ($1,247)	3 Months
HSBC (6 Sites)	JLL – Anthesis Group (UK)	13%	2 Weeks (with sub-metering)

University of British Columbia – Heat Transfer Study

EndoTherm™ was added to a secondary system on the UBC DES network to improve heat transfer of an underperforming heat exchanger. Flow and return temperatures were recorded at 15-minute increments. Table shows **ΔT** at various DES valve positions. Installation of EndoTherm improved the recorded **ΔT** by **15.23% or 1.04°C (1.87°F) on average.**



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