



## Thermodesign Low Water Volume Boilers Series Represent a Technology Breakthrough in Energy Efficiency

*Thermodesign, a Montreal based engineering firm among the Canadian experts in boiler design, has recently developed and brought to the market a leading edge Low Water Volume Boiler, the Thermodesign AQT Low Volume Series. Thanks to the financial help of Canadian National Research Council (CNRC) and support of the Industry Energy Research and Development Program (IERD) Thermodesign was able to develop this new boiler providing industrial capacity in steam generating without loss in efficiency and capacity. The innovative concept developed in this new class of boilers offers the highest fuel efficiency ratings and the lowest energy consumption in the industry.*

### A Strong Demand in the Market

Many existing solutions in the market have tried to lower the volume of water used in boilers, often time with losses in their overall efficiency and capacity. But for energy cost reasons and environmental considerations, there is a growing demand in the industry and in the country as a whole to use more fuel efficient boilers, improving the energy consumption vs capacity ratio.

In particular, in the past decade, climate change concerns have grown and subsequently government have pushed forward emission control regulations. This new boiler takes an active part in reducing carbon dioxide emissions thanks to its proven efficiency.



### The Project Challenges

The Thermodesign approach to the many challenges facing its team was to conduct several simulations in order to chase all possible thermal losses and create a state of the art boiler that would be a master piece of efficiency.

The main model to be designed and produced as a pilot was a 600HP (5880kW) "Low Volume" steam boiler with integral type economizer that would reach 85% combustion efficiency on natural gas.

The maximum threshold for Low Volume boilers TSSA accreditation is 75 Imperial Gallons. Thermodesign has managed to bring this value down to 72.9 Imperial Gallons reducing the potential harmful effects of pressurized steam.

### An Energy Efficiency and Technology Breakthrough

After systematic testing and with calculations based on a 300HP unit running at 70% capacity over a 4000 hours period within a year, it was measured that this new boiler will yield an average reduction of 79 tons of CO<sub>2</sub> per year.

The fact that the economizer is fully integrated with the boiler in a very efficient way while keeping a strong energy performance is considered to be a technical accomplishment worth mentioning.

The AQT Series also increases the potential to install larger capacity generating plants up to 1500 BHP without the need of operating engineers in Ontario.

Following is a brief summary about the technical features of this new class of modern boilers:

## The main technical features of the new Low Water Volume AQT Boilers are:

- Boiler horse power ratings from 100 to 600 BHP
- TSSA and ASME approval
- Meets and exceeds NOx Emission Standards
- Three Pass Flue Gas contact staggered tubes arrangement for maximum heat transfer
- Integrated economizer giving 85% efficiency at 180 F feed water and at 200 psig
- Reduced radiation loss, using a unique wet back design and double insulation on side walls
- High turndown ratio, from 4:1 to 8:1, reducing purge loss
- Superior steam quality using special steam separation techniques together with a large steam drum
- Natural boiler circulation eliminating the need for a circulating pump
- Balanced heat transfer preventing thermal shocks
- Units can be fired on gas and #2 oil
- Low electrical consumption using small size blower motor
- Very fast response time from cold start to steam in less than 5 minutes



*This high pressure steam boiler combines the advantages of low operating costs plus high efficiency that will reduce fuel consumption and green house gases.*

## High Level Testing

To confirm the performance of the boiler in all aspects, a serious validation process was done by building a prototype with the help of Simoneau Group and testing it extensively at their facilities.

Mr. John Coulter from TSSA came two consecutive days to witness and testify the measures of the low water content in operation at 600HP and 200 PSIG operating pressure. The fuel input was controlled by the fuel flow rate meter. Thermodesign was timing it over long periods of time to average the power input.

Also a gas analyzer was giving in real time the efficiency based on the flue gases temperature. The feed water temperature was maintained at 180°F.

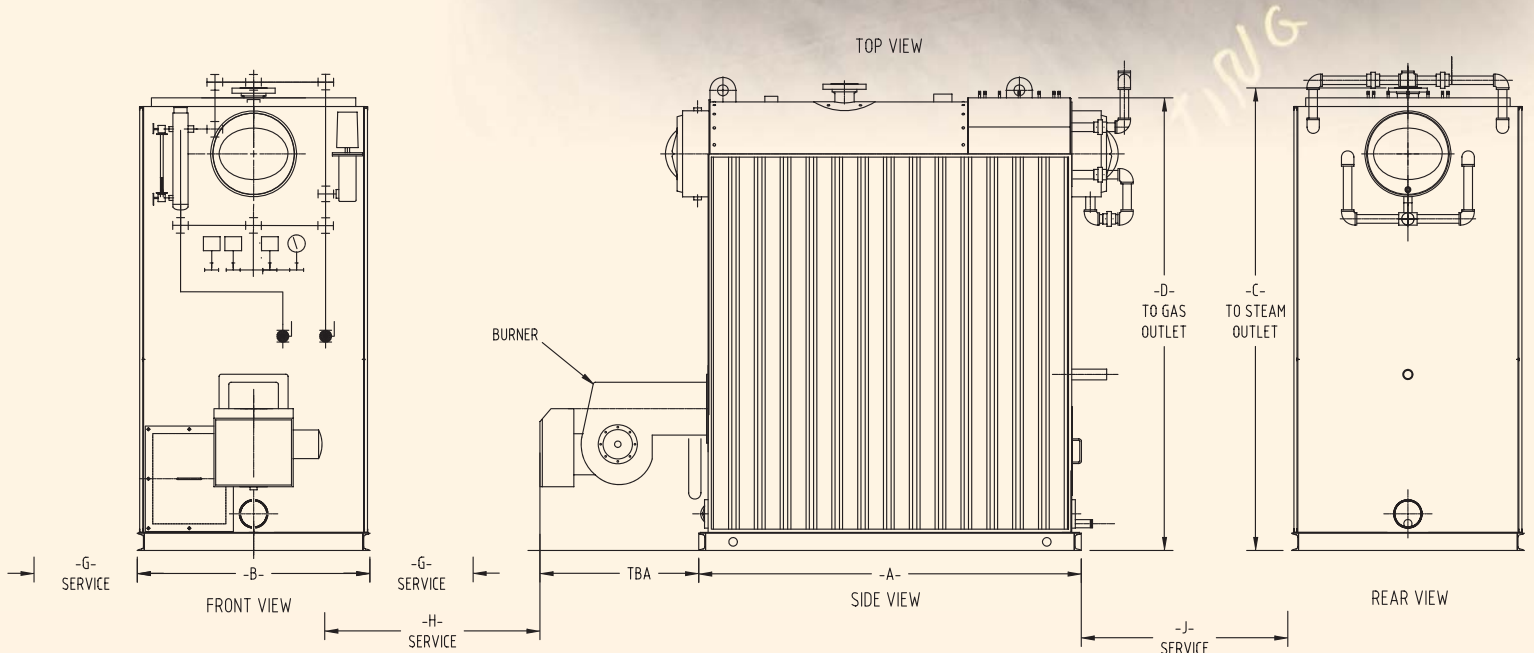
## The Development Team

Over the years, Thermodesign has brought together one of the strongest team in Canada and even in North America as a whole in the design and the engineering of boilers of various sizes and configurations.

These boilers have been manufactured and sold around the world, often time with the constant cooperation and skill of the Simoneau Group, a leading Canadian manufacturer in the field.

Mr. Réjean Gauthier, President of Thermodesign has long served the boiler industry and his experience as an engineer allowed him to customize and bring the finest of thermal and boiler design to achieve the greatest performances on this kind of boiler.

Says Mr. Gauthier: *"The preliminary design was for operating at 500HP but I intimately knew that firing at a higher rate without sacrificing the boiler efficiency would benefit the water volume content. That's what we did on the two days validation phase and we succeeded. I am really proud of all the results achieved by our team."*



## Key Client and Industry Benefits of the AQT Low Water Volume Boiler Series

- It supplies reliable source of high quality 99.5% dry saturated steam with greater steam reserve in large drum. Under many load conditions, this can be critical to any operation
- It brings the highest fuel and electrical cost savings in the industry
- Its state of the art design and quality manufacturing provides peace of mind to clients, for years of strong reliability, stable operating and reduced maintenance costs
- An extended warranties is offered, among the best in the market (thermal shock – 20 years, pressure vessel – 10 years)
- Thermodesign also provides boiler predicted performances prior to the purchase of a Low Water Volume Boiler. This allows customers to compare improved efficiencies with competitive alternatives.



### About Thermodesign:

Thermodesign is a leader in design and engineering of boilers and energy systems for the industrial, commercial and institutional markets. Thermodesign develops a wide range of advanced boilers using fuels such as natural gas, #2 and #6 oil, biomass products and biogases. It brings to the market the value that comes from the reliability, the efficiency and the safety of its boiler systems.

You can reach Thermodesign to learn more about their Low Water Volume Boilers or some of their other products.

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