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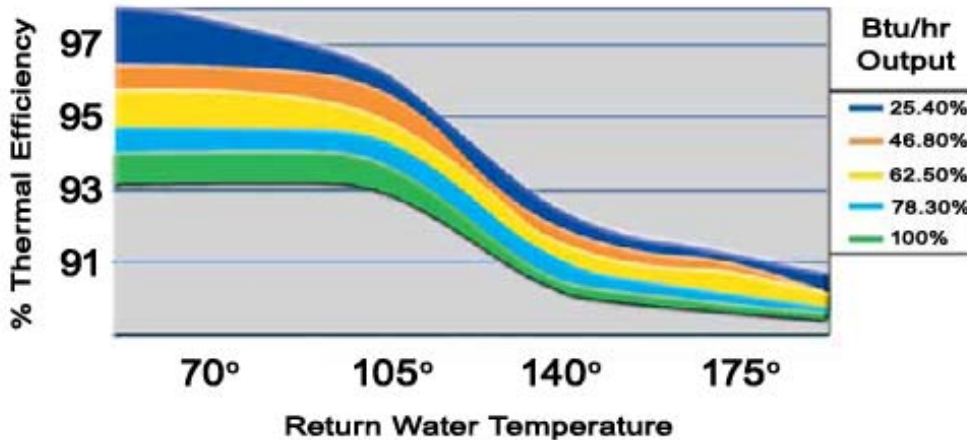
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October 19th, 2009 ~ Monday Morning Minutes:

The Importance of Turndown Ratio in Condensing Boilers & Water Heaters by Chip Bidigare and edited by Norm Hall

Condensing boilers are most efficient at lower return temperatures and lower firing rates. Let's look at lower firing rates today. Turndown is defined as the ratio of maximum fuel input rate to the minimum fuel input rate of a variable input burner. In general, it refers to the ability to adjust a boiler or water heater's firing rate (input) to precisely meet the real-time heating demand (output) of the system without temperature overshoot or wasteful cycling.

The higher the turndown ratio you have, the greater the efficiency of the boiler plant. In the graph below we can see even with a system with a 150°F return we can pick up 2% efficiency operating at 25% of full fire.



For many years boilers operated as on-off devices. These boilers had a great deal of water content and fired for long periods of time because of the mass. As boilers became smaller and contained less water there was more cycling and with cycling came temperature overshoot and losses due to bringing the flue and boiler up to temperature. Very simple, like a car that either does 100 miles an hour or 0 MPH. It was fine as long as you just kept running wide open.

The next evolution was the Lo-Hi-Lo or 2 Stage Fired Boilers. Everyone rallied around this as being the better way to go because sometimes the "Speed Limit" was only 50 MPH and with an on-off boiler all you could do was go 100 miles an hour then brake for a while. Now we had a choice of 100 MPH or 50 MPH. The next generation of boilers included three and four stage boilers.

Today many condensing boilers are modulating. They operate to match the load from maximum fire down to minimum fire. Once at minimum fire the boiler will cycle on and off. The lower the minimum firing rate, the less cycling occurs and the higher the efficiency. The higher the turndown ratio, the lower you can operate the boiler or water heater before cycling. The Laars NeoTherm high efficiency condensing boilers are fully modulating constant flow appliances with a 5:1 turndown ratio. Aercos Benchmark boilers are fully modulating variable flow appliances with a 20:1 turndown ratio. Next week we will look at the load profiles of systems.

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LAARS
NEOTHERM
Commercial Modulating,
Condensing Boilers

NEOTHERM is a direct vent, sealed combustion, condensing boiler with 95%+ AFUE that modulates with a 5 to 1 turndown.

The boiler features an ASME stainless steel heat exchanger, integral boiler pump (399 and 500 also available without pump) and low NOx emissions (10 ppm NOx), for a package that's easy to use, and is easy on our environment.