THE COMFORT ZONE

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INTRODUCTION

This Newsletter is the first of many to come and will be regularly published on a quarterly basis.

It is our goal that the material covered within this newsletter will be of interest to both the HVAC & Plumbing Industries, from Wholesaler to Contractor to Consulting Engineer.

We at Thermco look forward to bringing you Product Highlights, Design and Application Guidance, Technical Tips and Industry News. We hope that you enjoy the Newsletter and look forward to receiving your input and requests for future articles.

Save Money by Designing with High Efficiency Boilers

Traditional heating loop design practice has always called for operating with a 180 degree temperature and a 20 degree delta T. It has always been done that way, and it works, so why change it?

One of the main reasons why it has been done this way, is that it simplifies the calculations – when operating at a 20 degree delta T, it is relatively simple to convert back and forth between load (Btu/hr) and flow rate (gpm) by using the formula:

Q (Btu/hr) = GPM x 500 x delta T

By using a 20 degree delta T, the calculation is simplified to:

Q (Btu/hr) = GPM x 10,000

Which means that you need 1 gpm to satisfy every 10 MBH of heating load – nice and simple, isn't it? Designers have thought so for years, which is one of the main reasons why a 20 degree delta T has been the benchmark for system design.

Now that we know why we use a 20 degree delta T, let's address the question raised earlier – we have always done it that way, so why change it? For one extremely powerful reason on everyone's mind these days – energy efficiency.

By changing to a 40 degree delta T as the design basis, the overall system efficiency increases first by reducing the pumping power required to satisfy the building load. Instead of 1 gpm per 10 MBH, we now only need 0.5 gpm. This not only reduces the initial cost of the pumps, but also lowers the operating costs. Less energy input to accomplish the same goal means higher overall system efficiency.

Your gpm calculations don't get more complicated– simply take the flow rate you would have used for a 20 degree delta T and cut it in half—that's right, half.

Alright, we have settled on a 40 degree delta T for our design basis, so now let's take a look at water temperature. The old standard was to provide 180 degree water on a design day, but we all know that the system rarely oper-

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Designing with High Efficiency Boilers (cont'd)

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ates at design capacity. Running the system at full capacity doesn't make sense from an efficiency standpoint – not only will the boiler cycle continuously, but the terminal units will also have to be cycled to prevent overheating of the space. Think of it as trying to drive your car at 55 MPH in bumper to bumper traffic that is moving at 15 MPH – not very efficient, is it?

One way to address this issue is to incorporate some level of outdoor reset, where the supply temperature to the space is reduced as the outdoor air temperature increases. As the ambient temperature increases, the space load decreases, so by providing lower temperature water to the terminal units, you allow them to operate for a longer period of time to meet the space load. The result is a more consistent space temperature, with less swings and lower fluctuations, which means happier occupants.

Another feature to consider when selecting a condensing boiler is modulation capacity. Since the system, and therefore, the boiler, operates at part load for the vast majority of the year, the ability of the boiler to match the space load will affect efficiency. The higher the modulation rate of the boiler, the lower in input rate the boiler will be able to fire, and the more closely it will be able to match the system load requirement.

This is the point where boiler selection starts to become critical. Depending on the type of boiler selected, there may be a minimum return water temperature requirement imposed by the manufacturer. Copper fin boilers, for example, typically have a minimum heat exchanger inlet temperature requirement of 130 to 140 degrees, depending on the manufacturer. If we use a 40 degree design delta T with a copper fin boiler that has a 140 degree minimum inlet temperature, we obviously can't do any outdoor reset on the boiler, or else we would violate the manufacturer's requirements.

So why do some manufacturers

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DID YOU KNOW?

When you need a quick heat loss check or even a rough estimate, use 4.0 BTUH/cubic foot. For example, for a 5,000 square foot building with 12 foot high ceilings, your heat loss is around 240 MBH.

Q = 5,000 sq. ft. x 12 ft. high x 4.0 Btu/cu. ft. = 240,000 Btu

Of course, this is only an estimate, and is not a replacement for a true heat load calculation, but it will get you in the neighborhood. The factor of 4.0 should be varied based on construction and desired indoor temperature. This method should not be considered accurate for loads greater than 2,000,000 Btuh, for which a true heat load calculation should be performed.

Answers to Take A Break!:
Brain Tease: O - the entries in the grid are the first letter of the numbers one to twenty when spelled out
Riddle: Nine feet—the boat rises with the tide, so the ladder stays nine feet above the water.

INFORMATION UPDATE FORM

We are in the process of updating our records and request your assistance. Please complete the following form and fax back to (973) 777-1540 or email to sales@thermcoreps.com when completed. Please make sure to include your email address to ensure prompt delivery of your issue of *The Comfort Zone* delivered right to your computer.

Please feel free to distribute this form to anyone you feel may be interested in receiving this newsletter.

NAME: _____

COMPANY: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

TELEPHONE: _____ FAX: _____

EMAIL ADDRESS: _____

❑ I would like someone to visit me to discuss our current and/or future needs.

PLEASE FAX TO (973) 777-1540 OR EMAIL TO SALES@THERMCOREPS.COM WHEN COMPLETED. THANK YOU!
Thermco guarantees to keep your email confidential and will not sell to any 3rd parties.

PRODUCT HIGHLIGHT

LAARS® NEOTHERM®

- High condensing efficiency - 95+% AFUE
- Modulation with 5:1 turndown
- 285, 399 or 500 MBH input in natural gas or propane
- Floor-standing condensing boiler
- All connections are on top of unit—zero clearance installation
- Stainless steel heat exchanger with welded construction
- Low NOx emissions (10 ppm)
- Horizontal or vertical direct vent or separated combustion
- ASME “H” stamp
- 160 psi maximum working pressure
- Boiler circulator, mounted and wired inside jacket
- Electronic PID modulating control
- Outdoor reset with sensor
- Accepts external (4-20 mA) modulation control
- 12 year limited warranty

Designing with High Efficiency Boilers (cont’d)

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limit the return water temperature to their boilers? The answer is condensation – with low return water temperatures, the heat exchanger surface is at a low enough temperature to extract sufficient heat from the combustion gases to force the vapor in the gases to condense. Although this condensation is a benefit in that it results in increased boiler efficiency, it can be harmful to the boiler. If the heat exchanger is not constructed of materials that can withstand the corrosive effects of the condensation, the boiler will fail. This is the reason why copper fin and cast iron boilers have minimum inlet water temperatures.

So where do you go from here? You need a boiler that can handle low inlet temperatures for an extended period of time – after all, we want the boiler to operate at these lower inlet temperatures for the majority of the heating season, not just a few hours. Fortunately, there are several true condensing boilers available on the market today, in virtually any size required to meet any building load. A true condensing boiler will have a single heat exchanger of sufficient material to withstand the condensation without the use of auxiliary/economizer heat exchangers and/or elaborate mixing systems.

There are a number of choices available on the market today for mod-con (modulating, condensing) boilers. Selecting the boiler to correctly match your application while still meeting your budget can be confusing. Let the experts at ***THERMCO*** guide you – simply call our office at (973) 777-6700 and ask for help selecting the boiler that best suits your needs.

	ABSOLUTAIRE - Direct fired systems for makeup air, heating and ventilating
	AERCO - High efficiency gas fired water heaters and boilers
	AIRMATE - Registers, grilles and diffusers
	AIRTHERM - Unit heaters, convectors, fan coils, cabinet heaters
	BOOTZ - Porcelain on steel tubs, lavs and sinks
	ERV SYSTEMS - Energy recovery ventilators
	ERIE - Zone valves, damper actuators, thermostats, boiler controls, relays
	HEATFAB - Positive pressure stainless steel venting systems and chimney liners
	HOLBY - Tempering & mixing valves
	HYDROLEVEL - Low water cutoffs, water feeders, liquid level controls, flow switches
	INDUSTRIAL COMMERCIAL EQUIPMENT - Heating, ventilating and makeup air—oil, gas and electric. Custom built units with cooling and heat recovery.
	LAARS - Copper finned volume water heaters, boilers, pool heaters and storage tanks
	MACON CONTROLS - Valves, electric & non-electric operators, one pipe steam controls
	MANSFIELD - Vitreous china toilets, lavs and urinals; Acrylic whirlpools, tubs, shower bases, sinks
	MARS - Air curtains, heated or unheated
	REZNOR - Gas, oil & hydronic unit heaters, heating, cooling, ventilating & makeup air units, infrared heaters
	SELKIRK - Air distribution products, chimney & gas vent systems
	SLANT FIN - Modular commercial and residential hot water and steam boilers, commercial heaters, commercial and residential radiation
	TEKMAR - Indoor/outdoor reset controls and valves
	TRIANGLE TUBE - Indirect domestic water heaters, brazed plate and plate & frame heat exchangers
	UNILUX - Bent “water tube” boilers—100 HP to 7,500 HP
	VELOCITY PLUS - High velocity HVAC systems
	WATTS RADIANT - Residential and commercial radiant floor heating and snowmelting systems
	YORK-SHIPLEY GLOBAL - High performance packaged fire tube boilers

TAKE A BREAK! *Answers on page 2*

RIDDLE: A ship is docked in a harbor. A rope ladder hangs over the side, with 9 feet of the ladder above the water. The tide begins rising at a rate of 8 inches per hour. After six hours, how much of the rope ladder will remain above water?

BRAIN TEASE:

What letter comes first in this grid?

_	T	T	F	F
S	S	E	N	T
E	T	T	F	F
S	S	E	N	T

FUN FACTS

Things you may not have known, or felt you needed to:

- Your skeleton is never more than 10 years old.
- The animal responsible for the most human deaths worldwide is the mosquito.
- The Bible, the world’s best selling book, is also the most shoplifted.

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