KN SERIES

Cast iron to the core.

KN-16

MADE IN USA

The commercial boiler industry is demanding. Customers want low costs and high efficiencies — all while remaining environmentally conscious. So, to meet these demands, our engineers went to work to create a fully modulating, condensing boiler with a small footprint. After several years of research and development, KN-Series introduced the first-and-only line of condensing cast iron boilers.

But KN-Series boilers aren't your average commercial boilers. What sets the KN-Series apart is its unique cast iron heat exchanger. By combining condensing technologies with a heat exchanger made exclusively of cast iron, KN-Series boilers have proven themselves to be the most durable and most efficient cast iron boilers on the market.

Why Cast Iron?

Used throughout history for its strength and resiliency, cast iron is an ASHRAE-approved material for condensing boiler applications. It holds valuable latent heat longer than other materials, providing superior longevity and reliability.

The cast iron heat exchangers used in KN-Series boilers contain no welds, and have up to five times more wall thickness than competitive stainless steel and aluminum heat exchangers. This makes them less susceptible to the dramatic thermal stresses of today's boiler applications. The KN-Series' unique down-fired design protects the durable cast iron heat exchanger even further. Acidic condensate is removed from the heat exchanger surface during operation and is never allowed to pool and re-evaporate onto the surface. The condensate is essentially blown off the heating surface into a stainless steel pan and safely removed from the boiler.

KN-20

Iron Clad Results

Not only has the KN-Series cast iron design gained the acceptance of ASHRAE as an approved material for condensing boiler applications, KN-Series boilers have continued to prove themselves for the past 14 years.

- KN-Series boilers have an installation base of over 16,000 units since 2003.
- KN-Series boilers haven't had a single documented failure associated with corrosion.
- Cast iron has been the material of choice in the boiler industry for over 150 years.
- Cast iron is popular because of its compatibility with water and its superior durability.

KN-Series: Tear-down Report

Despite the fact that KN-Series boilers produce efficiencies upward of 99%, many still believe that condensing cast iron is a bit of an oxymoron. To finally put the naysayers to rest, the KN-Series team went straight to the source to investigate the true effects of cast iron in condensing boiler applications.

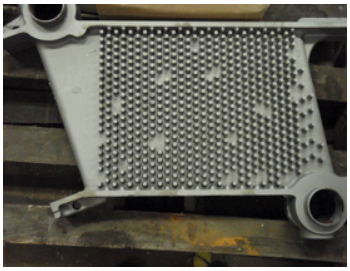
Two different KN-20 boilers in full operation were removed from their job sites solely to examine their heat exchangers and to verify their thermal efficiency. Boiler 1 (Serial #: KN-HL-07-1059) and Boiler 2 (Serial #: KN-HL-07-1068) were installed in extremely harsh operating conditions with low operating temperatures and non-stop condensing performance. While these types of applications exist globally, they are not the norm and are the ultimate test for any condensing boiler.

Observations & Findings

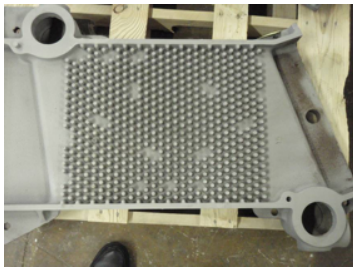
Prior to disassembly, both Boiler 1 and Boiler 2 were hydrostatically tested for leaks, with no leaks found.

An internal view of the heat exchanger's bottom pan showed an even distribution of iron oxide, with no indication of corrosion beyond the surface level. Consistent loss of metal across the entire exchanger stems from even gas and water distribution across the entire unit and is an expected result.

Boiler 1 and 2 were then disassembled, and four sections from each unit were sandblasted for a clearer look at the cast iron surface. All sections showed nearly identical levels of wear, which proved inconsequential. When compared side-by-side with a new heat exchanger, it was hard to see any significant differences in the surface between the new and returned sections.

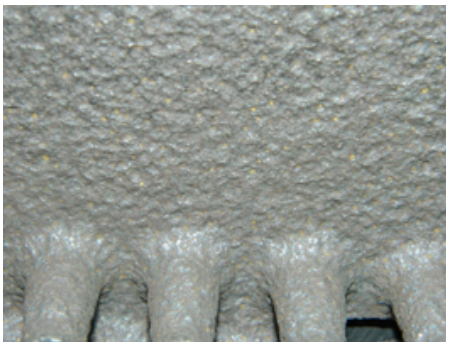


New



Returned

Areas that were expected to have the highest levels of wear were cut down even further for a more detailed examination. The areas exhibiting the most corrosion were then milled until the surface was free from pits and revealed clean cast iron. Together, the weight of the removed castings and the extent of surface pitting indicate a 1 – 2% loss of cast iron throughout Boiler 1 and 2's lifecycles.



Conclusions

Based on the amount of material lost and overall condition of the heat exchangers in our comparison, it can be concluded that both sample boilers could run an additional 38,000 – 44,000 hours in full condensing mode, before reaching the ASME minimal wall thickness standards for performance.

In addition, certified efficiency decreased less than 1% from the original 92.7% using the standard BTS-2000 testing protocol. More importantly, there was a less than .3% thermal efficiency performance change at part load firing rates using a 30° ΔT, which is indicative of today's modern boiler application parameters.

The calculated remaining lifecycle is estimated at an additional 19 - 22 years when used in the same full-condensing operating condition.

With these numbers in mind, its easy to see that cast iron is an ideal material for condensing boiler applications. It's durable. It's efficient. It's made to last the long haul.

Learn more: KNseries.com

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