

QUESTIONS FROM 1/25/17 WEBINAR

1. Q: What is the start-up time for a fire-tube boiler?

A: Bring the boiler up to temperature slowly, using the manual low fire hold setting. Once the boiler has reached its operating temperature (hot water boiler) switch to automatic control and allow the boiler to modulate the firing rate based on the signal from the modulating (or firing rate) control. In the case of a steam boiler, allow the pressure to reach 10-15 psig before releasing to automatic control as outlined above. The time will depend on the size of the boiler, but could be an hour or two depending on ambient conditions.

2. Q: I always thought the Reynolds number pertained to liquid flow, am I correct that an earlier slide mentioned it in terms of burner combustion??

A: The reference was in conjunction with properly matching the burner to the boiler especially its furnace in order to provide adequate time for combustion to complete. The hot gasses (actually a fluid) then pass through various convective passes in the boiler to transfer heat to the water in the boiler to make steam or hot water. It is here where we need to determine the heating surface required to deliver the highest efficiency possible. This involves calculations to determine maximum heat transfer coefficients (Btu's transferred vs the Delta T) and Reynolds numbers (Ratio of viscous vs turbulent flows) to enhance the overall heat transfer coefficient.

3. Q: Can we consider similar circumstances and effects for auxiliary boilers (cold, warm and hot) if we work with firetube boilers?

A: Yes, the circumstances and effects are the same regardless of boiler type; however, the procedures for commissioning varies somewhat. For instance in the "Warm" standby mode we would not employ a heating coil. Rather in a firetube, the boiler would have its operating controls set at a lower pressure in and kept in low fire in order to keep it warm. "Cold" standby would be the same as a watertube boiler (77+ deg. F water in boiler), and then follow the answer in #1 above. "Hot" standby would have the pressure controls set to control the process load while maintaining operating pressure through the use of its integrated automatic controls including the operating, high limit and modulating control(s) mounted on the boiler.

4. Q: What are some of the potential issues involving pilot burner installation?

A: Cost and procedural because you are adding another small burner and its integrated controls which add to the capital spend, and procedural in that this separate burner and fan need to be brought on line and operated properly, and then be maintained as diligently as any other piece of mechanical equipment. . Additionally, there will likely be changes to the BMS (burner management system) as well as the CCS (Combustion control system).

5. Q: How much does the mud drum or boiler drum warming mechanism interfere with steam flow/production in the boilers that they are installed in?

A: When the boiler is engineered the coil in the lower drum is sized and fitted so as to not impede circulation be it forced or natural circulation using the designed in pressure/density differential created by the size and distance of the drums and tubes including risers and down comers.

6. Q: Do you ever see any pipe expansion problems with multiple boilers cycling between hot and cold or warm operation?

A: When the design engineer lays out the piping system and knowing what the steam requirements are and how they may fluctuate, they will include properly sized expansion joints, rollers and supports to accommodate for this inevitable expansion/contraction. This is why it is imperative to not only evaluate steady state conditions, but also upset conditions when designing your piping system.

7. Q: What is the difference between REM/LAG and LEAD/LAG?

A: REM/Lag control is a time delay or specific time actuated control which starts an event. This is often applied to lighting systems in buildings. The lead/lag control we were referring to applies to multiple boilers which are tied into an electro-mechanical or electronic system which stages boilers to come on line when certain load conditions require more steam or hot water for process or heating.

8. Q: During Hot standby, Boiler is set to Manual mode Zero modulation, is the Pilot burner the only one firing?

A: Yes, if the boiler is so equipped, and the pilot burner can maintain sufficient input to keep the unit at the desired temperature/pressure.

9. Q: What are the best installation practices for installing a steam flow meter in the steam supply piping system for accurate readings?

A: Number one, make sure the transmitter is mounted in a straight length of pipe reflective of the steam needed for the process and number two, it is located in a place you can readily get to for inspection and service if needed. A good rule of thumb is to place the transmitter with at least 10 pipe diameter lengths upstream and downstream of the transmitter, and recognize this might not be possible. Accessibility should always be the top priority with a good compromise on strait length pipe.

10. Q: Using the Canning plant scenario cited, what is the viability of Thermal Energy Storage (TES) in the case of the cold-startup standby boiler?

A: If your question pertains to filling the boiler with hot water from another source there is the possibility of "hot shock" causing a rapid expansion of the steel and consequential leaking as a result. Check with the boiler manufacturer for their recommendation.

11. Q: Why not rotate which boilers are in service to prevent the standby corrosion on the 4th boiler in the example?

A: This is certainly a possibility, but you need to look at the cost of fuel for this rotation strategy versus a standby strategy to determine which is most cost effective.

12. Q: Is there a minimum size of water-tube boilers that can use pony burners be use to maintain hot standby

A: No

13. Q: If a watertube's max rate of temperature rise is 100 degF or 200 degF, what is the max rate of temperature rise for a firetube boiler?

A: See #1 above

14. Q: Is a "lower drum heating coil" or something similar available in Firetube boilers?

A: No

15. Q: In a dry layup condition (typically used for extended outages), What are some common methods /devices to seal off the fireside of the boiler and economizer (i.e. fan inlet, stack). to prevent humidity/rain on the fireside surfaces.

A: Stacks and breechings should be designed with offsets and clean out/drain taps & covers to prevent moisture from draining directly on the equipment. The boiler may also include an automatic damper which will be closed when the unit is not firing or off line to prevent unwanted draft and moisture formation. This needs to be electrically tied into the boiler's BMS to prevent firing when it is in the closed position. It is often referred to as a "pre-ignition interlock."

16. Q: What is more accurate in meeting demand , using hot water supply temperature or HW supply pressure ?

A: Based on the possibility of thermal lag time, we would recommend measuring pressure, and understand there is a direct correlation between pressure and temperature. In other words, 100 psig is 338 degrees F.

17. Q: Are slides available to download?

A: Yes, just go to our website <cleaverbrooks.com> for everything you need including a fully recorded playback of the entire program. We also have many of our programs on U tube.

18. Q: You mentioned a high turn down system. I have been told that we should convert to a high turn down system to prevent damage to our burner nozzle on our 500 HP boiler that is using propane as a fuel. We had this unit converted last June 2016.

A: First understand that turndown has to do with the firing rate of the burner. A 4:1 turndown means your input can be reduced to 25% minimum, and this is low fire. A 10:1 turndown means you can go down to 10% of the rated capacity. If you are experiencing burner housing or diffuser problems this is

normally caused by the flame front pulling back too far causing overheating. A higher turndown burner may certainly help, but the fuel and air adjustment also has to be considered as well.

19. Q: Does it make sense to install individual steam flow meters on each boiler versus on the main line or lines leaving the boiler plant?

A: It does if the boilers are serving different processes. If they are only serving one, then one meter is sufficient.

20. Q: Warm-up times/rates were related to welded tubes vs. non-welded tubes. Is the referenced tube weld at the drum attachment or tube to tube (membrane) attachment?

A: The references were tube to tube (non-welded tangent) versus welded tube to tube or membrane.

21. Q: On the load side, do you recommend a combination air vent/vacuum breaker to work with the steam trap on a steam coil?

A: Yes

22. Q: What is the recommended cycles of concentration and what are the factors that play into that recommendation?

23. Q. You mentioned Training, and I'm sure it is fee based. Anything free besides these webinars?

A: Yes, we conduct various boiler related Symposiums throughout the year in various locations of the country. Our next one is on February 28 – March 1 in New Orleans, LA. They are free, offer up to 16 PDH credits, and are by invitation only. So if you want to attend, contact your local CB Rep for details.

24. Q. Can you give us more insight about wet storage and the chemical requirements?

A: Go to our website and view our water treatment programs recorded in October and November 2016. This question and others are given within the proper context.

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