

JURISDICTIONAL ISSUES WITH SOLAR BOILERS



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Pressure Vessel Unit



WHAT'S A SOLAR BOILER?

- Is it a “fired” boiler?
- Is it an “unfired pressure vessel”?
- Is it a “forced flow steam generator”?
- Is it “piping”?
- Is it Section I or Section VIII or B31.1?
- What’s the law in your state or province?
- How do you build it to code?



TYPES OF SOLAR BOILERS

- Parabolic trough with piping at focal point.
- Fresnel mirror with elevated piping at focal point.
- Mirror field projecting onto boiler tower.
- Can produce saturated or superheated steam.
- Power plant sized.
- Small roof top sized.



HEAT TRANSFER MEDIA

- Water flows through solar field creating steam.
- Oil flows through solar field and then through heat exchanger creating steam.
- Molten salt flows through solar field and then through heat exchanger creating steam.
- Steam is used externally or to drive a turbine.



SAFETY CONCERNS

- Designs are new and somewhat experimental.
- Treat the solar flux the same as a flame.
- What's the "low-water cutoff"?
- What controls are in place to defocus the mirrors and how quickly do they work?
- Solar flux can melt steel (+2000°F).
- How can they be inspected?
- Long term cyclical issues are possible.



JURISDICTIONAL ISSUES

- Does the regulation define a boiler as a vessel that is “fired” or through the application of “heat”?
- Is it even a “boiler”?
- Manufacturers need direction on how to build and install the boiler.
- Constrained by what the law says.



CALIFORNIA'S SOLUTION

- ASME Code Case 1855-1 was used to create California Circular Letter PV-2010-1.
- Code Case allows the use of ASME Section VIII vessels in a Section I boiler. Originally created for Heat Recovery Steam Generators.
- Incorporates all the various pieces into a single Section I boiler ensuring all appropriate items are addressed (controls, PRD's, feedwater, etc).
- Could have used refinery “unfired steam generator” concept.



ASME SOLUTION

- Created a Sub-Group Solar under Section I.
- Lets the experts in the solar industry determine what issues need to be addressed.
- We recommend that people in the solar industry get involved on the committee.



CONCLUSION

- Jurisdictions like having a uniform design code like ASME. So do manufacturer's.
- Most jurisdictions have the ability to “accept as equivalent to code” either through the Chief Inspector or their “Boiler Board”.
- Treat a solar boiler like any other boiler.
- The industry can't afford to have an accident!