

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety & Health
Pressure Vessel Unit
1515 Clay Street, Suite 1302
Oakland CA 94612-1402
Tel: (510) 622-3052 Fax: (510) 622-3063



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Circular Letter PV-2010-1

Effective Date: November 19, 2010

Subject: Solar Boilers

To: All Inspection Agencies and Boiler Owners

California has become a prime United States location for the installation of solar boilers. This letter will clarify the applicable regulations that are under the jurisdiction of the Division.

Solar boilers fall into two general categories pertaining to how they produce steam through the conversion of solar heat flux into steam.

The first is a boiler where the feedwater is heated while passing through tubes located in the solar field (e.g. mirrors reflect sunlight directly onto the tubes containing feedwater). The heated water can become saturated steam or superheated steam depending upon the boiler design. These boilers are considered a fired boiler and shall be constructed, inspected, and stamped in accordance with ASME Section I Power Boilers as described in the California Code of Regulations Title 8 Section 754.

The second type is a boiler where a heat transfer medium other than water (e.g. thermal fluid oil, molten salt, etc.) is heated while passing through tubes located in the solar field. The heat transfer medium then travels through a heat exchanger where the hot fluid heats feedwater into steam. This heat exchanger is called an unfired steam boiler and may be constructed, inspected, and stamped in accordance with ASME Section I Power Boilers or ASME Section VIII Division 1 Pressure Vessels as determined by the boiler owner.

The steam may then pass through other heat exchangers acting as superheaters, economizers, etc and these heat exchangers may also be constructed, inspected, and stamped in accordance with ASME Section I Power Boilers or ASME Section VIII Division 1 Pressure Vessels as decided by the boiler owner. For example, the steam may be superheated to run a turbine or the steam may remain saturated and used external to the boiler (e.g. pumped into the ground in an oilfield application).

The various heat exchangers, their interconnecting piping, and the appropriate controls and safety devices in the second type of boiler make up an "ASME Section I system". ASME Section I Code Case #1855-1 provides the details on how to incorporate these items into a coherent, documented boiler package and this Code Case shall be used for



these types of solar boilers. What the Code Case essentially requires is that an ASME Section I "S" or "A" stamp holder assembles all the components and then document and stamp the boiler in accordance with ASME Section I. The components may be built and stamped to ASME Section I, Section VIII, or per B31.1, as appropriate, but the completed system will have an "S" stamp applied. The "S" stamping shall be in an easily accessible location on the boiler. The Code Case number shall be recorded on the completed manufacturer's data report.

The solar boiler is also required to have a "Permit to Operate" issued by the Division. This requires an annual internal inspection by a Qualified Inspector who holds a Certificate of Competency issued by the Division.

The solar boiler also requires a competent attendant per Title 8 Section 761.

Please contact our office if you have any questions.

Sincerely,

Donald C. Cook
Principal Safety Engineer

Approval Date: December 30, 2006

Code Cases will remain available for use until annulled
by the applicable Standards Committee.

Case 1855-1

**Section VIII, Division 1, Unfired Steam Boiler in Section I System
Section I**

Inquiry: Code rules permit unfired steam boilers as defined in the Preamble of Section I to be constructed under the provisions of Section I or Section VIII, Division 1. If it is desired to construct an unfired steam boiler under the provisions of Section VIII, Division 1, under what conditions may it be installed in a Section I system?

Reply: It is the opinion of the Committee that an unfired steam boiler constructed in accordance with the rules of Section VIII, Division 1 [see UW-2(c)], may be installed in a Section I system when the requirements of PG-58, PG-59, PG-60, PG-61, and PG-67 through PG-73 of Section I, applicable to piping and protective devices, are satisfied by an appropriate Section I certificate holder, and when the following additional requirements are satisfied.

(a) When any steam drum is not an integral part of the unfired boiler it shall be constructed in accordance with Section VIII, Division 1, including UW-2(c) or in accordance with Section I.

(b) *Materials*

(1) For those vessels or chambers constructed to Section VIII, Division 1 rules, the materials shall be limited to those permitted by Section VIII, Division 1;¹

(2) For those portions constructed to Section I rules, the materials shall be limited to those permitted by Section I.

(c) *Stamping and Data Reports*

(1) Those vessels or chambers constructed to Section VIII, Division 1 rules shall be stamped with the ASME Code "U" Symbol and additional marking required by UG-116, and be documented with the ASME U-1 or U-1A Data Report. A nameplate per UG-119 shall be furnished and shall be marked "Case _____."

(2) All portions constructed to the rules of Section I shall be stamped with the applicable Section I Symbol and be documented with the applicable Section I data report forms. This Case number shall be shown on the Section I master stamping.

(3) This Case number shall be shown on the Section VII Manufacturer's Data Report for the unfired steam boiler and the Section I Master Data Report.

¹ Except that any nonintegral steam drum, in water or steam service, shall be constructed of materials permitted by Section I, PG-9.1.

The Committee's function is to establish rules of safety, relating only to pressure integrity, governing the construction of boilers, pressure vessels, transport tanks and nuclear components, and inservice inspection for pressure integrity of nuclear components and transport tanks, and to interpret these rules when questions arise regarding their intent. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks and nuclear components, and the inservice inspection of nuclear components and transport tanks. The user of the Code should refer to other pertinent codes, standards, laws, regulations or other relevant documents.