

MSC Guidelines for Fired Thermal Fluid Heaters

Procedure Number: E1-28

Revision Date: 01/28/00

References

- a. 46 CFR Part 52 – Power Boilers
 - b. 46 CFR Part 63 – Automatic Auxiliary Boilers
-

Disclaimer

These guidelines were developed by the Marine Safety Center staff as an aid in the preparation and review of vessel plans and submissions. They were developed to supplement existing guidance. They are not intended to substitute or replace laws, regulations, or other official Coast Guard policy documents. The responsibility to demonstrate compliance with all applicable laws and regulations still rests with the plan submitter. The Coast Guard and the U. S. Department of Transportation expressly disclaim liability resulting from the use of this document.

Contact Information

If you have any questions or comments concerning this document, please contact the Marine Safety Center by e-mail or phone. Please refer to the Procedure Number: **(E1-28)**.

E-mail: customerservicemsc@msc.uscg.mil

Phone: 202-366-6480.

Fired Thermal Fluid Heaters

General Review Procedure

- Determine Applicable Parts of 46 CFR Subchapter F for the specific design and operating parameters. See the table below.

Table 54.01-5(a) Applicable Regulation Reference

Service/ Temperature/Pressure Boundary	Design	Automatic Control
All Fired Thermal Fluid Heaters	Part 52	Part 63

MSC Guidelines for Fired Thermal Fluid Heaters

46 CFR Part 52

46 CFR Part 52 – Power Boilers

General
Review
Procedure

- Acceptance Criteria [46 CFR Part 52]
 - ❑ Required plans submitted per Part 52.01-5. Plans and calculations must be certified by a registered Professional Engineer as meeting Part 52 and Section I of the ASME Code. Required items as follows:
 - ❑ Calculation for all pressure components
 - ❑ MAWP
 - ❑ Hydrostatic/Pneumatic testing pressure
 - ❑ Steam capacity
 - ❑ Joint design and method of attachment
 - ❑ Bill of materials meeting ASME Section I and Part 52 as modified
 - ❑ Diagram of assembled components of system
 - ❑ Design, inspected, tested, and stamped in accordance with section I of the ASME Code as modified by Part 52 of the Code per §52.01-2.

- Further Review
 - ❑ Examine for Appropriate Compliance with Design Criteria of ASME Code Section I as modified by Part 52.
 - ❑ Examine for Compliance with Part 52 modifications to ASME Code.
 - ❑ Fusible plugs comply with §52.01-50.
 - ❑ Safety valves and safety relief valves shall comply with Part 52.01-120.
 - ❑ Materials shall meet the requirements in §52.01-90.
 - ❑ Design shall comply with §52.01-95.
 - ❑ Openings and reinforcements shall comply with part §52.01-100.
 - ❑ Piping, Valves and Fittings Shall Comply with Part §52.01-105.
 - ❑ Piping within the jurisdiction of the ASME Code shall comply with ASME Code Section I (PG-58 and PG-59) with modifications in §52.01-105.
 - ❑ Piping outside the jurisdiction of the ASME Code shall comply with Part 56 piping requirements.
 - ❑ Water-level Indicators and pressure gauges (§52.01-110).
 - ❑ Comply with ASME Code Section I (PG-90).
 - ❑ Comply with modifications in §52.02-110.
 - ❑ Certification by stamping.
 - ❑ All boilers shall be stamped for compliance with the ASME Code is required by §52.01-140.
 - ❑ Special requirements for boilers fabricated by welding. (Part 52.05)
 - ❑ Shall comply with ASME Section I (PW-1 through PW-54)
 - ❑ Boilers and components shall be heat treated per PW-38 and PW-39. (§52.02-15)

MSC Guidelines for Fired Thermal Fluid Heaters

General Review Procedure

- Radiographic & ultrasonic examination shall comply w/ §52.05-20.
 - Attachment welds shall comply with Part 52.05-30.
 - Circumferential joints in pipes, tubes and headers shall comply with §52.05-45.
 - Requirements for Watertube Boilers
 - Shall comply with ASME section I (PWT-1 through PWT-15) except as modified in Part 52.15.
 - Requirements for Firetube Boilers
 - Shall comply with ASME Section I (PFT-1 through PFT-49) except as modified in Part 52.20.
 - Feedwater Heaters shall comply with ASME Section I (PFH-1) or Part 54 per §52.25-3.
- Review of all calculation details for requirements.
- Review design calculations and verify that the calculations are correct.
 - Equivalency Determination(s)
 - Manufacturers data report shall be available to the marine inspector per 52.01-145
 - Review of installation details.
 - Boiler support details shall be approved by the OCMI per §52.01-130.
 - At least 18” distance between TFH and deck.
 - At least 24 “ between back of boiler and fuel compartment.

46 CFR Part 63

46 CFR Part 63 - Automatic Auxiliary Boilers

- Acceptance Criteria [46 CFR Part 62]
- Submittal of Test procedures and certification report per §63.10-1.
 - Detailed instructions for operationally testing each automatic auxiliary boiler, its controls, and safety devices.
 - A certification report by the manufacturer for each automatic auxiliary boiler containing:
 - A statement that the system complies with CG-510 of ANSI/ASME CSD-1a “Controls and Safety Devices for Automatically Fired Boilers.”
 - A statement that the boiler system complies with the control and safety device requirements in Part 63.

MSC Guidelines for Fired Thermal Fluid Heaters

General Review Procedure

- Further Review
 - **Controls**
 - An electric control used to shut down the boiler shall comply with §58.01-25. Fuel supply must be stopped to the fuel burning equipment.
 - Following emergency safety trip, air-flow to the boiler must not automatically increase. Post purge must be accomplished manually (§63.20-1).
 - Low fire interlock must insure low fire start when variable firing rates are used. (§63.20-1)
 - Water level controls and low water cutoff controls shall comply with §63.20-1(c).
 - **Fuel System** (§63.15-3)
 - Fuel oil piping shall comply with §56.50-65.
 - Materials shall comply with Part 56. Cast iron or malleable iron is prohibited.
 - Piping shall comply with pressure classification design criteria found in §56.04-2.
 - Fuel pumps shall meet the performance and test requirements of ANSI/UL 343.
 - Fuel heating devices are permitted provided a high temperature limit device is installed per §63.15-3.
 - Natural Gas Fuel is prohibited unless approved by the MSC.
 - Strainers shall be installed in the fuel supply line. (§63.15-5)
 - Alarms shall comply with the requirements of §63.15-7.
 - Mercury tube actuated controls are prohibited.
 - **Small Automatic Auxiliary Boilers** (<400,000 Btu/hr) shall meet the following additional requirements (§63.25-1):
 - Visual indicators indicating when the low water cutoff is activated shall be provided.
 - An air prepurge cycle of 4 changes in the combustion chamber and stack shall be provided. This cycle shall not be less than 15 seconds. Ignition must occur only before or simultaneously with the opening of the fuel valve.
- Further Plan Review Details
 - All components shall operate satisfactorily in the marine environment with a momentary role of 30°, a list of 15° and permanent trim of 5° with it installed in a position as specified by the manufacturer. (§63.15-1).

MSC Guidelines for Fired Thermal Fluid Heaters

General
Review
Procedure

- Details of the compliance with the requirements for ANSI/ASME CSD-1/CSD-1a shall be examined.
- Boiler Feed Piping shall comply with §56.50-30. (§63.20-1(c))
- Inspection and testing of the boiler shall meet Part 61. (§63.15-9)

46 CFR Part 56

46 CFR Part 56 – Piping System Requirements

- This section details general requirements for piping that fall outside the piping requirements found within Part 52.
- **Piping Acceptance Criteria** [46 CFR Part 56]
 - Pipe maximum allowable working pressure MAWP shall not be greater than the internal design pressure calculated using ANSI-B31.1.
 - System MAWP shall be designed to the lowest components MAWP. (§56.07-10(e))
 - The pressure design of piping components shall comply with the material requirements of §56.07-10(e). Material selection shall meet §56.60-1(a) with allowable stresses indicated in ANSI-B31.1. The temperature of the material shall for allowable stress determination shall be the saturated steam temperature.
 - The design pressure of steam piping connected to the boiler shall not be less than the safety valve pressure setting per §56.50-15.
 - Steam piping (except for heating) may not pass through passageways, accommodation spaces, or public spaces.
- **Boiler Feed Piping** [46 CFR 56.50-30]
 - Feed discharge piping shall be designed to the feed pump relief valve setting or the shutoff head of the pump.
 - Feed piping from the boiler to the stop and stop-check valve shall be designed to a pressure 25% greater than the boiler MAWP or 225 psig.
 - Allowable stress values shall be selected per §56.50-30.
 - Feed valves shall comply with §56.50-30(b).
- **Blowoff Piping** [46 CFR 56.50-40]
 - Blowoff piping for the boiler shall be designed to 125% of the boiler's MAWP 225 psig in addition to the MAWP.
 - If design pressure is greater than 100psig, the wall thickness shall not be less than schedule 80. Design shall be to §56.07-10(e).
 - Where blowoff valves are connected to a common discharge from two or more boilers, a non-return valve shall be provided for each boiler.
 - Globe valves shall not be used for blowoff service.

Fired Thermal Fluid Heaters (continued)

General
Review
Procedure

- **Review Testing Requirements** [46 CFR 56.97-40]
Installation tests for piping systems shall comply with the requirements of §56.97-40.

46 CFR Part 61

46 CFR Subpart 61.30 – Tests and Inspections of Fired Thermal Fluid Heaters

- This section details the testing requirements for a TFH to be performed by the marine inspector.

 - **Testing and Inspection** (<400°F and < 225 psig) [§61.30]
 - ❑ Visual inspection per §61.30-15.
 - ❑ Hydrostatic testing to 1 ½ times MAWP per §61.30-10.
 - ❑ Automatic control and safety test per §61.30-20.

 - **Testing and Inspection of Boilers** (>400°F or > 225 psig) [§61.05]
 - ❑ In-service testing per §61.05-10.
 - ❑ Boiler mounting and attachments per §61.05-15.
 - ❑ Boiler safety valves tested per §61.05-20.
-