

**POWER BOILERS ASME SECT. I & POWER PIPING ANSI/ASME B 31.1**  
**CODE REQUIREMENTS FOR PIPING, FITTINGS, VALVES & TRIM**  
**APPLICABLE FOR PARKER STEAM BOILER SYSTEMS**

This information has been prepared to answer questions that are regularly brought up concerning the requirements on piping, fittings, valves and trim to be used on Parker Steam Boilers.

The "MAWP" Maximum Allowable Working Pressure as stamped on the Boiler determines the minimum required working pressure of most trim and valves on the Boiler. (Sect. I Interpretation I-83-53). The safety valve setting normally determines the required working pressure of the steam valve, 100 PSI minimum (B31.1 Para. 122.1.7 and 122.1.2), steam pressure gage, controls (Sect. I PG-60.6.1), and low water cutoff (ANSI/ASME CSD-1 CW-110).

**I. GENERAL STEAM LINE PIPING & VALVES:**

1. All steam line piping, valves and fittings must comply with the code for the required temperature and pressure of not less than the safety valve setting of the boiler but never less than 100 PSI. (B31.1 Para. 122.1.2).
2. Each Boiler must be fitted with a steam stop valve located at an accessible point in the steam-delivery line and as near the boiler nozzle outlet as is convenient and practical. (B31.1 Para. 122.1.7). A check valve is normally recommended installed close to the outlet of the stop valve.
3. Steam Stop valves must be of the rising stem style or, if not, be equipped with a position indicator to indicate from a distance whether the valve is open or closed. Quarter turn valves shall be equipped with a slow-opening mechanism. Valves with resilient (non-metallic) seats shall not be used over 150 PSIG (B31.1 Para. 122.1.7).
4. If two or more boilers are connected to a common Header, each Boiler shall be fitted with a steam stop valve. A steam check valve is recommended for each Boiler. On Boilers equipped with a manhole see B31.1 Para. 122.1.7 for valves and piping required.
5. High pressure steam piping threaded connections are limited to 3" size and maximum pressure of 400 PSI. (Sect. I PG 39.5.2)
6. Cast iron is not recommended for high pressure steam piping and must be avoided where shock loading (pressure, temperature or mechanical) may occur (B31.1 Para. 124.4).
7. Galvanized pipe and fittings are not recommended for steam piping due to the possibility of galvanic corrosion. (B31.1 Para. 124) Galvanized pipe and fittings should not be used on high pressure steam piping or where the temperature exceeds 250°F. (UMC 1201)
8. Provisions shall be made for the expansion and contraction of steam mains connected to Boilers, by providing substantial anchorage at suitable points, so that there shall be no undue strain transmitted to the Boiler. The steam piping must be installed with sufficient flexibility to permit expansion and contraction to prevent pipe movement from causing failures. (Sect. I PG-59.1.2 and UMC 1201)

**II. WATER FEED LINE PIPING & VALVES:**

1. The water feed line piping, valves and fittings from the Boiler through the required stop valve and check valve shall have a pressure rating of not less than the "MAWP" plus 25% but never less than 100 PSI (valves and fittings, minimum Class 150 Steel). (B31.1 Para. 122.1.3 and 122.1.7)
2. The water feed line piping, valves, and fittings from the required check valve to the feed pump shall have a pressure rating of not less than the pressure required to feed the Boiler but never less than 100 PSI. (B31.1 Para. 122.1.3)
3. The water feed line shall be equipped with a check valve and stop valve (between boiler and check valve), which may be a ball, cock, gate, or globe type valve. When the MAWP does not exceed 200 PSI, the valves or cocks shall be bronze, cast iron, ductile iron or steel. For MAWP above 200 PSI, the valves or cocks shall be steel. (B31.1 Para. 122.1.7)
4. The size of water feed piping between the Boiler and the first required valve shall be at least the same size as the boiler connection. (B31.1 Para. 122.1.3)
5. Galvanized pipe and fittings are not recommended for water feed piping due to the possibility of galvanic corrosion. (B31.1 Para. 124)

### **III. BLOWOFF LINE PIPING & VALVES:**

#### **1. Blowoff Line Piping & Fittings:**

- A. The blowoff line piping, fittings and valves from the Boiler through the required valve or valves shall have an approved pressure rating of not less than the "MAWP" plus 25% but never less than 100 PSI. (B31.1 Para. 122.1.4)
- B. The blowoff line piping and fittings from the required valve or valves to the blowoff tank or other point of discharge shall have a pressure rating of not less than the safety valve setting. (B31.1 Para. 122.2)
- C. For the entire blowoff line from the Boiler to the tank or other point of discharge: All pipe shall be steel. Galvanized steel pipe and fittings shall not be used. When the "MAWP" does not exceed 100 PSI, the fittings shall be malleable iron, ductile iron, steel or bronze. When the "MAWP" EXCEEDS 100 PSI the fittings shall be steel and the thickness of the pipe and fittings shall not be less than that of Schedule 80 pipe. (B31.1 Para. 122.1.4).
- D. Cast iron is not recommended for blowoff line piping where shock loading may occur. (B31.1 Para. 124.4)
- E. The size of blowoff piping shall not be less than the size of the blowoff connection on the boiler. (B31.1 Para. 122.1.4)

#### **2. Blowoff Valves:**

- A. The blowoff valves shall have an approved pressure rating of not less than the "MAWP" plus 25% but never less than 100 PSI. (B31.1 Para. 122.1.4)
- B. When the "MAWP" does not exceed 100 PSI, one Blowoff Valve is required and may be either the quick or slow opening type. When the "MAWP" exceeds 100 PSI, there shall be two slow opening valves or one quick opening valve at the Boiler followed by a slow opening valve. (B31.1 Para. 122.1.7)
- C. Blowoff Valves must comply with the Boiler Code and cannot be of the integral screwed bonnet design. Blowoff cocks must have the plug held in place by a guard or gland and the plug shall be distinctively marked in line with the passage. (B31.1 Para. 122.1.7).
- D. A ball type valve may be used as a quick opening blowoff valve, providing it is approved for blowoff steam service, is constructed of the proper material, complies with the above Item (C) and has a steam pressure rating stamped on the valve.
- E. Ordinary globe valves and other types that have dams or pockets where sediment can collect, shall not be used for blowoff service. Y-Type globe valves or angle valves may be used in vertical piping, or they may be used in horizontal piping provided they are constructed or installed so that the lowest edge of the opening through the seat is at least 25% of the inside diameter below the center line of the valve. (B31.1 Para. 122.1.7)
- F. When the "MAWP" does not exceed 200 PSI, the Blowoff Valves shall be bronze, CL250 Cast Iron, ductile iron or steel. When the "MAWP" exceeds 200 PSI, the valves shall be of steel construction equal at least to Class 300 of the applicable ANSI Standard. (B31.1 Para. 122.1.7).

### **IV. WATER COLUMN DRAIN LINE PIPING & VALVES:**

- 1. The water column drain line piping, valves and fittings shall be of materials and design in accordance with the Code and have a pressure rating of not less than the "MAWP" stamped on the Boiler. (B31.1 Para. 122.1.6)
- 2. All drain lines including pipe, fittings and valves shall comply with the requirements for steam or water piping according to the service. Drain lines are not considered to be blowoff or blowdown piping. (B31.1 Para. 122.1.4 & 122.1.5)
- 3. The water column shall be fitted with a drain cock or valve at least 3/4" pipe size and piped to a safe point of discharge. (Sect. I PG-60.2)
- 4. The drain valve may be a gate or ball type valve of the approved design with a steam pressure rating of not less than the "MAWP" but never less than 100 PSI.

**V. SAFETY VALVE:**

1. Each Boiler shall have at least one safety valve and Boilers with more than 500 sq. ft. of heating surface require two or more safety valves. The safety valves on the Boiler proper must be set at or below the "MAWP" of the Boiler. The relieving capacity must be such to safely relieve the full 100% generating capacity of the Boiler without allowing the pressure to rise more than 6% above the valve setting. The minimum relieving capacity of the valve in pounds of steam shall not be less than the maximum designed steaming capacity. The minimum required relieving capacity in pounds per hour for high temperature water boilers shall be determined by dividing the maximum output in BTU/Hr by 1000. (Sect. 1 PG-67 & PG-70)
2. The safety valve connection to the Boiler shall be independent of any other connection and without any unnecessary intervening pipe or fittings. The opening or connection between the Boiler and the safety valve must not be smaller than the valve inlet. (Sect. I PG-71)
3. The discharge drain outlet must be piped full size without any shut-off valves, independent of other piping. Install piping with sufficient flexibility to allow for free expansion and properly support so there is no strain on the safety valve body. Pipe to a safe point of discharge to prevent any possibility of personal injury and within 18" from the floor or into an open receptacle protected by a splash shield. If discharge cannot be piped to a completely safe location in the Boiler Room, such discharge should be piped outside the room to a safe location. If piped upwardly a drain line should be provided at the low point to keep this line drained. Secure the piping so it cannot rise to cause personal injury when safety valve discharges. If piping is considerable distance install a union near the safety valve outlet for convenience of changing valve when required. (Sect. I PG67 & 71) (B31.1 Para 122.6)
4. Ample provision for gravity drain shall be made in the discharge pipe at or near each safety valve. Each valve shall have an open gravity drain through the casing below the level of the valve seat. (Sect. I PG-71)
5. If two safety valves are used it is recommended that individual discharge lines be used, but if two or more relief valves are combined, the discharge piping shall be designed with the full area of the valve outlets discharging there into and the discharge pipe shall be as short and straight as possible and so arranged as to avoid undue stresses on the valves. (B31.1 Para. 122.6)

**V. MISCELLANEOUS PIPING, FITTINGS & VALVES:**

1. All pipes, fittings and valves must comply to the pressure and temperature requirements of not less than the "MAWP" of the Boiler.
2. On valves such as water glass fixtures, try cocks and steam test cocks, these must be for an approved pressure of not less than the "MAWP". When these pressure ratings are not stamped on the valve, it is necessary to have a record on file from the Manufacturer, certifying such pressures as acceptable.
3. Water Column gage cocks are no longer required by the ASME Section I Boiler Code.
4. **Steam Accumulators:**
  - A. If constructed in compliance with ASME Code Section I, does not require a stop valve between the Boiler and Accumulators.
  - B. If constructed in compliance with the Unfired Pressure Vessel Code, Section VIII, a stop valve must be installed on the steam line between the Boiler and tank.
  - C. If the "MAWP" of the Accumulator is less than the "MAWP" of the Boiler, a separate safety valve of proper size at the lower setting must be installed on the Accumulator.

**NOTE:** The Inspection Authority should be consulted before proceeding with installation and if there is any question concerning the Code approval and acceptance of the equipment or system. The Manufacturer is sincerely interested to assist on clarifying any Code questions concerning the Boiler and to cooperate in planning installation to fully comply with the Code and to the advantage of a safe and efficient operating Boiler System.

**PARKER BOILER CO.**

5930 Bandini Blvd.

Los Angeles, CA 90040

Phone: (323) 727-9800

www.parkerboiler.com