



BLOWDOWN SEPARATOR

SELECTOR CHART

USING CHART A

- Select Separator Size from Chart "A" below by matching your Operating Pressure and Bottom Blowdown Valve Size. The largest size valve and highest pressure should be used for multiple boilers.
- From Chart "A" read the height "H" of the separator, "I" the inlet size to match blowdown valve size, "D" the drain and "V" atmospheric steam vent recommended sizes. All connections come standard as NPT. Flanges are optional.

- All Separators are 14" diameter and are ASME Code "UM" designed and stamped for 250 psig at 450 deg. F. Select plate thickness of 5/16" or 3/8" as local regulations require. Add for National Board "U" Stamping when required. Flanged units are limited in pressure to flange rating and would be stamped accordingly.
- The separator size is now determined and the piping can follow these sizes. Separators are designed to quietly exhaust steam to atmosphere at 90 dB(A) or less and operate at a pressure of less than 5 psig. Drain sizing includes cooling water required for 140 deg. F. drain temperature. Select cooling valve size from chart "B" below.

CHART A — BOILER BLOWDOWN SEPARATORS

| Blowdown Valve Size Separator Dimensions Boiler Oper. Pressure | 1" | | | | 1-1/4" | | | | 1-1/2" | | | | 2" | | | | 2-1/2" | | | | 3" | | | |
|---|----|---|---|-------|--------|-------|---|---|--------|-------|---|---|----|---|---|---|--------|-------|---|---|----|---|---|---|
| | H | I | D | V | H | I | D | V | H | I | D | V | H | I | D | V | H | I | D | V | H | I | D | V |
| 0-15 | 14 | 1 | 2 | 2-1/2 | 20 | 1-1/4 | 3 | 4 | 20 | 1-1/2 | 3 | 4 | 20 | 2 | 4 | 5 | 34 | 2-1/2 | 5 | 6 | 34 | 3 | 6 | 5 |
| 16-50 | 20 | 1 | 2 | 2-1/2 | 20 | 1-1/4 | 3 | 4 | 34 | 1-1/2 | 3 | 4 | 34 | 2 | 4 | 5 | 34 | 2-1/2 | 5 | 6 | 34 | 3 | 6 | 5 |
| 51-100 | 20 | 1 | 3 | 2-1/2 | 34 | 1-1/4 | 4 | 4 | 34 | 1-1/2 | 4 | 4 | 34 | 2 | 5 | 5 | 34 | 2-1/2 | 6 | 6 | 34 | 3 | 8 | 6 |
| 101-125 | 34 | 1 | 3 | 3 | 34 | 1-1/4 | 4 | 4 | 34 | 1-1/2 | 4 | 4 | 34 | 2 | 5 | 5 | 56 | 2-1/2 | 6 | 6 | 56 | 3 | 8 | 6 |
| 126-150 | 34 | 1 | 3 | 3 | 34 | 1-1/4 | 4 | 4 | 34 | 1-1/2 | 4 | 5 | 56 | 2 | 5 | 6 | 56 | 2-1/2 | 6 | 6 | 56 | 3 | 8 | 6 |
| 151-175 | 34 | 1 | 3 | 4 | 34 | 1-1/4 | 4 | 4 | 34 | 1-1/2 | 4 | 5 | 56 | 2 | 5 | 6 | 56 | 2-1/2 | 6 | 6 | 56 | 3 | 8 | 6 |
| 176-200 | 34 | 1 | 3 | 4 | 34 | 1-1/4 | 4 | 5 | 56 | 1-1/2 | 5 | 5 | 56 | 2 | 6 | 6 | 56 | 2-1/2 | 6 | 6 | 56 | 3 | 8 | 6 |
| 201-225 | 34 | 1 | 4 | 4 | 56 | 1-1/4 | 4 | 5 | 56 | 1-1/2 | 5 | 5 | 56 | 2 | 6 | 6 | 56 | 2-1/2 | 8 | 8 | 56 | 3 | 8 | 6 |
| 226-300 | 56 | 1 | 4 | 4 | 56 | 1-1/4 | 4 | 5 | 56 | 1-1/2 | 5 | 6 | 56 | 2 | 6 | 8 | 56 | 2-1/2 | 8 | 8 | 56 | 3 | 8 | 6 |

* Miniature Boilers: 1/2"-1" Blowdown Valve up to 1000#/hr Blowdown use 14" High, 1" Inlet, 2" Drain, 2-1/2" Vent.
For Boilers above 300 PSIG see Selector Chart H.

CHART B — COOLING WATER LINE AND VALVE SIZE

| Separator Inlet Size Cooling Water Pressure (PSI) Boiler Oper. Pressure | 1" | | | 1-1/4" | | | 1-1/2" | | | 2" | | | 2-1/2" | | | 3" | | |
|---|-------|-------|-------|--------|-------|-------|--------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|
| | 40# | 50# | 60# | 40# | 50# | 60# | 40# | 50# | 60# | 40# | 50# | 60# | 40# | 50# | 60# | 40# | 50# | 60# |
| 0-50 | 1/2 | 1/2 | 1/2 | 1 | 1 | 1 | 1-1/4 | 1 | 1 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/2 | 1-1/2 | 1-1/2 | 2 | 2 | 2 |
| Use For 51-100 | 1 | 3/4 | 3/4 | 1 | 1 | 1 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/2 | 1-1/2 | 1-1/4 | 2 | 2 | 2 | 2-1/2 | 2-1/2 | 2-1/2 |
| 50-70° F | 1 | 3/4 | 3/4 | 1-1/4 | 1 | 1 | 1-1/4 | 1-1/4 | 1-1/4 | 2 | 2 | 1-1/2 | 2 | 2 | 2 | 2-1/2 | 2-1/2 | 2-1/2 |
| Cooling 126-175 | 1 | 1 | 1 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 2 | 2 | 2 | 2-1/2 | 2-1/2 | 2 | 2-1/2 | 2-1/2 | 2-1/2 |
| Water 176-225 | 1 | 1 | 1 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/2 | 1-1/2 | 1-1/4 | 2 | 2 | 2 | 2-1/2 | 2-1/2 | 2 | 3 | 3 | 2-1/2 |
| Temp. 226-250 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/2 | 1-1/2 | 1-1/4 | 2 | 2 | 2 | 2-1/2 | 2-1/2 | 2 | 3 | 3 | 2-1/2 |
| 251-300 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/4 | 1-1/2 | 1-1/2 | 1-1/4 | 2 | 2 | 2 | 2-1/2 | 2-1/2 | 2-1/2 | 3 | 3 | 3 |

USING CHART B

- Depending upon the temperature of the cooling water used, locate the section of the chart which applies, 50-70° or 71-80° F.
- At the top of the chart locate Separator inlet size and in left column under the section selected in step one, locate Boiler Operating Pressure. You now have a selection of three valve sizes.
- From the top of chart select the cooling water line pressure, either 40, 50 or 60 and read the desired valve and line size.
- A pressure reducing valve should be used prior to temp regulator for cooling water above 60 PSIG.

CHART C — SAFETY/RELIEF VALVE SEPARATORS

| Sat Pressure Valves (PSI) Separator Dimensions Boiler MBH | 0-49# | | | 50-99# | | | 100-150# | | | 151-200# | | | 201-250# | | | 251-350# | | | 351-400# | | |
|---|-------|-------|---|--------|-------|---|----------|-------|---|----------|-------|---|----------|-------|---|----------|-------|---|----------|-------|---|
| | H | D | V | H | D | V | H | D | V | H | D | V | H | D | V | H | D | V | H | D | V |
| 0-500 | 14 | 1-1/2 | 3 | 14 | 1-1/2 | 3 | 14 | 1-1/2 | 3 | 14 | 1-1/2 | 3 | 14 | 1-1/2 | 3 | 14 | 1-1/2 | 3 | 14 | 1-1/2 | 3 |
| 501-670 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 |
| 671-1005 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 | 14 | 2 | 3 |
| 1006-1340 | 14 | 2-1/2 | 3 | 14 | 2-1/2 | 3 | 14 | 2-1/2 | 3 | 14 | 2-1/2 | 3 | 14 | 2-1/2 | 3 | 14 | 2-1/2 | 3 | 14 | 2-1/2 | 3 |
| 1341-1675 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 |
| 1676-2010 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 | 14 | 3 | 3 |
| 2011-2345 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 |
| 2346-2680 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 | 20 | 3 | 4 |
| 2681-3350 | 20 | 4 | 4 | 20 | 4 | 4 | 20 | 4 | 4 | 20 | 4 | 4 | 20 | 4 | 4 | 20 | 4 | 4 | 20 | 4 | 4 |
| 3351-4185 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 |
| 4186-5025 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 | 20 | 4 | 5 |
| 5026-6695 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 |
| 6696-8370 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 | 20 | 5 | 5 |
| 8371-10045 | 34 | 5 | 6 | 34 | 5 | 6 | 34 | 5 | 6 | 34 | 5 | 6 | 34 | 5 | 6 | 34 | 5 | 6 | 34 | 5 | 6 |
| 10046-11720 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 |
| 11721-13400 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 | 34 | 6 | 6 |
| 13401-16740 | 34 | 6 | 8 | 34 | 6 | 8 | 34 | 6 | 8 | 34 | 6 | 8 | 34 | 6 | 8 | 34 | 6 | 8 | 34 | 6 | 8 |
| 16741-20080 | 34 | 8 | 8 | 34 | 8 | 8 | 34 | 8 | 8 | 34 | 8 | 8 | 34 | 8 | 8 | 34 | 8 | 8 | 34 | 8 | 8 |

USING CHART C

- Use Set Pressure of Valves and Boiler MBH or BHP x 33.3 to determine Sep. "H"eight, "D"rain and "V"ent Size.
- Separator Inlet Size is determined by Relief Valve, Outlet Size. When two or more valves are manifolded together, the Inlet size must be larger than the combined Cross Sectional area of the Valves' Outlets (See Chart C₁).
- Separator Diameter is 14" except: 16" diameter when Inlet is 4" and Vent is 5" or larger 18" diameter when Inlet is 5" and Vent is 5" or larger
- Plate Thickness 5/16" or 3/8" as required by Local Regulations. All Separators are constructed to ASME Code.

CHART C₁ INLET AREAS

| Relief Valve Outlet and Separator Inlet Area Square Inches | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" | 4" | 6" |
|--|------|------|--------|--------|-------|--------|-------|--------|--------|
| | .533 | .864 | 1.495 | 2.036 | 3.355 | 4.788 | 7.393 | 12.730 | 28.891 |

For Example: Two Relief Valves 1-1/2" and 2" (2.036 + 3.355 = 5.39) Separator Inlet 3" (7.393). When combined area is greater than 6" Inlet, use Individual Separators.

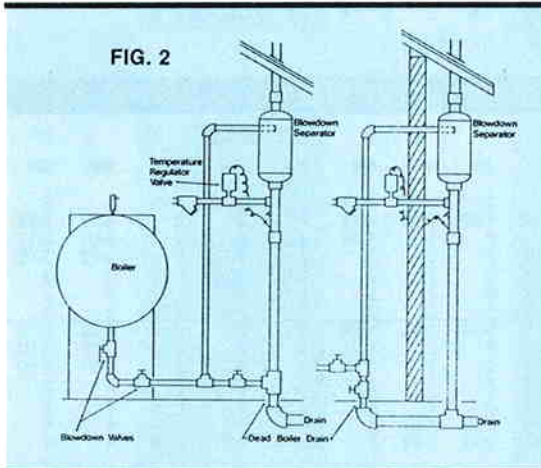
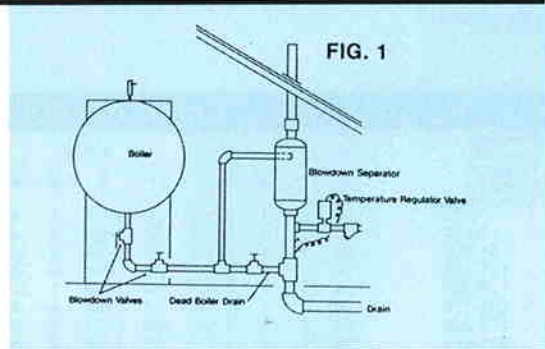
Installations Penn Separator Blowdown Separator

Inside - Outside - Near Floor - Near Roof

Installation of the Penn Separator is simple. The following may suggest the method for your system. Being an instantaneous separator, drain and vent should be the same size or larger than provided and should not be restricted. Drain piping should be sloped at least 1' per 100 foot; more for obstructed or angled drains. Flashing should be used around vents through composition roofs.

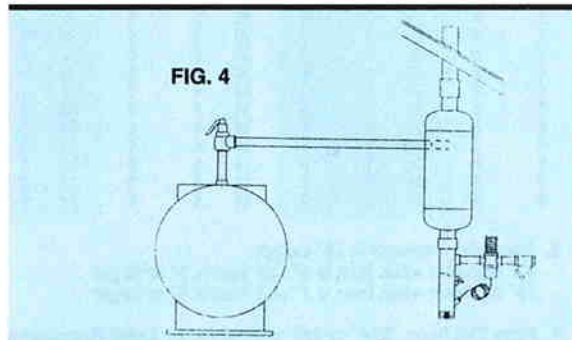
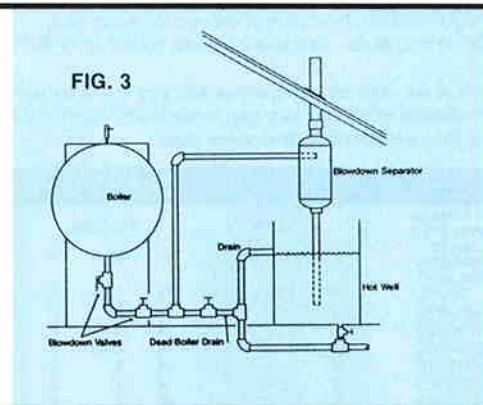
Steam Boiler Blowdown Separator

Shown is a normal installation for bottom blowdown of a steam boiler. A dead boiler drain should be included as shown. Drain tempering fitting can be added as shown. Aftercooler models along with other cooling accessories available shown on Brochure B-1. Sizing of water inlet and cooling valve given on selector chart B.



Elevated installation is shown in Fig. 2. This can be used where boiler room is crowded. The boiler pressure will lift blowdown up and into the blowdown separator. Another space saving installation is outside. Because the separators are self-draining there is no chance of freezing. The cooling valve, bulb, and capillary should be protected from freezing. Because of the smaller size of the separator, buried installations to prevent loss of space is no longer necessary.

Localities that require storage tempering can use the installation as shown in Fig. 3. The separator can be discharged into a open, closed but vented, slotted or grid top receiver. The receiver should be sized for a holding capacity twice that of a blowdown. The turn in the siphon or overflow should be located at the top of the first blowdown. The separator should be located of sufficient height above the receiver so that the blowdown mixes well with the retained blowdown water. A manual drain should always be provided on the receiver for periodic cleanout.



Hydronic systems with pressurized hot water can use the separator on the relief valve. The separators work the same as on blowdown by flashing steam to atmosphere and cooling the condensate to drain. The piping to the separator should be as direct as possible. Check local regulations for piping these units.



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