



Flash Economizer

Heat Recovery
System for
Continuous
Blowdown



Flash Economizer

Heat Recovery System

Continuous Blowdown

When a boiler is steaming, solids in the water are left behind in the boiler, increasing concentration. Boiler water treatment with phosphates or chelating agents does not reduce the amount of concentration but it chemically reacts with boiler solids to reduce or eliminate scale forming materials.

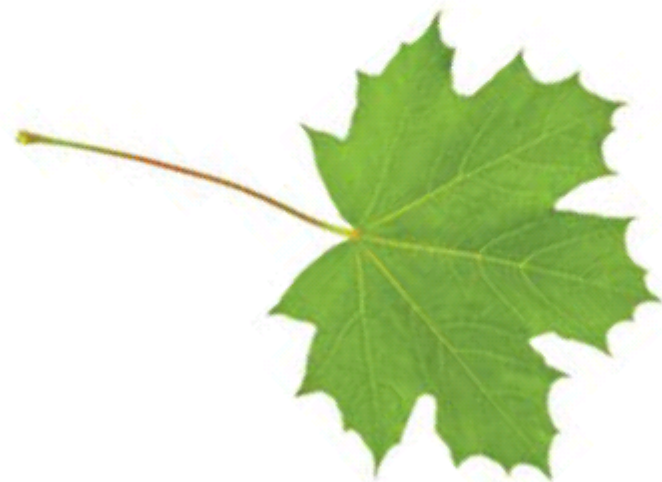
If the concentration of solids becomes too high, foaming and priming can occur, and excessive sludge can restrict circulation and heat transfer causing rupturing and blistering of boiler tubes or shell. Since the concentration is greatest at the point of highest steam release, the best location for the continuous blowdown is just below the water level in the boiler.

At this point of highest concentration (about 4" to 6" below the water level), boiler water is continually drained off to reduce the concentrated boiler water. Fresh make-up water with a much lesser concentration is, at the same time taken, into the boiler. While this is the best method of controlling Total Dissolved Solids (T.D.S.) in the boiler, valuable heat can be lost.

The Penn Flash Economizer Saves You Money

Continuous blowdown of 1 gpm on a 150 psig boiler wastes 169,000 BTUs/Hr. This blowdown water, too hot to dump to streams or public sewage, must be cooled to at least 140°F in most localities. Tempering this water with added cold water or just taking the water and dumping it to a hot well or blowdown tank becomes costly because you're losing both flash steam and hot water which can be recycled into the boiler. This water can be cooled by sending it through a Flash Economizer, which takes the heat out of the continuous blowdown and recycles it back into the make-up water. The drain temperature is reduced to 100-110°F.

With a Flash Economizer most of the heat is recycled back into the boiler. A Flash Economizer saves more BTUs than a conventional heat exchanger. When a percentage of the continuous blowdown flashes into steam in the upper portion of the Flash Economizer, you get 100% recovery of the BTUs in flash stream. Also, with today's cost of treating make-up water, you reclaim a percentage of the blowdown water in flash stream and put it back into your system. For more information on these savings see Brochure F14.5.



Recycle
Save

Steam Outlet
clean dry steam 97% quality
to deaerator

Tangential Inlet
imparts high velocity
spinning action to liquid

**Low Pressure
Vortex Area**
expedites instant flashing of
all steam to outlet

Stainless Steel Wear Plate
a point of impingement prevents
erosion of separator wall

**High Velocity
Centrifugal Action**
drives liquid and solids to outside -
only clean dry steam releases into
central vortex area and up into
steam outlet

Float Trap
for continuous discharge
of cooled water to drain

**Spiral Coil Heat
Exchanger**
designed to provide maximum
heat transfer

Sludge Area
no pockets or baffles in heat
exchanger area for sludge
to deposit and reduce heat
recovery efficiency or to clog
the flow area

Cold Water
boiler make-up
enters system

Cooled Blowdown
to drain (100-110°F)

Boiler Make-up
exits heated by
continuous blowdown
at no extra cost



Heat Recovery Process

Continuous blowdown enters tangentially spinning around in the Flash Chamber. Flash steam is released in the center area and recycled into the deaerator or feedwater heater. Every pound of flash steam returns 1156 BTUs into your system which, when taken back to the deaerator or feedwater heater, is condensed. So you not only save BTUs but also make-up water. The remainder of the blowdown water flows directly down to the second area of recovery — the spiral coil heat exchanger. The hot water flows around the coils and heats the make-up water which flows through the coils.

The Penn Flash Economizer is designed for efficient trouble-free operation. Note that the only area in which sludge can accumulate is below the heat transfer area, and that there is no valve between the flash area and heat exchanger area to stick or clog. Maintenance is simple with the Flash Economizer. The unit is flanged to simply drop out the lower spiral coil section, clean the copper or stainless coils, and place the unit back in operation without even having to shut the boiler down. This is recommended maintenance at least once a year.

Single and Multiple Boilers

Because the flash process is a natural process continuous blowdown from one boiler or multiple boilers, even operating at different pressures can be taken into one Flash Economizer. They will each flash down to the pressure maintained in the deaerator set by the pressure reducing valve off of the main steam line. The pressure inside the economizer will be the same as in the deaerator or feedwater heater.

Design Features

- Tangential inlet produces clean dry steam for the Deaerator or Feedwater Heater
- 100% recovery of BTUs in the Flash Stage
- Reduces the amount of live steam needed for deaeration
- Stainless Steel Wear Plate in the Flash Area to eliminate erosion
- Efficient Spiral Coil Heat Exchanger
- No internal float valve to stick or clog
- One unit can serve many boilers even if they are operating at different pressures
- Maintenance is quick and easy

Free Heat Recovery Survey

Find out exactly how much you can save, by using the Penn Flash Economizer. We can save you important dollars, by recovering up to 90% of the heat normally lost with continuous blowdown with the economizer. There is no obligation to you for getting the facts about Penn's Flash Economizer adapted to your boiler operation. For a free copy of our Heat Recovery Survey send us your name, title, company and address or telephone us at 888-PENNSEP (736-6737).

Save Money & Help Protect Our Environment



CO₂ emissions reduced by 833 tons/yr.



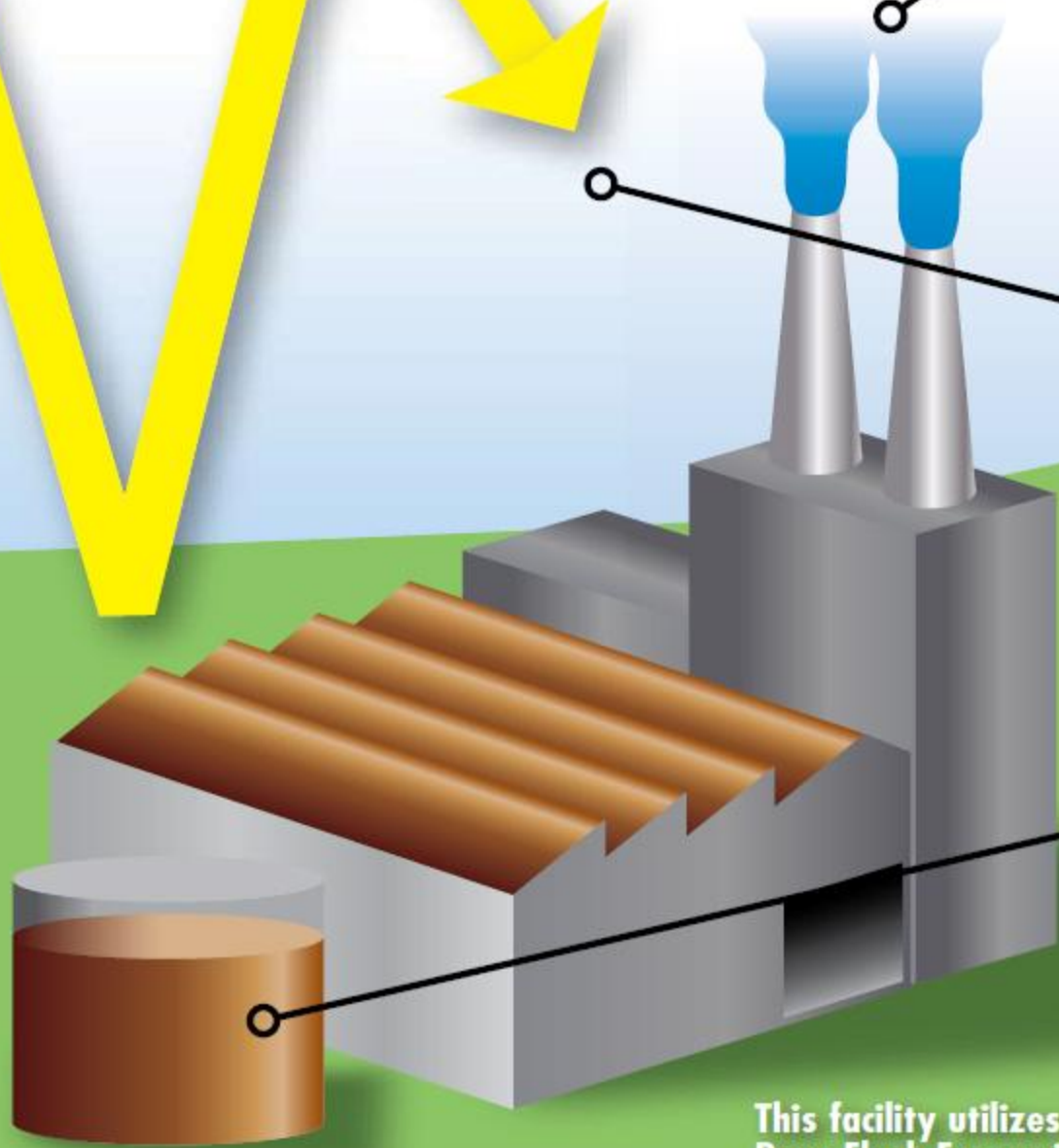
Reduction Equivalent to CO₂ processed by 333 acres of trees/yr.



Fuel consumption reduced by 61,582 gallons/yr.



Effluent 100°F



This facility utilizes Penn Flash Economizer Model AHRB 6-30

90% Total Savings



2800 lbs/hr Continuous Blowdown

Recovery Ability of BTUs in Blowdown

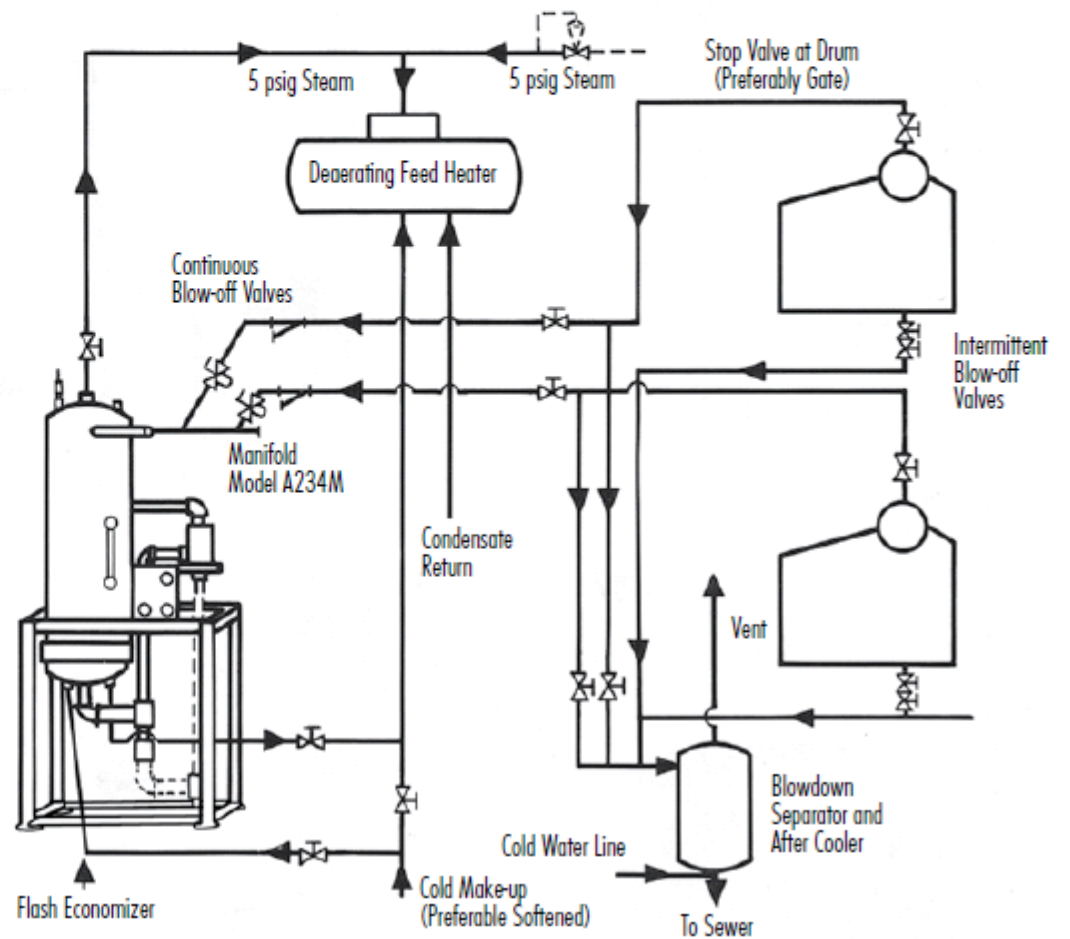
Conditions

- Boiler 100,000 lbs/hr
- Fuel Oil
- 150 psig
- 40% load factor
- 80% boiler efficiency
- 7% blowdown
- Effluent to sewer 100°F

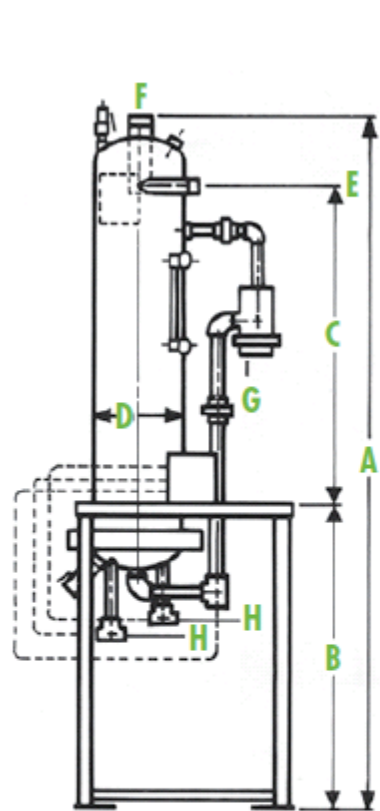
Sizing Chart

Model	Blowdown	Make-up
AHR 3	3 GPM	9 GPM
AHR 6	6 GPM	12 GPM
AHR 10	10 GPM	20 GPM
AHR 20	20 GPM	40 GPM
AHR 30	30 GPM	60 GPM
AHRB 3-15	3 GPM	15 GPM
AHRB 6-30	6 GPM	30 GPM
AHRB 10-50	10 GPM	50 GPM
AHRB 20-100	20 GPM	100 GPM
AHRB 30-150	30 GPM	150 GPM

Installation Diagram



Specification Print (dimensions are in inches)



Model	A	B	C	D	E	F	G	H
AHR 3	96	44	42	8 ⁵ / ₈	1	2 ¹ / ₂	1	³ / ₄
AHR 6	110	49	50	10 ³ / ₄	1 ¹ / ₂	3	1	³ / ₄
AHR 10	93 ³ / ₄	45	37 ¹ / ₄	16	1 ¹ / ₂	4	2	1 ¹ / ₄
AHR 20	140	68	60	18	1 ¹ / ₂	6	2	1 ¹ / ₂
AHR 30	172	77	84	18	1 ¹ / ₂	6-8	2	1 ¹ / ₂
AHRB 3-15	97	46	40	10 ³ / ₄	1	2 ¹ / ₂	1	1
AHRB 6-30	111	53	46	12 ³ / ₄	1 ¹ / ₂	3	1	1 ¹ / ₄
AHRB 10-50	106	51	43	16	1 ¹ / ₂	4	2	1 ¹ / ₂
AHRB 20-100	140	68	60	18	1 ¹ / ₂	6	2	2
AHRB 30-150	132 ¹ / ₂	67	51 ¹ / ₄	24	1 ¹ / ₂	6-8	2	2 ¹ / ₂

Nozzle Schedule

E. Continuous Blowdown Inlet
F. Steam Vent

G. Condensate Drain
H. Cold Water Inlet and Outlet



Penn Separator Corporation

P.O. Box 340 Brookville, PA 15825
 814.849.7328 Fax 814.849.4510