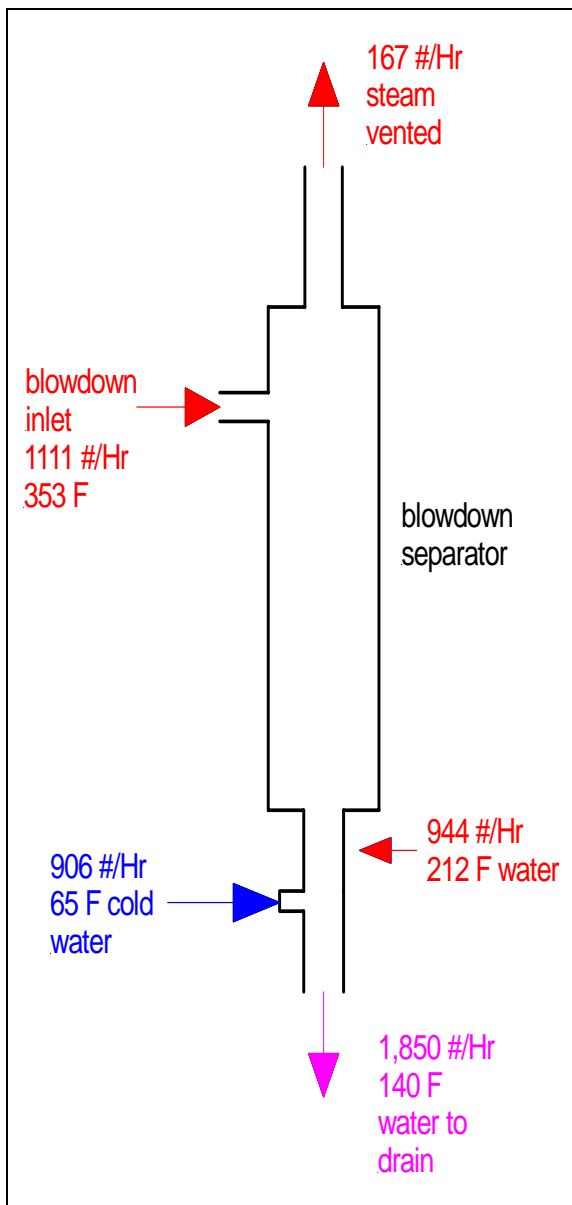


Blowdown Economizer Calculation

Surface boiler blowdown is required to prevent foaming and priming because the blowdown maintains the proper amount of dissolved solids in the boiler. Surface blowdown is necessary but an energy hog.

For example: a 10,000 #/Hr steam boiler operating at 125 psig requires a TDS level of 2,500 PPM or less. Since the feedwater TDS level is 250 PPM, the surface blowdown rate needs to be 1,111 #/Hr or just over 2 GPM.

Here are the costs associated with the requirement of blowing the boiler down.



given:

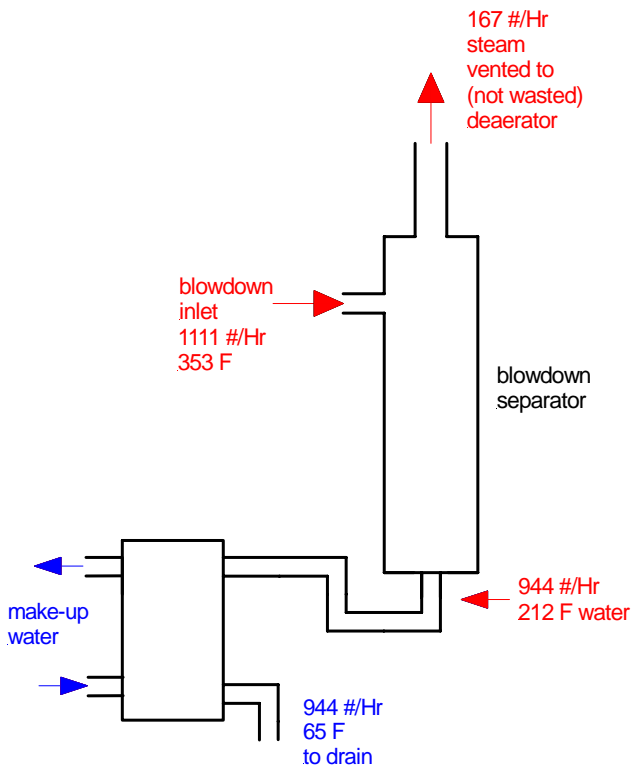
steam capacity of boiler (#/Hr)	10,000
hours of operation / year	8,000
required TDS in boiler	2,500
TDS in feedwater	250
cost of water per hour (\$/1000#)	\$ 0.93
cost of a BTU (\$/MMBTU)	\$ 7.50

calculated:

blowdown rate (#/Hr)	1,111
flash steam lost (#/Hr)	167
energy lost in flash steam (BTU/Hr)	161,990
liquid blowdown down drain (#/Hr)	944
energy lost in blowdown down drain (BTU/Hr)	138,768
water used to quench blowdown (#/Hr)	906
water to be made up because of blowdown (#/Hr)	2,017
cost of flash steam (\$/yr)	9719.4
cost of blowdown heat (\$/yr)	8326.08
cost of water (\$/yr)	\$15,006.48
total cost per year	\$33,051.96

The cost of making dry steam is expensive but it doesn't need to be. A Pennsylvania Separator "blowdown heat recovery system" recovers about 95% of the heat lost without their system. On top of that, it eliminates a lot of water and sewer cost.

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blowdown rate (#/Hr)	1,111
flash steam recovered (#/Hr)	167
energy recovered in flash steam (BTU/Hr)	161,990
liquid blowdown down drain (#/Hr)	944
energy recovered in blowdown down drain (BTU/Hr)	129,328
water used to quench blowdown (#/Hr)	0
water to be made up because of blowdown (#/Hr)	1,111
savings from flash steam (\$/yr)	\$ 9,719.40
savings from recovering blowdown heat (\$/Yr)	\$ 7,759.68
savings from using less water (\$/yr)	\$ 6,740.64
total savings (\$/yr)	\$ 24,219.72