



### **Proven Energy Savings Using Maxi-Therm's Innovative System**

With over 300 installations in North America, Maxi-Therm has demonstrated proven energy savings over the last decade. Included are three examples of the energy savings derived by using Maxi-Therm's innovative vertical flooded heat exchanger system. Each example provides a simple design sketch followed by the calculated energy savings versus a conventional heat exchanger given the example's specifications. As an added bonus, the savings realized by a mechanical contractor installing a Maxi-Therm system at Yale University in 2011 are also detailed.

#### **Sample Installation Sites:**



*Martha  
Jefferson*  
Hospital



Middlebury



**WISCONSIN**  
UNIVERSITY OF WISCONSIN-MADISON



**HARVARD**  
UNIVERSITY



Beth Israel Deaconess  
Medical Center



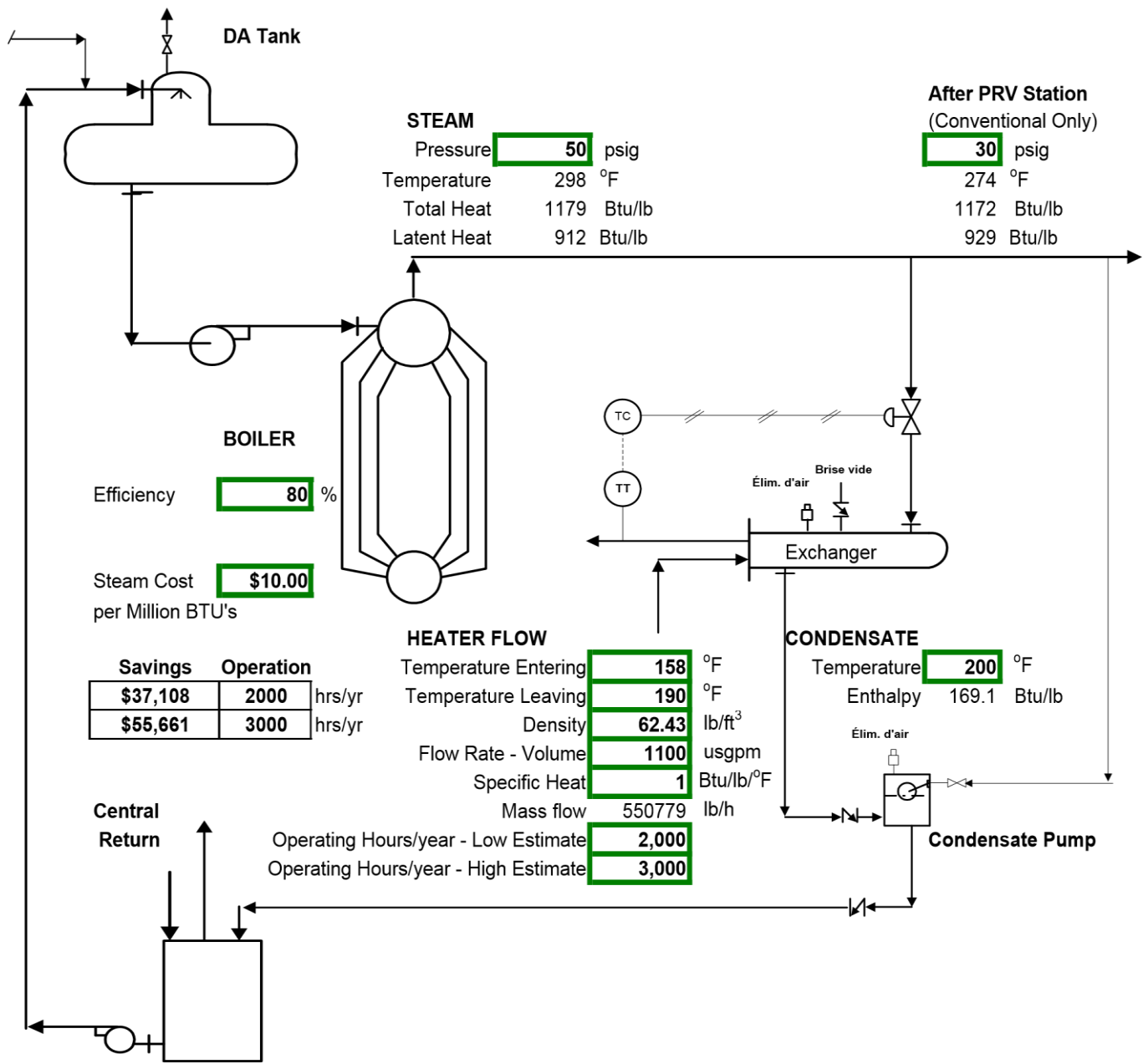
HARVARD MEDICAL SCHOOL  
TEACHING HOSPITAL



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**Example 1 – Building Heat (1100 usgpm, 158F to 190F water, 50 psig, \$10/MMBTU)**

*Actual system installed in the Meyer Building at Johns Hopkins Hospital in 2015*



**Operating Cost Comparison: (exchanger at full load)**

M=Million

	CONVENTIONAL	MAXI-THERM	
Pressure	<b>30</b>	<b>50</b>	psig
Energy Transferred	17.62	17.62	MBtu/h
Steam Flow	18972	17449	lb/h
Flash Rate	6.48	0.00	%
Atmospheric Flash Loss.	1229	0	lb/h
Energy to Heat Condensate	1.52	1.71	MBtu/h
Energy to Heat Make Up	0.28	0.00	MBtu/h
Energy to Vaporize	17.30	15.91	MBtu/h
<b>Total:</b>	<b>19.10</b>	<b>17.62</b>	<b>MBtu/h</b>

**Difference = Savings**

1.48	MBtu/h
7.77	%

**Boiler Efficiency**

80.00	%
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**Total Savings**

1.86	MBtu/h
9.71	%

**Dollar Savings at \$10.00 per Million BTU's**

2,000 hrs / year

3,000 hrs / year

<b>\$37,107.53</b>
<b>\$55,661.30</b>

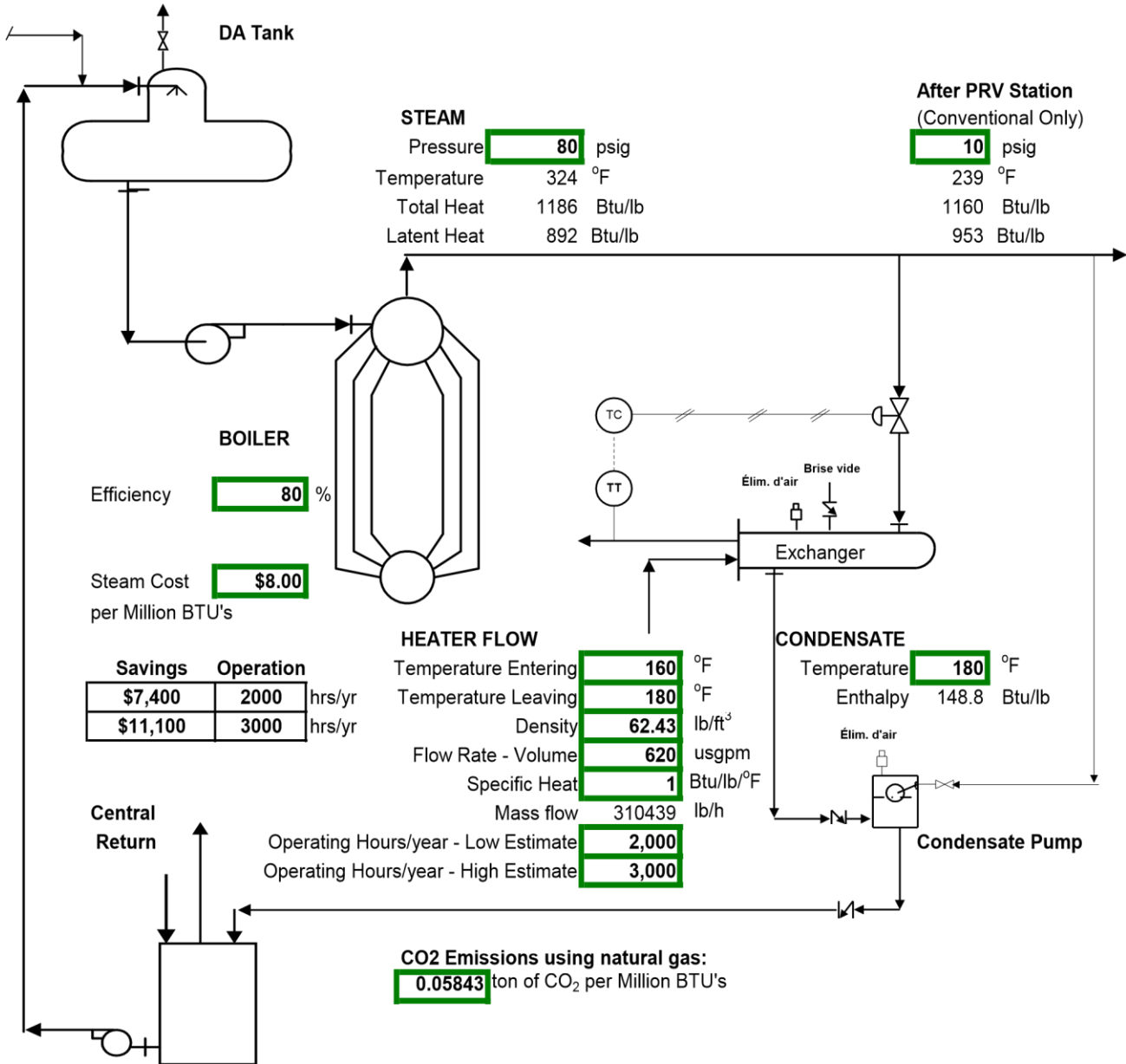
*How does the Maxi-Therm System save so much?*

1. *It condenses steam and extracts heat from condensate, too.*
2. *It uses less steam since it extracts this extra heat.*
3. *It creates NO FLASH STEAM.*
4. *The Conventional System does create flash steam.*
5. *The Boiler and DA Tank have to heat up the water lost by flash steam.*

**Example 2 – Building Heat (620 usgpm, 160F to 180F water, 80 psig, \$8/MMBTU)**

Actual system installed in the Searle Chemistry Laboratory at University of Chicago in 2008

**Design Specifications:**



**Operating Cost Comparison: (exchanger at full load)**

M = Million

	CONVENTIONAL	MAXI-THERM	
Pressure	<b>10</b>	<b>80</b>	psig
Energy Transferred	6.21	6.21	MBtu/h
Steam Flow	6517	5984	lb/h
Flash Rate	2.85	0.00	%
Atmospheric Flash Loss	186	0	lb/h
Energy to Heat Condensate	0.71	0.86	MBtu/h
Energy to Heat Make Up	0.05	0.00	MBtu/h
Energy to Vaporize	5.81	5.34	MBtu/h
<b>Total:</b>	<b>6.57</b>	<b>6.20</b>	<b>MBtu/h</b>

**Difference = Savings**

0.37	MBtu/h
5.63	%

**Boiler Efficiency %**

80.00
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**Total Savings**

0.46	(MBtu/h)
7.04	%

**Dollar Savings at \$8.00 per Million BTU's**

**2,000 hrs / year**

<b>\$7,400.09</b>
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**3,000 hrs / year**

<b>\$11,100.14</b>
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**Carbon Footprint Reduction (using natural gas):**

**0.05843 ton of CO<sub>2</sub> per Million BTU's**

**2,000 hrs / year tons of CO<sub>2</sub> per year**

<b>54.05</b>
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**3,000 hrs / year tons of CO<sub>2</sub> per year**

<b>81.07</b>
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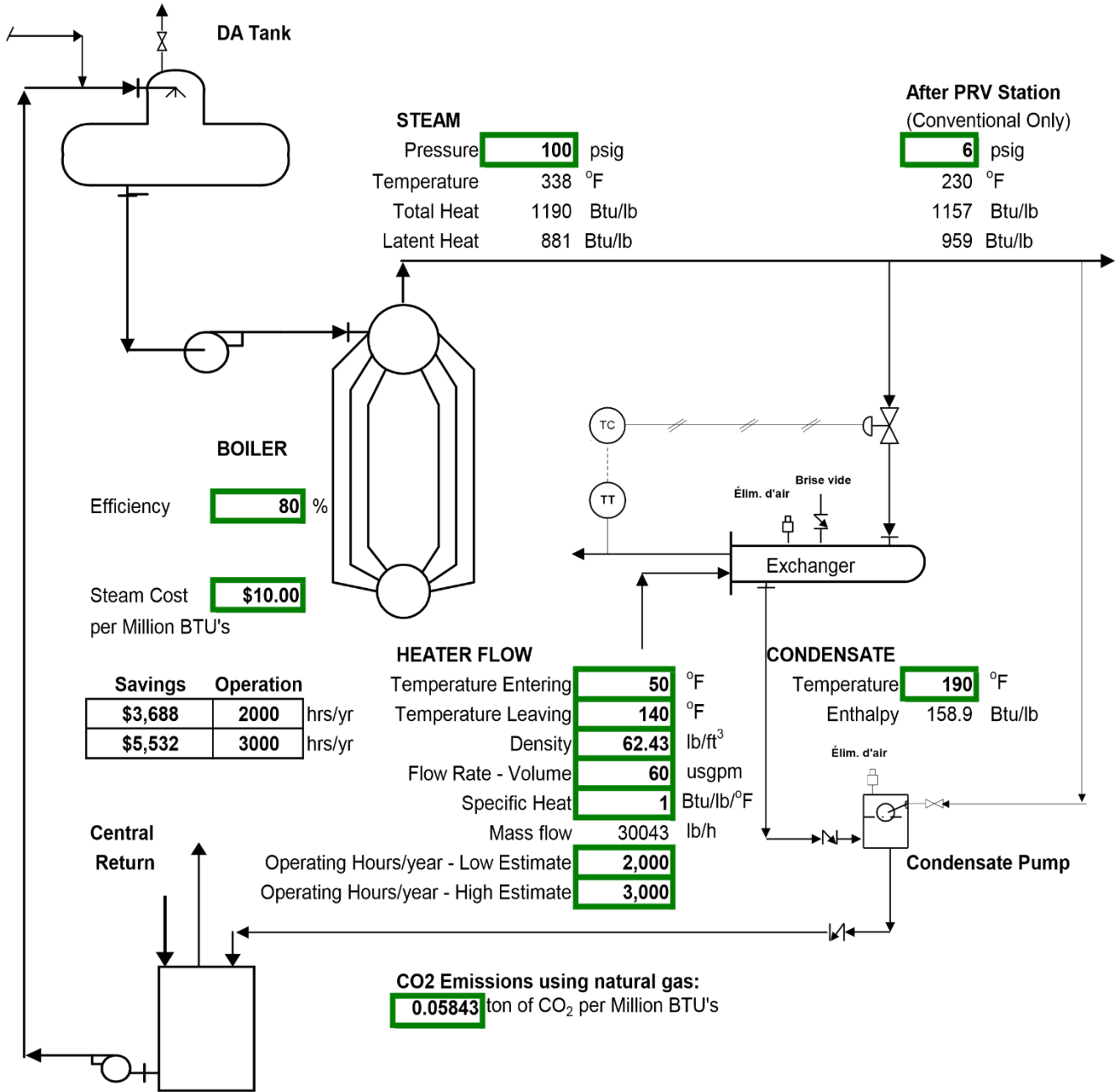
*How does the Maxi-Therm System save so much?*

6. It condenses steam and extracts heat from condensate, too.
7. It uses less steam since it extracts this extra heat.
8. It creates NO FLASH STEAM.
9. The Conventional System does create flash steam.
10. The Boiler and DA Tank have to heat up the water lost by flash steam.

# Example 3 – Domestic Hot Water (60 usgpm, 50F to 140F hot water, 100 psig steam)

Calculated example for illustrative purposes

## Design Specifications:



**Operating Cost Comparison: (exchanger at full load)**

M = Million

	CONVENTIONAL	MAXI-THERM	
Pressure	<b>6</b>	<b>100</b>	psig
Energy Transferred	2.70	2.70	MBtu/h
Steam Flow	2819	2623	lb/h
Flash Rate	1.85	0.00	%
Atmospheric Flash Loss.	52	0	lb/h
Energy to Heat Condensate	0.35	0.39	MBtu/h
Energy to Heat Make Up	0.01	0.00	MBtu/h
Energy to Vaporize	2.48	2.31	MBtu/h
<b>Total:</b>	<b>2.85</b>	<b>2.70</b>	<b>MBtu/h</b>

**Difference = Savings (MBtu/h)**

0.15
5.18 %

**Boiler Efficiency**

80.00 %
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**Total Savings**

0.18	MBtu/h
6.48 %	

**Dollar Savings at \$10.00 per Million BTU's**

**2,000 hrs / year**

<b>\$3,688.04</b>
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**3,000 hrs / year**

<b>\$5,532.07</b>
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**Carbon Footprint Reduction (using natural gas):**

**0.05843 ton of CO<sub>2</sub> per Million BTU's**

**2,000 hrs / year tons of CO<sub>2</sub> per year**

<b>21.55</b>
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**3,000 hrs / year tons of CO<sub>2</sub> per year**

<b>32.32</b>
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*How does the Maxi-Therm System save so much?*

- 1. It condenses steam and extracts heat from condensate, too.*
- 2. It uses less steam since it extracts this extra heat.*
- 3. It creates NO FLASH STEAM.*
- 4. The Conventional System does create flash steam.*
- 5. The Boiler and DA Tank have to heat up the water lost by flash steam.*



### Bonus Example - Installation Savings

*Actual installation savings as provided by the contractor installing a Maxi-Therm system at Yale University in 2011*

HVAC Item	Qty	5-16-11 Budget Value	10-14-11 Maxi-therm Budget Option
General Conditions		\$18,000	\$10,000
Labor		\$220,000	\$65,000
PVF		\$75,000	\$35,000
Maxitherm Skid			\$190,000
Air Sep	1	\$3,000	N/A
Condensate Meter	1	\$5,000	\$5,000
Condensate Pump	1	\$15,000	\$15,000
Expansion Tanks	2	\$7,000	\$7,000
Flash Tank	1	\$4,500	N/A
Steam PRV	1	\$12,000	N/A
VFD	3	\$13,500	\$13,500
Pumps	3	\$24,000	N/A
Pump Specialties	3	\$15,000	N/A
Vibration Isolation		\$12,000	N/A
Controls		\$80,000	\$80,000
Fire Watch		\$25,000	\$3,500
Pipe Insulation		\$50,000	\$35,000
Water Balance		\$3,000	\$3,000
Rigging		\$18,000	\$18,000
<b>HVAC Budget Value</b>		<b>\$600,000</b>	<b>\$480,000</b>

#### General Areas of Recognized Installation Savings:

1. No PRV station required - *Maxi-Therm systems are capable of using up to 175 psig steam*
2. Reduced onsite labor - *Maxi-Therm units come pre-piped on a "plug and play" skid with all pumps and controls programmed and pre-wired. Just four connections are required – electrical, steam, water and condensate.*
3. No safety relief valve required roof – *the heat exchanger is ASME certified above the maximum pressure of the system*
4. No condensate pumps are required – *since the exchanger is flooded, the condensate can be lifted using the system's pressure*
5. No flash tanks are required – *system generates 0% flash and evacuates condensate at 200F*
6. Reduced pipe requirements - *higher pressure steam requires smaller pipe diameters and less insulation*



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