High Efficiency Steam Exchangers

Steam to Building Heat
Steam to Domestic Water

Increase energy efficiency and save space

Introducing... the XE System for steam control in large facilities. It's a skid-mounted/pre-piped design that saves space, energy, and even water.

Designed for both building heat and domestic hot water applications. XE systems can reduce energy consumption by between 5 – 15 percent.

Toll Free 877-629-4843
website: advancedsteam.com
XE Stands for “Extra Energy Extraction”

How GREEN is your STEAM? Go outside and look at your facility. See that flash steam? It has valuable BTU’s that are being wasted. It is pure water that could have been re-used. By using this wasted energy the XE system saves money, reduces emissions, and can even earn LEED points towards GREEN building construction.

Advantages of the XE Vertical Exchanger

The direct benefits of the XE Vertical Exchanger are threefold;

1) Reduced greenhouse emissions by reducing fuel consumption and flash steam

2) Reduced cost of operation, and carbon footprint, and

3) Lower installed costs for new projects since high pressure steam can be used directly.

These benefits will result in simpler mechanical room design, and add incrementally to the greening of the facility.

Besides being environmentally friendly, the Advanced Steam Technology XE system is:

**Accurate**
Control liquid leaving temperature:
- at +/- 2F for Building Heat
- at +/- 4F for Domestic Water

**Efficient**
Utilize steam wasted by other water heaters
- Save 20% of energy usage at 125 psig steam,
- Save 5% of energy usage at 15 psig steam.

**Economical**
Lower installed cost than other water heaters

**Space saving**
Smaller footprint – typically 3ft.x 4ft.

**Easy to install**
Only 4 connections required
How does the XE design extract extra energy from condensate?

Simply put... By using the lower part of the heat exchanger as a water to water exchanger:

In this simplified diagram, straight 100 psi steam fills the unit, except for the bottom 20 percent. The condensate there is being cooled by the entering 160F return water. The unit is sized to cool the condensate to 200F, so it doesn’t flash.

The primary control valve is at the bottom of the heat exchanger, and adjusts the amount of flooding to meet the heat demand.

Often times a pump is not needed to lift the condensate, because unlike a modulated steam unit, 100 psi is pushing the condensate.

New Project Benefits include:

✓ LEED Certifiable for energy savings and innovation points
✓ Reduce steam pipe size and total installed cost
✓ Reduce or eliminate wasteful flash steam venting
✓ Vertical design saves expensive mechanical room floor space
Conventional Steam Piping Requirements

**Compare an example** of a 500 GPM, 5 million BTU/hr, building heat system. Let's look at the sizing and energy consumption for conventional equipment:

Steam is distributed at 100 psig and reduced in the mechanical room to 15 psi. The load on a conventional system will be 5294 #/hr of steam.

1. **High Pressure Steam**
   - 3 inch line size at 100 psi

2. **Pressure Regulating Valve**
   - 2 inch full port (or perhaps a 1/3-2/3 using two regulators for better accuracy)

3. **Relief Valve Size**
   - 4x6 inch with N orifice is needed to handle the potential flow from a “stuck open” regulator

4. **Relief Valve Vent Pipe**
   - Size = 6 inch, normally run up through the roof. This is often the most expensive part of the installation

5. **Low Pressure Steam**
   - 6 inch line size at 15 psi
   - This is because steam expands 4 times in volume when reduced from 100 psi

6. **Control Valves**
   - Normally 2 valves are needed, both 2 inch
   - They throttle steam pressure to control water temperature

7. **Heat Exchanger Accessories**
   - Thermostatic Air Vent and Vacuum Breaker are needed for when the control valves throttle below 50%

8. **Primary Steam Trap**
   - A 2-1/2 inch high capacity trap must discharge by gravity and be installed 18 inches below the exchanger

9. **Hot Flashing Condensate**
   - Discharges into the return piping and the temperature drops from 250F to 212F. It can damage a condensate pump impeller and seals due to cavitation

10. **Condensate Pump**
    - 30 GPM at 20 feet head when the condensate return line is elevated or has back pressure. The pump will require a power source and isolation

11. **Pump Receiver Vent**
    - 208 #/hr of flash steam will be released when operating at full load and 15 psi

12. **Condensate Return**
    - If returned to the boiler, the 208 #/hr flash loss must be “made up” with fresh treated feed water
**XE Thermal Steam Piping Requirements**

**Look at the same example** of a 500 GPM, 5 million BTU/hr system. Let’s look at the sizing and energy consumption for the XE Thermal System:

Steam is condensed at 100 psig, but the extra efficiency uses only 4906 #/hr of steam, about 8% less steam than conventional.

1. **Steam Line**
   - A 3 inch line is sufficient since the 100 psi pressure is delivered directly to the exchanger. No need for pressure reducing valves unless desired.

2. **Shut-off Valve**
   - An automatic temperature over-ride valve is installed at the inlet as a safety, and to allow slow start-up. It can be an automated butterfly valve or on some applications, a self operated temperature regulator.

3. **Drip Traps**
   - Two steam traps are furnished on the inlet. The first keeps condensate away from the inlet valve on start up. The second keeps condensate from building up above the exchanger.

4. **Vertical Exchanger**
   - The exchanger is larger and more heavy duty than conventional. It needs more surface area to cool the condensate down to 200F or below.

5. **Cool Condensate**
   - The condensate is below 200F and under pressure, so a long drop leg is not needed on the drain side.

6. **Condensate Control Valve**
   - Is the primary temperature control device. It throttles to maintain the flooded condition in the exchanger which satisfies the load demand. It is normally a ¼ inch industrial grade unit with fail closed actuator.

7. **Steam Trap**
   - Serves as a back-up in case the condensate control valve fails open or the load increases.

8. **Condensate Injector**
   - High pressure flashing condensate from the drip traps is mixed with the cooler condensate from the exchanger through a sparge fitting.
Typical Systems

The XE steam exchanger systems are available in multiple sizes:

Building heat from **10 - 1700 gpm**.
Domestic water from **10 - 200 gpm**.

Units can be duplexed for higher capacity and redundancy.

High efficiency operation on steam pressures up to 175 psig.

Duplex 400 gpm Building Heat on 60 psi steam

Duplex 125 gpm Domestic Water on 50 psi steam

Duplex 275 gpm Building Heat on 100 psi steam
**Typical Specifications** (also available as text files on advancedsteam.com)

**Building Heat**
XE-BH XE Thermal Vertical Style Steam Water Exchanger for Building Heat.
XE Control for "extra energy extraction" from the steam and condensate. Capacity XX gpm, with EWT 85 LWT 105F, 100 psi steam in, 200F condensate out. Heat exchanger model BEM Vertical steel shell, copper or cupro-nickel tubes & 150 psig ASME stamp. High performance industrial grade control valve for primary condensate control. Electronic control panel with basic MODBus controls (or control can be by BAS contractor). Self standing steel framework. Pre-piped trap, strainer, and control valve on condensate side. Pre-piped thermometers and gages on water side.
Items delivered separately:
- Double acting electric actuator on HP butterfly valve and control interface for secondary steam control.
- Pressure gauge with pigtail & isolation valve for the steam side.
- Pressure relief valve on the water/glycol side.
- F&T steam trap as drip and air eliminator on steam inlet.

**Domestic Hot Water**
XE Control for "extra energy extraction" from the steam and condensate. Capacity: XX GPM of water, from 40F to 120F, 70 psig steam, 200F condensate out. Heat exchanger model BEM Vertical T-316 stainless steel shell, copper or cupro-nickel tubes & 150 psig ASME stamp. Inlet and outlet thermometers. Modulating Electric Valves: Siemens magnetic control valve for primary condensate control.
Electronic control panel with basic MODBus controls. Self standing steel framework. Pre-piped trap, strainer, and control valve on condensate side. Pre-piped thermometers and gages on water side.
Note: If a 3-way mixing or system anti-scald device limits building recirculation back to this unit, a pre-insulated, 150 psi ASME buffer tank and pump are required for unit recirculation.
The tank shall have the same "gallonage" as the unit capacity. (60gpm = 60 gallon tank)
Items delivered separately:
- Double acting electric actuator on HP butterfly valve and control interface for secondary steam control.
- Pressure gauge with pigtail & isolation valve for the steam side.
- P/T relief valve on the liquid side.
- F&T steam trap as drip and air eliminator on steam inlet.

**Double-wall Domestic Hot Water**
XE Control for "extra energy extraction" from the steam and condensate. Capacity: XX GPM of water, from 40F to 120F, 70 psig steam, 200F condensate out. Heat exchanger model BEU-DW Vertical T-316 stainless steel shell, double-wall copper or cupro-nickel tubes & 150 psig ASME stamp. Inlet and outlet thermometers. Modulating Electric Valves: Siemens magnetic control valve for primary condensate control.
Electronic control panel with basic MODBus controls. Self standing steel framework. Pre-piped trap, strainer, and control valve on condensate side. Pre-piped thermometers and gages on water side.
Note: If a 3-way mixing or system anti-scald device limits building recirculation back to this unit, a pre-insulated, 150 psi ASME buffer tank and pump are required for unit recirculation.
The tank shall have the same "gallonage" as the unit capacity. (60gpm = 60 gallon tank)
Items delivered separately:
- Double acting electric actuator on HP butterfly valve and control interface for secondary steam control.
- Pressure gauge with pigtail & isolation valve for the steam side.
- P/T relief valve on the liquid side.
- F&T steam trap as drip and air eliminator on steam inlet.
Limited Warranty and Remedy

Advanced Steam Technology Company LLC (Advanced Steam) warrants to the original user of those products supplied by it and used in the service and in the manner for which they are intended, that such products shall be free from defects in material and workmanship for a period of one (1) year from the date of installation, but not longer than 15 months from the date of shipment from the factory [unless a Special Warranty Period applies, as listed below]. This warranty does not extend to any product that has been subject to misuse, neglect, or alteration after shipment from the Advanced Steam factory. Except as may be expressly provided in a written agreement between Advanced Steam and the user, which is signed by both parties, Advanced Steam DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

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