

# CONTINUOUS BOILER BLOWDOWN HEAT RECOVERY SYSTEMS

## (4) Models from 1,500 PPH to 3,000 PPH C.B.D. Capacity

- > Most Cost Effective H.R.S.'s.
- > Low up-front costs.
- > High return on investment.



HX Series: Shell and coil only heat exchanger.



### MADDEN ENGINEERED PRODUCTS, LLC.

1317 PRINCETON BLVD, ELKHRAT, IN 46516 PH: 574-295-4292 • EMAIL: INFO@MADDENEP.COM Format: 1st - start with HX, or HVX. 2nd - add capacity number. 3rd - add ancillary equipment adders and upgrades as necessary.

1.)	"HX" SERIES *
SMAL	L, EFFICIENT, COST EFFECTIVE
B	LOWDOWN CAPACITIES
	"20" - 2,000 PPH *
	"25" - 2,500 PPH *
	"30" - 3,000 PPH *

2.)	"HVX" SERIES
	(HV / HX HYBRID)
	BLOWDOWN CAPACITIES

"15" - 1,500 PPH

\*NOTE: HX series heat exchangers do not offer flash steam recovery.

#### **OPTIONAL ANCILLARY EQUIPMENT 'ADDITIONS'**

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- "H" HIGH LEVEL ALARM SYSTEM, P/N HC002B
- "I" CUSTOM FIT ISULATION JACKET, P/N = HV50(CAPACITY)IJ

- "A" COPPER COIL HEAT EXCHANGER shorter service life, but more efficient BTU recovery
- "O" MADDEN ORIFICE METER(S), P/N OM250\_A OR OM650\_A, for blowdown flow rate control.
- "M" INLET MANIFOLD, P/N HV310, 3" X 36", Sch 80, SA106 or A53, CS, up to (3) 1" FNPT connections.

#### Full P/N Example:

HVX15	Ι	HIA	-	2
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# Heat Recovery Systems' Performance Data

### **BTU Recovery** Example

1. Boiler surface water blowdown rate:	1,000 PPH
2. Boiler Pressure in P.S.I.G.:	150 PSIG
3. Lbs. of water flashed @ 5 p.s.i.g (14.6%):	146 PPH
4. B.T.U. Recovery per hour from Flash Steam @ 1155 B.T.U. per hour:	168,630
5. Specific volume of flash in Cubic Feet per Hour (146 PPH * 21):	3,066 Ft^3/HR
6. Water remaining after flash in lbs. per Hour:	854 PPH
7. Heat in remaining condensate (unflashed) water @ 225 deg F. temperature:	192,150 BTU's
8. Recoverable heat in water with 60 deg F. cooling medium plus 10 deg F. transfer loss:	132,370
9. Total Heat Recovery from Boiler Blowdown B.T.U. per Hour (Item 4 + 8):	<u>301,000 BTU's</u>

- Big BTU savings can result in fast investment payback and lower operating costs.
- Contact the factory or your sales representative for a computer analysis of your operating system today.

#### **Fuel Savings** Example

Blowdown Rate 3,000 lbs. per hour							
Boiler Pressure							
BTU Savings							
Fuel Savings per Hour							
6 gallons of oil							
9 therms of gas							
Fuel Savings per Year							

### Fuel Savings per Year

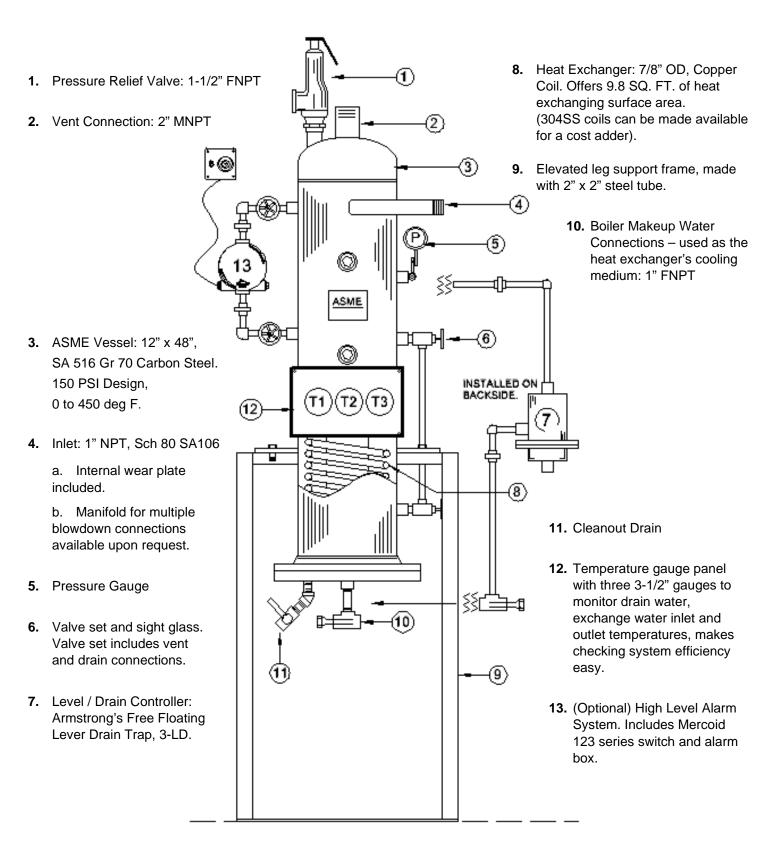
- 678,000 lbs. of Coal, or
  36,000 gallons of Oil, or
- = \$
- 54,000 therms of Gas.

Initial Pressure	Temp. of	ATM Pressure	Percent of Flash at Reduced Pressures							
P.S.I.G.	Liquid (F)	0 P.S.I.	5 #	10 #	15 #	20 #	25 #	30 #	35 #	40 #
50	298	9	7.5	6.3	5.2	4.2	3.4	2.6	1.9	1.2
75	320	11.5	9.9	8.7	7.6	6.7	5.9	5.1	4.4	3.8
100	338	13	11.5	10.3	9.3	8.4	7.3	6.9	6.3	5.5
125	353	14.5	13.3	11.8	10.9	10	9.2	8.5	7.9	7.2
150	366	16	14.6	13.2	12.3	11.4	10.6	9.9	9.3	8.5
175	377	17	15.8	14.4	13.4	12.5	11.6	11.1	10.4	9.7
200	388	18	16.9	15.5	14.6	13.7	12.9	12.2	11.6	10.9
225	397	19	17.8	16.5	15.5	14.7	13.9	13.2	12.6	11.9
250	406	20	18.8	17.4	16.5	15.6	14.9	14.2	13.6	12.9
300	421	21.5	20.3	19	18	17.2	16.5	15.8	15.2	14.5
350	435	23	21.8	20.5	19.5	18.7	18	17.3	16.7	16
400	448	24	23	21.8	21	20	19.3	18.7	18.1	17.2
450	459	25	24.3	23	22	21.3	20	19.9	19.3	18.7
500	470	26.5	25.4	24.1	23.2	22.4	21.7	21.1	20.5	19.9
550	480	27.5	26.5	25.2	24.3	23.5	22.8	22.2	21.6	20.9
600	488	28	27.3	26	25	24.3	23.6	23	22.4	21.8
650	495	31.5	30.2	29.1	28.2	27.5	26.75	26.1	25.5	24.9
B.T.U. in Fl	ash per lbs.	1150	1155	1160	1164	1167	1169	1172	1174	1176
Temperature	e of Liquid (F)	212	225	240	250	259	267	274	280	287
Steam Volun	ne Cu. Ft. Lb.	26.8	21	16.3	13.7	11.9	10.5	9.4	8.5	7.8

# Madden Features – Model No. HVX15

\*NEW\* - Hybrid model between the Type HV and Type HX.

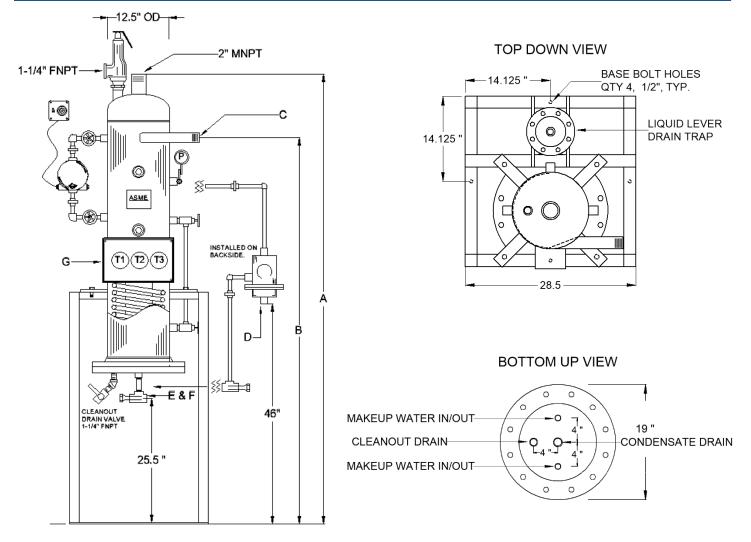
Compact like the original HX to keep cost low as possible but now has room to recover flash steam like the HV.



## **Dimensions - Type HX Heat Recovery Systems**

	Model Number	HX20	HX25	HX30	HVX15		
	Capacity (PPH)	2,000	2,500	3,000	1,500		
	Flash Steam ?	N	N	N	Ŷ		
Dufat Dufat Dram	Coil Area (Sq. Ft.)	17	21	25	9.8		
	Coil Material	Copper / SS	Copper / SS	Copper / SS	Copper		
	A (OAH)	42"	48"	54"	92.5"		
	B	22"	28"	34"	79"		
В	C - BD Inlet	1-1/2"	1-1/2"	1-1/2"	1-1/2"		
<b>○         </b> ← F	D - Blowdown Drain	1-1/2"	1-1/2"	1-1/2"	1"		
	E - Makeup Water Inlet	2-1/2"	2-1/2"	2-1/2"	1"		
	F - Makeup Water Out	2-1/2"	2-1/2"	2-1/2"	1"		
	G - Temperature Gauges and Nameplate. Includes 3 digit Serial Number.						
	Ship Weight (Lbs.)	500	525	575	595		

## **Dimensions - Type HVX15 Heat Recovery System**





## **Orifice Meter - Flow Control Option**

The adjustable Madden Orifice Meter has 17 different orifices to select for accurate blowdown flow control. Durable, guaranteed for 10 years against cutting, wire drawing, or other distortion. One unit required for each boiler.

The Madden Orifice Meter enables the boiler operator to maintain accurate, repeatable flow control for continuous top blowdown.

#### Two models:

- OM250 for boilers up to 250 psi.
- OM650 for boilers up to 650 psi.

#### Features include:

- Sediment chamber w/stainless steel filter screen.
- Removable adjustment key.
- Stainless steel, heat-treated orifice plate.
- Drain valve and flush filter screen.

### High Level Switch and Alarm System

All heat recovery systems, less the 'original' HX series, have an optional highlevel switch and alarm system (P/N HC002B). Madden typically uses a Mercoid 123 series SPDT switch with our alarm box. The switch enclosure is "general purpose". Other switches can be sourced upon request.

The alarm box is a 4" x 4" x 4" PVC wall mount box (NEMA 4X) with manual silencing toggle switch. It is wired to blink the light and sound the alarm. Contractors can connect to the same alarm contact to then wire an external output signal elsewhere at the job site.

### Custom Insulation Jackets - Cost efficient and easy to install.

Madden offers M.I.T. International insulation jackets to further boost the energy efficiency of our heat recovery systems. The jackets are built to order to fit your particular HV, HC, or HX system. They fit around all connections and come with Velcro straps and hog ring ties to further secure the jacket to the system.

This material has a durable silicone interior and exterior cloth with 1" thick insulation. Rated to 500 deg F.

Not only will this material increase your system's efficiency, it also protects local personnel from accidentally touching the units when operating.



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