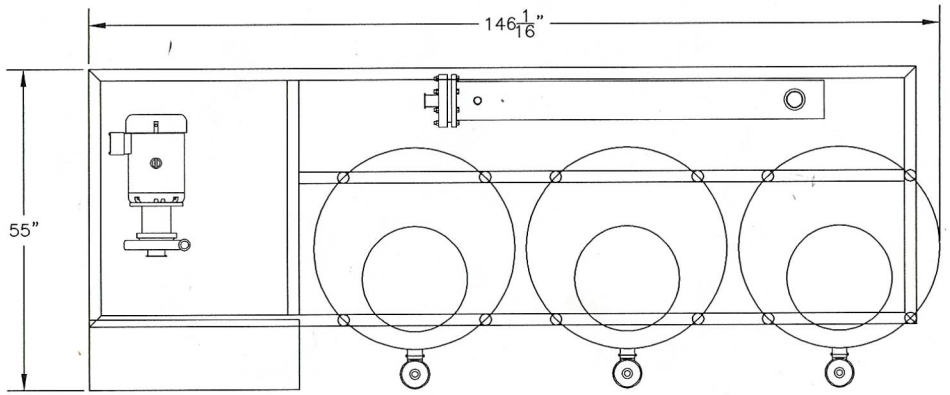
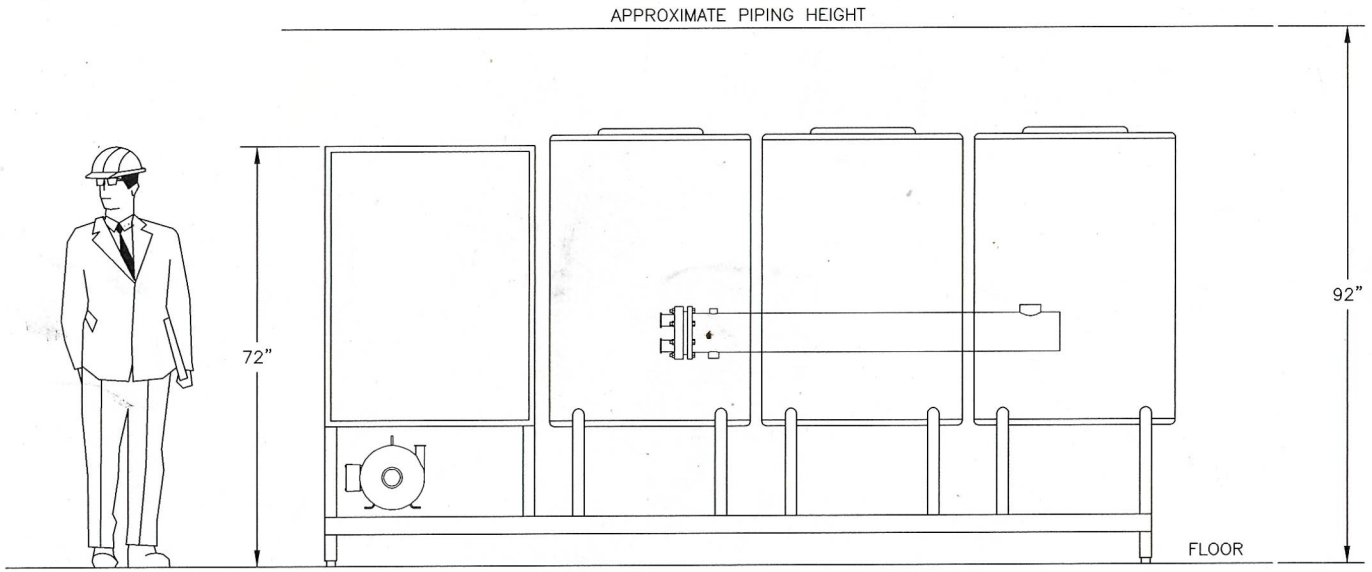
NOTE:

1. DIMENSIONS ARE APPROXIMATES, ACTUAL DIMENSIONS WILL BE DETERMINED AT TIME OF DESIGN.





REV	DESCRIPTION	DATE	BY
A	FOR CUSTOMER APPROVAL	05-19-11	SY

W.O. _____

NO. REQD._____

DO NOT SCALE DRAWING
ALL DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS OTHERWISE SPECIFIED:

FRACTIONAL	± 1/16
1 PLACE DECIMAL	± .030
2 PLACE DECIMAL	± .015
3 PLACE DECIMAL	± .005
ANGULAR	± 1°

DEBURR ALL SHARP EDGES

SANI-MATIC.
1915 S. Stoughton Rd. + Madison, WI 53716
P: 608.222.2300 + F: 608.222.8348 + info@sanimatic.com + www.sanimatic.com

FEDERAL BUREAU OF PRISONS
54506
FOOTPRINT, 3-TANK CIP SYSTEM

DR. BY	DATE	DWG. NO.	REV
SY	05-19-2011	135125	A
PROJ. ENG:	SCALE: 1:16		

Enerquip, LLC

611 North Road • PO. Box 467 • Medford • Wisconsin • 54451

Tel: 715.748.5888 • Fax: 715.748.6484 • Website: www.enerquip.com

Heat Exchanger Specification Sheet

1	Customer Name:	**Sanimatic**						Proposal No.:	**31812A**			
2	Location:	**Madison, WI**						Your Reference:				
3	Service of Unit:	**Process Water Heater**										
4	Item No.:	**624O25C10C-30425T2**										
5	Date:	**5/4/11 7:30 AM**										
6	Shell OD (in.)	**6.625**	Length (in.)	**24.00**	Type	**BEUB**	hor/vert	**Hor**	Connected in	**1**	parallel	**1** series
7	Surf/unit(eff.)	**11.04**	ft2	Shells/unit	**1**			Surf/shell (eff.)	**11.04**			ft2

PERFORMANCE OF ONE UNIT

			Shell Side		Tube Side	
8	Fluid allocation		**Shell Side**		**Tube Side**	
9	Fluid name		**Steam**		**Process Water**	
10	Fluid quantity, Total	lb/h	**1142.09**		**100 gpm**	
11	Vapor (In/Out)	lb/h	**1142.09**	**0.00**		
12	Liquid	lb/h	**0.00**	**1142.09**	**49641.00**	**49641.00**
13	Noncondensable	lb/h				
14						
15	Temperature (In/Out)	F	**297.63**	**297.56**	**119.00**	**140.00**
16	Dew / Bubble point	F				
17	Density (Vap / Liq)	lb/ft3	**0.150 / 57.387**	**0.149 / 57.389**	**/ 61.73**	**/ 61.38**
18	Viscosity	cp	**0.014 / 0.186**	**0.014 / 0.186**	**/ 0.562**	**/ 0.466**
19	Molecular wt, Vap					
20	Molecular wt, NC					
21	Specific heat	BTU/(lb*F)	**0.567 / 1.029**	**0.567 / 1.029**	**/ 0.999**	**/ 1**
22	Thermal conductivity	BTU/(ft*h*F)	**0.018 / 0.396**	**0.018 / 0.396**	**/ 0.369**	**/ 0.376**
23	Latent heat	BTU/lb	**911.98**	**912.03**	**0.00**	**0.00**
24	Pressure	psi	**50 psig**			
25	Velocity	ft/s	**6.54**		**8.33**	
26	Pressure drop, allow./calc.	psi	**0.00**	**0.07**	**0.00**	**2.86**
27	Fouling resist. (min)	ft2*h*F/BTU	**0.0005**		**0.0000**	

28	Heat exchanged	**1041671**	BTU/h	MTD corrected	**167.9** F
29	Transfer rate, Service		Calculated **580.93**	Clean	**818.75** BTU/(h*ft2*F)

CONSTRUCTION OF ONE SHELL

			Shell Side		Tube Side	
30			**Shell Side**		**Tube Side**	
31	Design/Test pressure	psig	**150**	**Code**	**150**	**Code**
32	Design temperature	F	**375**		**375**	
33	Number passes per shell		**1**		**2**	
34	Corrosion allowance	in				
35	Connections	In	**2.50 " NPT 3000#**		**2.50 " Sanitary Ferrule**	
36	Size/rating	Out	**1.00 " NPT 3000#**		**2.50 " Sanitary Ferrule**	
37	in	Intermediate	**1.00 " NPT 3000#**			

38	Tube No.	**16 U**	OD	**0.625**	Tkns - Avg	**0.035** in	Length	**2.0** ft	Pitch **0.78125** in
39	Tube type	**Plain Welded**				Material	**SS304L**		Tube pattern **60**
40	Shell	**SS304L**			ID (in.) **6.407**	OD (in.)	**6.625**	Shell cover	
41	Channel or bonnet		**SS304L**		**Hogged Integral**			Channel cover	
42	Tubesheet-stationary		**SS304L**					Tubesheet-floating	
43	Floating head cover							Impingement protection	**Off Bundle**
44	Baffle-crossing	**2**	**SS304**	Type	**Single Segmental**	Cut(%d)	**37 Vert**	Spacing: c/c	**9.500** in
45	Baffle-long					Seal type			Inlet in
46	Supports-tube					U-bend		Type	
47	Bypass seal					Tube-tubesheet joint			**Grooved & Expanded**
48	Expansion joint					Type			
49	RhoV2-Inlet nozzle		**579.02**		Bundle entrance	**413.48**		Bundle exit	**1.01**
50	Gaskets - Shell side		**EPDM O-Ring**			Tube Side	**EPDM O-Ring**		
51	Floating head								
52	Code requirements		**ASME Section VIII Div. 1**					TEMA class	**C - General Service**
53	Weight/Shell	**240.48**			Filled with water	**296.71**		Bundle	**22.95** lb

54 Remarks

Unit designed by: Bobbi Dassow - 715-748-5888 (ext. 224) - bobbi@enerquip.com
Product contact surfaces shall meet 32 Ra µinch finish requirements.
Unit to heat 150 gal of water @ 100 gpm from 55°F to 140°F in 6 minutes using 50 psig steam.
1469 lbs/hr of steam required in the intial condition. Final condition shown.

Mean metal temperatures

Shell side **297.57** °F Tube side **192.05** °F

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Heat Exchanger Specification Sheet

1	Customer Name:	**Sanimatic**						Proposal No.:	**31812BR1**			
2	Location:	**Madison, WI**						Your Reference:				
3	Service of Unit:	**Process Water Heater**										
4	Item No.:											
5	Date:	**5/5/11 7:53 AM**										
6	Shell OD (in.)	**6.625**	Length (in.)	**54.00**	Type	**BEUH**	hor/vert	**Hor**	Connected in	**1**	parallel **1**	series
7	Surf/unit(eff.)	**24.13**	ft2	Shells/unit	**1**			Surf/shell (eff.)	**24.13**			ft2

PERFORMANCE OF ONE UNIT

			Shell Side		Tube Side	
8	Fluid allocation		**Shell Side**		**Tube Side**	
9	Fluid name		**Hot Water**		**Process Water**	
10	Fluid quantity, Total	lb/h	**100 gpm**		**100 gpm**	
11	Vapor (In/Out)	lb/h				
12	Liquid	lb/h	**48689.00**	**48689.00**	**49641.00**	**49641.00**
13	Noncondensable	lb/h				
14						
15	Temperature (In/Out)	F	**180.00**	**169.84**	**130.00**	**140.00**
16	Dew / Bubble point	F				
17	Density (Vap / Liq)	lb/ft3	/ **60.58**	/ **60.799**	/ **61.55**	/ **61.38**
18	Viscosity	cp	/ **0.345**	/ **0.37**	/ **0.508**	/ **0.466**
19	Molecular wt, Vap					
20	Molecular wt, NC					
21	Specific heat	BTU/(lb*F)	/ **1.003**	/ **1.002**	/ **0.999**	/ **1**
22	Thermal conductivity	BTU/(ft*h*F)	/ **0.386**	/ **0.384**	/ **0.373**	/ **0.376**
23	Latent heat	BTU/lb	**0.00**	**0.00**	**0.00**	**0.00**
24	Pressure	psi				
25	Velocity	ft/s	**5.00**		**8.35**	
26	Pressure drop, allow./calc.	psi	**0.00**	**4.42**	**0.00**	**3.85**
27	Fouling resist. (min)	ft2*h*F/BTU	**0.0005**		**0.0000**	

28	Heat exchanged	**496145**	BTU/h	MTD corrected	**39.4** F
29	Transfer rate, Service		Calculated **539.46**	Clean	**738.72** BTU/(h*ft2*F)

CONSTRUCTION OF ONE SHELL

30			Shell Side		Tube Side	
31	Design/Test pressure	psig	**150**	**Code**	**150**	**Code**
32	Design temperature	F	**375**		**375**	
33	Number passes per shell		**1**		**2**	
34	Corrosion allowance	in				
35	Connections	In	**2.50 " NPT 3000#**		**2.50 " Sanitary Ferrule**	
36	Size/rating	Out	**2.50 " NPT 3000#**		**2.50 " Sanitary Ferrule**	
37	in	Intermediate	**1.00 " NPT 3000#**			

38	Tube No.	**16 U**	OD	**0.625**	Tkns - Avg	**0.035** in	Length	**4.5** ft	Pitch **0.78125** in
39	Tube type	**Plain Welded**				Material	**SS304L**		Tube pattern **30**
40	Shell	**SS304L**		ID (in.) **6.407**		OD (in.)	**6.625**	Shell cover	
41	Channel or bonnet		**SS304L**		**Hogged Integral**			Channel cover	
42	Tubesheet-stationary		**SS304L**					Tubesheet-floating	
43	Floating head cover							Impingement protection	**Off Bundle**
44	Baffle-crossing	**10**	**SS304**	Type	**Single Segmental**	Cut(%d)	**37 Horz**	Spacing: c/c	**4.000** in
45	Baffle-long					Seal type			Inlet in
46	Supports-tube					U-bend		Type	
47	Bypass seal					Tube-tubesheet joint			**Grooved & Expanded**
48	Expansion joint					Type			
49	RhoV2-Inlet nozzle		**2598.43**	Bundle entrance		**1912.60**		Bundle exit	**386.68**
50	Gaskets - Shell side		**EPDM O-Ring**			Tube Side	**EPDM O-Ring**		
51	Floating head								
52	Code requirements		**ASME Section VIII Div. 1**					TEMA class	**C - General Service**
53	Weight/Shell	**329.63**		Filled with water	**419.09**			Bundle	**47.23** lb

54 Remarks

Unit designed by: Bobbi Dassow - 715-748-5888 (ext. 224) - bobbi@enerquip.com
Product contact surfaces shall meet 32 Ra µinch finish requirements.
Unit to heat 150 gal of water @ 100 gpm from 55°F to 140°F in 9 minutes using 100 gpm of 180°F water
1177482 BTU/h required in the intial condition. Final condition shown.

Mean metal temperatures

Shell side **175.27** °F Tube side **148.15** °F

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Heat Exchanger Specification Sheet

1	Customer Name:	**Sanimatic**						Proposal No.:	**31812C**			
2	Location:	**Madison, WI**						Your Reference:				
3	Service of Unit:	**Process Water Heater**										
4	Item No.:	**624O25C10C-30425T2**										
5	Date:	**5/5/11 8:08 AM**										
6	Shell OD (in.)	**6.625**	Length (in.)	**24.00**	Type	**BEUB**	hor/vert	**Hor**	Connected in	**1**	parallel **1**	series
7	Surf/unit(eff.)	**11.04**	ft2	Shells/unit	**1**			Surf/shell (eff.)	**11.04**			ft2

PERFORMANCE OF ONE UNIT

			Shell Side		Tube Side	
8	Fluid allocation		**Shell Side**		**Tube Side**	
9	Fluid name		**Steam**		**Process Water**	
10	Fluid quantity, Total	lb/h	**676.98**		**100 gpm**	
11	Vapor (In/Out)	lb/h	**676.98**	**0.00**		
12	Liquid	lb/h	**0.00**	**676.98**	**49641.00**	**49641.00**
13	Noncondensable	lb/h				
14						
15	Temperature (In/Out)	F	**239.34**	**239.20**	**127.00**	**140.00**
16	Dew / Bubble point	F				
17	Density (Vap / Liq)	lb/ft3	**0.061 / 59.115**	**0.060 / 59.118**	**/ 61.6**	**/ 61.38**
18	Viscosity	cp	**0.013 / 0.242**	**0.013 / 0.243**	**/ 0.522**	**/ 0.466**
19	Molecular wt, Vap					
20	Molecular wt, NC					
21	Specific heat	BTU/(lb*F)	**0.513 / 1.013**	**0.513 / 1.013**	**/ 0.999**	**/ 1**
22	Thermal conductivity	BTU/(ft*h*F)	**0.015 / 0.395**	**0.015 / 0.395**	**/ 0.372**	**/ 0.376**
23	Latent heat	BTU/lb	**952.53**	**952.62**	**0.00**	**0.00**
24	Pressure	psi	**10 psig**			
25	Velocity	ft/s	**9.08**		**8.34**	
26	Pressure drop, allow./calc.	psi	**0.00**	**0.06**	**0.00**	**2.87**
27	Fouling resist. (min)	ft2*h*F/BTU	**0.0005**		**0.0000**	

28	Heat exchanged	**644945**	BTU/h	MTD corrected	**105.6**	F
29	Transfer rate, Service		Calculated **581.21**	Clean	**819.31**	BTU/(h*ft2*F)

CONSTRUCTION OF ONE SHELL

			Shell Side		Tube Side	
30						
31	Design/Test pressure	psig	**150**	**Code**	**150**	**Code**
32	Design temperature	F	**375**		**375**	
33	Number passes per shell		**1**		**2**	
34	Corrosion allowance	in				
35	Connections	In	**2.50 " NPT 3000#**		**2.50 " Sanitary Ferrule**	
36	Size/rating	Out	**1.00 " NPT 3000#**		**2.50 " Sanitary Ferrule**	
37	in	Intermediate	**1.00 " NPT 3000#**			

38	Tube No.	**16 U**	OD	**0.625**	Tkns - Avg	**0.035** in	Length	**2.0** ft	Pitch **0.78125** in
39	Tube type	**Plain Welded**			Material	**SS304L**			Tube pattern **60**
40	Shell	**SS304L**	ID (in.)	**6.407**	OD (in.)	**6.625**	Shell cover		
41	Channel or bonnet	**SS304L**			**Hogged Integral**		Channel cover		
42	Tubesheet-stationary	**SS304L**					Tubesheet-floating		
43	Floating head cover						Impingement protection	**Off Bundle**	
44	Baffle-crossing	**2**	**SS304**	Type	**Single Segmental**	Cut(%d) **37**	**Vert**	Spacing: c/c	**9.500** in
45	Baffle-long				Seal type			Inlet	in
46	Supports-tube				U-bend		Type		
47	Bypass seal				Tube-tubesheet joint		**Grooved & Expanded**		
48	Expansion joint				Type				
49	RhoV2-Inlet nozzle	**501.95**	Bundle entrance	**361.00**			Bundle exit	**0.34**	
50	Gaskets - Shell side	**EPDM O-Ring**			Tube Side	**EPDM O-Ring**			
51	Floating head								
52	Code requirements	**ASME Section VIII Div. 1**					TEMA class	**C - General Service**	
53	Weight/Shell	**240.60**	Filled with water	**296.83**			Bundle	**22.99**	lb

54 Remarks

Unit designed by: Bobbi Dassow - 715-748-5888 (ext. 224) - bobbi@enerquip.com
Product contact surfaces shall meet 32 Ra µinch finish requirements.
Unit to heat 150 gal of water @ 100 gpm from 55°F to 140°F in 8 minutes using 10 psig steam.
1043 lbs/hr of steam required in the intial condition. Final condition shown.

Mean metal temperatures

Shell side	**239.22** °F	Tube side	**173.20** °F	1
				2
				3
				4
				5
				6