Fulton®

Thermal Fluid Heaters

Vertical, Horizontal and Electric

75,000 - 14,000,000 BTU/HR

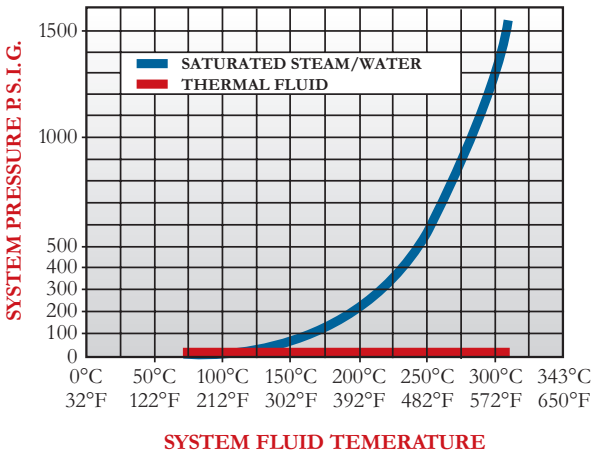
a few of the

FEATURES

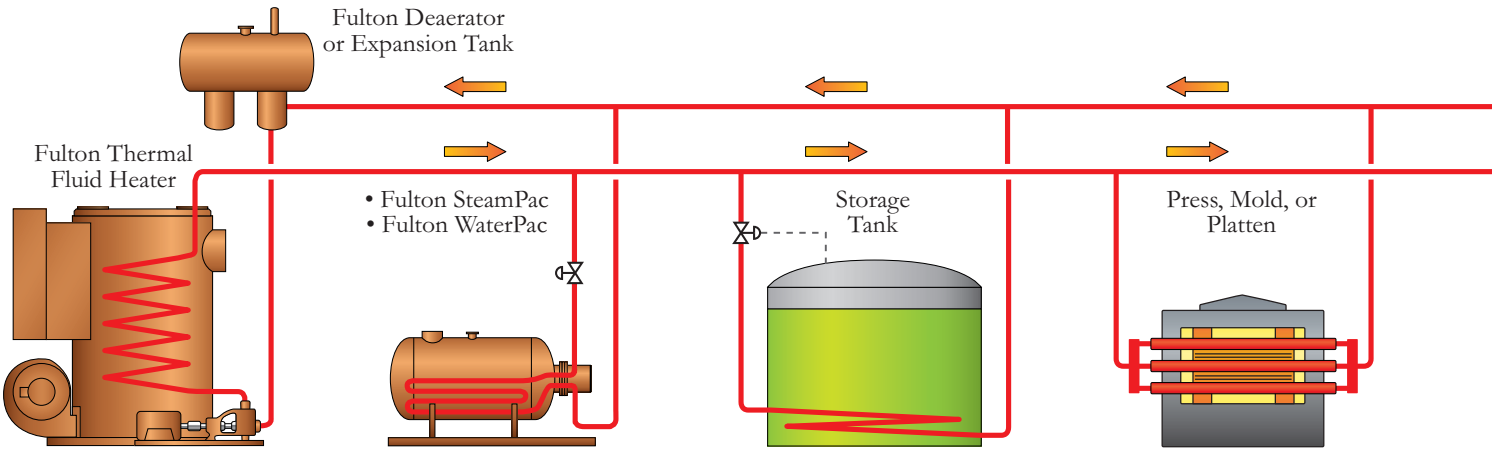
- No corrosion or freezing
- High operating temperatures (up to 750°F) with low system pressure
- Minimum maintenance – burner, pump and controls
- Simple circuit, no blow-downs, steam traps or condensate return systems
- Fulton's combination expansion/ deaerator/thermal buffer tank provides pipework simplification, protection of thermal fluid from oxidation and continuous deaeration of fluid avoiding pump cavitation
- Heaters are built and tested to ASME Code Section I or ASME Code Section VIII Div. I
- Fulton heaters are manufactured individually for maximum flexibility and to customer specifications
- Fulton heaters and accessory components (pumps, expansion tanks, control valves, etc.) can be skid mounted to save time and on site fabrication

Thermal Fluid vs. Steam

A thermal fluid (hot oil) system operates in a closed loop circulation system with minimal pressure. Fulton thermal fluid systems can reach 750°F (345°C) making them an ideal choice for many process heat applications.



The choice between a steam system or a thermal fluid system is governed by the process requirements. The range or process temperature is a deciding factor. If the system's required temperature is above the freezing point of water (32°F) and below approximately 350°F, the choice is usually steam. However, if the required temperature is below 32°F or above 350°F, thermal fluid may be a better solution.

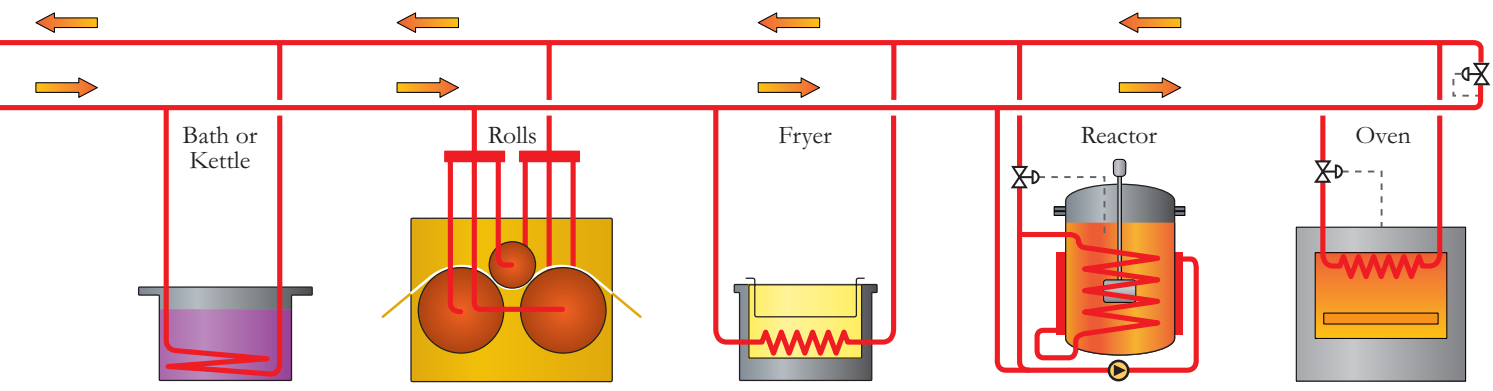


a wide range of

APPLICATIONS

Fulton heaters are used in a variety of applications throughout many industries. Food, plastic and chemical processing as well as pharmaceutical and bio-fuel production are only a few of the many existing applications using Fulton.

- Adhesives
- Asphalt
- Autoclaves
- Bio-fuel
- Chemical reactors
- Deoderization
- Distillation
- Food processing (frying, baking, etc.)
- Inks & Dyes
- Laminating
- Laundry
- Marine heating and shipboard services
- Metal finishing
- Mining
- Ovens
- Paint and varnish manufacture
- Paper converting machinery
- Plastics
- Printing and packaging machinery
- Surface pretreatment and finishing
- Tank farms/pipe and pump tracing
- Textile machinery
- Unfired steam or hot water generation
- Uranium processing
- Waste treatment/dryers



features of the C-Model

Vertical Coil Design

- Vertical 4-pass design
- Preheated combustion air is an integral part of the design
- Built and tested in accordance with ASME Code Section I or ASME Code Section VIII Div. I
- 800,000 BTU/hr to 14,000,000 BTU/hr output
- Operating temperatures to 750°F
- Gas, oil or dual fuel burners; on/off or modulating
- Low emissions natural gas burners are available
- Minimal refractory results in low thermal inertia and prevents overheating of the fluid in the event of a pump or power failure
- High efficiencies
- Even heating
- Customized controls available

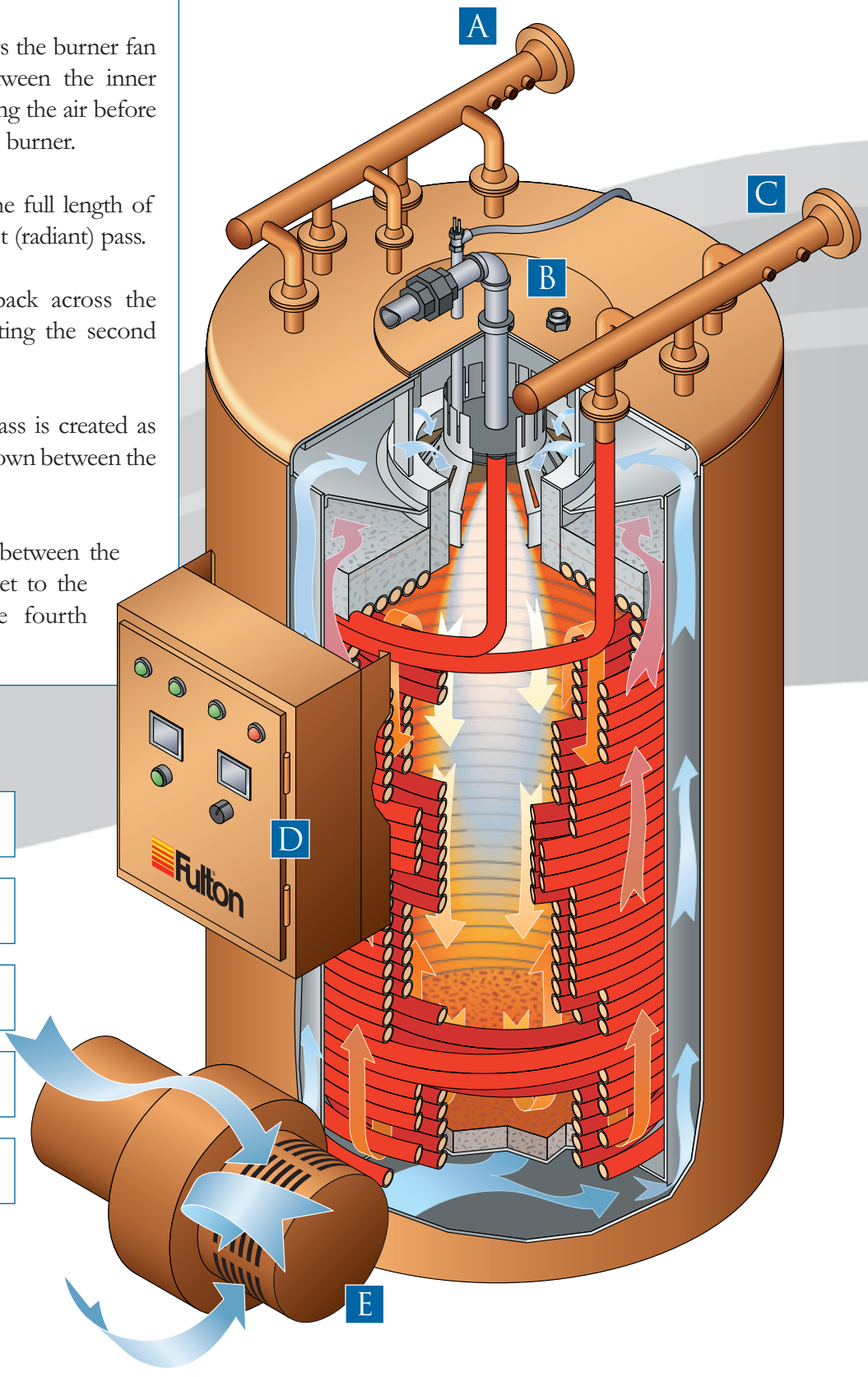
The FT-0600-C shown below supplies 600°F thermal fluid for a food processing application. The skid includes modulating valves to control fluid flow and a bypass valve to maintain flow throughout the heater at all times.

take a look

INSIDE

Operating Principle

- The combustion air enters the burner fan inlet, travels upward between the inner and outer jacket, preheating the air before it enters the top mounted burner.
- Hot gases travel down the full length of the vessel creating the first (radiant) pass.
- The gases then travel back across the inner row of coils, creating the second (convection) pass.
- The third (convection) pass is created as the gases continue back down between the inner and outer coil.
- The last pass is upward between the outer coil and inner jacket to the flue outlet, creating the fourth (convection) pass.



A	Thermal fluid inlet
B	Top mounted burner
C	Thermal fluid outlet
D	Electrical control panel
E	Combustion fan

technical

DETAILS (C-MODEL)

SPECIFICATIONS

MODELS	FT-C	0080	0120	0160	0240	0320	0400	0600	0800	1000	1200	1400
Heat Output	**1000 BTU/HR**	800	1,200	1,600	2,400	3,200	4,000	6,000	8,000	10,000	12,000	14,000
	1000 KCAL/HR	200	300	400	600	800	1000	1500	2000	2500	3000	3500
Thermal Fluid Content	**GAL**	10	21	19	31	68	76	132	171	290	383	460
	LITERS	38	80	72	116	258	288	500	648	1097	1450	1741
Recommended Flow Rate	**GPM**	50	75	100	150	250	250	375	500	615	730	800
	M^3/HR	11.4	17	22.7	34	56.8	56.8	85.2	113	139	167	182

APPROXIMATE FUEL USAGE

Light Oil *	**GPH**	7.1	10.7	14.3	21.4	28	35.3	53	69.7	87.1	104.5	122
	LPH	27	40.6	54.1	81	108.8	136	201	263.7	329.6	395.5	461.5
Natural Gas *	**FT^3/HR**	998	1,498	1,998	2,999	4,000	4,997	7,498	9,997	12,496	14,998	17,500
	M^3/HR	28.3	42.4	56.5	84.9	113.2	141.5	212.3	283	353.8	424.6	495.5

POWER

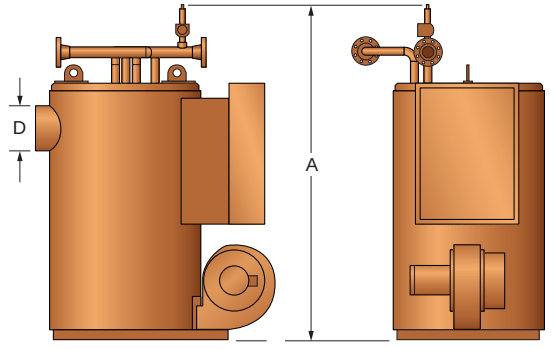
Typical Circulating	**HP**	7.5	10	10	15	20	20	30	40	50	50	60
Pump Motor	**KW**	5.6	7.5	7.5	11.2	14.9	14.9	22.4	29.8	37.3	37.3	45
Typical Burner Motor	**HP**	1.5	3	3	3	7.5	7.5	7.5	15	20	20	25
	KW	1.1	2.2	2.2	2.2	5.6	5.6	5.6	11.2	14.9	14.9	33.3

Voltage 3 Phase for Burner and Pump - Each unit has an incorporated stepdown transformer.
Fuel up to No. 6 Oil Available for Large Units. (FT-0600-C and larger)
Efficiency up to 80% Minimum Based on High Heating Value of the Fuel (No. 2 Oil @ 140,000 BTU/GHHV; Natural Gas @ 1000 BTU/ft^3HHV.
Modulation 3 to 1 Turn Down Ratio. Optional on FT-0080, 0120, and 0160 - Standard on all others.
Circulating pump motor sizes based on standard pressure (55 PSIG) and viscosity 1 cs, specific gravity 0.7, with 25-37 PSID available head for installation.

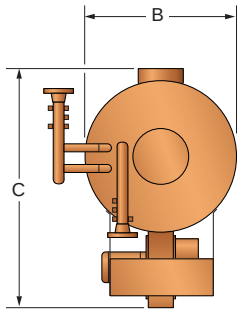
DIMENSIONS

MODELS	FT-C	0080	0120	0160	0240	0320	0400	0600	0800	1000	1200	1400
Heater Inlet/Outlet Connections	**IN**	1.25	1.25	2	2.5	3	3	4	4	6	6	6
	MM	32	32	50	65	80	80	100	100	150	150	150
(A) Overall Height	**IN**	60	76	76	86	101	108	139	139	143.5	144	163
	MM	1,524	1,930	1,930	2,184	2,559	2,793	3,531	3,531	3,645	3,658	4,144
(B) Heater Diameter	**IN**	25	34	34	40	49	49	57	71	90	108	108
	MM	6,35	8,65	8,65	1,015	1,252	1,245	1,450	1,805	2,285	2,745	2,746
(C) Overall Depth	**IN**	41	56	56	62	80	70	79	103	130	148.5	153
	MM	965	1,422	1,422	1,525	2,030	1,780	2,007	2,615	3,302	3,772	3,894
(D) Flue Outlet Diameter	**IN**	10	10	10	12	14	14	18	20	20	22	22
	MM	254	254	254	304	356	356	457	508	508	558	558
Recommended Vertical	**IN**	10	12	12	14	18	18	22	24	24	26	26
Stack Diameter	**MM**	254	304	304	356	457	457	558	609	609	661	661
Approx. Dry Weight	**LB**	1,500	2,100	2,550	3,400	5,300	5,300	8,250	11,450	19,250	21,700	23,000
	KG	680	953	1,150	1,550	2,400	2,400	3,750	5,200	8,750	9,850	10,455

* Please consult factory for additional fuel options.
Specifications and Dimensions are approximate. Consult factory for model specific electrical requirements.
We reserve the right to change specifications and/or dimensions without notice.
Operating specifications may change based on field conditions.



Top View Models FT-0080-C through FT-0400-C



Top View Models FT-0600-C through FT-1400-C Front & Side Views Not Shown

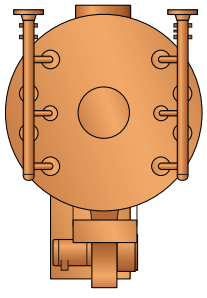
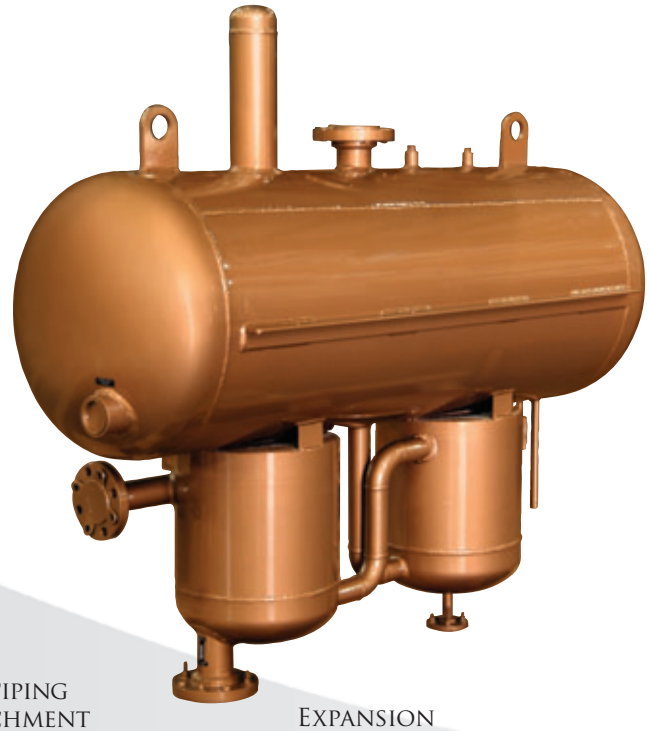


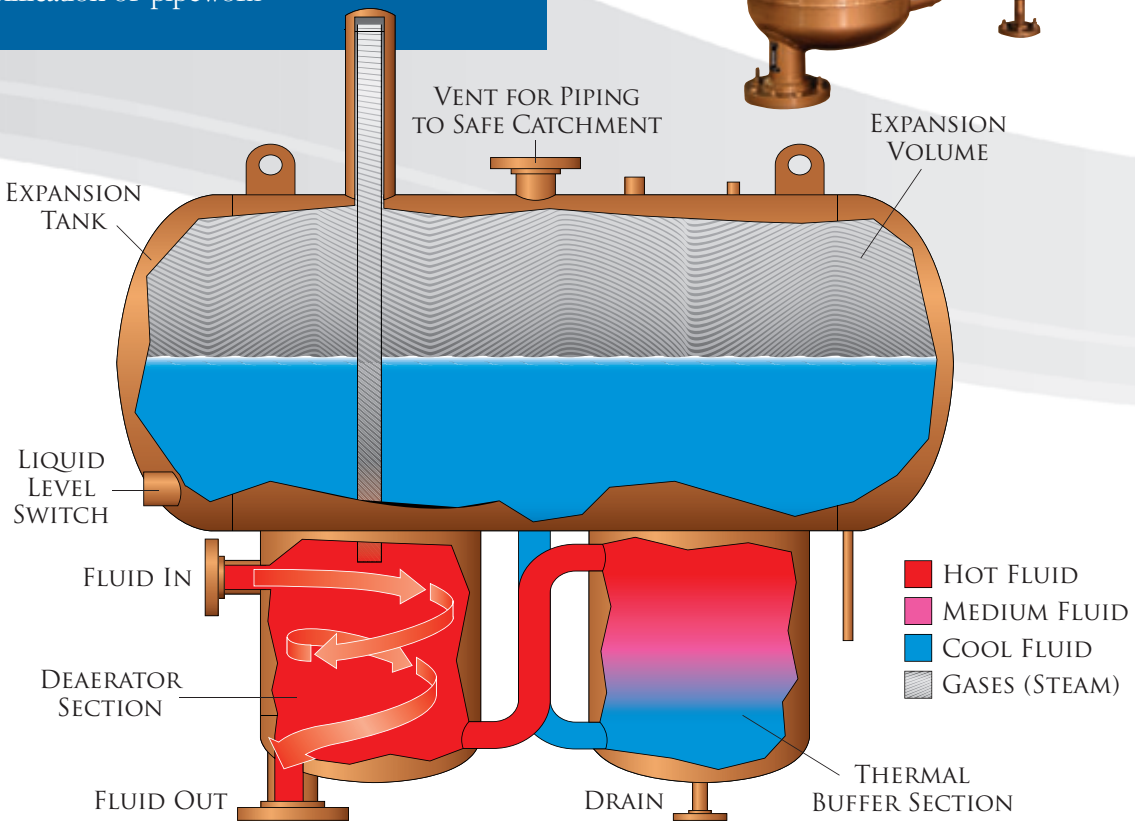
Diagram for guidance purposes only. Comprehensive details of dimensions, connections, etc. for each model are given on product dimension data sheets available from Fulton.

features of the

Combination Expansion/Deaerator / Thermal Buffer Tank

- Designed to work as an open system where applicable, eliminating the expense of an inert gas blanket
- Continuous deaeration of steam and other non-condensibles
- Protects fluid from oxidation
- Ease of installation
- Simplification of pipework





Tank Sizing and Capacities

Models	FT-L	200	500	1000	1500	2000	3000	5000
Capacity	**Gallons**	52	132	264	397	528	793	1,310
Initial Fill	**Gallons**	25	40	80	90	145	215	300
Available for Expansion	**Gallons**	46	121	232	380	444	717	1,168
Max System Volume	**Gallons**	184	525	1,000	1,400	1,700	2,600	4,600
Dry Weight	**LBS**	636	970	1,350	1,710	2,550	3,200	5,300
	KG	289	440	612	776	1,134	1,451	1,637

features of the A-Model

VERTICAL TUBELESS DESIGN

- Vertical annular design
- Built and tested in accordance with ASME Code Section I or ASME Code Section VIII Div. I
- 200,000 BTU/hr to 1,736,000 BTU/hr output
- Operating temperatures to 600°F
- Gas or oil fired burners on/off or modulating
- Low emissions gas burners are available
- Customized controls available

Pictured below is a skid mounted FT-0690-A with deaerator tank and two secondary loops for automatic heating and cooling of reactors.

SPECIFICATIONS

MODELS	FT-A	0200	0380	0520	0690	1050	1740
Heat Output	**1000 BTU/HR**	207	348	519	693	1,052	1,736
	1000 KCAL/HR	52	88	131	175	265	437
Thermal Fluid Content	**GAL**	23	38	45	65	98	117
	LITERS	87	144	170	246	371	443
Recommended Flow Rate	**GPM**	90	90	125	125	150	200
	M3/HR	21	21	28	28	34	46
APPROXIMATE FUEL USAGE							
Light Oil	**GPH**	2.2	3.2	4.7	6.7	9.4	15.8
	LPH	8.3	11.9	17.8	25.4	35.6	60
Natural Gas	**FT^3/HR**	259	435	649	866	1,315	2,170
	M^3/HR	7.2	12.2	18.4	24.2	36.8	60.8
POWER							
Typical Circulating Pump Motor	**HP**	10	10	15	15	15	20
	KW	7.5	7.5	11.2	11.2	11.2	14.9
Typical Burner Motor	**HP**	.33	.33	.33	.75	.75	1.5
	KW	.248	.248	.248	.56	.56	1.1

Consult factory for model specific electrical requirements.

technical

DETAILS

DIMENSIONS

MODELS	FT-A	0200	0380	0520	0690	1050	1740
Heater Inlet/Outlet Connections	IN	1.5	1.5	2	2	2	2.5
	MM	38	38	51	51	51	64
(A) Overall Height	IN	69	75	85	86	86	110
	MM	1,752	1,905	2,159	2,185	2,185	2,794
(B) Heater Diameter	IN	26	28	30	36	44	44
	MM	660	710	760	915	1,120	1,120
(C) Overall Depth	IN	43	45.5	46	56	64	64
	MM	1,092	1,156	1,168	1,422	1,626	1,626
(D) Flue Outlet Diameter	IN	6	6	8	10	12	12
	MM	152	152	203	254	305	305
Approx. Dry Weight	LB	1,850	2,100	2,300	3,400	4,400	7,200
	KG	840	955	1,045	1,540	1,995	3,275

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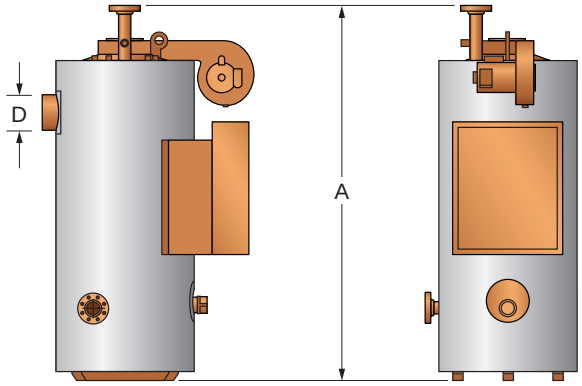
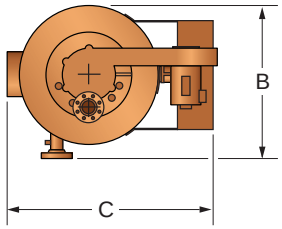
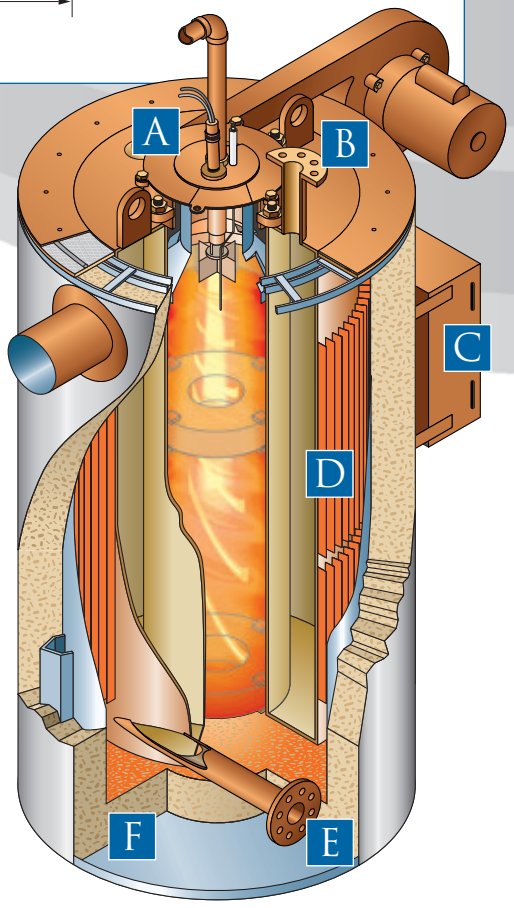




OPERATING PRINCIPLE

The top-mounted down fired burner delivers a spinning flame down the length of the furnace. As the flame swirls downward in a controlled flow pattern the fluid spirals upward in the pressure vessel. Hot gases from the flame are carried up the outside of the vessel in the secondary flue passage convection area. Convection fins welded along the full length of the vessel transmit the remaining heat through the outer side of the fluid vessel and into the fluid. The result is even heating of thermal fluids for optimum thermal efficiency.

- A — Top mounted burner
- B — Heater outlet
- C — Electrical control panel
- D — Convection fins
- E — Heater inlet
- F — High density, high temperature insulation

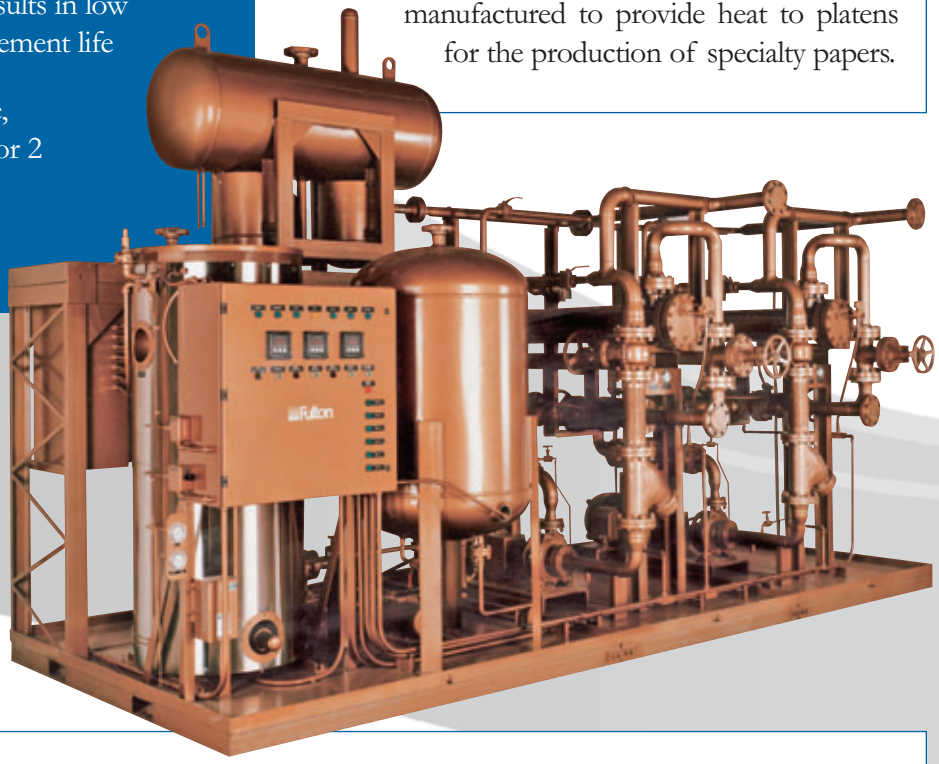


features of the N-Model

VERTICAL ELECTRIC DESIGN

- Compact vertical design
- Built and tested in accordance with ASME Code Section I or ASME Code Section VIII Div. I
- 75,000 BTU/hr to 1,719,000 BTU/hr output
- Operating temperatures to 650°F
- Low watt density elements results in low film temperatures and long element life
- Customized controls available, including Class 1, Division 1 or 2 groups C&D of NEC code
- Customized heaters available

FT-0640-N skid mounted with one main circulation pump, one FT-500-L expansion deaerator tank, one 200 gallon holding tank with drain/fill pump and two secondary loops. Each secondary loop consists of one circulation pump, one cooling heat exchanger and one automatic 3-way valve. This system was manufactured to provide heat to platens for the production of specialty papers.



SPECIFICATIONS

MODELS	FT-N	0075	0150	0225	0300	0375	0430	0640	0860	1070	1290	1500	1720
	KW	22	44	66	88	110	126	189	252	315	378	441	504
Heat Input	1000 BTU/HR	75	150	225	300	375	429	644	859	1,074	1,289	1,504	1,719
	1000 KCAL/HR	18.9	37.8	56.7	75.6	94.5	108	162	216	271	325	379	433
Heat Output	1000 BTU/HR	74	148	222	294	368	420	631	842	1,053	1,263	1,474	1,685
	1000 KCAL/HR	18.6	37.3	59.9	74.1	92.7	105.8	159	212.2	265.4	318.3	371.4	424.6
Thermal Fluid Content	GAL	18	36	42	54	63	79	79	102	127	152	168	185
	LITERS	68	136	159	204	238	299	299	386	480	575	636	700
Recommended	GPM	50	50	50	90	90	125	125	150	150	175	200	200
Flow Rate	M3/HR	11.4	11.4	11.4	20.5	20.5	28.4	28.4	34	34	39.8	45.5	45.5
POWER													
Typical Circulating	HP	7.5	7.5	7.5	10	10	15	15	15	15	15	20	20
Pump Motor	KW	5.6	5.6	5.6	7.5	7.5	11.2	11.2	11.2	11.2	11.2	14.9	14.9
Amps	208V	61	122	183	245	306	350	525	700	875	1,050	1,224	1,399
	208V	53	106	159	212	265	303	455	607	758	910	1,061	1,212
	480V	26	53	79	106	132	151	228	303	379	455	531	606

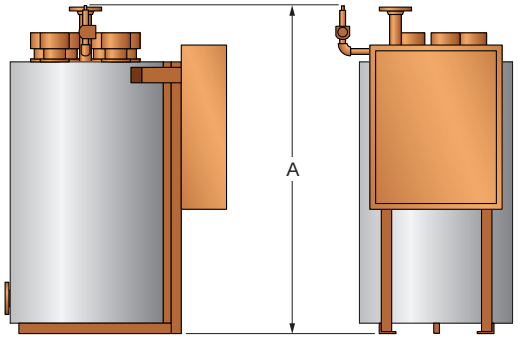
Consult factory for model specific electrical requirements.

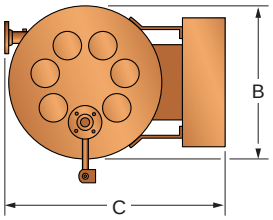
take a look

INSIDE

DIMENSIONS

MODELS	FT-N	0075	0150	0225	0300	0375	0430	0640	0860	1070	1290	1500	1720
Heater Inlet	**IN**	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2.5	2.5
	MM	38	38	38	38	38	51	51	51	51	51	64	64
(A) Overall Height	**IN**	70	70	70.5	70	70	90.5	90.4	90.8	89.8	91.2	93	93
	MM	1,778	1,778	1,791	1,778	1,778	2,299	2,296	2,306	2,281	2,317	2,362	2,362
(B) Heater Diameter	**IN**	20	26	28	32	32	32	32	38	44	50	54	58
	MM	508	660	711	813	813	813	813	965	1,118	1,270	1,372	1,473
(C) Overall Depth	**IN**	37.5	43	43.5	47.5	47.5	47.5	49.5	53.8	58.4	65.7	71.8	75.7
	MM	953	1,092	1,105	1,207	1,207	1,207	1,257	1,365	1,257	1,669	1,823	1,993
Approx. Dry Weight	**LB**	1,060	1,220	1,400	1,540	1,660	2,040	2,200	2,370	2,650	2,950	2,950	3,600
	KG	481	555	636	700	756	927	1,000	1,077	1,205	1,341	1,341	1,636





Specifications and Dimensions are approximate.
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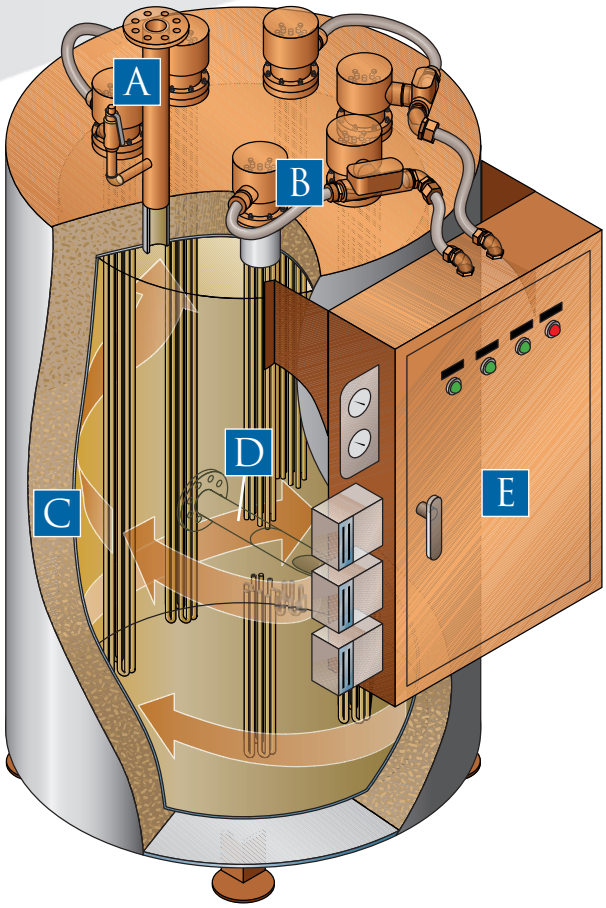
Operating specifications may change based on field conditions.

OPERATING PRINCIPLE

Even circulation of thermal fluid is created within the vessel. This unique circulation method (upward spiraling fluid) results in an even flow of thermal fluid across the multiple low watt density elements, uniformly heating the thermal fluid. This results in low film temperatures and assures long element life.



A	Thermal fluid outlet
B	Top mounted, easily accessible elements
C	High density, high temperature insulation
D	Thermal fluid inlet
E	Electrical control panel

features of the HC-Model

Horizontal Coil Design

- Compact horizontal 3 pass design
- 2,400,000 BTU/hr to 12,000,000 BTU/hr output
- Built and tested in accordance with ASME Code Section I or ASME Code Section VIII Div. I
- Operating temperatures to 650°F
- Modulating gas, oil or dual fuel burners
- Open protocol burner
- Low profile design
- Customized controls available

Shown here is a FT-0600-HC horizontal heater skid mounted with circulation pump and combination expansion/deaerator/thermal buffer tank, designed for barge cargo heating.

Specifications

Models	FT-HC	0240	0400	0600	0800	1000	1200
Heat Output	**1000 BTU/HR**	2,400	4,000	6,000	8,000	10,000	12,000
	1000 KCAL/HR	600	1,000	1,500	2,000	2,500	3,000
Thermal Fluid Content	**GAL**	75	115	190	264	325	508
	LITERS	284	435	719	998	1,230	1,921
Recommended Flow Rate	**GPM**	150	300	400	600	850	1,000
	M3/HR	35	69	91	137	193	227
Approximate Fuel Usage							
Light Oil	**GPH**	23	39	58	77	96	115
	LPH	88	148	220	292	364	436
Natural Gas	**FT^3/HR**	3,200	5,340	8,000	10,700	13,340	16,000
	M^3/HR	91	152	227	304	378	454
Power							
Typical Circulating Pump Motor	**HP**	15	25	30	50	60	75
	KW	11.2	18.7	22.5	37.3	45	56.3
Typical Burner Motor	**HP**	2	5	7.5	10	15	15
	KW	1.5	3.7	5.6	7.5	11.2	11.2

Consult factory for model specific electrical requirements.

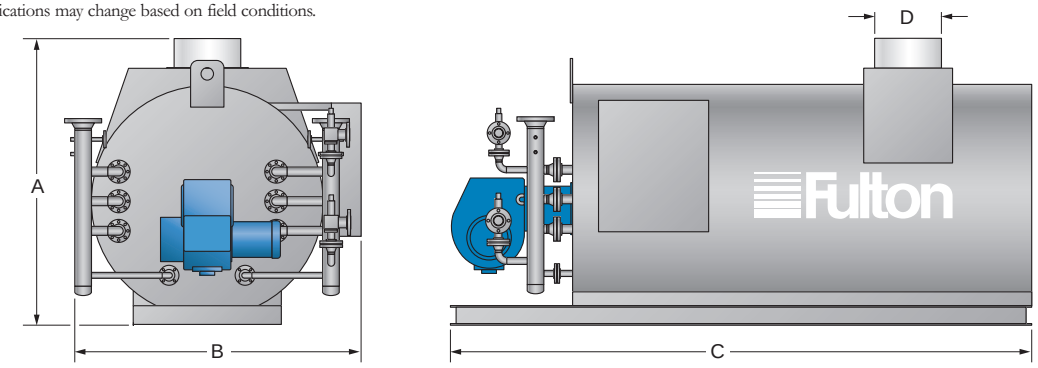
take a look

INSIDE

DIMENSIONS

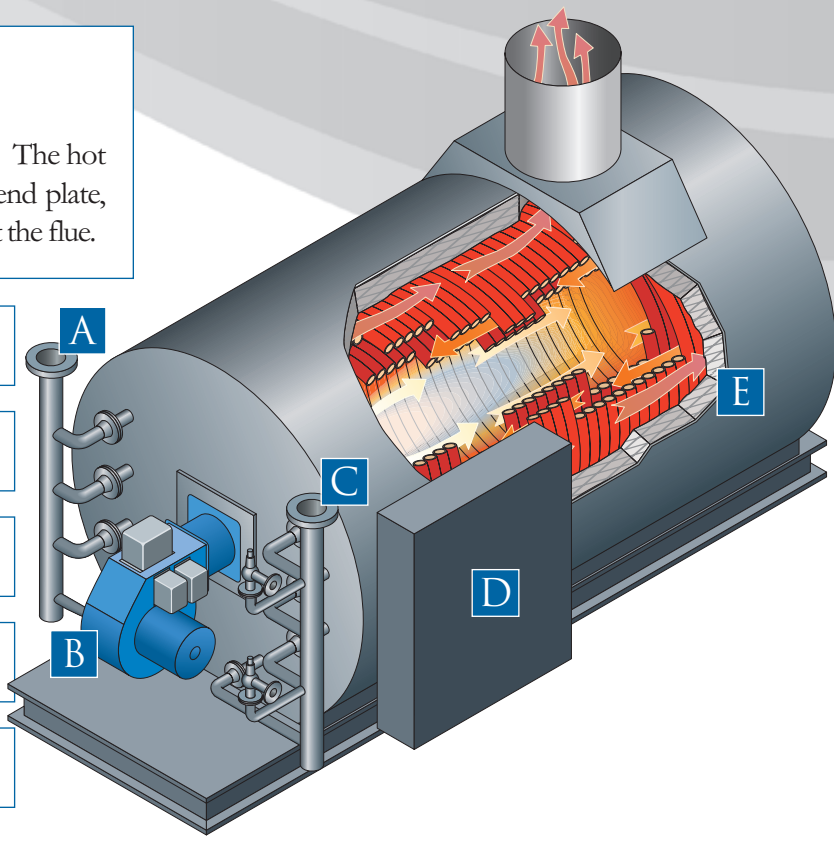
MODELS	FT-HC	0240	0400	0600	0800	1000	1200
Heater Inlet/Outlet Connections	**IN**	2.5	3	4	4	6	6
	MM	65	80	100	100	150	150
(A) Overall Height	**IN**	64	68	78	98	107	125
	MM	1,626	1,727	1,981	2,489	2,718	3,175
(B) Heater Diameter	**IN**	62	62	80	92	107	124
	MM	1,575	1,575	2,032	2,337	2,718	3,150
(C) Overall Depth	**IN**	134	136	157	157	153	170
	MM	3,404	3,455	3,988	3,988	3,886	4,318
(D) Flue Outlet Diameter	**IN**	12	14	18	20	20	22
	MM	305	356	457	508	508	559
Approx. Dry Weight	**LB**	5,000	7,500	9,500	12,500	19,250	21,700
	KG	2,272	3,409	5,455	5,682	8,750	9,864

Specifications and Dimensions are approximate.
We reserve the right to change specifications and/or dimensions without notice.
Operating specifications may change based on field conditions.



OPERATING PRINCIPLE

The burner fires down the center of the coil. The hot gases return between the coils to the front end plate, then flow to the back of the heater, exiting out the flue.



- **A** Thermal fluid inlet
- **B** Burner and air inlet
- **C** Thermal fluid outlet
- **D** Electrical control panel
- **E** High density, high temperature insulation

thermal fluid system

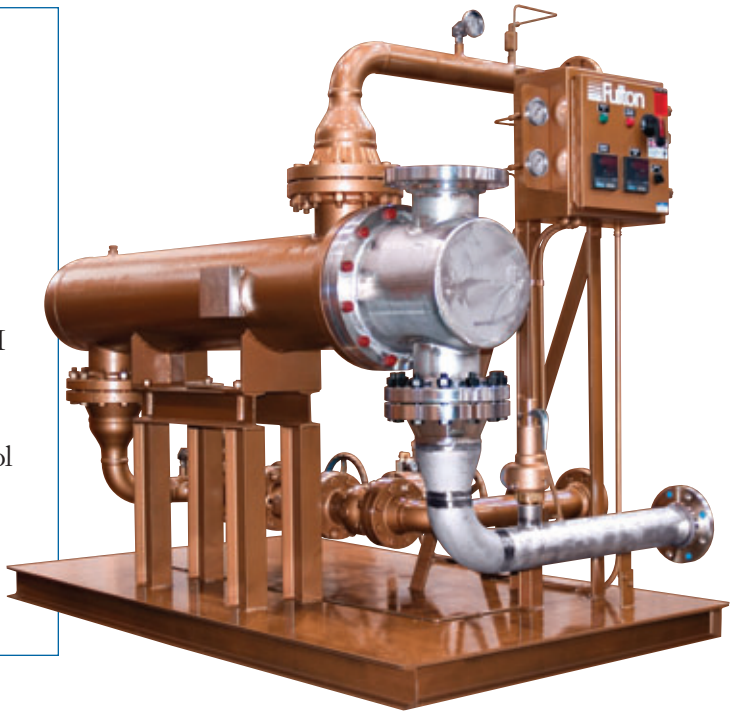
ACCESSORIES

UNFIRED STEAM GENERATORS

- Vertical design 10HP to 100HP
- Horizontal design 70HP to 350 HP (Custom sizes are available)
- Standard designs 15 psig to 150 psig (custom operating pressures are available)
- Built and stamped to ASME Code Section VIII Div. I
- Complete with modulating thermal fluid control valve
- May be skid mounted with blowdown separators, return tanks, deaerator tanks, feedwater pumps, chemical tanks and water softeners

UNFIRED HOT WATER GENERATORS

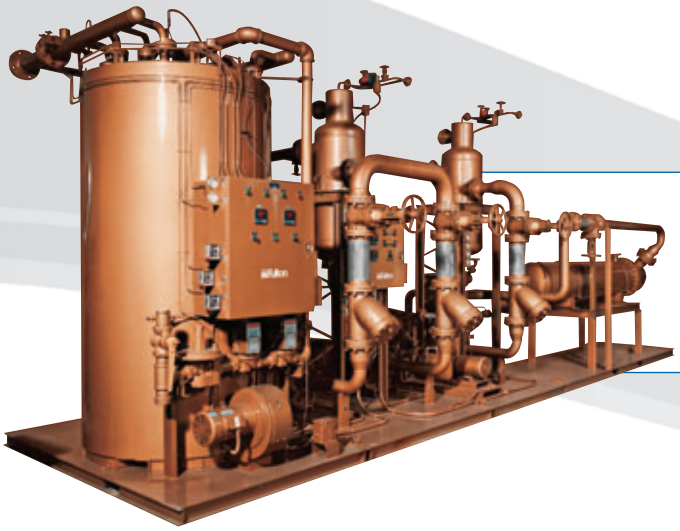
- Custom designs available
- Carbon steel or stainless steel
- Built and stamped to ASME Code Section VIII Div. I
- Complete with modulating thermal fluid control valve
- Instantaneous hot water generation, or can be used with a storage tank



some examples of

CUSTOMIZED SKID SYSTEMS

This system includes two FT-0600-C thermal fluid heaters skid mounted with three circulating pumps (one pump acts as a backup for either heater), and one FT-5000-L expansion tank. These heaters are used to provide process heat for the manufacture of asphalt roofing shingles.



Shown here is a skid mounted FT-0600-C with heating and cooling loops which was manufactured for the printing industry for staggered heating and cooling of ink compounds.

This skid system includes one FT-0240-C thermal fluid heater with a skid mounted circulation pump and FT-500-L expansion tank. The system also includes two specialty heat exchangers. One exchanger uses thermal fluid to heat water, while the other heat exchanger is used to heat ethylene glycol.

The skid system shown here included one FT-0240-C heater, a circulating pump, expansion tank and a temperature control unit (TCU). This system was designed to provide thermal fluid and hot water to several dryers for a wastewater application.

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