

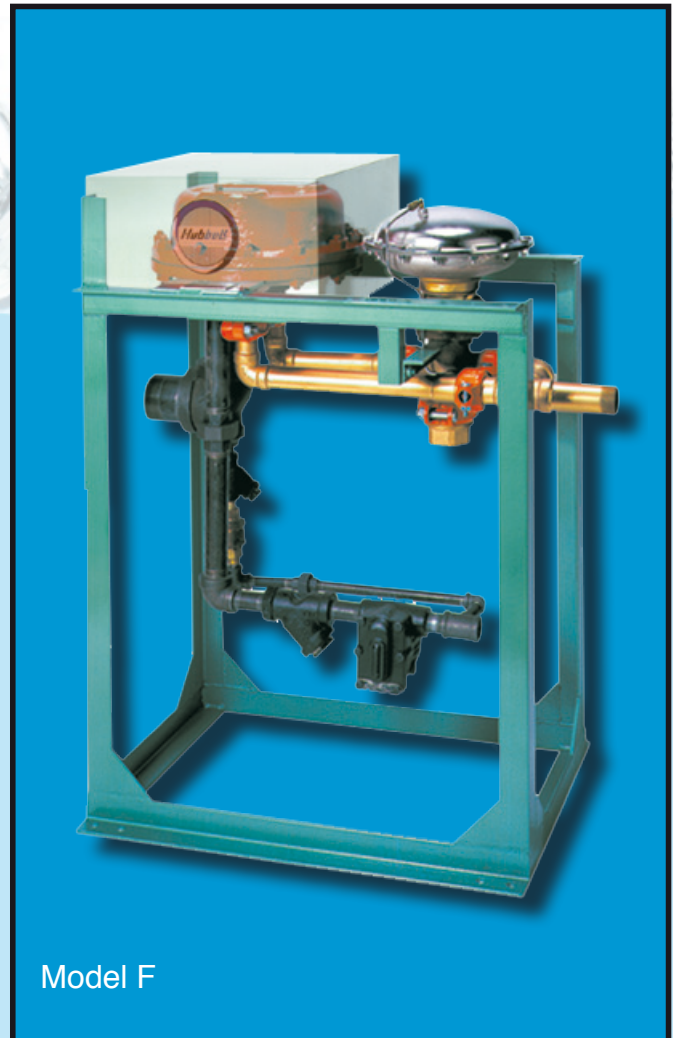
# Instantaneous Steam Fired Water Heater

## Features

- **Compact Design**
  - ✓ On demand water heater eliminates the need for a large storage tank
  - ✓ Advanced design requires only 7 Sq.Ft. of floor space
  - ✓ All steam controls are located within the steel frame
- **Packaged System**
  - ✓ Water heater is factory assembled on an all welded steel mounting frame to save time and money during installation
  - ✓ All steam operating controls are factory selected, sized, and piped
  - ✓ Ready for water and steam service connections
- **Heavy Duty Construction**
  - ✓ Heat exchanger is ASME Section VIII stamped and registered with the National Board
  - ✓ Factory fitted protective shroud covers the heat exchanger for improved safety
- **High Efficiency**
  - ✓ Helical coil design is up to 40% more efficient than traditional "U" tube coils
  - ✓ No standby heat loss
  - ✓ Feed forward blending valve controls hot water to  $\pm 4^{\circ}\text{F}$

## Applications

- Hotels
- Office Buildings
- Hospitals
- Wash Down Systems
- Industrial Facilities
- Laundries
- Schools



Model F

The space saving highly efficient F Model instantaneous steam fired water heater.



## Highly Efficient and Compact Water Heater

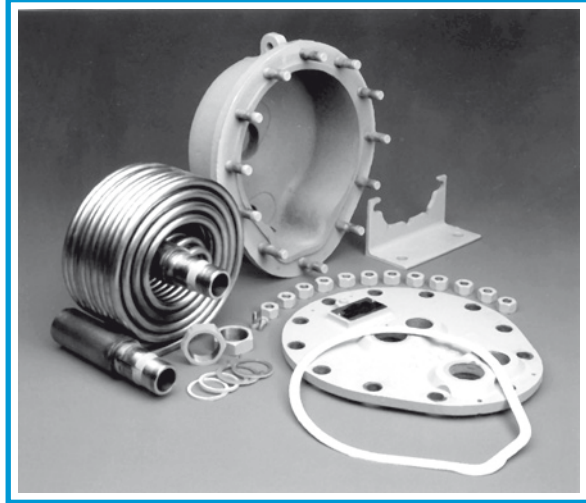
The Hubbell F Model is a compact, highly efficient, packaged instantaneous steam fired water heater perfect for new or replacement water heating requirements. This highly efficient Hubbell heater requires no large storage tank, is easily installed, and requires minimal floor space. Furthermore, the Hubbell F model utilizes a helical coil as

its source for heat transfer and is up to 40% more efficient than traditional "U" tube heaters. When you specify and install a Hubbell steam fired water heater, you will have confidence in knowing the owner will be provided with a long lasting, trouble-free source for hot water.

## Spiral Design Heat Exchanger

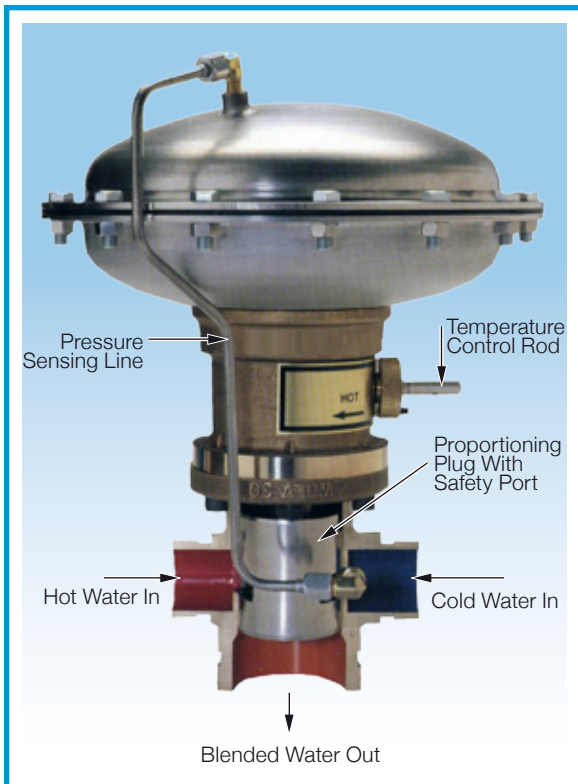
The heart of the Hubbell Instantaneous Steam fired water heater is a compact, highly efficient, and versatile spiral tube heating coil which offers many advantages over a conventional "U" tube design including:

- 100% counterflow for heat-transfer rates up to 40% greater than equivalent straight tube exchangers.
- Pressure drop is minimized.
- Bourdon tube configuration that allows entire assembly to expand and contract without localized stresses. Failure from thermal shock or mechanical process is rare.
- No baffles.
- ASME Section VIII Div. 1 Certification **standard.**
- Variety of materials available to suit specific applications.
- Compact design for easy maintenance.
- Parts in stock to prevent long and expensive down times.



## Blending Valve

The temperature regulating device in a Hubbell Instantaneous Steam water heater is a "feed forward" blending valve designed to assure safe and accurate temperature control of the heated water for an entire range of flow capacities. A purely mechanical operation, the Hubbell blending valve will provide  $\pm 4^\circ\text{F}$  temperature control without the use of thermostatic sensing devices.



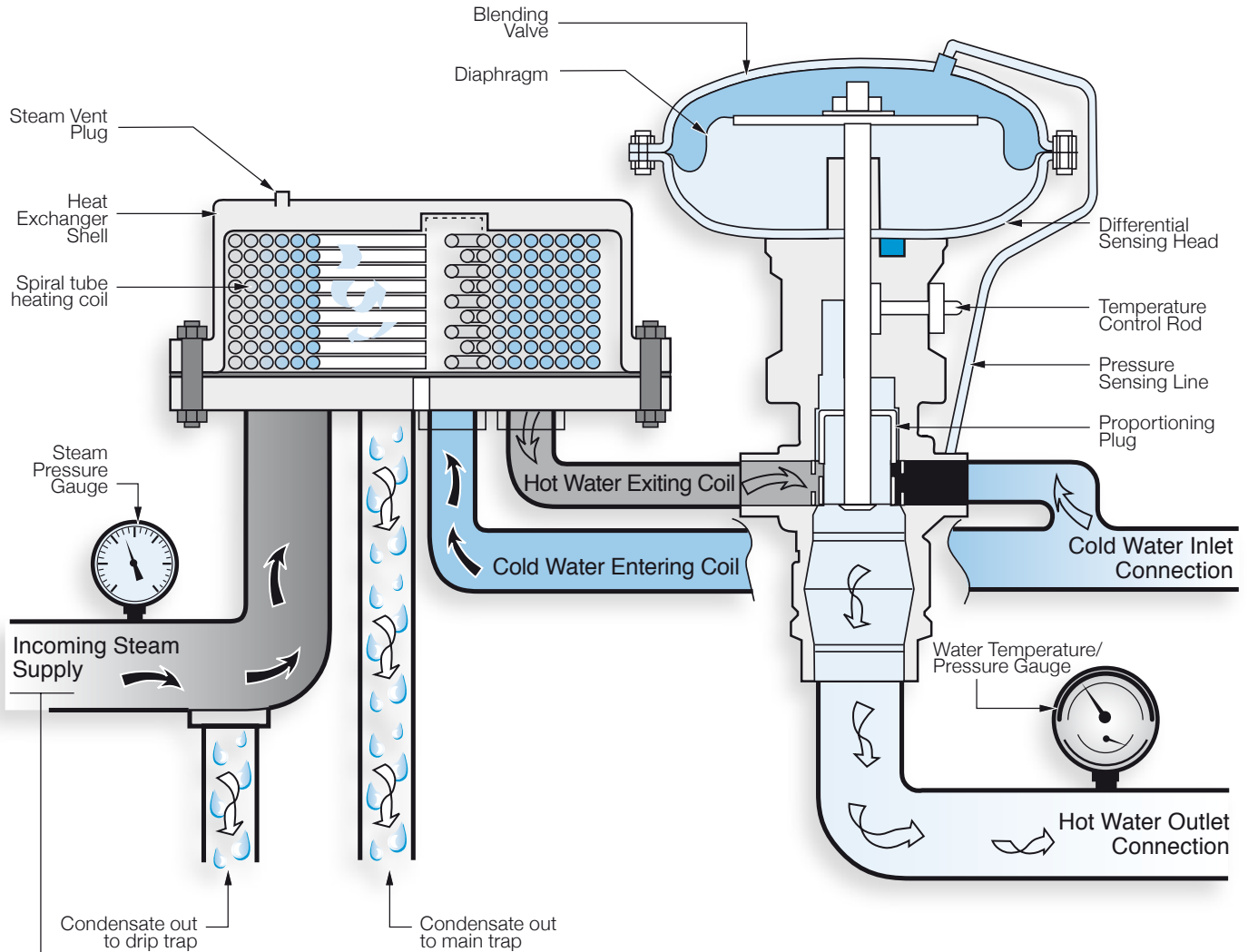
### How the blending valve works:

1. The proportioning valve plug is constructed from Hastelloy C and is regulated by movement of the neoprene diaphragm, induced by pressure differentials in the sensing head.
2. A sensing line "loads" the top portion of the diaphragm with supply line cold water pressure while blended water outlet pressure is being sensed below.
3. Flow demand imparts a pressure imbalance above (+) and below (-) the diaphragm resulting in movement of the diaphragm and proportioning plug.
4. The movement aligns ports in the plug with supply ports in the valve body, introducing the correct proportion of hot and cold water.
5. This action automatically generates blended hot water through all rated flow capacities at the chosen preset temperature ( $\pm 4^\circ\text{F}$ ).

The integral fail-safe system permits stem travel in the event of plug restriction or parts failure, opening an auxiliary cold water port. Cold water flooding yields cooler water, or when parts fail, no water at all.

Temperature is easily adjusted by side-to-side movement of the control rod on the valve body. Stabilization adjustments are made during initial start-up by rotation of the control rod. All settings are locked in with a locking ring and set screw.

# Operational Overview



## Note:

Domestic water heating applications with steam supply pressure greater than 15 psi require a steam pressure reducing valve as well as a separate steam pressure relief valve to be installed in the incoming steam supply line prior to the heat exchanger shell.

Hubbell can supply the pressure reducing valve as an option. Steam pressure relief valve supplied by others.

- 1. Cold water** enters via the inlet piping and branches off to supply both the cold port on the blending valve and the heat exchanger.
- 2. The cold water** passes through the coils in the heat exchanger and is heated by the surrounding steam in the shell.
- 3. Hot water** exits the heat exchanger and enters the hot port on the blending valve.
- 4. The plug assembly** in the blending valve opens the hot and cold ports to provide the precise amount of hot and cold water in order to achieve the desired output temperature water  $\pm 4^{\circ}\text{F}$ .
- 5. The heated water** exits the unit at the base of the blending valve.

## General Configuration

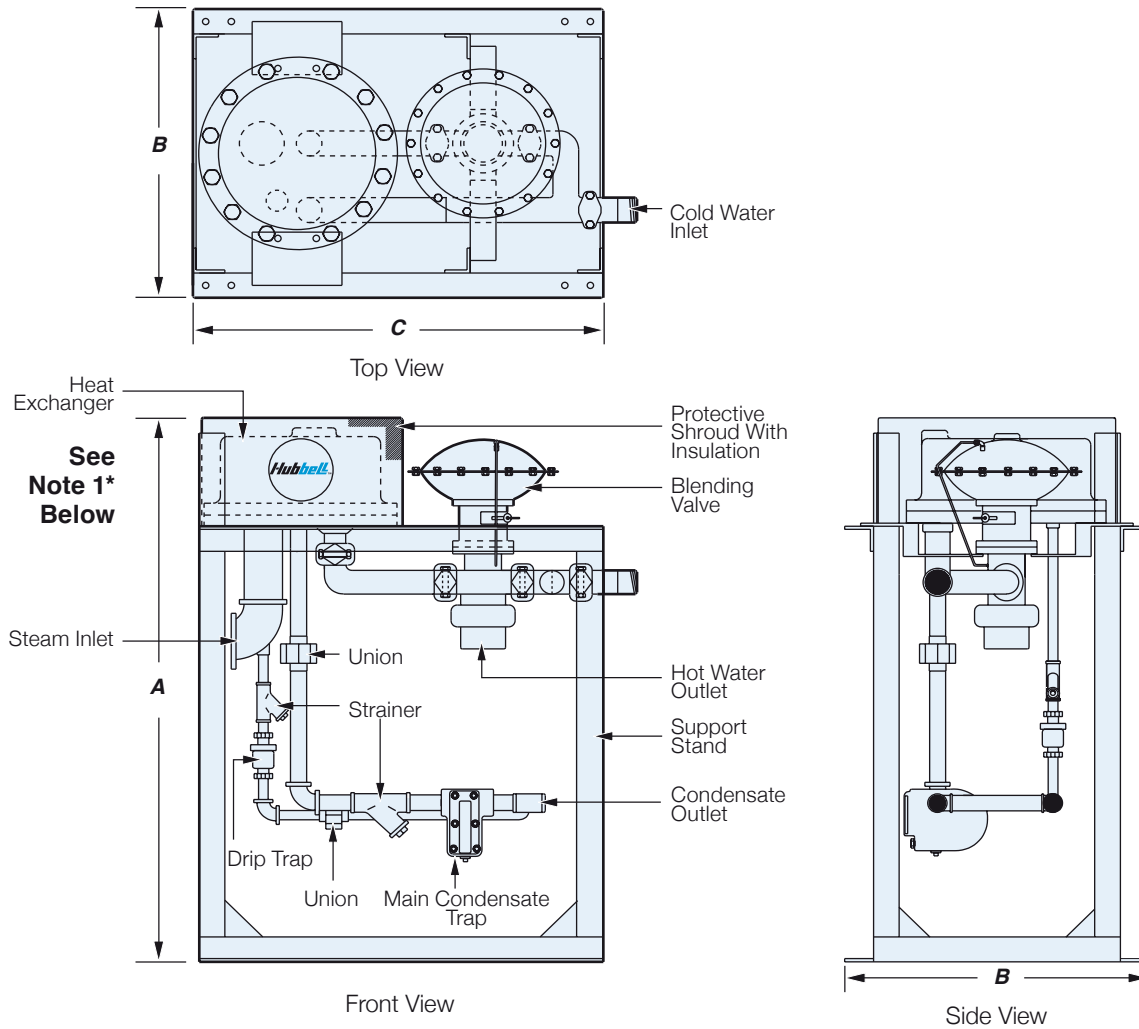
- The factory-supplied, all welded, heavy duty steel stand is high enough to accommodate the condensate piping and traps, therefore no special field-erected stand is required.
- Hubbell is committed to increasing operating efficiencies and improving safety features. Therefore, each water heater is supplied with a factory jacketed and insulated heat exchanger. Without this feature, the heat exchanger (with a surface temperature in excess of 200°F) acts as a radiator and adds to heat loss inefficiencies, and is a severe safety hazard for personnel who may inadvertently come in contact with the surface of the exchanger.
- The Hubbell water heater will fit through most doorways, for simple and time saving installation.
- With only 7 square feet of floor space required for installation, compared to conventional storage water heaters the Hubbell water heater will require significantly less mechanical room space.
- Traps and strainers are factory piped, assembled, and tested to save time and money during installation and start-up.
- Built-in relief valve (water side) set at 165 psi to signal over-pressure condition.



## Model F Water Heater Specifications

<b>Orientation:</b>	Vertical	<b>Steam Pressure Gauge:</b>	30" Hg - 30 psig
<b>Installation:</b>	Floor Mounted	<b>Water Gauge:</b>	70-270°F, 0-200 psi 20-120°C, 0-1400 kPa
<b>Space Requirement:</b>	7 Sq.Ft.	<b>Frame:</b>	Steel Angle Iron
<b>Certification:</b>	ASME Section VIII	<b>Protective Shroud:</b>	20 GA Galvanized Steel
<b>Waterside WP:</b>	160 psi (max)	<b>Insulation:</b>	2 Lb. Density Fiberglass
<b>Shell Material:</b>	Cast Iron	<b>Strainers:</b>	Y Cast Iron 20 MESH Screen
<b>Shell Rating</b>		<b>Warranty (Standard)</b>	
F30 & F60:	75 psi @ 350°F	Shell:	5 year
F90 & F120:	50 psi @ 350°F	Coil:	5 year
<b>Coil Rating</b>		<b>Shipping Weight (Lbs.)</b>	
F30 & F60:	200 psi @ 400°F	F30:	320
F90 & F120:	200 psi @ 400°F	F60:	405
<b>Coil Material:</b>	Copper Tubing SB75	F90:	450
<b>Coil Size</b>		F120:	615
F30/F60/F90:	0.5" O.D. 18 BWG	<b>Piping</b>	
F120:	0.625" O.D. 18 BWG	Water:	Brass
<b>Ideal Water Temperature Operating Range:</b>	105 - 185°F	Steam:	Black Iron
<b>Main Condensate Trap:</b>	F&T Type		
<b>Drip Trap:</b>	Thermostatic Type		

# Outline Dimensions



## Model F Dimensional And Connection Sizing

	F30	F60	F90	F120
Height "A"	45"	49"	66"	67"
Width "B"	26"	26"	26"	26"
Length "C"	39"	39"	39"	39"
Cold Water Inlet (Male NPT)	1 1/2"	2"	2 1/2"	2 1/2"
Hot Water Outlet (Female NPT)	2"	2"	2 1/2"	2 1/2"
Steam Inlet (Female NPT)	3"	3"	4" FLG	4" FLG
Main Condensate (Trap Size)	1"	1"	1 1/4"	1 1/2"
Drip Trap Size	1/2"	1/2"	1/2"	1/2"
Steam Consumption Formula	$\text{GPM} \times 500 \times \Delta T = \text{Lbs./Hr. Steam}$ Latent heat of steam <input type="text"/>			

**Note:**

1. Not to be used as a submittal drawing. Steam component locations change with differing steam pressures.
2. A pressure relief valve is required when steam supply pressure is in excess of heat exchanger rating.

Steam Pressure (psi)	0	2	5	10	15	20	25	30	40	50
Latent Heat	970	966	960	953	946	939	933	929	920	912

# Recovery Rate In GPM

**For domestic water heating applications** optimum performance ( $\pm 4^{\circ}\text{F}$ ) is achieved when the steam pressure in the heat exchanger shell is 15 psi or less. Therefore, if the steam supply pressure is greater than 15 psi a pressure reducing valve is used to reduce the steam pressure in the heat exchanger shell to a maximum of 15 psi.

**For typical process or general applications with less stringent temperature control requirements** ( $\pm 8^{\circ}\text{F}$ ) up to 35 psi steam pressure in the heat exchanger shell may be utilized. If incoming steam supply pressure is greater than 35 psi a pressure reducing valve is used to reduce the steam pressure in the heat exchanger shell to a maximum of 35 psi.

Base Model	°F Temp. In/Out	Steam Supply Pressure (psi)				Steam Supply Pressure (psi)			
		2	5	10	15	20	25	30	35
F30	40-110	29	30	30	30	30	32	35	37
	40-120	27	30	30	30	30	31	33	34
	40-140	20	22	24	27	28	29	30	31
	40-150	17	19	21	23	25	26	28	29
	40-160	10	11	12	14	19	24	26	28
	40-180	9	9	10	12	17	21	23	25
	60-110	30	30	30	30	33	37	40	42
	60-120	30	30	30	30	33	35	38	40
	60-140	23	25	27	30	31	32	34	36
	60-150	20	22	24	27	28	29	32	33
	60-160	10	12	14	16	22	28	30	31
	60-180	8	10	12	14	19	24	26	28
F60		2	5	10	15	20	25	30	35
	40-110	58	60	60	60	62	64	70	72
	40-120	54	60	60	60	62	63	66	68
	40-140	46	54	58	60	60	62	64	67
	40-150	40	49	53	54	58	60	62	65
	40-160	34	41	44	46	50	54	52	56
	40-180	21	23	25	28	40	48	46	50
	60-110	60	60	60	60	72	74	81	85
	60-120	60	60	60	60	70	73	78	83
	60-140	57	59	60	60	68	72	75	81
	60-150	49	54	57	60	65	67	70	76
	60-160	42	49	51	56	63	64	66	70
60-180	29	33	39	44	50	52	54	56	
F90		2	5	10	15	20	25	30	35
	40-110	87	90	90	90	92	94	97	100
	40-120	81	90	90	90	91	92	95	97
	40-140	69	81	87	90	90	91	92	94
	40-150	60	73	79	81	88	90	91	93
	40-160	51	61	66	69	80	82	85	87
	40-180	31	35	38	42	60	62	65	68
	60-110	90	90	90	90	104	106	108	112
	60-120	90	90	90	90	102	104	106	110
	60-140	85	88	90	90	98	100	102	104
	60-150	74	82	85	90	96	98	100	102
	60-160	64	74	77	85	90	91	93	95
60-180	44	50	58	66	78	79	80	81	
F120		2	5	10	15	20	25	30	35
	40-110	116	120	120	120	128	130	133	135
	40-120	108	120	120	120	126	128	130	132
	40-140	92	108	116	120	122	124	126	126
	40-150	82	100	108	112	118	119	120	122
	40-160	70	85	90	94	104	106	108	109
	40-180	43	46	51	56	78	80	82	84
	60-110	120	120	120	120	134	136	138	140
	60-120	120	120	120	120	132	134	136	138
	60-140	116	118	120	120	128	130	132	134
	60-150	100	110	115	120	126	128	101	101
	60-160	87	98	104	115	120	122	101	101
60-180	60	68	78	90	95	97	101	101	

# F Model Optional Equipment

**NOTE:** Other optional features are available, please consult factory if required.

## Heating Coil

- 1.** Double wall tubing with leak detection port (F30 and F60 sizes only).

- 2. Tubing materials:**  
Standard is copper. Optional materials are Admiralty, 90/10 Copper-Nickel, Stainless Steel (Type 304 or 316),  
Other: \_\_\_\_\_

**Note:** Tubing materials other than copper will exhibit lower maximum capacities. To determine actual capacity, multiply the GPM rating on page 6 by the following:

0.95	Admiralty
0.81	90/10 Copper-Nickel
0.81	Stainless Steel

## Steam Shell

- 3. Shell construction:**  
Standard is Cast Iron. Optional materials are Cast Steel, Cast Bronze, 90/10 Copper-Nickel, Stainless Steel (Type 304 or 316),  
Other: \_\_\_\_\_

**Note:** Cast steel shell ratings:

F30	225 psi @ 350°F
F60 & F90	125 psi @ 350°F
F120	100 psi @ 350°F

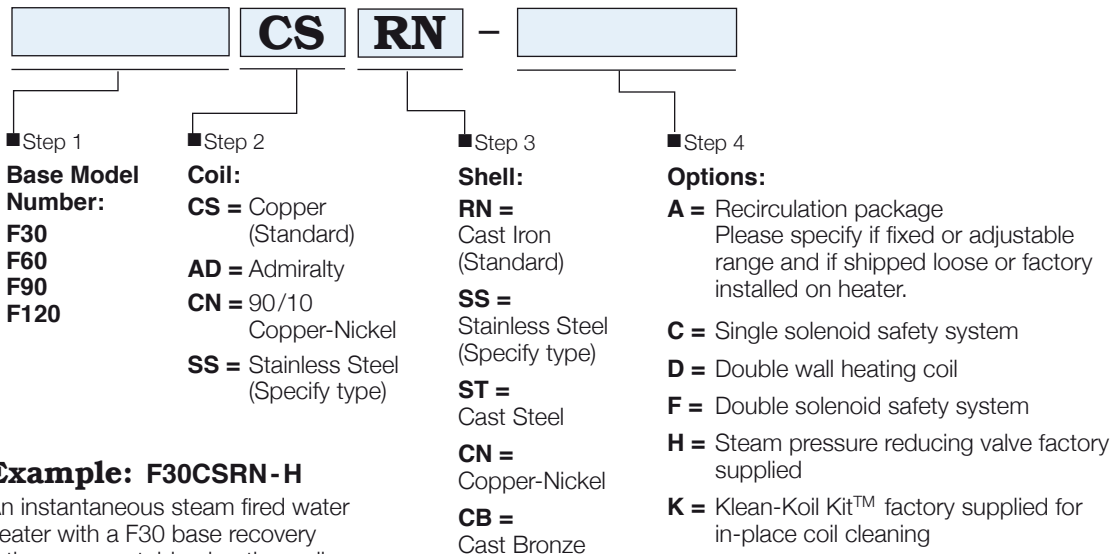
## Operating Controls

- 4.** In order to limit the steam pressure in the heat exchanger shell a steam pressure reducing valve is factory supplied and shipped loose for in-the-field installation.
- 5.** Single solenoid safety system opens the sensing line to the blending valve in order to limit the hot water output in the event of an over temperature condition. Requires 5 Amp, 120 Volt service.
- 6.** Double solenoid safety system opens the sensing line to the blending valve as well as closing the steam supply to the heat exchanger in the event of an over temperature condition. Requires 5 Amp, 120 Volt service.
- 7.** All steam components (traps, strainers) shall be Cast Steel construction.
- 8.** If water hardness exceeds 120 ppm, scale build-up can reduce efficiency. A factory packaged Klean-Koil Kit™ with built-in connections will allow for quick and easy in-place cleaning of the coil to remove these deposits thereby avoiding long periods of down time and expensive maintenance costs.
- 9.** Optional temperature control to ±3°F of set temperature.
- 10.** All 316 Stainless Steel blending valve and 316SS water piping.

## Recirculation Packages (pump by others):

- 11.** Fixed temperature (\_\_\_\_\_°F) 3-way diverting valve, one (1) 1" globe valve, and two (2) 1" check valves are shipped loose for in-the-field installation.
- 12.** Same as **Option 11** except the 3-way diverting valve has an adjustable range.
- 13.** **The 3-way diverting valve** is factory fitted and piped to the water heater.

## MODEL F NUMBER DESIGNATION



### Example: F30CSRN-H

An instantaneous steam fired water heater with a F30 base recovery rating, copper tubing heating coil, cast iron heat exchanger shell, with a steam pressure reducing valve factory supplied to limit the steam pressure to 15 psi maximum.

### OPTION NOTE

Any and all optional equipment for a water heater must be called out in the written specifications. A model number in and of itself does not necessarily reflect all optional equipment selected.

# Master Specification: Model F

JOB NAME \_\_\_\_\_

ENGINEER \_\_\_\_\_

REPRESENTATIVE \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

## GENERAL

Provide a quantity of \_\_\_\_\_ instantaneous steam fired water heater(s) Model no. \_\_\_\_\_ as manufactured by HUBBELL, Stratford, CT. The water heater(s) shall be factory assembled, packaged, and ready for service connections. The entire unit shall be factory supplied with the necessary structural support stand to raise the heater the proper distance off the ground to allow for immediate installation in the field. The unit must be designed and fabricated in strict conformance with the ASME code Section VIII, Division I and stamped, certified, and registered with the National Board of Boiler and Pressure Vessel Inspectors. The heating coil and all other water carrying components shall be rated for 150 psi (225 psi TP) working pressure. The unit shall not contain any storage capacity nor require the use of thermostatic control devices or a temperature/pressure relief valve. The heater(s) shall be capable of maintaining the set temperature within  $\pm 4^{\circ}\text{F}$  over a flow range of a few percent to 100% rated capacity.

## HEATING COIL

The water heater shall be rated to heat \_\_\_\_\_ GPM of water from \_\_\_\_\_  $^{\circ}\text{F}$  to \_\_\_\_\_  $^{\circ}\text{F}$  when supplied with \_\_\_\_\_ psig of steam to the heater. The heating coil shall be constructed of single wall ( **Optional Specification:** Double Wall) copper tubes ( **Optional Specifications:** Admiralty, 90/10 Copper-Nickel, Stainless Steel [Type 304 or 316]) spirally wound and brazed/welded into the manifold. No baffles or other supports shall be used in the shell. The coil must be capable of being removed for inspection and service without breaking any threaded steam or water connections or removing the unit from its installed position.

## HEAT EXCHANGER

The heat exchanger shall be Cast Iron ( **Optional Specification:** Cast Steel, Cast Bronze, 90/10 Copper-Nickel, Stainless Steel (Type 304 or 316) construction and shall be factory insulated to improve efficiency and reduce heat loss. The heat exchanger shall also be encased in a heavy gauge galvanized steel shroud to protect personnel from accidental contact with the exterior of the heat exchanger.

## OPERATING CONTROLS

The water heater shall be supplied with all steam condensate controls factory assembled, piped, and tested, including a drip trap, main condensate trap, and strainers. The heater(s) shall incorporate an integral safety system which automatically suppresses over-temperature conditions without the use of electrically operated devices. A steam pressure gauge (30" Hg - 30 psig) and a combination water temperature/pressure gauge (70-270 $^{\circ}\text{F}$ , 0-200 psi) are supplied and shipped loose for in-the-field installation.

A steam pressure reducing valve (shall, shall not) be provided by the factory to limit the steam supply pressure in the heat exchanger shell to a maximum of 15 psi ( **Optional Specification:** \_\_\_\_\_ psi). The pressure reducing valve shall be Cast Iron ( **Optional Specification:** Cast Steel) construction and shipped loose for in-the-field installation.

In addition, the water heater may be supplied with the following optional features:

- Option** Recirculation package including one (1) 1" 3-way diverting valve, one (1) 1" globe valve, and two (2) 1" check valves. Please specify: Diverting valve is (fixed or adjustable) temperature range type. Recirculation package components (shall or shall not) be factory piped and assembled on the water heater.
- Option** Single solenoid safety system factory assembled to open the sensing line to the blending valve and thereby closing the blending valve in the event water temperature exceeds the hi-limit set point. Please specify automatic or manual reset type. Requires 120 volt, 5 amp electrical service.
- Option** Double solenoid safety system closes the steam supply to the heat exchanger in addition to closing the blending valve. Requires manual resetting. Requires 120 volt, 5 amp electric service.
- Option** Heat exchanger coil supplied with a factory packaged Klean-Koil™ System for quick in the field removal of mineral deposits in the coil. System includes factory installed coil connections for acid cleaning, acid pump with connections, acid holding container, and 1 gallon of acid cleaner.
- Option** A steam pressure relief valve rated at \_\_\_\_\_ psi.

## WARRANTY

The water heater shall be guaranteed for a period of five (5) years Non-Pro Rated from date of shipment. ( **Optional Specification:** ten (10) year Non-Pro Rated Warranty). Specifically, the coil assembly shall carry an unconditional, Non-Pro Rated five (5) year guarantee from failure due to thermal shock, mechanical failure, or erosion. Additionally, the heat exchanger shell shall be warranted against all failures for the same five (5) year period. All other components including the blending valve and components shall be warranted for a period of one (1) year against failure due to defects in materials or workmanship.



**Hubbell**™

Committed to continuous improvement...

Continuing research results in product improvement; therefore specifications are subject to change without notice. For the most updated information, consult the factory directly.

Made in the U.S.A.

