

# Shipboard Electric Water Heater

**80-5000 Gallon Capacity**  
**15-1600 KW – All Voltages & Phases**



*The MSH is a storage packaged water heater for marine use.*

## Reliable

- Only high grade materials used in construction to ensure long operating life
- Hydrastone cement lining provides superior protection and tank longevity
- Heavy duty construction withstands demanding marine use

## Marine Approvals

- United States Coast Guard (USCG) conformance and Type Approved by American Bureau of Shipping (ABS)
- USCG conformance and ABS Type Approval eliminates costly delays and uncertainties during ship inspection

## Mounting Systems

- Heavy-duty legs secure the tank to deck
- Side-sway bulkhead attachment points provide added mounting stability
- The entire mounting system is integrally welded to tank for maximum stability and safety

## Packaged System

- Fully packaged water heater saves time and money during installation
- All electrical operating controls are factory selected and wired to ensure reliable operation
- Full range of styles, sizes, and optional features to meet your exact water heating needs

## A Heavy Duty Storage Electric Water Heater For Marine Use

The Hubbell Model MSH and MH water heater is specifically designed for marine use on board a surface vessel or platform and is in USCG conformance and is ABS Type Approved. By utilizing deck and bulkhead mounting supports, the water heater is securely fastened to the ship structure, thus providing a secure and reliable water heater installation. The heavy-duty carbon steel storage tank is lined with specially formulated hydrastone cement that provides superior protection, tank longevity and withstands demanding marine use.

When you specify and install a Hubbell model MSH or MH, knowing that it is in conformance with USCG regulations and is ABS Type Approved, you will have confidence that the ship owner will be provided with a quality product that is a long lasting and trouble free source for hot water.



**Hubbell**™ The Electric Heater Company

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# Cement Lined Tanks Provide Longer Service Life

**Hubbell™**

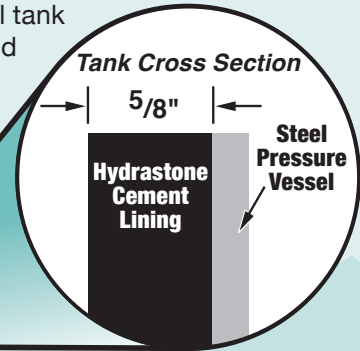
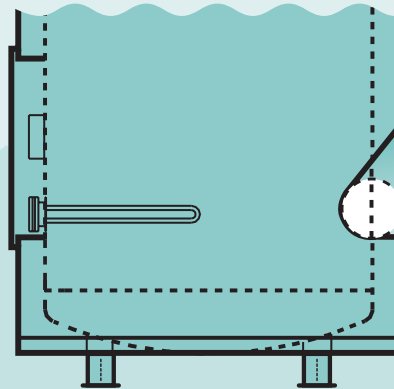
**Q**

**What is the most common reason why a water heater fails?**

**A**

Failure of a tank's protective lining allows water to come into direct contact with the steel tank causing it to corrode and leak.

Therefore, the type of protective lining is the single most important feature when determining the quality of any water heater. The ability of a lining to protect the steel tank is primarily based upon its thickness and complete coverage of all steel surfaces.



## Linings Available For A Steel Tank

### Cement Lining

A specially formulated Hydrastone cement applied to a minimum of  $\frac{5}{8}$ " thickness on all surfaces. The cement lining covers 100% of all interior surfaces and is 125 times thicker than glass lining. Due to the thickness and guaranteed coverage of cement lining there is no need for a sacrificial anode. An extremely durable and long lasting lining suitable for hot and cold potable water storage in marine applications.

### Phenolic Lining

An epoxy coating applied in 2 coats to a total of 10-12 mils DFT. Typically used in process applications using low conductivity DI, distilled or food grade water.

## Non-Ferrous Tanks

A solid Non-Ferrous tank does not require a lining because the pressure vessel itself is constructed from material which is impervious to the corrosive effects of hot water. This type of tank will provide a significantly longer service life than all lined steel tanks, but is initially more costly.

### 90/10 Copper-Nickel

A 90% Copper 10% Nickel alloy provides excellent strength and corrosion resistance. Typically used in applications with corrosive environments (salt water) or in critical marine applications requiring long tank life.

### Stainless Steel

Stainless Steel (Specify: Type 304, 316, or 316L) is suited for applications requiring a corrosion resistant tank with minimal leaching of impurities into the water. Well suited for process, RO and DI water systems.

**Note:** Unlined non-ferrous tanks do not require a manway. Inspection openings will be provided as required.



## Model MSH and MH Standard Equipment

### Vessel Construction

1. All welded carbon steel vessel designed and built in strict accordance with the ASME Code Section IV and stamped, certified and registered with the National Board of Boiler and Pressure Vessel Inspectors.
2. All internal tank surfaces are lined with a minimum of 5/8" thick Hydrastone cement for superior protection and tank longevity.
3. Designed for 100 psi working pressure and hydrostatically tested at 150 psi (1 1/2 times the WP).

### General

1. Heavy duty 2" thick fiberglass blanket insulation covers the pressure vessel for maximum operating efficiency and minimal standby heat loss.
2. Heavy gauge galvanized steel protective jacket holds insulation in place and protected to ensure highly efficient operation.
3. Integrally welded bulkhead attachment points.
4. Entire vessel is supported on heavy duty integrally welded steel supports for sturdy deck mounting.
5. Full five (5) year Non Pro-Rated tank warranty and one (1) year electrical component warranty.
6. Bronze ASME rated combination temperature and pressure safety relief valve set at the vessel working pressure and 210°F.
7. ABS Type Approved and in conformance with USCG regulations.

### Electrical Operating Controls

1. All electrical operating controls are factory sized, selected, wired, tested, and mounted in a NEMA 1 enclosure to ensure safe and reliable operation.
2. A power distribution block is supplied for single point electrical installation.
3. Power fuses rated at a maximum of 60 Amps protect each heating element branch circuit per NEC and UL requirements. Each branch circuit has a maximum rating of 48 Amps.
4. Heavy duty definite purpose magnetic contactor with integrally mounted power fuse block assembly switches power on/off to each branch circuit.
5. Heavy duty removable flange type immersion heating element provides long service life.
6. Fully adjustable thermostat maintains accurate water temperature and is sized by the factory to control the appropriate number of heating element circuits.
7. A generously sized transformer provides fused 120V to the control circuit
8. A fully adjustable (100-240 °F) safety hi-limit device with manual reset interrupts power to the control circuit in the event of over-temperature water in the storage tank.
9. Safety door interlock mechanism interrupts power to the control circuit upon opening the electrical control panel.
10. Louvers in the control panel allow for cooling of the electrical components to ensure maximum electrical component longevity (when required).

## Model MSH and MH Optional Equipment

### Vessel

- 1A. **Alternate protective lining:**  
Phenolic epoxy resin.
- 1B. **Alternate vessel construction:**  
Stainless Steel (Please specify Type: 304, 316 or 316L)  
90/10 Copper-Nickel, other.
- 1C. **Alternate working pressure:**  
Please specify
- 1D. **Alternate tank design:**  
ASME stamped to Section I or VIII

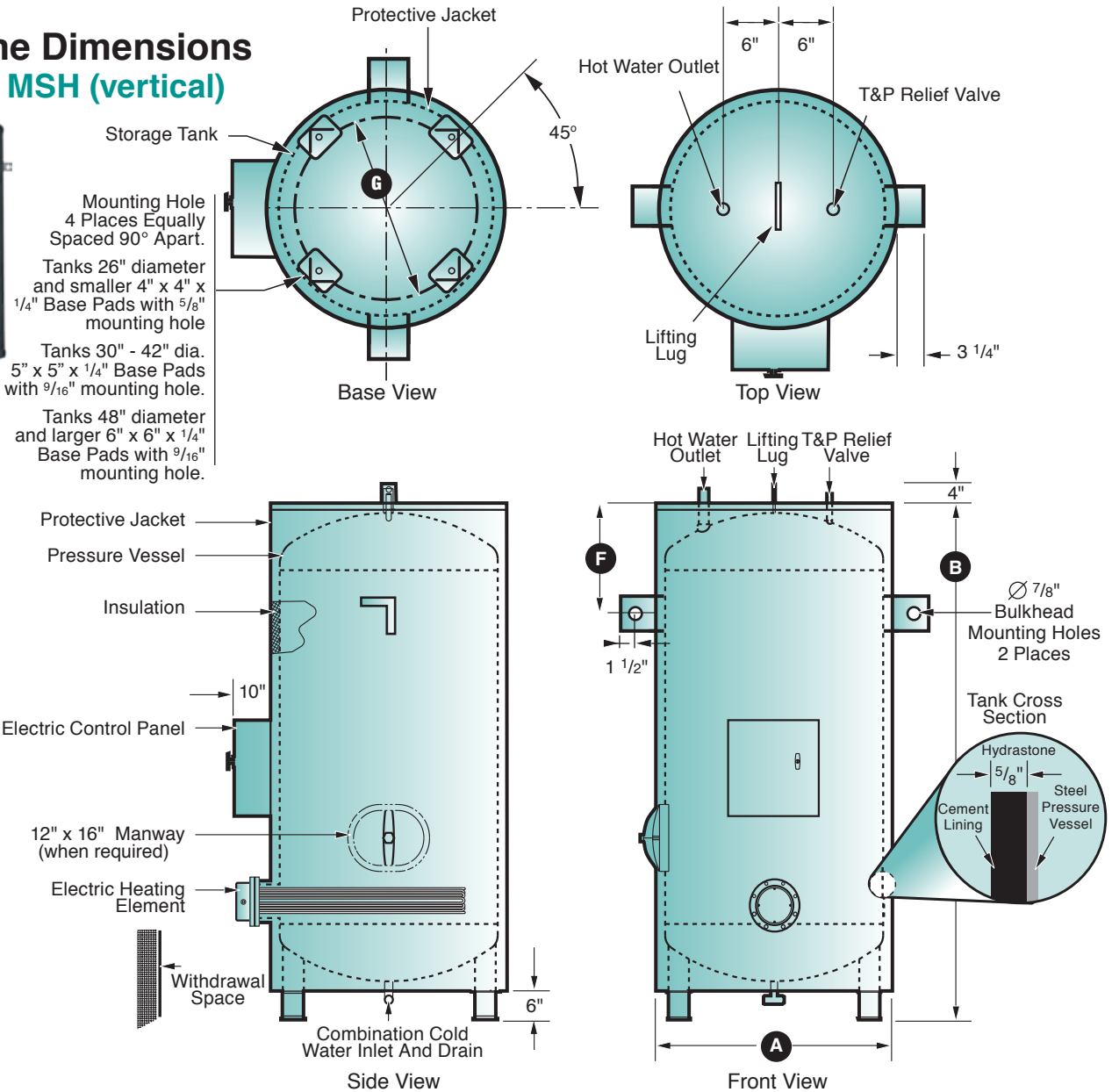
### General

- 1. Skid mounting on heavy duty all welded I Beam
- 2. Type 304 stainless steel protective jacket, please specify if painted.
- 3. Dual energy package provides operational flexibility for electric and steam or boiler water power. See page 8 for details.
- 4. Manway 12" x 16" size
- 5. Inspection opening 3" NPT
- 6. Specific third party approval including BV, NR-13, Lloyds or MIL spec.

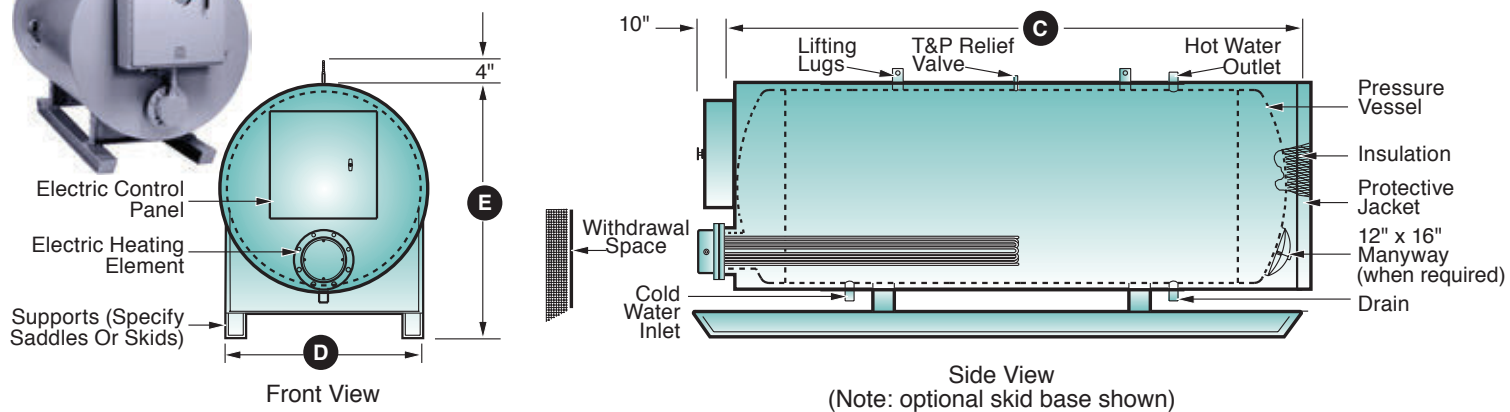
### Electrical

- 1. NEMA 4 weather resistant enclosure for outdoor/wet locations.
- 2. Explosion resistant enclosure for hazardous locations. Please specify class, division, and group.
- 3. Built-in circuit breaker (with or without shunt trip) or a built-in non-fused On/Off disconnect switch.
- 4. Alternate element sheath material (Please specify: Incoloy, Stainless Steel, other).
- 5. Specialized heating element construction including: Special watt density rating, passivation, electropolishing, hermetic seals or any other feature required to meet the needs of your application.
- 6. Factory installed low water cut out device to disengage electrically the heating element(s) in the event of insufficient water in the tank.
- 7. Dial thermometer and pressure gauge factory installed in the tank.
- 8. Intra-tank circulation pump package with On/Off switch to continuously circulate water within the tank and thereby reduce stratification.
- 9. Status indicating lamp(s).
- 10. Audible alarm system.
- 11. Digital display electronic temperature controller. Please specify with or without RS485 communication port for remote operation of the temperature controller.
- 12. Additional ground connections

**Outline Dimensions  
Model MSH (vertical)**



**Model MH (horizontal)**





### Dimensional Data, Model MSH & MH

Storage Capacity (Gallons)	Overall Dimensions (Inches)							Storage Tank Diameter x Length	Inlet Outlet Sizing (NPT)	Approx. Shipping Weight (Lbs.)
	Vertical		Length C	Width D	Height E	Bulkhead Mounting F	Bolt Circle G			
	Diameter A	Height B								
80	26	64	60	26	32	15	18	22 x 54	1½	1000
120	28	72	71	28	34	15	18	24 x 62	1½	1150
150	30	78	75	30	36	20	20	26 x 68	1½	1300
175	34	73	67	34	40	20	24	30 x 63	1½	1500
200	34	82	76	34	40	20	24	30 x 72	1½	1700
225	34	89	83	34	40	20	24	30 x 79	1½	1750
250	40	74	68	40	46	20	30	36 x 64	1½	1850
275	40	80	74	40	46	20	30	36 x 70	1½	2000
300	40	88	82	40	46	20	30	36 x 78	1½	2180
325	40	92	86	40	46	20	30	36 x 82	1½	2300
350	40	94	88	40	46	20	30	36 x 84	1½	2500
375	46	81	75	46	52	22	36	42 x 71	1½	2600
400	46	85	79	46	52	22	36	42 x 75	1½	2700
425	46	88	82	46	52	22	36	42 x 78	1½	2900
450	46	93	87	46	52	22	36	42 x 83	1½	3000
475	52	79	73	52	58	24	42	48 x 69	2	3100
500	52	82	76	52	58	24	42	48 x 72	2	3225
525	52	85	79	52	58	24	42	48 x 75	2	3350
550	52	89	83	52	58	24	42	48 x 79	2	3400
575	52	93	87	52	58	24	42	48 x 83	2	3500
600	52	95	89	52	58	24	42	48 x 85	2	3650
700	52	107	101	52	58	24	42	48 x 97	2	4000
800	52	119	113	52	58	24	42	48 x 109	2	4300
900	52	132	126	52	58	24	42	48 x 122	2	4800
1000	52	145	139	52	58	24	42	48 x 135	2	5200
1250	58	149	143	58	64	26	48	54 x 139	2	5600
1500	58	174	168	58	64	26	48	54 x 164	2	6000
1750	64	168	162	64	70	28	54	60 x 158	3	7400
2000	64	185	179	64	70	28	54	60 x 175	3	8100
2500	76	169	163	76	82	32	60	72 x 159	3	8200
3000	76	197	191	76	82	32	60	72 x 187	3	8300
3500	88	174	168	88	94	36	72	84 x 164	6 FLG.	8900
4000	88	195	189	88	94	36	72	84 x 185	6 FLG.	9800
4500	N/A	N/A	178	94	100	40	84	90 x 174	6 FLG.	10700
5000	N/A	N/A	200	94	100	40	84	90 x 196	6 FLG.	11600

**Note:** All dimensions are approximate and subject to change. Please reference the submittal drawing for actual dimensions. The tank selections above are shown for convenience. A full selection of storage capacities are available by entering the desired capacity into the model number.

\* 80, 120 and 150 gallon tanks do not come equipped with a manway. Please consult factory if desired on these sizes.



## Recovery Ratings And Amperage At Selected KW

KW INPUT	BTU/HR RATING	Gallons Per Hour (GPH) Heated At Various Temperature Rises					Amperage Rating At Various Voltages				
		60 °F Δ	80 °F Δ	100 °F Δ	120 °F Δ	140 °F Δ	208V 3F	240V 3F	380V 3F	440V 3F	480V 3F
15	51,180	102	77	61	51	44	42	36	23	20	18
20	68,240	136	102	82	68	58	56	48	30	26	24
25	85,300	170	128	102	85	73	69	60	38	33	30
30	102,360	205	153	123	102	88	83	72	46	39	36
35	119,420	239	179	143	119	102	97	84	53	46	42
40	136,480	273	205	164	136	117	111	96	61	53	48
45	153,540	307	230	184	153	131	125	108	68	59	54
50	170,600	341	256	205	170	146	139	120	76	66	60
55	187,660	375	281	225	187	161	153	132	84	72	66
60	204,720	409	307	245	205	175	167	145	91	79	72
65	221,780	443	332	266	222	190	181	157	99	85	78
70	238,840	477	358	286	239	205	195	169	106	92	84
75	255,900	511	383	307	256	219	208	181	114	99	90
80	272,960	545	409	327	273	234	222	193	122	105	96
85	290,020	580	435	348	290	248	236	205	129	112	102
90	307,080	614	460	368	307	263	250	217	137	118	108
95	324,140	648	486	389	324	278	264	229	145	125	114
100	341,200	682	511	409	341	292	278	241	152	131	120
110	375,320	750	562	450	375	321	306	265	167	145	132
120	409,440	818	614	491	409	351	333	289	183	158	145
125	426,500	852	639	511	426	365	347	301	190	164	151
150	511,800	1023	767	614	511	438	417	361	228	197	181
175	597,100	1193	895	716	597	511	486	421	266	230	211
200	682,400	1364	1023	818	682	584	556	482	304	263	241
225	767,700	1534	1150	920	767	657	625	542	342	296	271
250	853,000	1705	1278	1023	852	730	695	602	380	328	301
275	938,300	1875	1406	1125	937	803	764	662	418	361	331
300	1,023,600	2046	1534	1227	1023	876	834	723	456	394	361
325	1,108,900	2216	1662	1329	1108	950	903	783	494	427	391
350	1,194,200	2386	1790	1432	1193	1023	973	843	532	460	421
375	1,279,500	2557	1917	1534	1278	1096	1042	903	570	493	452
400	1,364,800	2727	2045	1636	1363	1169	1112	963	608	525	482
450	1,535,400	3068	2301	1841	1534	1315	1251	1084	685	591	542
500	1,706,000	3409	2556	2045	1704	1461	1390	1204	761	657	602
1000	3,412,000	6819	5113	4090	3409	2922	2779	2408	1521	1314	1204
1200	4,094,400	8182	6135	4908	4090	3506	3335	2890	1825	1576	1445
1400	4,776,800	9546	7158	5726	4772	4090	3891	3372	2130	1839	1686
1600	5,459,200	10910	8181	6544	5454	4675	4446	3854	2434	2102	1927

Notes: The KW selections above are shown for convenience. A full selection of KW ratings from 1 to 1600 KW is available by entering the desired KW into the model number. For alternate voltages including 415, 575 and 600 volt, please consult factory.

### Electrical

$$\frac{\text{KW} \times 1000}{\text{Volts}} \div 1.73 = \text{Amps } 3 \Phi$$

$$\frac{\text{KW} \times 1000}{\text{Volts}} = \text{Amps } 1 \Phi$$

**Example: 150 KW at 480V 3Φ**

$$\frac{150 \times 1000}{480} \div 1.73 = 180 \text{ Total Amp Draw}$$

180 ÷ 48 Amps max circuit rating = 3.75  
Round up the number of circuits to 4

Note: Each branch circuit is rated at a maximum of 48 Amps and each circuit is typically operated as an independent temperature step.



Shipboard Electric Water Heater

## Model MSH & MH Sizing Information

Step 1: Solve for the unknown using the formulas stated below

### Variables To Solve For:

**KW Requirement:** \_\_\_\_\_ GPH x \_\_\_\_\_ °F ΔT x 0.00244 = \_\_\_\_\_ KW

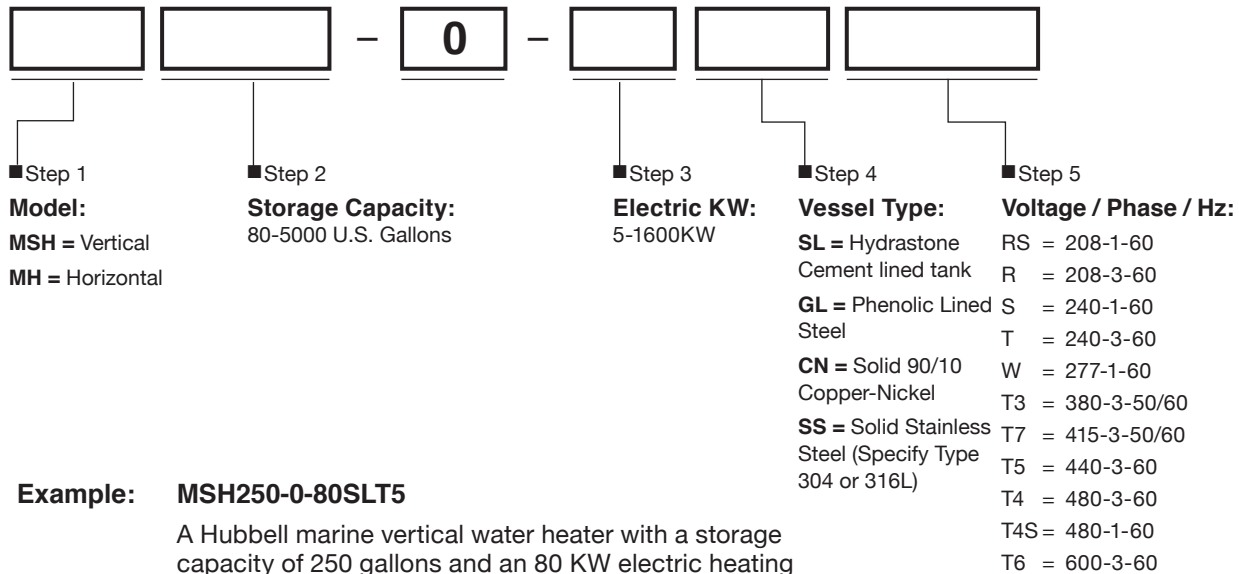
**Temperature Rise:** \_\_\_\_\_ KW x 410 ÷ \_\_\_\_\_ GPH = \_\_\_\_\_ °F ΔT

**Flow Rate:** \_\_\_\_\_ KW x 410 ÷ \_\_\_\_\_ °F ΔT = \_\_\_\_\_ GPH

### Metric Conversions

Liters x 0.2641 = Gallons	°C = (°F - 32) x 0.556	psi x 6.86 = kPa
Gallons x 3.79 = Liters	Watts/Sq.Cm. x 6.4 = Watts/Sq.In.	kPa x 0.1456 = psi
Gallons x 0.003785 = m <sup>3</sup>	Watts/Sq.In. x 0.155 = Watts/Sq.Cm.	Kg/cm <sup>2</sup> x 14.28 = psi
m <sup>3</sup> x 264.2 = Gallons	psi x 0.06896 = Bar	psi x 0.07 = Kg/cm <sup>2</sup>
1°C ΔT = 1.8°F ΔT	Bar x 14.5 = psi	Lbs x 0.4536 = Kg
°F = (°C x 1.8) + 32		Kg x 2.2 = Lbs

## Model Number Designation



**Example:** MSH250-0-80SLT5

A Hubbell marine vertical water heater with a storage capacity of 250 gallons and an 80 KW electric heating element. The tank is cement lined. Power required is 440 VAC, 3 phase, 60 Hz.

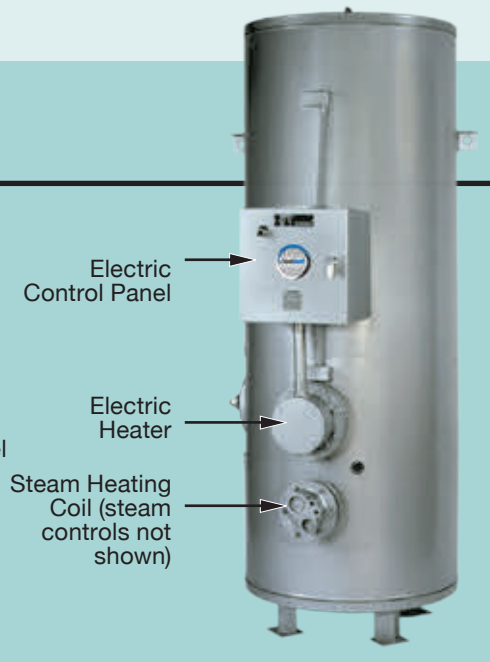
### Option Note

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

*(Manufacturer reserves the right to change specifications without notice.)*

## Benefit Of Dual Fuel Capability

The Hubbell model MSH and MH water heater is available with a factory installed heat exchanger to provide heating capability utilizing ships steam or boiler water. While the ship is under way and the boilers are producing steam, the water heater will operate in "primary" mode and use steam to heat the water. When the ship is dockside, and steam generation is reduced (or completely shut down), the operator can switch the water heater over to electric heating mode by simply turning a switch on the Hubbell control panel which activates the factory packaged and installed electric immersion heaters. This dual fuel capability provides ship operators with complete flexibility in determining which fuel mode is most advantageous to operate at any given time.



### Standard Features

#### Steam / Boiler Water Heating Coil

1. A high quality factory installed 2 pass U-Tube heating coil constructed from 18 BWG 3/4" O.D. single wall copper tubing designed for a maximum working pressure of 150 psi.
2. All wetted parts including the tube sheet and baffles are non-ferrous for maximum longevity.
3. Heavy duty fabricated steel head with threaded NPT steam and condensate connections.

#### Steam Operating Controls

1. Steam operating controls are factory selected, sized, piped and tested to ensure reliable operation.
2. All steam components are factory plumbed with schedule 40 black iron pipe and ready for steam and condensate connections.
3. High quality cast iron pilot operated steam control valve modulates the flow of steam through the heating coil to provide accurate water temperature control.
4. Cast iron Y strainer with 20 Mesh screen protects the steam controls and coil from dirt and debris in the steam supply.
5. Thermostatic drip trap removes condensate from the steam supply line.
6. Heavy duty cast iron float and thermostatic main condensate trap for optimum efficiency.
7. Brass vacuum breaker and dial steam pressure gauge installed in the heating coil head.

**Note:** Additional steam and boiler water design literature is available in Hubbell brochures titled "ST", "BW" and "Heating Coils".

### Optional Features

Optional vessel construction and optional general construction features as shown on page 3.

#### Steam Heating Coil

- 1. Double wall tubing with a leak detection port
- 2. **Alternate tubing material please specify:** (Stainless Steel, 90/10 Copper-Nickel, Other)
- 3. **Fabricated steam head constructed from:** (Stainless Steel, Copper Alloy, Other)

#### Operating Controls

- 4. Steam controls are factory selected and sized, but shipped loose for in the field installation by others.
- 5. Various steam control valves are available to meet the specific needs of your application, please specify: Self-operated type, pneumatic operated, electric motor operated, separate pressure reducing pilot type.
- 6. Single solenoid safety system closes the control valve should the water temperature in the tank reach the hi-limit set point. Requires 120 volt 5 amp electrical service.
- 7. A double solenoid safety system dumps over heated water in the storage tank to drain in addition to closing the control valve. Requires 120 volt 5 amp electrical service.
- 8. Dial water thermometer and pressure gauge factory installed in the tank.
- 9. Factory wrapped and baffled steam coil with integral pump package.
- 10. Steam Controls to be cast steel construction.



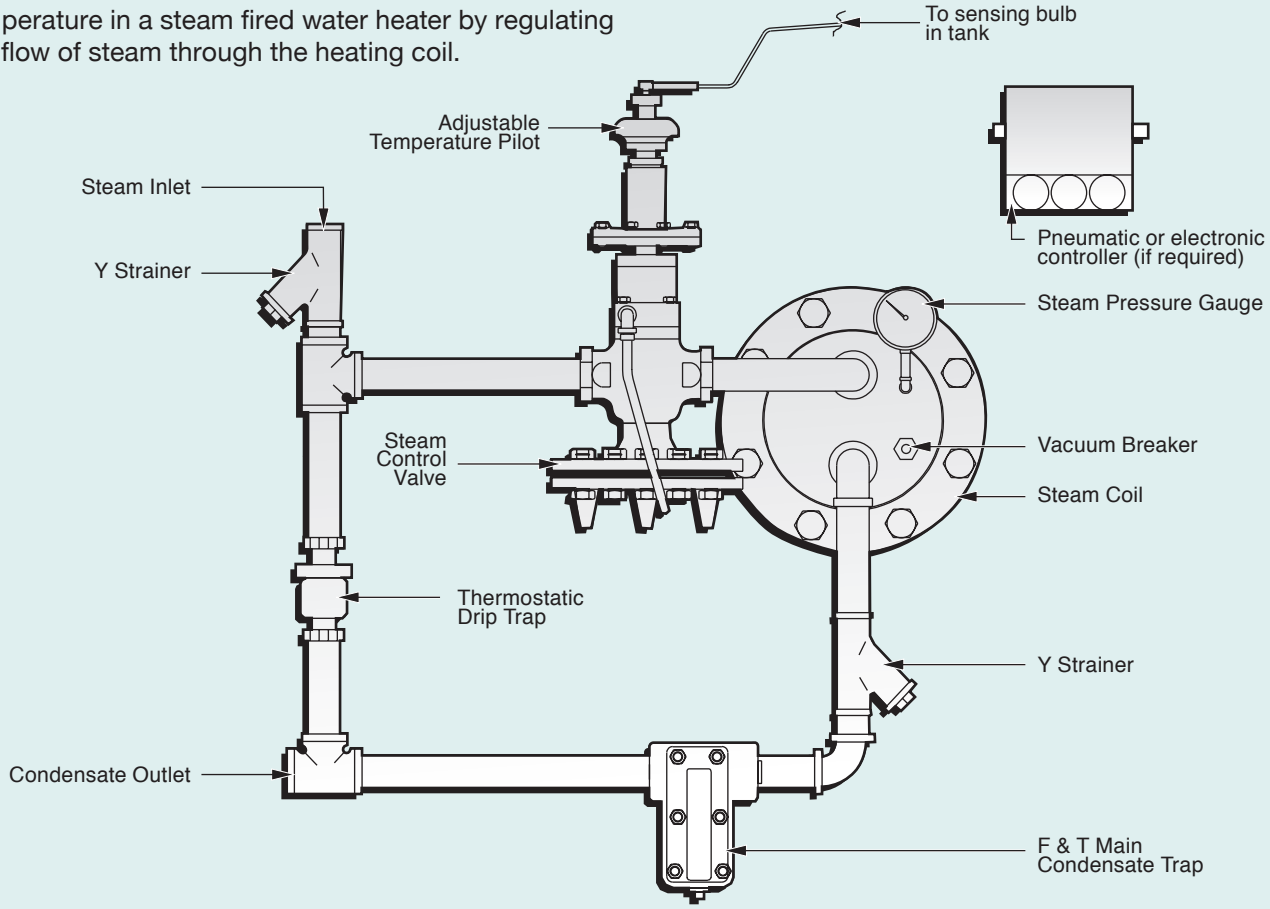


# Optional Steam Package

# Shipboard Electric Water Heater

## Steam Component General Configuration

The steam control valve maintains accurate water temperature in a steam fired water heater by regulating the flow of steam through the heating coil.



## There are four types of steam control valves available for use on a steam fired storage water heater.

### Self Operating

The valve design includes a bulb and capillary assembly charged with a thermally responsive vapor. The expansion/contraction of the vapor acts upon the valve bellows in order to control the flow of steam through the valve. No external power source is required for operation.

### Pneumatically Operated

In this configuration the ships air supply feeds a factory installed temperature controller which operates the steam control valve. The temperature controller sends a precise air signal to the steam control valve which adjusts the flow of steam into the heating coil. The temperature controller is fully adjustable from 50-250°F and requires 20 psi air at a maximum consumption of 0.5 SCFM.

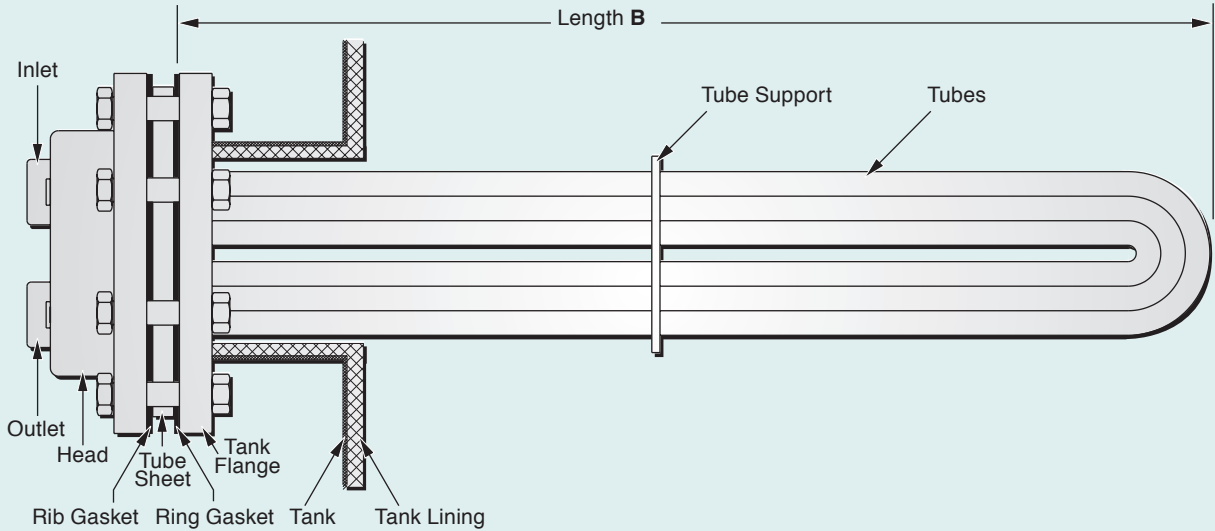
### Pilot Operated

A pilot operated control valve is the most widely used type of valve for standard water heating applications. In this type of valve, a temperature pilot device utilizes steam to operate the main valve. No external power source is required other than steam. This is a highly dependable temperature control system which is suitable for most applications. As an option, this valve may include a pressure reducing pilot which limits the steam pressure to a predetermined maximum.

### Electronic Operated

This control valve is similar to a pneumatically operated system, except in this case the temperature controller is a sophisticated digital display electronic device which outputs a 4-20ma signal to a compact motor mounted on the steam control valve in order to proportionally control the flow of steam to the heating coil. The temperature controller displays set point as well as actual water temperature and is available with an RS485 communications port for remote control.

### Heating Coil General Configuration



### Please Complete The Following Information:

**1 Tube Sheet Data**

Outside Diameter \_\_\_\_\_

Thickness \_\_\_\_\_

Material \_\_\_\_\_

Number of Tube holes in the tube sheet \_\_\_\_\_

Does the tube sheet have Bolt Holes in it?  
 Yes  No

**If Yes:**

- # of bolt holes \_\_\_\_\_
- Dia. of bolt holes \_\_\_\_\_
- Bolt circle \_\_\_\_\_

Do the bolt holes straddle the centerline?  
 Yes  No

**2 Diameter of the neck nozzle on the tank.**

Outside Diameter \_\_\_\_\_

Inside Diameter \_\_\_\_\_  
*(Include thickness of neck lining, if any)*

Circumference Of Neck \_\_\_\_\_

**3 Immersion length of tubes "B"** \_\_\_\_\_

Heating surface area in Sq. Ft. (if known) \_\_\_\_\_

**Tank Type:**  Vertical  Horizontal

**Tank dimensions:** Diameter \_\_\_\_\_

Height \_\_\_\_\_

Pull space maximum length \_\_\_\_\_

**4** Tube Outside Diameter \_\_\_\_\_

Material \_\_\_\_\_

Gauge \_\_\_\_\_ BWG

Type  Single Wall  Double Wall

Design Pressure \_\_\_\_\_

Design Temperature \_\_\_\_\_

**5** Number of passes \_\_\_\_\_

**6** Number of tube supports \_\_\_\_\_

Full  Half type

Distance to each tube support \_\_\_\_\_

Material \_\_\_\_\_

O.D. of supports \_\_\_\_\_

Thickness \_\_\_\_\_

**7** Recovery rated to heat \_\_\_\_\_ GPH

from \_\_\_\_\_ °F to \_\_\_\_\_ °F

**When supplied with the following heat source:**

Steam at \_\_\_\_\_ psig  
 \_\_\_\_\_ Lbs./Hour  
 Steam Consumption

Boiler Water at \_\_\_\_\_ GPM  
 from \_\_\_\_\_ °F to \_\_\_\_\_ °F

HTHW at \_\_\_\_\_ GPM  
 from \_\_\_\_\_ °F to \_\_\_\_\_ °F

**8 Pressure Drop**

Steam \_\_\_\_\_ psi

Boiler or HTHW \_\_\_\_\_ psi



# Optional Steam Package

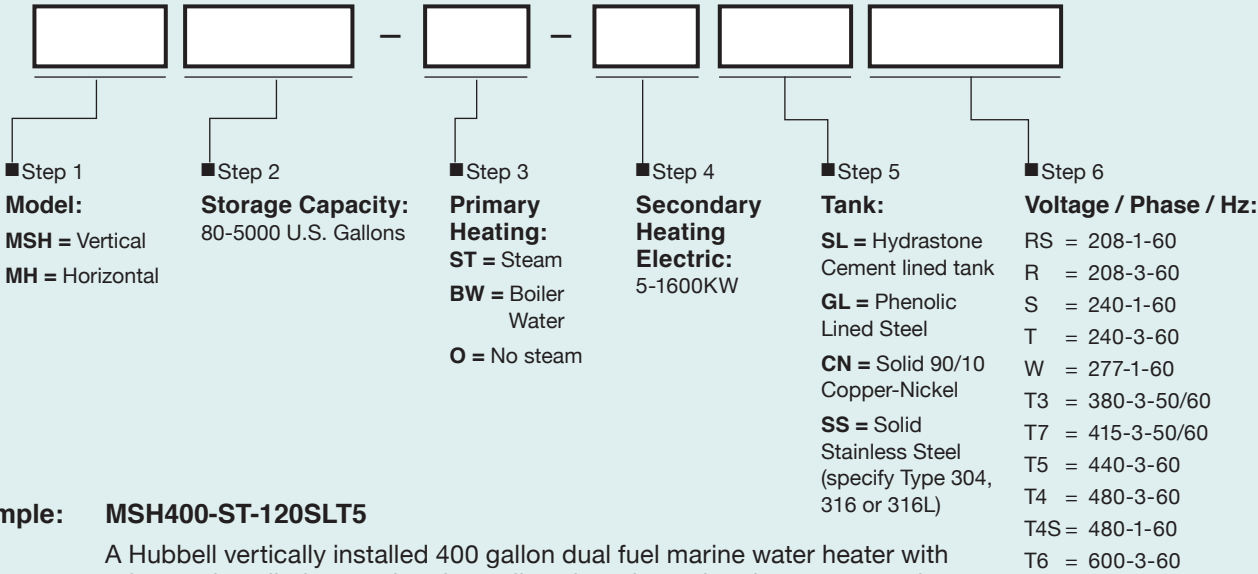
# Shipboard Electric Water Heater

## Steam Consumption Formula

$$\frac{\text{[ ] GPH} \times \text{[ ] } ^\circ\text{F } \Delta\text{T} \times 8.33}{\text{[ ] Latent Heat of Steam}} = \text{[ ] Lbs / Hr Steam}$$

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

## Dual Fuel Model Number Designation



**Example: MSH400-ST-120SLT5**

A Hubbell vertically installed 400 gallon dual fuel marine water heater with a factory installed steam heating coil as the primary heating source and a 120 KW electric heating element to operate as the secondary heating source. Tank is cement lined. Power required is 440 VAC, 3 phase, 60 Hz. Please note that steam heating capacity and construction features are not identified in the model number and therefore must be noted in the written specifications.

### 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 reflect any optional equipment selected.  
 (Manufacturer reserves the right to change specifications without notice.)



# Model MSH & MH

## Master Specification

SHIP NAME \_\_\_\_\_

ENGINEER / NAVAL ARCHITECT \_\_\_\_\_

SHIPYARD \_\_\_\_\_

CONTRACTOR / SHIP CHANDLER \_\_\_\_\_

### General

Provide a quantity of \_\_\_\_\_ packaged type Marine Electric water heater(s) Model No. \_\_\_\_\_ as manufactured by HUBBELL The Electric Heater Co., Stratford, CT. The water heater shall be constructed specifically for shipboard installation by utilizing deck and bulkhead mounting supports that are integrally mounted to the pressure vessel. The pressure vessel section, including the electrical control panel, shall be mounted on structural supports and be suitably insulated, jacketed, painted and provided with lifting lugs. The entire unit is to be packaged ready for plumbing and electric service connections and shall bear the UL listing mark certifying the entire water heater. The water heater shall conform to USCG regulations per 46 CFR 53.01-10 and be ABS Type Approved.

### Pressure Vessel

The pressure vessel shall be all welded construction and ASME Code Section IV stamped for a working pressure of 100 psi and contain a minimum of \_\_\_\_\_ gallons of storage. The storage vessel shall be carbon steel and lined with seamless Hydrastone cement applied to a minimum thickness of 5/8" on 100% of all interior tank surfaces, ( **Optional Specifications:** *Phenolic lined steel tank, solid 90/10 copper-nickel tank, solid Type 304, 316 or 316L Stainless Steel Tank.*) The pressure vessel is to be covered with 2" thick fiberglass blanket insulation and enclosed in a heavy gauge galvanized steel metal jacket finished in gray hammertone enamel. The vessel shall be protected by an ASME approved automatic reseating combination temperature and pressure relief valve set at the tank working pressure and 210 °F.

### Electric Recovery

The recovery section shall be rated at \_\_\_\_\_ KW which will heat \_\_\_\_\_ GPH of water at \_\_\_\_\_ °F rise ( \_\_\_\_\_ °F to \_\_\_\_\_ °F).

### Electric Controls

The heater shall be designed to operate at \_\_\_\_\_ volts, \_\_\_\_\_ phase, \_\_\_\_\_ HZ with a fused low voltage transformer providing 120 volt to all operating controls. The immersion heating element(s) shall be high quality copper sheathed ( **Optional Specification:** *Incoloy, Type 304, 316 or 321 stainless steel*) and sized to obtain the rated recovery. Each element circuit is to be independently operated through a definite purpose magnetic contactor having a resistive load rating equal to or exceeding the ampere rating of that particular circuit and shall be protected by individual power fuses rated approximately 125% of the ampacity of the circuit. Multiple circuit elements shall be provided with a power distribution block for connecting of the incoming power feeds ( **Optional Specifications:** *Built-in non-fused On/Off disconnect switch, built-in circuit breaker with an On/Off handle.*) A safety door interlock switch shall interrupt power to the control circuit when the control panel door is opened. The control thermostat shall be immersion type and shall be consistent with the recovery rate of the heating element as to the number of steps required. A hi-limit control with a manual reset button shall be factory installed to disconnect all ungrounded conductors to the heating element(s) in the event of an over-temperature condition in the storage section.

Option \_\_\_\_\_

Option \_\_\_\_\_

Option \_\_\_\_\_

### Dual Fuel Package

- Shall be required
- Shall not be required

The heating coil shall utilize ( **Optional Specification:** *steam, boiler water, HTHW*) and be rated to heat \_\_\_\_\_ GPH of water at a \_\_\_\_\_ °F rise ( \_\_\_\_\_ °F to \_\_\_\_\_ °F) when supplied with \_\_\_\_\_ psi steam (boiler water) to the control valve and consume \_\_\_\_\_ lbs/hour steam. The heating coil shall be a fully removable immersion U-tube heating coil rated for 150 psi working pressure. The single wall ( **Optional Specification:** *Double wall*) coil shall be constructed from 18 BWG 3/4" OD copper ( **Optional Specification:** *90/10 Copper-nickel, stainless steel*) tubes. The coil including the tube sheet, baffles, and spacers shall have all non-ferrous wetted parts and a fabricated steel head. The water heater shall (shall not) be supplied with steam operating controls. A self-contained ( **Optional Specification:** *Pneumatic, pilot, electric*) type steam control valve shall regulate the flow of steam to the heating coil in order to control water temperature. A drip trap, main condensate trap, Y strainers, vacuum breaker, and steam pressure gauge shall be factory sized and piped with the steam control valve.

#### In addition, the following steam options may be selected:

- Option:** The water heater shall be equipped with a factory-packaged intra-tank circulator to continuously circulate water within the tank to reduce stratification.
- Option:** The heating coil shall be wrapped and baffled and piped with an integral pump package to force circulate water over the heating coil in order to reduce the coil size.
- Option:** Single solenoid safety system to close the control valve should the water temperature in the tank reach the hi-limit set point. Requires 5 Amp, 120 Volt service.
- Option:** Double solenoid safety system dumps over heated water in the storage tank to drain in addition to closing the control valve. Requires 5 Amp, 120 Volt service.

### Warranty

The water heater manufacturer shall warranty all components against defects in workmanship and material for a period of one (1) year from date of start up, and the pressure vessel for a full five (5) years Non Pro-Rated ( **Optional Specification:** *full ten (10) years Non Pro-Rated tank warranty*) from start-up, provided that the unit is started within three (3) months of date of shipment and installed and operated within the scope of the tank design and operating capability. Each water heater shall be shipped with a complete set of installation and operating instructions including spare parts list and approved drawing.



*Committed to continuous improvements*

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



Marine Products Division

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