

Precision Storage Vessels



ELECTRIC WATER HEATERS



PRECISION

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High Capacity Electric Water Heaters

Electric calorifiers are one of the easiest method of generating hot water for both domestic and industrial application. Electric calorifiers are installed in hospitals, hotels, sports centers and general residential buildings. PRECISION Electric water heaters can be used to meet special site conditions where the use of other primary sources of energy cannot be used or expensive.

Storage Calorifier

Storage calorifiers are sized to meet the peak demand period with recovery periods varying from one to four hours.

Advantages

- Efficiency is maintained throughout the range of load. Even at part load all energy is converted into heat.
- Space requirements are minimum. Separate boiler fuel storage tanks are not required.
- Installation is simplified.
- The calorifier can be installed directly with the power supply.
- Maintenance is kept to a minimum.
- Electric calorifiers are clean.
- Electric calorifiers are extremely quiet.

Standards

ASME Code construction:- All tanks are constructed in accordance with ASME code section IV Stamped and labeled for 125 PSI (8.6 BAR) as Standard.

Precision also design electric calorifiers as per British Standard BS 853:1996, BS 5500:1997 or in accordance with Art 3.3 of the European Directive EEC/97/23 for pressure equipment.

HW	E	30	GL	V	1000 L
Hot Water	Electric	KW	Shell Material	Configuration	Capacity
		Input	GL-Glass Lined PC-Precision Coat	V-Vertical H-Horizontal	Litres

Eg: **HWE30GLV1000L**



Vessel Lining

Precision Coat

Precision coat is a polymerized coating which is applied to all internal surfaces of the tank. Tank surfaces are first sandblasted and cleaned to a white metal finish and then precision coat is applied uniformly. The tanks are then forced cured at 95°C to form a glossy lining unaffected by thermal shock from -6°C to 80°C. Precision coat is approved by US department of agriculture and with NSF/61 certification for drinking water.

Standard - Shells

Steel SA516 Gr-70
Coating FDA approved Precision coat material



Glass Lining

Precision's glass lining is a specially formulated vitreous porcelain enamel, which is applied to all interior surfaces of the tank. Tank surfaces are first sandblasted to a white metal finish and then Porcelain enamel is applied uniformly. The tank is then fired to 900°C in a furnace to achieve 100% molecular fusing of the glass to the interior steel surface, which forms a best possible glass coating for potable water in a strong vessel.

Standard - Shells

Steel SA516 Gr-70
Glass FDA approved vitreous porcelain enamel



Heating Elements

Heaters can be designed to operate in 3-phase, 415 volts, 50 HZ / 60 HZ supply. Precision uses two types of commonly used heating elements namely replaceable element and removable core element.

Replaceable Type

The elements on this type of immersion heater can be changed only after draining contents in the water heater.



Removable Core Type

Failed elements can be changed without draining the calorifier or removing the immersion heater from the shell. This saves time in changing the defective elements and with less down time. By this we can save the heated water without draining it.



Materials

Heating elements are available in copper, incoloy or Incoloy 825 which are suitable for any water conditions.

Watts density

The watts density of an immersion heater element is arguably the most significant issue for water heating. Generally the maximum watts density used for fresh water calorifier is 7.5 W/sq.cm.



Control Panels

Control panels are manufactured in house. All the wiring of panel and components are to IEE (Current Edition) Standard.



Following Controls and Fittings are available in the panel

- Isolator
- Test / Off / Auto Switch
- Safety Door Inlet Lock
- Indicators
- Power On
- High Temperature alarm (Optional)
- Low Water Level Alarm (Optional)
- Digital meter
- Thermostatic step controller
- High temperature fault
- Low Water fault



Control Options

Low water cut off

Probe type electric low water cut off prevents energizing of elements in the event of low water condition.



Sequencer

Two or three step time delay sequencer provides for stepping of elements in groups or individually (maximum of 1 step per contactor)

Modulating step

Solid state electronic control device modulates input to match load through progressive sequencing or steps.

Time Clock

Seven day clock may be programmed for 24/7 operation.

Pressure Limit Switches

High and low pressure limit switches can be supplied.

HWS Storage Heater Recovery

KW In Put	Elements		No. of Circuit		No. of KW & Steps			Ampere		
	Qty	KW	<150V	>250V	240W	380/415W	480W	240	380/415	480
- 15	1	15	1	1	1@15	1@15	1@15	43	23	18
- 30	2	15	2	1	1@30	1@30	1@30	84	46	36
- 45	3	15	3	2	1@15, 1@30	1@15, 1@30	1@15, 1@30	126	69	55
- 60	4	15	4	2	2@30	2@30	2@30	167	92	55
- 75	5	15	5	3	1@15, 2@30	1@45, 1@30	1@45, 1@30	209	114	91
- 90	6	15	6	3	3@30	3@30	3@30	251	137	109
- 105	7	15	7	4	1@15, 3@30	1@45, 2@30	1@45, 2@30	292	160	127
- 120	8	15	8	4	4@30	4@30	4@30	334	183	145
- 135	9	15	9	5	1@15, 4@30	1@45, 3@30	1@45, 3@30	376	206	163
- 150	10	15	10	5	5@30	5@30	5@30	417	228	181
- 165	11	15	11	6	1@15, 5@30	1@45, 4@30	1@45, 4@30	459	250	199
- 180	12	15	12	6	6@30	6@30	6@30	501	274	217
- 195	13	15	13	7	1@15, 6@30	1@45, 5@30	1@45, 5@30	542	297	235
- 210	14	15	14	7	7@30	7@30	7@30	584	319	253
- 225	15	15	15	8	1@15, 7@30	1@45, 6@30	1@45, 6@30	626	342	271
- 240	16	15	16	8	8@30	8@30	8@30	667	365	289
- 270	18	15	18	9	1@60, 7@30	1@60, 7@30	1@60, 7@30	750	411	325

FOR OTHER RATINGS & CONFIGURATIONS CONSULT FACTORY

Specifying Electric Storage Colorifiers

High capacity water heaters shall be model HWVE with ----- litre storage capacity rated at ----- kW with ----- volts ----- phase. Heaters are to be insulated and jacketed for vertical installations. The water heater tank shall be constructed in accordance with ASME Boiler and pressure vessel code requirements stamped and registered with the national Board of Boilers and Pressure vessel inspectors or requires BS standard of European Standards (specify one) The tank shall have 125 Psi (8.6 bar) design pressure.

All tanks shall be glass lined with vitreous glass enamel and fired at 900°C to ensure a molecular fusing of glass and steel. Manufacturer approved certificate to be provided along with the heaters. A manhole shall be provided as per standards. Each tank shall be furnished with magnesium anodes to protect against corrosion.

Immersion heating elements shall be low watts density with an incoloy outer sheath material for long life. Immersion heaters are to be replaceable (water contents from the shell to be drained before changing the elements) or removable core type (Immersion heaters can be replaced without draining the water contents) (specify any of the one).

The water heaters to be fitted with factory fitted shell mounted pre-wired control panel with Isolator, Safety Door Inter Lock, Test/On/Auto switches, Illuminating Indication for power on, Automatic Stages, High Temperature fault, Low temperature fault, Low Water Fault, Thermostatic control shall comprise of a thermostatic switch for each stages. Temperature display, low water cut out to be mounted on the shell.



The control panel should have 3 volt free contacts to give signals for Low Water /Power On/Off/Temperature and for external alarm.

The tank to be fully lagged with 50mm thick fibre glass mattress and clad with in a mild steel sheets painted with two coat gloss blue paint.

The tank shall be fitted with screwed/flanged connection for safety valve, thermostats, Pressure gauge. The water heaters shall be factory mounted, wired and tested.

Selection & Sizing

Maximum Demand Rates (litres/hour) @60°C

Sl. No.	Description	Apart ment house	Club	Gymnasium	Hospital	Hotel	industrial Pant	Office Building	Private Residence	School	YMCA
1	Basin, Private Lavatory	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
2	Basin, Public Lavatory	15	23	30	23	30	45.5	23	-	57	30
3	Bathtub	76	76	114	76	76	-	-	76	-	114
4	Dishwasher	57	190-570	-	190-570	190-760	76-380	-	57	76-380	76-380
5	Foot basin	11	11	46	11	11	46	-	11	11	46
6	Kitchen sink	38	76	-	76	114	76	76	38	76	76
7	Laundry, Stationary tub	76	106	-	106	106	-	-	76	-	106
8	Pandry sink	19	38	-	38	38	-	38	19	38	38
9	Shower	114	568	850	284	284	850	114	114	850	850
10	Service sink	76	76	-	76	114	76	76	57	76	76
11	Hydrotherapeutic shower				1520						
12	Hubbard bath				2270						
13	Leg bath				380						
14	Arm bath				130						
15	Sitz bath				114						
16	Continuous flow bath				625						
17	Circular wash sink				76	76	114	76		114	
18	Semicircular wash sink				38	38	57	38		57	
	Demand Factor	0.3	0.3	0.4	0.25	0.25	0.4	0.3	0.3	0.4	0.4
	Storage Factor	1.25	0.9	1	0.6	0.8	1	2	0.7	1	1

Courtesy: Ashrae

Example:- Determine heater and storage tank size for an apartment building from a number of fixtures.

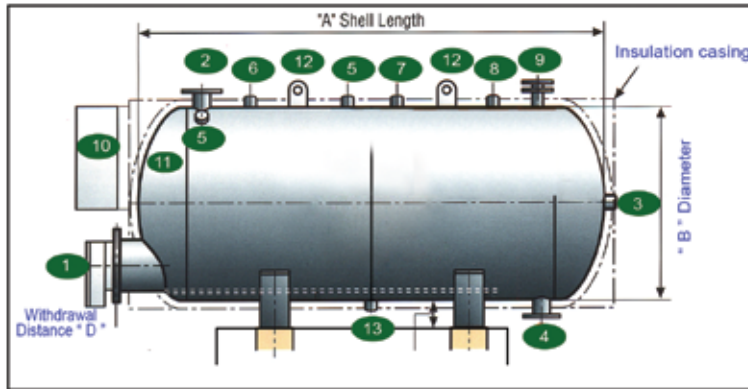
Solution

60 Lavatories	x	2	7.6	l/h	=	456 l/h
30 Bathtubs	x	20	76	l/h	=	2280 l/h
30 Showers	x	30	114	l/h	=	3420 l/h
60 Kitchen sinks	x	10	38	l/h	=	2280 l/h
15 Laundry tubs	x	20	76	l/h	=	1140 l/h
Possible maximum demand					=	9776 l/h
Proable Maximum demand	=			9576 x 0.30	=	2873 l/h
Heater or coil capacity					=	2873 l/h
Storage tank capacity	=			2873 x 1.25	=	3591 l/h

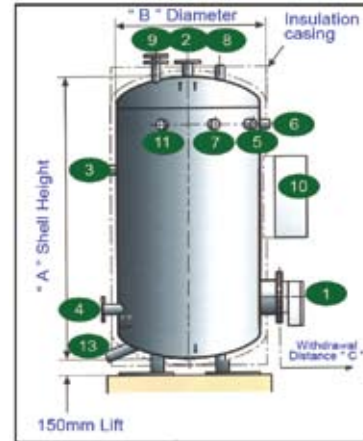


Sizes and Dimensions

HORIZONTAL TYPE



VERTICAL TYPE



Description

- | | |
|---------------------|--|
| 1 Immersion Heater | 8 Safety Valve/Pressure Temp. Relief Valve |
| 2 Secondary Flow | 9 Anti Vacuum Valve |
| 3 Secondary Return | 10 Control Panel |
| 4 Cold Feed | 11 Low water cut-off |
| 5 High Limit Safety | 12 Lifting Hooks |
| 6 Thermometer | 13 Drain |
| 7 Pressure Gauge | |

HWE DIMENSIONAL DATA

Model No.	Capacity Litres	Dimensions in mm				Connections			Weights kgs
		A	B	C (max)	D (max)	in /Out	DRAIN	RETURN	
HWE 440	440	1800	600	600	1500	1 1/4"	1"	1 1/4"	250
HWE 550	550	1700	675	675	1500	1 1/4"	1"	1 1/4"	260
HWE 700	700	1750	750	750	1500	1 1/4"	1"	1 1/4"	300
HWE 800	800	1950	750	750	1500	1 1/2"	1 1/4"	1 1/2"	330
HWE 900	900	2000	800	800	1500	1 1/2"	1 1/4"	1 1/2"	400
HWE 1000	1000	1950	750	750	1500	2"	1 1/4"	2"	430
HWE 1200	1200	2100	900	900	1500	2"	1 1/4"	2"	480
HWE 1350	1350	2350	900	900	1500	2"	1 1/4"	2"	530
HWE 1500	1500	1950	1050	1050	1500	2"	1 1/4"	2"	550
HWE 1800	1800	2300	1050	1050	1500	2"	1 1/4"	2"	630
HWE 2000	2000	2500	1050	1050	1500	2"	1 1/4"	2"	670
HWE 2300	2300	2400	1150	1150	1500	2"	1 1/4"	2"	740
HWE 2500	2500	2450	1250	1200	1500	2"	1 1/4"	2"	800
HWE 3000	3000	2900	1200	1200	1500	2"	1 1/2"	2"	910
HWE 3500	3500	2700	1350	1350	1500	2"	1 1/2"	2"	1250
HWE 4000	4000	3050	1350	1350	1500	2"	1 1/2"	2"	1370
HWE 4500	4500	3400	1350	1350	1500	3"	1 1/2"	3"	1500
HWE 5000	5000	3200	1450	1450	1500	3"	1 1/2"	3"	1500
HWE 6000	6000	3800	1450	1450	1500	3"	1 1/2"	3"	1720
HWE 7000	7000	3300	1680	1500	1500	3"	1 1/2"	3"	2350
HWE 8000	8000	3700	1680	1500	1500	3"	1 1/2"	3"	2560
HWE 9000	9000	4200	1680	1500	1500	3"	1 1/2"	3"	2820
HWE 10000	10000	4600	1680	1500	1500	3"	1 1/2"	3"	3030
HWE 12500	12500	6000	1830	1500	1500	3"	1 1/2"	3"	4360
HWE 15000	15000	6000	1830	1500	1500	3"	1 1/2"	3"	4360

* Pressures available upto 20 bar (300psi).

* Capacities available upto 30,000 litres.

* Specified weights are for 7 bar Design pressure & 10.5 bar Test Pressure.

* Alternate sizes available.

* Please consult Factory.



Accessories

Thermometer

The thermometer is located near the top of a storage calorifier to measure the temperature of water reaching the outlet.



Safety Valve

All electric calorifiers should be fitted with a safety valve to protect the cylinder against over-pressure due to malfunction of controls or incorrect operation.



Supports

All electric calorifiers have their legs or cradles permanently fixed to the shell before dispatch. This is to assist handling and to offer greater protection against damage.

Inspection Opening

The heater and shell internals can be inspected by withdrawing the heater. Alternatively upon request a manhole can be incorporated so that inspection does not disturb the heater or its connections.

Control Thermostats

Control Thermostats are applied for temperature regulation for heating installations. The control thermostat consists of a temperature sensor, a set point adjuster with temperature scale and excess temperature safety device, a capillary tube and an operating element. They regulate the temperature of the medium by causing the connected valve to open or close. The thermostats operate according to the liquid expansion principle.



Anodes

Magnesium anodes are supplied as standard to water properties. Magnesium anodes help to protect cylinders. The life of the magnesium anode depends on the quality of the water and regular checks should be made to establish a service period.



Anti-Vacuum Valve

All water heaters are supplied with anti vacuum valve as standard to protect the tank against partial vacuum.



Insulation

Adequate thermal insulation is essential to prevent unnecessary heat losses from storage calorifiers which may be standing for many hours at working temperature. Standard factory-fitted insulation consists of 50mm thick Fiber glass wool / rock wool mattress which is closely fitted to the shell and encased in mild steel sheets of 1mm thick with two coats of gloss paint.

Low Water Level Switch

Low water cut off probe type is fitted as standard for all water heaters. The risk of switching on the heaters when they are not covered by water damages the electric heating element.

High Limit Cut Out

All electric calorifier is fitted with a high temperature cut out as standard. This acts as an immediate monitor of overheating. It will be fitted with a manual reset button so that the heater will continue to operate from the high limit switch if the control thermostat is malfunctioning.

Water Quality & Electric Water Heating

All waters contain dissolved substances. A large proportion of these dissolved substances are generally calcium and magnesium carbonates and sulphates. The concentration of these salts in the water define the hardness of the water. Greater their concentration harder the water, smaller their concentration softer the water.

Generally, water which can be considered as slightly hard to moderately hard we must consider the effects on the immersion heaters and other components within the calorifier shell.

For more details please consult your water treatment SPECIALIST.



Useful Conversions

Electrical Data

$$\text{Amps (3 Phase)} = \frac{\text{kW} \times 1000}{\text{Volts} \times 1.732}$$

$$\text{Amps (1 Phase)} = \frac{\text{kW} \times 1000}{\text{Volts}}$$

Btu/hr Requirement

$$\text{Btu / hr Output} = \text{GPM} \times 60 \text{ min/hr} \times 8.33 \text{ lb/gal} \times \text{Temp. Rise}$$

$$\text{Btu / hr Input} = \frac{\text{GPM} \times 60 \text{ min/hr} \times 8.33 \text{ lb/gal} \times \text{Temp. Rise}}{\% \text{ Efficiency}}$$

Efficiency of Heat Transfer

$$\% \text{ Efficiency} = \frac{\text{GPH} \times 8.33 \text{ lb/gal} \times \text{Temp. Rise}}{\text{Btu/hr Input}}$$

Recovery - Electric

$$\text{GPH} = \frac{\text{kW Input} \times 3412 \text{ Btu/kW} \times \% \text{ Efficiency}}{8.33 \text{ lb/gal} \times \text{Temp. Rise}}$$

Temperature Rise

$$\text{Temp. Rise} = \frac{\text{Btu/hr Input} \times \% \text{ Efficiency}}{\text{GPM} \times 60 \text{ min/hr} \times 8.33 \text{ lb/gal}}$$

Heat - Up Time

$$\text{Time in hours} = \frac{\text{GPH} \times 8.33 \text{ lb/gal} \times \text{Temp. Rise}}{\text{Btu/hr Input} \times \% \text{ Efficiency}}$$

% Hot Water Required to provide Mixed Water at a lower Temperature

$$\% \text{ of the Hot water required in mixture} = \frac{\text{Temp. Mixed Water F} - \text{Temp. Cold Water F}}{\text{Temp. Mixed Hot F} - \text{Temp. Cold Water F}}$$

$$\text{kW} = \frac{m \times C_v \times \Delta T}{860 \times \text{No. of Hours}}$$

RANGE OF PRODUCTS

- ✦ HEAT EXCHANGER PACKAGE
- ✦ AIR RECEIVER
- ✦ STEAM ACCUMULATORS
- ✦ INDIRECT HEATED STORAGE CALORIFIERS
- ✦ FEED TANKS & CONDENSATE RECEIVERS
- ✦ BLOWDOWN VESSEL
- ✦ ELECTRIC WATER HEATERS
- ✦ BUFFER VESSELS



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