



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Firebox Boiler

PHW-FB

Hot water three pass boiler



Today's process and heating applications continue to be powered by steam and hot water. The mainstay technology for generating heating or process energy is the packaged firetube boiler. The packaged firetube boiler has proven to be highly efficient and cost effective in generating energy for process and heating applications. Efficient F.P.B three-pass design, available in 150 Kw to 1200 Kw models. Our Firebox boilers are fitted with a forced draft flame retention burner that results in an efficiency of over 85%. This boiler-burner combination gives reliable operation with minimum maintenance.



Standard features

All unit and factory packaged with operating controls, relief valves, burner and fuel train. Installation is made simple in that only service connections are need to place in operation. Flexible burner systems are available for firing natural gas & oil or combination. High density 2" mineral wool insulation assures lower radiant heat loss.

Efficiency

Conventional atmospheric burners operate at high excess air levels, up to 300%, which decrease flame temperature. Variation of adiabatic flame temperature by excess air is illustrated in fig. 1. It is obvious that excess air has substantial effect on flame temperature and consequently on the rate of heat transfer and efficiency. Influence of excess air on thermal efficiency at different stack temperature is illustrated in fig. 2. Forced draft burners which are used in our boilers operate at lower excess air, about 10-30 percent.

By accounting appropriate heat transfer area, stack temperature decreased to 130-150 oC which jail energy inside boiler. These cases provide acceptable efficiency of 84-85% which lessen operation costs. The initial cost of a boiler is the lowest portion of your boiler investment. Fuel costs and maintenance costs represent the largest portion of your boiler equipment investment. Some basic design differences can reveal variations in expected efficiency performance levels. Evaluating these design differences can provide insight into what efficiency value and resulting operating costs you can expect.

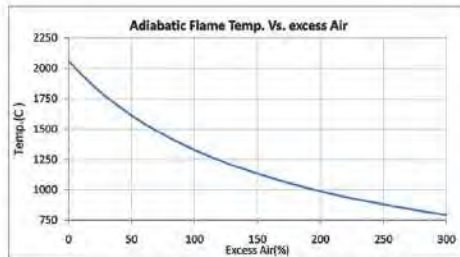


Figure 1

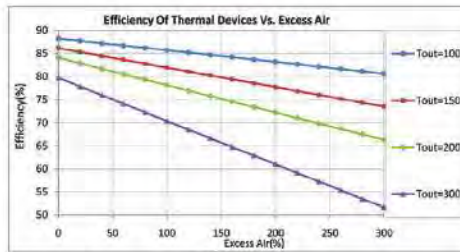
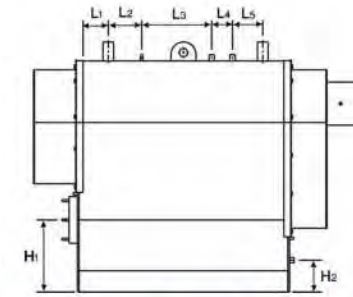
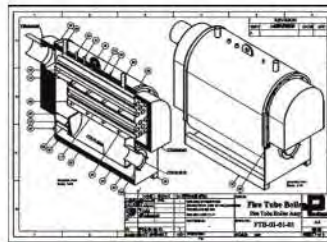
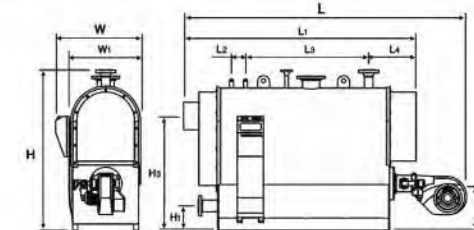


Figure 2



Type 1

Boiler model		PHW FB150	PHW FB200	PHW FB250	PHW FB300	PHW FB400
Input	KW	150	200	250	300	400
	Kcal/h	129000	172000	215000	258000	344000
Fuel consumption	M3/h	15	20	25	30	40
Supply & return nozzle size	in	2	2	2	3	3
Safety relief size	in	1/2	1/2	1/2	1	1
Drain size	in	1	1	1	2	2
Total length	mm	1610	1770	1930	1960	2180
Total height	mm	1180	1180	1180	1440	1440
Total width	mm	580	580	580	660	660
Dimension L1	mm	140	160	180	180	200
Dimension L2	mm	160	210	220	355	390
Dimension L3	mm	335	375	420	120	180
Dimension L4	mm	100	105	130	120	140
Dimension L5	mm	145	160	190	345	390
Dimension H1	mm	340	340	340	410	410
Dimension H2	mm	150	150	150	160	160
Operating weight	kg	760	850	940	1370	1540
Transport weight	kg	500	550	600	900	1000
Pressure vessel volume	M3	0.26	0.3	0.34	0.47	0.54



Type 2

Boiler model		PHW FB250	PHW FB325	PHW FB400	PHW FB500	PHW FB600	PHW FB700	PHW FB800	PHW FB1000	PHW FB1200
Input	KW	250	325	400	500	600	700	800	1000	1200
	Kcal/h	215000	279500	344000	430000	516000	602000	688000	860000	1032000
Fuel consumption	M3/h	25	32.5	40	50	60	70	80	100	120
Supply & return nozzle size	in	3	3	3	4	4	4	4	4	4
Safety relief size	in	1	1	1	1-1/2	1-1/2	1-1/2	1-1/2	1 1/2	1 1/2
Drain size	in	1	1	1	1-1/4	1-1/4	1-1/4	1-1/4	1 1/2	1 1/2
Hand hole size	in	6	6	6	8	8	8	8	10	10
Total length	mm	2400	2600	2800	2900	3100	3300	3500	3860	4080
Total height	mm	1850	1850	1850	1900	1900	1900	1900	2100	2100
Total width	mm	830	830	830	1090	1090	1090	1090	1190	1190
Dimension L1	mm	1900	2100	2300	2400	2600	2800	3000	3310	3524
Dimension L2	mm	110	120	140	140	140	160	160	230	250
Dimension L3	mm	1000	1100	1200	1230	1420	1500	1610	840	950
Dimension L4	mm	440	440	470	485	495	540	595	1040	1080
Dimension H1	mm	200	200	200	250	250	250	250	250	250
Dimension H2	mm	420	420	420	535	535	535	535	560	560
Dimension H3	mm	1180	1180	1180	1430	1430	1430	1430	1500	1500
Dimension W1	mm	760	760	760	920	920	920	920	1000	1000
Operating weight	kg	1960	2120	2340	3470	3740	4030	4340	4830	5040
Transport weight	kg	1220	1310	1400	2300	2460	2620	2790	3000	3300
Pressure vessel volume	M3	0.74	0.81	0.94	1.17	1.29	1.42	1.56	1.83	2.06





Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Thermal Oil Heater

PTOH



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

www.packmangroup.com

www.packmangroup.com

The Concept

Steam is typically used as a heat carrier in heating systems. But at high temperatures, steam requires a corresponding high operating pressure. In industrial process a high temperature fluid is often required, and achieving this steam can be controversial and expensive.

Thermal oil heaters are widely used for supplying heat up to 300°C at very low pressure, typically just the pressure required to pump the oil through the system. Comparing this to other heating fluid, e.g. steam, it would require a pressure of 85 bar to achieve this temperature. Thermal oil heating systems, as compared to other heating systems e.g. steam offer many advantages:

- Low pressure
- High temperature (Consequently smaller heating surface is required)
- No risk of corrosion (effectively a preservative, thus longer life)
- No risk of freezing when the plant is shut down
- No scale deposits (The heating surface shall be clean, thus retaining efficiency)
- No water softener for pretreatment of boiler feed
- No chemical dosing system
- No heat loss due to hot condensate and flash steam
- No steam traps
- No Blow down
- No risk of explosion by compressed gas
- No Deaerators & Condensation Tanks
- No vacuum Breaker
- No supervision required
- Less maintenance required
- Higher performance & efficiency
- More safety
- More reliable
- Accurate temperature control
- Quiet in operation (no steam stroke & flash steam noise)
- Easy to operate
- Rugged long life construction

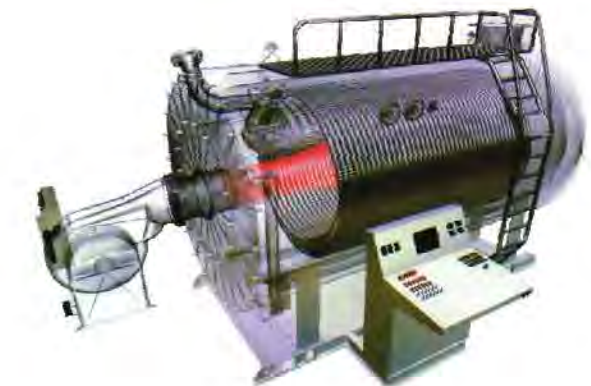
Industrial Applications

Thermal oil heaters are used in the following industries:

- Cement industry
- Chemical / petrochemical industry
- Polymer industry
- Textile industry
- Leather industry
- Oil industry
- Glue industry
- Food processing industry
- Metal industry
- Tyre industry
- Bitumen & Tar processing industry
- Paper mills industry
- Wood industry
- Soap & Detergent industry
- Pharmaceutical industry
- Paint & Varnish industry
- Packing & Packaging industry
- Glass industry
- Industrial Laundries

$$a_1 = f_1 \cdot \frac{\lambda}{d_1} \cdot 0.012 \cdot \text{Re}^{0.87} \cdot \text{Pr}^{0.4}$$

$$\dot{Q}_0 = f_2 \cdot \frac{d_F}{D} \cdot \epsilon_{FW} \cdot C_s (T_F^4 - T_w^4) - f_2 \cdot \dot{Q}_F$$



Design & Construction

The design & construction of Thermal Oil Heaters require special skills. Due to the fact that we have a permanent top level quality control, we can offer Thermal Oil Heaters featuring the highest heating surface area, efficiency, safety, reliability & durability. The design is based on a forced circulation heater with two coaxial cylindrical tube coils, in which the flue gas is conducted in a three pass counter flow system as described below:

- 1st Pass - The radiant heat from the flame of the burner is transferred to the thermal oil in the main combustion chamber.
- 2nd Pass - Combustion gases then pass the space between the inner and outer tube coils, where the heat is transferred by convection.
- 3rd Pass - The last convection pass is between the outer coil and the heater's shell, where combusting gases are hereafter cooled.

This principle ensures that maximum heat transfer is achieved before the combustion gases exit the heater, thus ensuring high thermal efficiency. Maximum heat transfer is also affected by thermal fluid velocity and heating surface area. To maintain optimum fluid velocity and hence low heat flux rate, the coil cross sectional and surface area is generously designed to keep film and bulk temperatures and linear velocity low to achieve maximum heat transfer and low pressure drop and also to protect the oil from degradation.

The design philosophy ensures that the film temperature in tubes is not exceeded beyond its permissible limits. We carry out analysis to determine whether this requirement is met for the parts of the tubes exposed to flame impingement. The maximum film temperature is also used to calculate the service life of thermal oil. Low film temperature, ensures longer life of thermal oil. The film temperature is at its highest, when the oil is subjected to the greatest thermal stress.

Our thermal design ensures a modest volume of the thermal oil relative to the heater capacity and allows thermal expansion due to the high oil temperature. Furthermore, coil life is extended by optimizing length to diameter ratio, heat flux rate and series flow.

Technical Specification

Packman supplies a comprehensive set of safety controls for Thermal Oil Heaters. The logic of control elements comply with the stringent regulations enforced by DIN 4754. There are many safety interlocks, incorporated in the system. All of our heaters incorporate continuous flow monitoring with Differential Pressure Controllers. The flow monitoring is an essential element, as it measures and monitors the minimum flow rate and if it drops below a certain minimum value, it shuts down the firing system.

Also the thermostats in the supply and return oil and in the flue gas are interlocked to the firing system and shall prevent an inadmissible temperature rise in the system. A level switch is also mounted on the expansion tank which is interlocked with the feed pump and burner.

Packman will integrate your desired control requirements from basic relay logic to advanced PLC to interface with your plant.

Scope of Services

- Conceptual & Feasibility Studies
- Detailed Proposal
- Consultancy
- Design
- Procurement
- Installation
- Supervision
- Commissioning
- After-sales services

Our Process & Mechanical Design Department, offer the following engineering services:

- Process Flow Diagram (PFD)
- Piping & Instrumentation Diagram (P&ID)
- Mass Flow Analysis
- Computational Flow Dynamics (CFD)
- Equipment & Piping Modelling
- Detailed Drawings of Equipment & Piping Arrangement
- Thermal oil Heater Design
- Heating coil Design
- Exhaust Gas Heater Design
- Suction Heater Design
- Flue Gas Recovery Design
- Heat Exchanger Design
- Steam Generator Design
- Heater Stack Design



- Gas Separator Design
- Blocking Vessel Design
- Expansion Tank Design
- Storage & Drain Tank Design
- Heavy Flue oil Filter Design
- Instrumentation & Controls Design



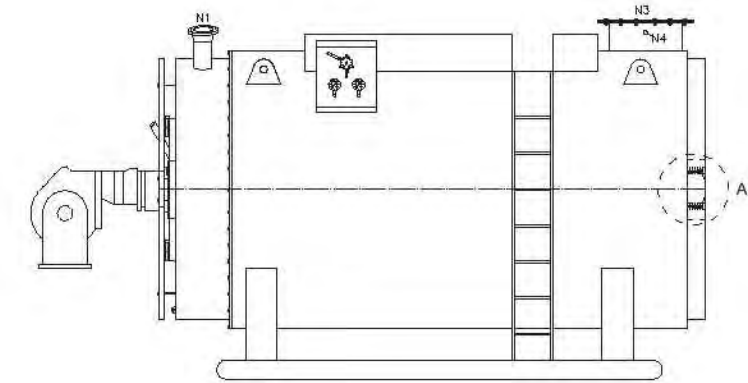
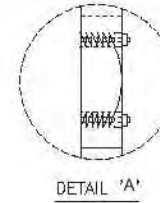
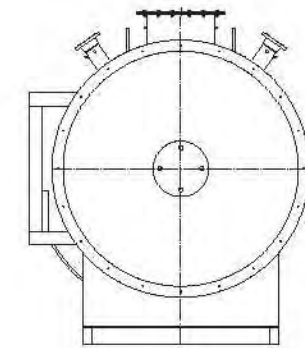
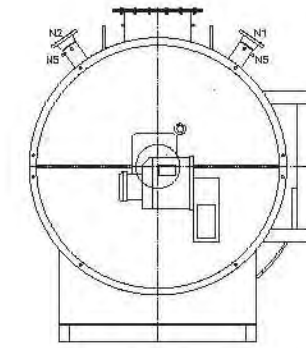
Productivity



Efficiency



Reliability



Technical Specification

Item No.	Description	Specification
1	Heater configuration	Horizontal
2	Heating capacity range	From 250.000 to 4.000.000 Kcal/h
3	Max. Operating temp. of thermal oil	300 °C
4	Design temp. of thermal oil	350 °C
5	Differential temp. of thermal oil	25 °C or 40 °C
6	Permissible operating Pressure	8.5 bar g
7	Design pressure	10 bar g
8	Pneumatic or hydrostatic test pressure	15 bar g
9	Thermal efficiency	83-85%
10	No. of circulation of flue gasses	3 pass
11	Coil material	St 35.8 according to DIN 17175
12	Shell material	Corten plate 9 CrNiCup 3-2-4 according to DIN 1.8962
13	Return chamber material	17 Mn 4 according to DIN 17155 (1.0481)
14	Heater standard	According to DIN 4754
15	Shell insulation	Rock wool, Thk. 150 mn, Density 120 kg/m3
16	Shell cover	Stainless steel SS 304, Thk. 1.5 mm
17	Test type	100%Radiography, Pneumatic, Penetration

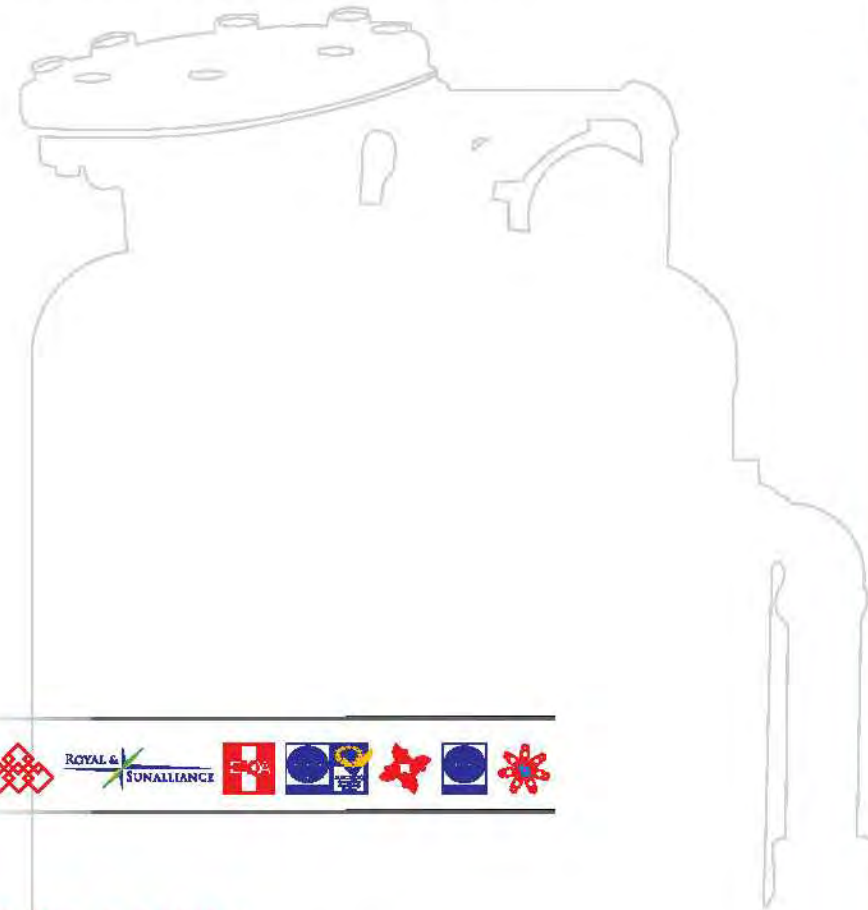
Dimensional Data

Model NO.	Heating Capacity (Kcal/h)	Overall Length L(mm)	Heater Length L ₁ (mm)	Heater Diameter D(mm)	Overall Height H(mm)	Flue Diameter Ø(mm)	Flange Diameter DN(mm)
ToH - 250	250.000	2900	2200	1200	1700	210	65
ToH - 500	500.000	3000	2400	1500	2000	335	80
ToH - 750	750.000	3300	2600	1750	2300	390	100
ToH - 1000	1.000.000	3700	2900	2000	2600	400	100
ToH - 1250	1.250.000	3800	3100	2000	2800	490	125
ToH - 1500	1.500.000	4100	3300	2000	2900	515	125
ToH - 1750	1.750.000	4500	3500	2300	3000	540	150
ToH - 2000	2.000.000	4800	3800	2300	3100	560	150
ToH - 2250	2.250.000	5300	4200	2300	3100	600	150
ToH - 2500	2.500.000	5600	4500	2300	3100	630	150
ToH - 2750	2.750.000	5850	4750	2300	3100	665	150
ToH - 3000	3.000.000	6100	5000	2300	3100	700	150
ToH - 3250	3.250.000	6400	5300	2500	3300	725	200
ToH - 3500	3.500.000	6750	5500	2500	3300	750	200
ToH - 3750	3.750.000	6950	5700	2500	3300	775	200
ToH - 4000	4.000.000	7250	6000	2500	3300	800	200





Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Water Softener

PWS



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

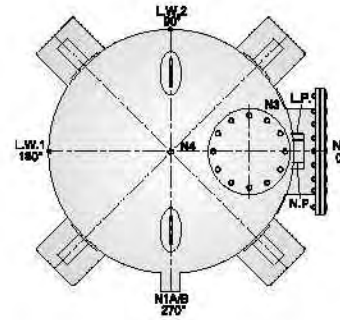
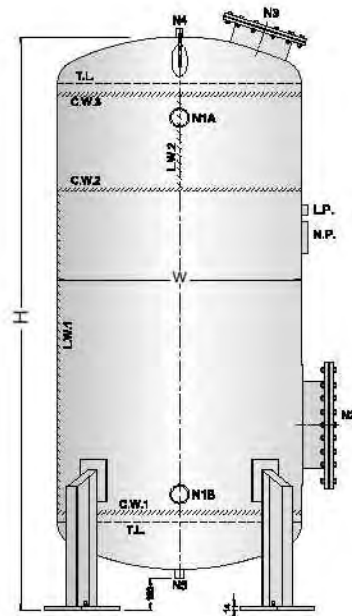
Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

[www . p a c k m a n g r o u p . c o m](http://www.packmangroup.com)

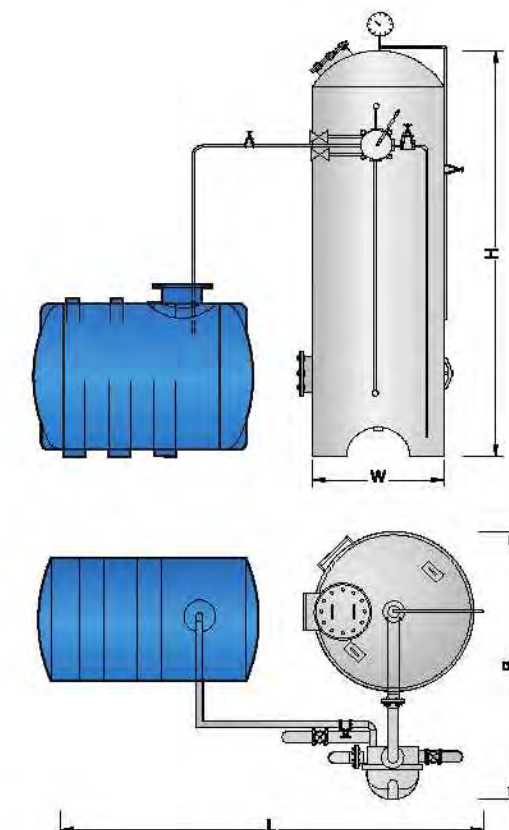
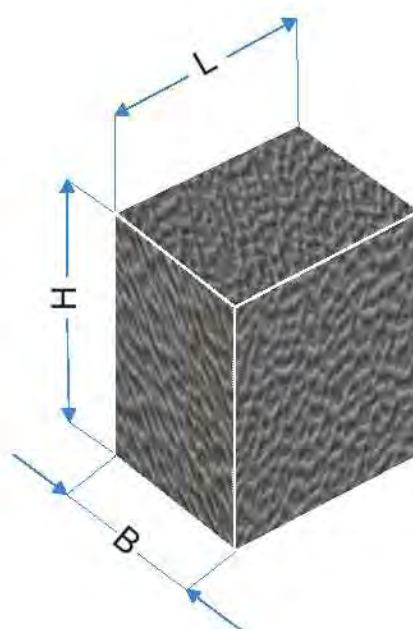
www.packmangroup.com



- There are two kinds of control valves, hand adjustment and semi automatic.
- The resin storage tank is made of ST37 with 6-10 thickness and two layer epoxy.
- The salt tank is made of steel or plastic and the nozzles are made of brass.
- The internal water temperature is between 5-55 degree of centigrade.
- working pressure: 1-6 bar
- Test pressure: 10 bar

water Softener Capacity (Grain) = $\frac{\text{Flow Rate (Gpm)} \times 60 \times \text{Washing Cycle (hr)} \times \text{Water Hardness (ppm)}}{17.1}$

Model	PWS-3	PWS-6	PWS-9	PWS-12	PWS-15	PWS-18	PWS-21	PWS-24	PWS-30	PWS-36		
Capacity (Grain)	30,000	60,000	90,000	120,000	150,000	180,000	210,000	240,000	300,000	360,000		
Vessel Diameter (W)	(mm) 270	270	300	400	450	500	500	550	600	600		
Inlet/Outlet Size	(in.) 3/4"	3/4"	3/4"	1"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"		
Flow Data	Service Flow Rates	Medium (gpm)	2.7	5.3	8.1	10.6	13.3	15.9	18.6	21.2	26.5	31.8
		Maximum (gpm)	4.4	8.8	13.3	17.7	22.1	26.5	30.9	35.3	44.2	53.1
	Regeneration (NaCl Injection)	Brine Flow Rate (gpm)	0.4	0.9	1.3	1.8	2.2	2.7	3.1	3.5	4.4	5.3
		Min. Req. Duration (min.)	22	22	22	22	22	22	22	22	22	22
Rinse	Flow Rate (gpm)	1.6	3.2	4.8	6.4	8.1	9.5	11.1	12.7	15.9	19.1	
	Min. Req. Duration (min.)	17	17	17	17	17	17	17	17	17	17	
Resin	Volume (lit)	25	50	75	100	125	150	175	200	250	300	
Brine 10% NaCl Solution	NaCl (kg)	4	8	11	15	19	23	26	30	38	45	
General Dimensions	Height (Cap top)	(mm) 1,220	1,740	2,010	1,690	1,690	1,690	1,860	1,800	1,910	2,140	
	Total Height (H)	(mm) 1,350	1,900	2,150	1,850	1,850	1,850	2,000	1,950	2,050	2,250	
	Occupied Space	(mm x mm)	560 x 450	560 x 560	580 x 500	790 x 650	830 x 700	880 x 740	880 x 740	x 790	950 x 780	950 x 780
Total Pressure Drop	(Type, in.)	4	4	5	6	6	6	6	8	8	8	



Model	PWS-45	PWS-54	PWS-75	PWS-96	PWS-120	PWS-150	PWS-180	PWS-200	PWS-220	PWS-250	PWS-300	PWS-360		
Capacity (Grain)	450,000	540,000	750,000	960,000	1,200,000	1,500,000	1,800,000	2,000,000	2,200,000	2,500,000	3,000,000	3,600,000		
Vessel Diameter (W)	(mm) 850	750	800	900	1000	1150	1250	1300	1350	1400	1500	1600		
Inlet/Outlet Size	(in.) 2"	2"	2"	2"	2 1/2"	2 1/2"	4"	4"	4"	4"	4"	4"		
Flow Data	Service Flow Rates	Medium (gpm)	39.8	47.7	66.3	84.8	106.1	132.5	159.2	177.6	193.5	220.8	265.1	318.2
		Maximum (gpm)	66.3	79.5	110.4	141.3	176.7	220.8	265.1	295.9	322.4	368.1	441.7	530.1
	Regeneration (NaCl Injection)	Brine Flow Rate (gpm)	6.6	8.1	11.1	14.1	17.7	22.1	26.5	29.6	32.2	36.8	44.2	53.1
		Min. Req. Duration (min.)	22	22	22	22	22	22	22	22	22	22	22	
Rinse	Flow Rate (gpm)	23.9	28.6	39.8	50.9	63.6	79.5	95.4	106.5	116.1	132.5	159.1	190.8	
	Min. Req. Duration (min.)	17	17	17	17	17	17	17	17	17	17	17		
Resin	Volume (lit)	375	450	625	800	1000	1250	1500	1675	1825	2075	2500	3000	
Brine 10% NaCl Solution	NaCl (kg)	56	68	94	120	150	188	225	251	274	313	375	450	
General Dimensions	Height (Cap top)	(mm) 2,320	2,250	2,530	2,600	2,700	2,700	2,830	2,930	2,930	3,030	3,150	3,300	
	Total Height (H)	(mm) 2,450	2,400	2,650	2,750	2,800	2,800	2,950	3,050	3,050	3,150	3,300	3,450	
	Occupied Space	(mm x mm)	1300 x 850	1380 x 1000	1510 x 1060	1600 x 1150	1770 x 1240	1900 x 1360	2230 x 1470	2280 x 1500	2330 x 1560	2380 x 1610	2480 x 1710	2580 x 1810
Total Pressure Drop	(Type, in.)	8	10	10	10	16	16	16	16	16	16	16		

1 in = 25.3995 mm; 1 ft = 12 in = 0.3048m
 1 lb = 7000 grain = 0.4536 kg
 1 gal = 4.546 l (brit) = 3.785 l (am) = 0.16 cu. ft.
 1 bar = 14.504 psi = 0.984 atm = 100 kpa
 1 atm = 1.013 bar; 1 kg/cm = 14.233 lb/sq in (psi)
 All Specifications are subject to change without notice.





Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Combination Boiler

PCB

Packman Combination Boiler is a complete central heating and hot water boiler in a single, remarkably compact unit, produced to most stringent quality control



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

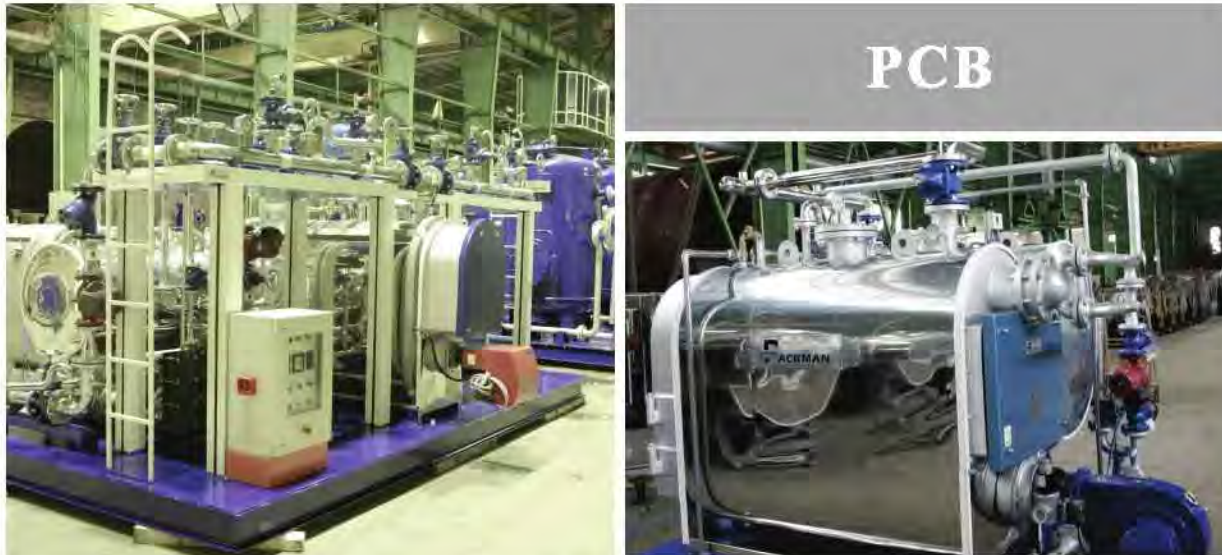
Factory Tel: +98 31 33 68 61 80

[www . p a c k m a n g r o u p . c o m](http://www.packmangroup.com)

[www . p a c k m a n g r o u p . c o m](http://www.packmangroup.com)

Item	Model PCB	100	150	200	250	300	400	500
Capacity	Kcal/h	100,000	150,000	200,000	250,000	300,000	400,000	500,000
Flow rate	lit/h	500	750	1,000	1,200	1,500	2,000	2,500
Fuel consumption max								
Oil No.2	lit/h	14	21	28	35	42	56	70
Gas	m ³ /h	13	20	26	32.5	39	53	66
Electric power required	Kw	0.5	0.5	1	1.5	1.5	1.75	2.1
Water contents	lit	350	400	450	500	600	700	800
Package dimension								
Total height	mm	1,900	2,000	2,000	2,000	2,000	2,000	2,100
Total length	mm	2,000	2,000	2,000	2,200	2,300	2,500	2,700
Total width	mm	900	1,100	1,100	1,100	1,100	1,200	1,250
Outflow & return nozzles	mm	32	32	40	50	50	65	75
Transport weight	kg	700	800	950	1,50	1,350	1,650	1,900
Service weight	kg	1,000	1,100	1,180	1,400	1,700	2,000	2,400

- PACKMAN PCB is special oil/gas hot water steel boiler. PCB designed for use in installations conforming to highest global standards with a permissible overall operating pressure of min 6.0 bar.



Item	Model PCB	600	700	800	1000	1250	1400	1600	2000
Capacity	Kcal/h	600,000	700,000	800,000	1,000,000	1,250,000	1,400,000	1,600,000	2,000,000
Flow Rate	lit/h	3,000	3,500	4,000	5,000	6,000	7,000	8,000	10,000
Fuel Consumption Max									
Oil No.2	lit/h	84	98	110	140	175	190	220	280
Gas	m ³ /h	75	87	100	133	165	185	210	265
Electric Power Required	Kw	2.1	2.1	2.1	3.5	3.5	3.5	4	8
Water Contents	lit	1000	1100	1500	1800	2200	2300	2700	3000
Package Dimension									
Total Height	mm	2,500	2,200	2,600	2,600	2650	2700	2700	2700
Total Length	mm	2,700	2,700	2,800	3500	3700	3800	4000	4500
Total Width	mm	1,900	1,900	2000	2000	2200	2300	2400	2500
Outflow & Return Nozzles	mm	100	100	100	125	125	125	150	150
Transport Weight	kg	2200	2300	2700	3700	4200	4300	5000	5800
Service Weight	kg	3200	3400	4200	5500	6400	600	7700	8800

- Providing efficient space heating to meet every customers needs.
- Fast production of hot water through indirect oil or gas - fired submerged copper water heaters which are specially designed for hotels, swimming pools, schools, coil mosques, restaurants, Laundromats etc., where large quantities of hot water are required.
- Full automatic operation.
- Easy transport.
- Easy to install & service.
- Less of the pipework that a convention requires.
- Significant saving on space, installation time and above all, running costs.





Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Hot Water Steel Boiler

PHWB



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

[www . p a c k m a n g r o u p . c o m](http://www.packmangroup.com)

[www . p a c k m a n g r o u p . c o m](http://www.packmangroup.com)

Hot Water Steel Boiler

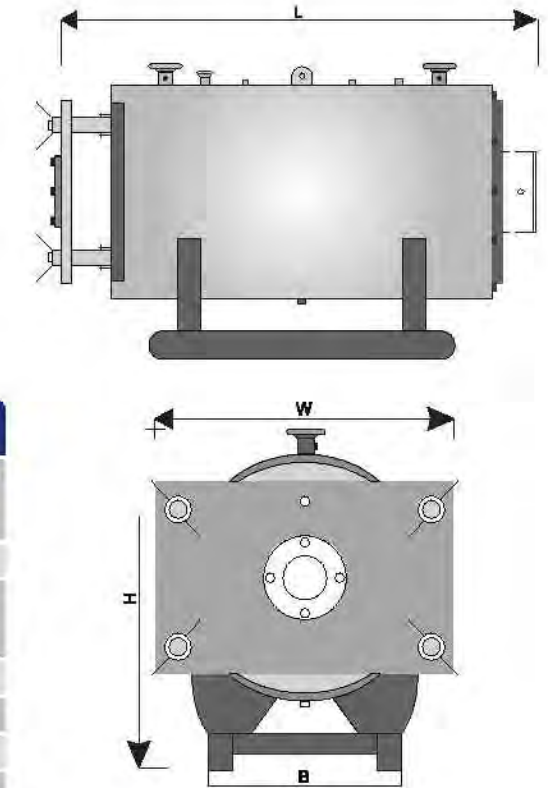
- PACKMAN PHWB is special oil/gas hot water steel boiler designed for use in installations conforming to highest global standards with a permissible overall operating pressure of min. 6.0 bar.
- The main prerogative in the design of the PACKMAN PHWB has been economy in conjunction with maximum protection of the environment. Favorable base measurements ensure that it fits into small heating installations where space is tight.
- The reverse combustion chamber offers optimum conditions for complete combustion which, in conjunction with balanced thermal stress of all heating surfaces, guarantees a high degree of fuel and heat utilization.
- Due to the concentric arrangement of all heating surfaces around the flame and streamlined shape of the turbulence pipes the intrinsic energy requirement is reduced to a minimum.
- The symmetrical construction layout means that the boiler is sufficiently elastic with heat stresses eliminated, which in combination with the advantage of easy maintenance ensures a long service life.
- In the cylindrical reverse combustion the returning flue gases envelop the burner flame thus ensuring complete soot-free combustion with a high CO₂ content, the most important prerequisite for environmentally harmless boiler operation.
- The boiler body is covered with 100 mm heat insulation mats with cladding of stainless steel sheets
- PACKMAN PHWB is produced in modern, sophisticated and well-equipped workshops. Careful testing ensures a top level standard of quality.

Boilre Type		PHWB	10	15	20	25	30
Heat Output		Kcal/h	100,000	150,000	200,000	250,000	300,000
		KW	117	174	232	290	350
Overall Length	L	mm	1740	2000	2030	2040	2040
Boiler Width	W	mm	1050	1050	1100	1100	1200
	B	mm	620	620	660	660	740
Boiler Height	H	mm	1280	1280	1330	1350	1450
Flow Gas Resistance		mbars	1.20	1.20	1.50	1.50	1.70
Transport Weight		kg	700	750	800	1000	1200
Operating Weight		kg	1000	1050	1130	1360	1600

Boilre Type		PHWB	40	50	60	70	80
Heat Output		Kcal/h	400,000	500,000	600,000	700,000	800,000
		KW	465	581	697	814	930
Overall Length	L	mm	2350	2450	2450	2600	2730
Boiler Width	W	mm	1200	1220	1320	1400	1450
	B	mm	740	780	860	900	950
Boiler Height	H	mm	1450	1500	1600	1650	1700
Flow Gas Resistance		mbars	2.60	3.20	3.50	3.90	4.10
Transport Weight		kg	1400	1600	2000	2100	2400
Operating Weight		kg	1900	2200	2750	2975	3400

Hot Water Steel Boiler PHWB

The Weights are of the boilers with working pressure up to 6 bar. All specifications are subject to change without notice. Further information is available upon request.



Boilre Type		PHWB	90	100
Heat Output		Kcal/h	900,000	1,000,000
		KW	1046	1162
Overall Length	L	mm	2830	3000
Boiler Width	W	mm	1550	1670
	B	mm	1000	1120
Boiler Height	H	mm	1830	1940
Flow Gas Resistance		mbars	4.20	4.60
Transport Weight		kg	3000	3500
Operating Weight		kg	4300	5200

Boilre Type		PHWB	125	150	175	200	250	270	300
Heat Output		Kcal/h	1.250.000	1.500.000	1.750.000	2.000.000	2.500.000	2.700.000	3.000.000
		KW	1453	1744	2035	2325	2907	3139	3488
Overall Length	L	mm	3600	3700	3800	3800	3900	4100	4100
Boiler Width	W	mm	1670	1670	1750	1860	2000	2100	2280
	B	mm	1120	1120	1170	1260	1360	1440	1560
Boiler Height	H	mm	1940	1940	2000	2110	2280	2380	2530
Flow Gas Resistance		mbars	3.60	4.30	5	5.60	6.60	7.60	7.70
Transport Weight		kg	4000	4700	4800	5500	6500	6600	7700
Operating Weight		kg	6100	7200	7500	8500	10300	10500	12000
LS		mm	1545	1545	1545	1545	1545	1545	1545
LT		mm	295	295	345	345	365	365	365
Outflow and Return Pipe Connections		in	6	6	8	8	8	8	8
Safety Valve		in	2 ½	2 ½	3	4	4	4	4
Drains		in	1 ¼	1 ¼	1 ¼	1 ¼	1 ¼	1 ¼	1 ¼





**Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...**



Three Pass Boilers

PHWB

PSBH

Hot water boilers P.H.W.B series

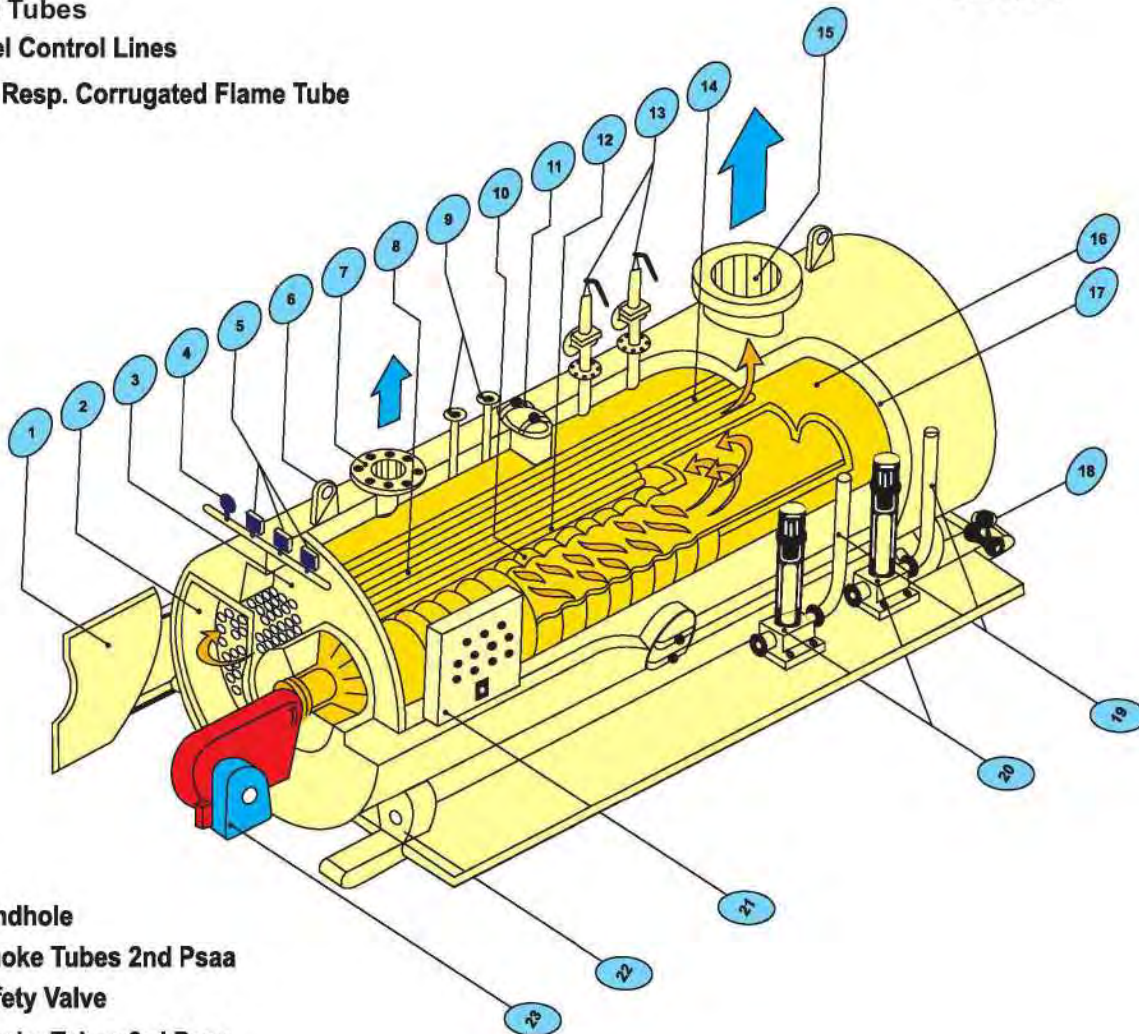
Steam boilers horizontal P.S.B.H series

Three pass boiler

PHWB-PSBH

- 1-Hinged Front Door
- 2-Reversing Chamber
- 3-Boiler Body
- 4-Pressure Gauge
- 5-Pressure Switches
- 6-Lifting Lug
- 7-Main Steam Outlet
- 8-Fire Tubes
- 9-Level Control Lines
- 10-Flat Resp. Corrugated Flame Tube

- 17-Insulation
- 18-Drain Valve
- 19-Feed Water Lines
- 20-Feed Water Pumps
- 21-Electric Control Panel
- 22-Boiler Frame
- 23-Burner



- 11-Handhole
- 12-Smoke Tubes 2nd Pass
- 13-Safety Valve
- 14-Smoke Tubes 3rd Pass
- 15-Chimney
- 16-Reversing Chamber

www.Packmangroup.com

Boiler Description

The PACKMAN three-pass boilers are produced in workshops equipped with the most modern machines. Materials and Workmanship are submitted to a permanent quality control. Thus it is possible to produce reliable construction elements and groups. Reliable to make sure that you can rely on your PACKMAN boiler, even after a number of years, and these are the convincing advantages of the PACKMAN three-pass boiler:

- adaptation of the thermal layout to fuel, medium and operation;
- adjusting of the boiler to the plant with regard to heating circuit, environmental and constructional conditions;
- dimensioning and selection of material qualities according to thermal stress and charge;
- constructional design in consideration of the greatest possible elasticity for absorption of thermal stresses;
- extensive heat utilization by water cooling of the flue gas touched surfaces and reduction of the radiation losses to a minimum;
- over pressure operation at the flue gas side and dimensioning of the fire tube, adapted to the furnace, result in a complete burn-out and thus in highest possible furnace efficiency rates;
- low losses combined with low energy demand and optimum controllability enable the most economical operation which can be achieved with today's technique.

The three-pass boiler is robust and economical. The furnace is formed by the fire tube. The flue gases are directed through topped smoke tubes where they are cooled down. As it has proved to be especially economical to lead the flue gases through three passes most of the large water space boilers built today belong to this type-hence the name "three-pass boilers". Because of its constructional design the three-pass boiler is especially suitable for the combustion of liquid or gaseous fuels. It can, however, as well be used for solid fuels. Coal or wood preburners.

■ Fire tube:

In the three-pass boiler the fire tube forms the combustion chamber. The chosen diameter makes sure that an unobjectionable flame can develop and a complete burnout is guaranteed. The decision whether plane or corrugated fire tubes are to be used depends on the diameter and the working pressure. The arrangement in the inferior part of the water space has an especially favorable effect on the heat exchange and the water circulation, and allows a clear arrangement of the remaining flue gas passes. The limited thermal load for fire tubes prescribed by the German law demands the installation of two fire tubes at boiler capacities exceeding 9.3 MW. In several foreign countries, however, higher capacities are allowed with one fire tube.

■ Boiler supports, skids:

The boiler body is based on supports. Most of the units are delivered on skids; by that special foundations for the installation are not required. In this case all accessories which are necessary for operation, such as oil or gas firing equipment, combustion air fan, oil preheater, control panel or switchboard and feeding device, can be mounted on the skid, too.

■ Boiler body, insulation:

The cylindrical boiler body forms the water and the steam space and contains the heating surfaces. Outside it is provided with a highly effective insulation as well as with a cladding of galvanized sheets (at both sides).

All connection pieces with mountings, fittings, control instruments as well as service platform, flue gas reversing chambers and flue gas duct arc mounted at boiler body. Man-and hand-holes allow inspection at the water side and supervision of the heating surfaces.

■ Smoke tubes:

The second and third boiler pass are formed by thick-walled smoke tubes which are welded into the end plates. The tubes are easily accessible and can be cleaned without problems. The arrangement of the smoke tubes considers the recommendation of ascending flue passes in order to prevent the formation of residual- or lingering gases.

■ Rear reversing chamber:

PACKMAN three pass boilers with a fire tube have an interior flue gas reversing chamber, situated in the water space. Here the direction of the flue gases, coming out of the fire tube is changed and they are distributed to the smoke tubes of the second pass. The all over cooling of the reversing chamber contributes to an optimum heat utilization. At PACKMAN double outside the boiler body. The exterior reversing chamber is formed of tightly welded tube walls; it is water cooled and absolutely gas tight. At this type, too, an economical heat utilization has been drawn into consideration.

Access openings allow an flue gas side inspection of the interior and exterior reversing chamber.

■ Front reversing chamber:

Inside of a tightly welded and insulated chamber made of steel sheets the flue gases are led from the second to the third boiler pass. The reversing chamber is equipped with large doors, allowing free access to the smoke tubes and easy maintenance and cleaning. High quality tightening material guarantees that the doors are shut gas tight. Special literature on three-pass boiler with wood or coal firing as well as on special constructions can be sent upon request. In addition our engineers as well as our representatives abroad are always at your disposal for further information and assistance.



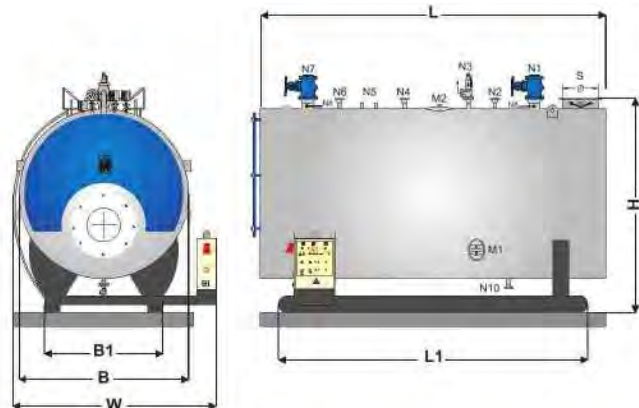
Three pass boiler

PHWB

Hot water boiler type

PHWB1

- for the combustion of fuel oil EL or gas generating hot water up to approx 200°C for plants acc. to DIN 4751 and 4752
- design pressure up to 20 bar
- thermal capacity 0.46- 1.63 MW



Boiler type			PHWB1	46	58	75	92	115	145	160
Thermal capacity			MW	0.46	0.58	0.75	0.92	1.15	1.45	1.60
water contents full			m ³	1.52	2.10	2.50	2.90	2.85	4.09	4.00
transport weight at 8 bar			t	3.05	3.50	3.60	4.50	4.60	5.50	5.60
service weight at 8 bar			t	5.00	6.00	6.00	7.50	7.50	10.60	10.60
press. Loss comp. Chamber			mbar	9.0	6.5	9.5	6.5	9.5	8.5	12.5
gas contents up to boiler end			m ³	0.57	0.84	0.84	1.01	1.01	1.70	1.70
Boiler dimensions										
	length	L	mm	2870	3070	3070	3300	3300	3500	3500
	width	B	mm	1260	1360	1360	1560	1560	1760	1760
	height	H	mm	2000	2140	2140	2340	2340	2540	2540
Ground frame										
	length	L1	mm	2740	2940	2940	3170	3170	3370	3370
	width	B1	mm	900	1000	1000	1100	1100	1200	1200
conn. piece distances										
	outflow	L2	mm	430	480	480	450	450	450	450
	safety valve	L3	mm	850	950	950	990	990	1040	1040
	ex-tank	L4	mm	1920	1920	1920	1900	1900	2000	2000
	return	L5	mm	2370	2570	2570	2620	2620	2770	2770
nominal widths and pressures										
outflow and return at Δt										
	20°C	PN40	DN	80	80	100	100	125	150	150
	30/40°	PN40	DN	50	65	65	80	80	100	100
	50°C		DN	40	50	50	65	65	80	80
safety valve make lesser										
at design pressure										
	6bar	PN25	DN	25	25	32	32	40	40	40
	8bar	PN25	DN	25	25	25	32	32	40	40
	10bar	PN25	DN	25	25	25	25	32	32	40
	13bar	PN25	DN	25	25	25	25	32	32	32
	16bar	PN25	DN	25	25	25	25	25	32	32
feeding			PN40	DN	25	25	25	25	25	25
drainage			PN40	DN	25	25	25	25	25	25
venting			PN40	DN	20	20	20	20	20	20

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi
 1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi); 1 BHP = 33,480 BTU/hr = 9.803 KW
 All Specifications are subject to change without notice.

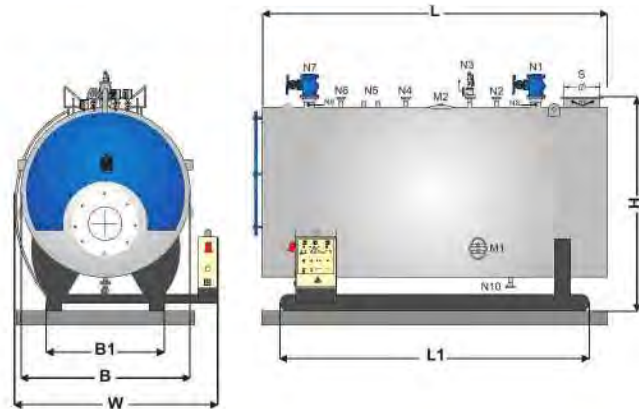
www.Packmangroup.com



hot water boiler type

PHWB2

- for the combustion of fuel oil EL or gas generating hot water up to 120°C for plants acc. to DIN 4751
- design pressure up to 16 bar
- thermal capacity 1.15 - 9.30 MW
- Execution for multi - storey buildings
- exceeding 6 bar with special permission.



Boiler type		PHWB2	115	145	185	230	290	370	460	580	700	820	930	
Thermal capacity		MW	1.15	1.45	1.85	2.30	2.90	3.70	4.60	5.80	7.00	8.20	9.30	
water contents full		m³	2.09	2.47	2.98	3.20	4.55	5.97	7.50	9.75	11.70	13.90	17.70	
transport weight		t	3.47	4.11	4.66	5.94	7.24	8.26	10.37	13.4	15.41	17.71	2060	
service weight		t	6.20	7.30	8.40	11.00	13.00	15.70	17.90	25.10	29.90	34.80	42.20	
press. Loss comp. Chamber		mbar	9.5	9.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	
gas contents up to boiler end		m³	1.45	1.79	2.07	3.00	3.80	4.90	6.00	7.60	9.50	12.60	16.50	
Boiler dimensions	length	L	mm	3750	3950	4050	4100	4700	4850	5050	5600	57500	6100	6450
	width	B	mm	1360	1460	1560	1710	1860	2010	2160	2310	2510	2260	2910
	height	H	mm	1650	1750	1850	2000	2150	2300	2450	2600	2800	2950	3200
Ground frame	length	L1	mm	3300	3500	3600	3650	4150	4300	4500	5000	5150	5500	5850
	width	B1	mm	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
conn. piece distances														
	outflow	L2	mm	650	650	650	650	750	750	800	900	900	900	900
	safety valve	L3	mm	1150	1200	1200	1250	1450	1150	1600	1700	1800	1900	1900
	ex-tank	L4	mm	2700	2900	3000	3000	3500	3650	3900	4350	4550	4900	4900
	return	L5	mm	3000	3200	3300	3350	3900	4000	4200	4750	4850	5200	5200
nominal widths and pressures														
outflow & return at Δt	20°C	PN 16	DN	125	150	150	200	200	200	250	250	300	300	300
	30/40°C	PN 16	DN	100	100	125	150	150	150	200	200	200	250	250
safety outflow	PN 16	DN	65	65	80	100	100	100	125	125	150	150	150	
drainage	PN 40	DN	25	25	32	32	32	32	40	40	40	50	50	

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi
 1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in (psi); 1 BHP = 33,480 BTU/hr = 9.803 KW
 All Specifications are subject to change without notice.



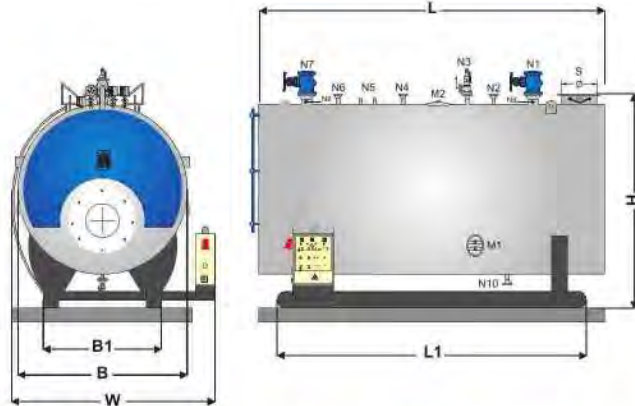
Three pass boiler

PHWB

Hot water boiler type

PHWB3

- for the combustion of fuel oil or gas generating hot water exceeding 120°C up to appr. 180 C for plants acc. to DIN 4752, group I and II
- design pressure up to 16 bar
- thermal capacity 1.15 - 9.30 MW



Boiler type		PHWB3	115	145	185	230	290	370	460	580	700	820	930
Thermal capacity		MW	1.15	1.45	1.85	2.30	2.90	3.70	4.60	5.80	7.00	8.20	9.30
water contents full		m³	4.7	5.3	6.3	6.6	8.0	9.9	12.6	15.4	17.5	19.5	21.8
transport weight at 8 bar		t	6.5	6.8	7.7	8.6	10.4	11.7	14.4	16.7	19.8	23.5	25.5
service weight at 8 bar		t	12.5	13.0	15.5	18.0	21.5	26.0	31.5	37.0	43.5	52.0	56.0
press. Loss comp. Chamber		mbar	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.5
gas contents up to boiler end		m³	1.70	2.50	3.20	4.50	4.80	5.20	6.30	7.20	10.60	13.80	17.50
Boiler dimensions	length L	mm	3900	3900	4600	4700	5150	5250	5950	6050	6200	6650	6750
	width B	mm	1700	1800	1950	2000	2150	2300	2500	2600	2750	2900	3000
	height H	mm	1950	2050	2200	2250	2400	2550	2750	2850	3000	3150	3250
Ground frame	length L1	mm	3450	3450	4050	4150	4550	4650	5350	5450	5800	5950	6050
	width B1	mm	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
conn. piece distances	outflow L2	mm	900	900	900	900	900	900	900	900	900	900	900
	safety valve L3	mm	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
	ex-tank L4	mm	2800	2800	3150	3300	3700	3750	4100	4200	4300	4500	4600
	return L5	mm	3250	3250	3700	3900	4350	4450	5100	5100	5100	5500	5500
	nominal widths and pressures outflow & return at Δt												
	20°C PN*)	DN	125	150	150	200	200	200	250	250	300	300	300
	30/40°C PN*)	DN	100	100	125	150	150	150	200	200	200	250	250
	50°C PN*)	DN	80	80	80	100	100	125	150	150	150	200	200
safety valve make lesser at design pressure	6 bar PN 25	DN	40	40	50	50	65	65	80	80	100	100	100
	8 bar PN 25	DN	32	40	40	50	50	65	65	80	80	100	100
	10 bar PN 25	DN	32	32	40	40	50	50	65	65	80	80	80
	13 bar PN 25	DN	25	32	40	40	40	50	65	65	65	80	80
	16 bar PN 25	DN	25	32	32	40	40	50	50	65	65	65	80
feeding	PN 40	DN	25	25	25	25	25	32	32	32	32	40	40
drainage	PN 40	DN	25	25	25	32	32	40	40	40	50	50	50
venting in outflow intermediary piece	PN 40	DN	20	20	20	20	20	25	25	25	25	25	25

*) up to DN 150 PN 40, from DN 200 on PN 25

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cn² = 14.223 lb/sq in(psi); 1 BHP = 33,480 BTU/hr = 9.803 KW

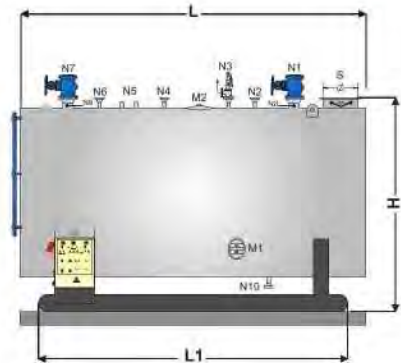
All Specifications are subject to change without notice.



Hot water boiler type

PHWB4

- for the combustion of fuel oil or gas generating hot water up to appr. 200°C for plants acc. to DIN 4752, group I and II
- design pressure up to 25 bar
- thermal capacity 1.60 - 9.00 MW



Boiler type		PHWB4	160	200	260	320	400	450	500	600	700	800	900
Thermal capacity		MW	1.60	2.00	2.60	3.20	4.00	4.50	5.00	6.00	7.00	8.00	9.00
water contents full		m³	6.03	7.40	9.48	11.87	13.34	13.69	13.91	17.54	18.73	20.46	24.10
transport weight at 8 bar		t	6.5	7.6	9.0	11.0	12.5	14.0	15.1	17.6	19.6	22.2	25.9
service weight at 8 bar		t	13.2	15.8	19.5	24.0	27.2	29.2	30.8	37.0	40.5	45.0	52.0
press. Loss comp. Chamber		mbar	11.0	11.0	11.0	11.0	11.0	11.5	12.5	12.5	13.0	12.5	12.0
gas contents up to boiler end		m³	3.00	3.80	4.80	6.25	7.40	8.80	9.60	11.75	13.50	15.25	19.00
Boiler dimensions	length L	mm	4050	4650	5050	5450	5700	5900	6150	6500	6800	6800	7300
	width B	mm	2100	2150	2300	2450	2550	2600	2600	2800	2850	3000	3150
	height H	mm	2350	2400	2550	2700	2800	2850	2850	3050	3100	3250	3400
Ground frame	length L1	mm	3200	3800	4200	4600	4800	5000	5200	5500	5800	5800	6300
	width B1	mm	1400	1450	1550	1650	1750	1800	1800	1950	1950	2100	2200
conn. piece distances	outflow L2	mm	700	700	700	750	750	800	850	900	900	900	950
	safety valve L3	mm	1300	1350	1400	1550	1600	1650	1700	1800	1800	1850	1900
	ex-tank L4	mm	2850	3450	3800	4100	4300	4400	4600	4900	5100	5000	5400
	return L5	mm	3300	3900	4300	4650	4900	5000	5250	5600	5900	5900	6350
nominal widths and pressures outflow & return at Δt													
	20°C PN*)	DN	150	200	200	250	250	300	300	300	350	350	400
	30°C PN*)	DN	125	125	150	150	200	200	200	250	250	300	300
	40°C PN*)	DN	100	125	125	150	150	200	200	200	200	250	250
	50°C PN*)	DN	100	100	125	125	150	150	150	200	200	200	200
safety valve make lesser at design pressure													
	6 bar PN 25	DN	50	50	65	65	80	80	80	100	100	100	125
	8 bar PN 25	DN	40	50	50	65	65	65	80	80	80	100	100
	10 bar PN 25	DN	40	40	50	50	65	65	65	80	80	80	80
	13 bar PN 25	DN	32	40	40	50	50	50	65	65	65	80	80
	16 bar PN 25	DN	32	32	40	40	50	50	50	65	65	65	65
	20 bar PN 40	DN	25	32	32	40	40	50	50	50	65	65	65
	25 bar PN 40	DN	25	32	32	32	40	40	40	50	50	50	65
feeding	PN 40	DN	25	25	25	25	32	32	32	32	32	40	40
drainage	PN 40	DN	25	25	32	32	32	40	40	40	50	50	50
venting in outflow intermediary piece	PN 40	DN	20	20	20	20	20	20	20	20	20	20	20

*) up to DN 150 PN 40, from DN 200 on PN 25

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi); 1 BHP = 33,480 BTU/hr = 9.803 KW

All Specifications are subject to change without notice.



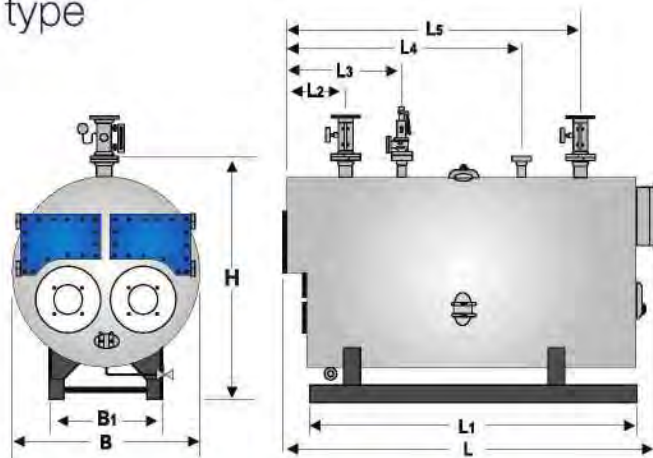
Three pass boiler

PHWB

Hot water double-flue boiler type

PHWB5

- for the combustion of fuel oil or gas generating hot water up to appr. 200°C for plants acc. to DIN 4751 and 4752
- design pressure up to 20 bar
- thermal capacity 10.5 - 18.5 MW



Boiler type		PHWB5	1050	1200	1300	1450	1650	1850
Thermal capacity		MW	10.50	12.00	13.00	14.50	16.50	18.50
water contents full		m ³	25.50	27.90	29.05	33.80	37.15	40.36
transport weight at 8 bar		t	28.0	31.0	34.0	39.0	42.0	49.0
service weight at 8 bar		t	59.0	65.0	70.0	80.0	87.0	98.0
press. Loss comp. Chamber		mbar	12.0	12.0	12.0	13.0	10.5	10.0
gas contents up to boiler end		m ³	22.0	24.0	27.0	29.0	34.0	39.5
Boiler dimensions	length L	mm	7400	7400	7400	7700	8200	8200
	width B	mm	3400	3550	3650	3800	3900	4100
	height H	mm	3850	4000	4100	4250	4350	4550
Ground frame	length L1	mm	5750	5750	5750	6050	6550	6550
	width B1	mm	1700	1800	1800	1900	1900	2000
conn. piece distances	outflow L2	mm	1200	1200	1200	1200	1400	14000
	safety valve L3	mm	2000	2000	2000	2000	2400	2400
	ex-tank L4	mm	4700	4700	4700	4700	5000	5000
	return L5	mm	5500	5500	5500	5500	6000	6000
	nominal widths and pressures outflow & return at Δt							
	20°C PN 25	DN	300	350	350	350	400	400
	30°C PN 25	DN	250	250	250	300	300	350
	40°C PN 25	DN	200	250	250	250	300	300
	50°C PN 25	DN	200	200	200	250	250	250
safety valve make lesser at design pressure	6 bar PN 25	DN	125	150	150	150	200	200
	8 bar PN 25	DN	100	125	125	150	150	150
	10 bar PN 25	DN	100	100	100	100	125	150
	13 bar PN 25	DN	80	80	100	100	100	100
	16 bar PN 25	DN	80	80	80	80	100	100
	20 bar PN 25	DN	65	65	80	80	80	100
feeding	25 bar PN 40	DN	50	50	50	65	65	65
drainage	PN 40	DN	50	50	50	65	65	65
venting	PN 40	DN	20	20	20	20	20	20

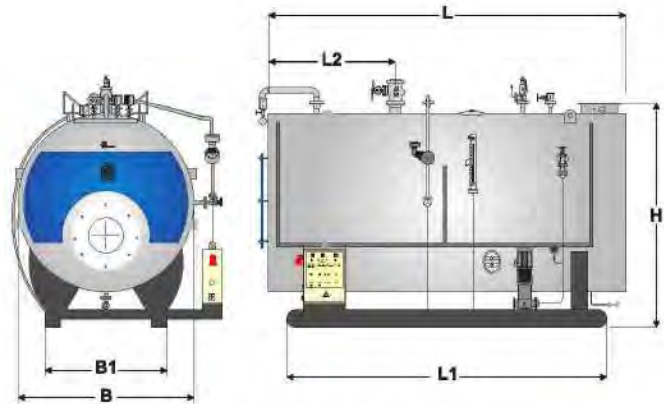
1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi
 1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi) ; 1 BHP = 33,480 BTU/hr = 9.803 KW
 All Specifications are subject to change without notice.

www.Packmangroup.com

Steam boiler type

PSBH1

- for the combustion of fuel oil EL or gas generating saturated steam design pressure up to 20 bar
- steam output 0.35 - 2.50 t/hr
- standard execution: burner arrangement and operating side as shown on the right
- optional: arrangement of the armatures on the left, burner, however, always on the right



Boiler type		PSBH1	0.35	0.40	0.45	0.50	0.60	0.70	0.80	1.00	1.15	1.40	1.60	1.80	2.00	2.50
Rated capacity		t/hr	0.37	0.42	0.46	0.53	0.62	0.74	0.83	1.04	1.20	1.46	1.67	1.87	2.08	2.61
Steam output		t/hr	0.35	0.40	0.45	0.50	0.60	0.70	0.80	1.00	1.15	1.40	1.60	1.80	2.00	2.50
Thermal Capacity *)		MW	0.23	0.26	0.29	0.33	0.39	0.46	0.52	0.65	0.75	0.91	1.04	1.17	1.3	1.63
Water cont. up to "NW"- mark		m3	0.85	0.83	0.80	1.07	1.04	1.00	1.60	1.55	1.50	2.27	2.21	2.15	3.20	3.14
Transport weight at 8 bar		t	2.50	2.52	2.55	3.00	3.02	3.05	3.50	3.55	3.60	4.50	4.55	4.60	5.50	5.60
Service weight at 8bar		t	4.00	4.00	4.00	5.00	5.00	5.00	6.00	6.00	6.00	7.50	7.50	7.50	9.60	9.60
Press. Loss comb. Chamber		mbar	5.0	6.5	7.0	4.5	7.0	9.0	5.0	8.0	9.5	6.5	8.0	9.5	8.0	12.5
Gas contents up to boiler end		m3	0.43	0.43	0.43	0.57	0.57	0.57	0.84	0.84	0.84	1.01	1.01	1.01	1.7	1.7
Boiler dimensions																
Length	L	mm	2600	2600	2600	2900	2900	2900	3050	3050	3050	3300	3300	3300	3500	3500
Width	B	mm	1160	1160	1160	1260	1260	1260	1360	1360	1360	1560	1560	1560	1800	1800
Height	H	mm	1750	1750	1750	1800	1800	1800	1940	1940	1940	2140	2140	2140	2210	2210
Ground frame																
length	L1	mm	2321	2321	2321	2589	2589	2589	2723	2723	2723	2946	2946	2946	3125	3125
width	B1	mm	795	795	795	863	863	863	932	932	932	1068	1068	1068	1233	1233
Conn. piece distances																
Steam take-off	L2	mm	1230	1230	1230	1280	1280	1280	1420	1420	1420	1580	1580	1580	1700	1700
Nominal widths and pressures																
Steam take-off																
at design pressure 1 bar	PN 16	DN	100	100	100	125	125	125	150	150	150	200	200	200	250	250
8 bar	PN 16	DN	40	40	40	50	50	50	65	65	65	80	80	80	100	125
10 bar	PN 16	DN	40	40	40	50	50	50	65	65	65	80	80	80	100	125
13 bar	PN 40	DN	32	32	32	40	40	40	50	50	50	65	65	65	80	100
20 bar	PN 40	DN	32	32	32	40	40	40	50	50	50	65	65	65	80	100
Safety valve make lesser																
at design pressure 1 bar	PN 16	DN	32	32	40	40	40	40	50	50	65	80	80	80	100	100
8 bar	PN 16	DN	25	25	25	25	25	25	25	25	25	32	32	32	32	40
10 bar	PN 16	DN	25	25	25	25	25	25	25	25	25	25	25	32	32	32
13 bar	PN 25	DN	25	25	25	25	25	25	25	25	25	25	25	25	25	32
20 bar	PN 25	DN	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Feeding	PN**)	DN	25	25	25	25	25	25	25	25	25	25	25	25	32	32
Drainage	PN 40	DN	25	25	25	25	25	25	25	25	25	25	25	25	25	25

*) layout at 10 bar and a feed water temperature of 103°C **) up to 10 bar PN 16, exceeding 10 bar PN 40

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi
 1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi) ; 1 BHP = 33,480 BTU/hr = 9.803 KW

All Specifications are subject to change without notice.



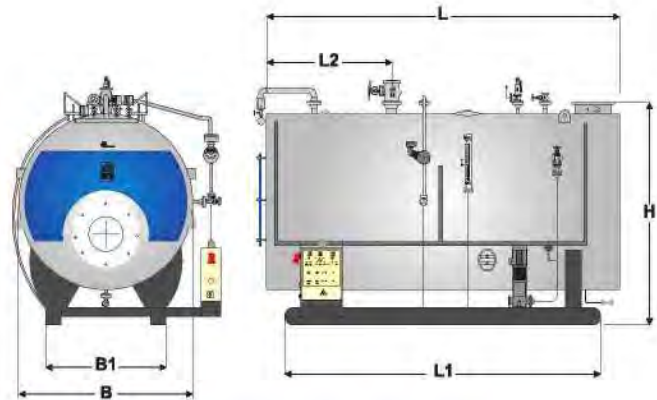
Three pass boiler

PSBH

Steam boiler type

PSBH2

- for the combustion of fuel oil EL or gas generating saturated steam
 - design pressure up to 16 bar
 - steam output 0.55 - 1.80 t/hr
 - due to its low water contents suitable for installation below, above and next to dwelling or day rooms acc. to TRD 403.
- Armatures and burner arrangement see DA



Boiler type			PSBH2	0.55	0.70	0.90	1.15	1.40	1.80
Rated capacity			t/hr	0.58	0.74	0.94	1.20	1.46	1.87
Steam output			t/hr	0.55	0.70	0.90	1.15	1.40	1.80
Thermal capacity *)			MW	0.36	0.46	0.59	0.75	0.91	1.17
Water content up to NW - mark			m³	0.596	0.726	0.821	1.00	1.183	1.66
Appartaining design pressure			bar	16.5	13.5	12.0	10.0	8.0	6.0
Transport weight at 8 bar			t	3.2	3.5	3.8	4.0	4.6	5.0
Service weight at 8 bar			t	4.5	5.0	5.4	5.8	6.6	7.5
Press. Loss comb. Chamber			mbar	10.0	10.5	9.5	11.5	10.5	11.5
Gas content up to boiler end			m³	0.47	0.65	0.79	0.98	1.14	1.71
Boiler dimensions		length L	mm	2970	3070	3120	3170	3370	3670
		width B	mm	1010	1060	1160	1260	1360	1460
		height H	mm	1620	1670	1810	1910	2010	2110
Ground frame		length L1	mm	2652	2741	2785	2830	3009	3277
		width B1	mm	692	720	795	863	932	1000
Conn. piece distances									
		steam take - off L2	mm	1060	1140	1225	1170	1290	1515
Nominal widths and pressures									
Steam take - off									
at design pressure		6 bar PN 16	DN	50	50	65	65	80	100
		8 bar PN 16	DN	50	50	65	65	80	
		10 bar PN 16	DN	50	50	65	65		
		12 bar PN 40	DN	40	40	50			
		13.5 bar PN 40	DN	40	40				
		16 bar PN 40	DN	40					
Safety valve make lesser at design pressure		6 bar PN 16	DN	25	25	25	32	32	40
		8 bar PN 16	DN	25	25	25	25	32	
		10 bar PN 16	DN	25	25	25	25		
		12 bar PN 25	DN	25	25	25			
		13.5 bar PN 25	DN	25	25				
		16 bar PN 25	DN	25					
Feeding		PN**)	DN	25	25	32	32	32	32
Drainage		PN 40	DN	25	25	25	25	25	25

*) layout at 10 bar and a feed water temperature of 103°C

**) up to 10 bar PN 16, exceeding 10 bar PN 40

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in (psi) ; 1 BHP = 33,480 BTU/hr = 9.803 KW

All Specifications are subject to change without notice.

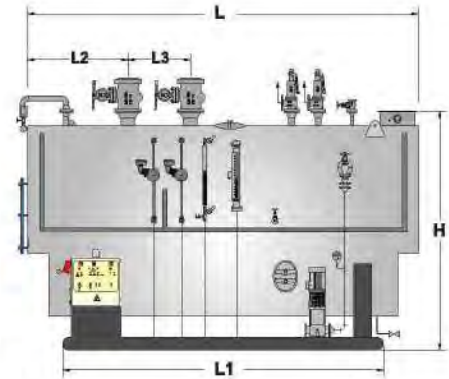
www.Packmangroup.com



Steam boiler type

PSBH3

- for the combustion of fuel oil or gas generating saturated steam
- design pressure up to 1 bar
- steam output 2.5 - 14.0 t/hr
- thermal capacity 1.63 - 9.12 MW



Boiler type		PSBH3	2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0	
Rated capacity		t/hr	2.61	3.12	4.16	5.20	6.25	7.30	8.33	10.41	12.50	14.61	
Steam output		T/hr	2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0	
Thermal Capacity *)		MW	1.63	1.95	2.60	3.25	3.90	4.56	5.20	6.50	7.80	9.12	
Water cont. up to "NW"- mark		m³	4.95	6.09	7.82	9.62	10.94	11.19	13.28	15.45	17.80	22.18	
Transport weight		t	5.3	6.2	7.5	8.9	10.2	11.4	13.2	15.2	17.8	21.2	
Service weight		t	11.8	14.1	17.6	21.0	24.0	26.0	30.5	35.5	41.0	50.0	
Press. Loss comb. Chamber		mbar	10.5	10.5	10.5	10.5	10.5	11.0	12.0	13.0	12.5	12.0	
Gas contents up to boiler end		m³	3.00	3.80	4.80	6.25	7.40	8.80	10.00	11.20	14.60	19.20	
Boiler dimensions													
Length	L	mm	4050	4650	5050	5450	5700	5900	6150	6500	6800	7300	
Width	B	mm	2100	2150	2300	2450	2550	2600	2750	2900	3050	3300	
Height	H	mm	2350	2400	2550	2700	2800	2850	3000	3150	3300	3550	
Ground frame	length	L1	mm	3200	3800	4200	4600	4800	5000	5200	5500	5800	6300
	width	B1	mm	1400	1450	1550	1650	1750	1800	1900	2000	2100	2300
Conn. piece distances													
steam take- off .1	L2	mm	1800	2050	2250	2450	2500	2600	2150	2300	2350	2550	
steam take- off .2	L3	mm	-	-	-	-	-	-	650	700	750	800	
Nominal widths and pressures													
Steam take- off													
at design pressure	1bar	PN6	DN	250	300	300	350	350	400	2x300	2x350	2x400	2x400
Safety valve make lesser		PN16	DN	80	100	100	125	150	150	1x150	1x150	1x150	2x150
at design pressure	1bar									1x50	1x80	1x125	
Feeding		PN6	DN	32	32	40	40	50	50	50	65	65	65
Drainage		PN6	DN	25	32	32	32	40	40	40	50	50	50
Venting		PN 6	DN	20	20	20	20	20	20	20	20	20	20

*) layout at 0.8 bar and a feed water temperature of 80°C

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi); 1 BHP = 33,480 BTU/hr = 9.803 KW

All Specifications are subject to change without notice.

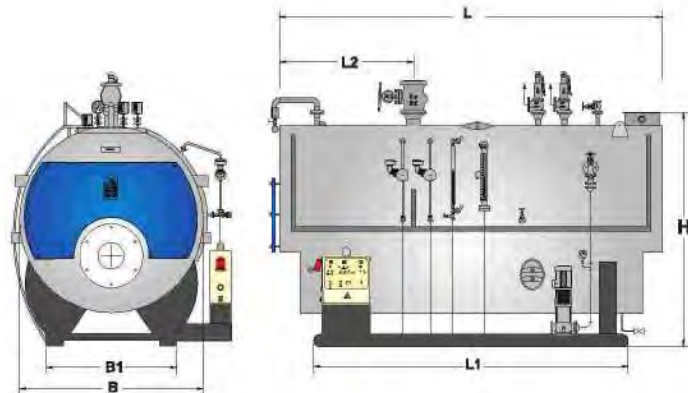
Three pass boiler

PSBH

Steam boiler type

PSBH4

- for the combustion of fuel oil or gas generating saturated steam
- design pressure up to 25 bar
- steam output 2.5 - 14.0 t/hr
- thermal capacity 1.63 - 9.12 MW



Boiler type		PSBH4	2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0
Rated capacity	t/hr		2.61	3.12	4.16	5.20	6.25	7.30	8.33	10.41	12.50	14.61
Steam output	t/hr		2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0
Thermal Capacity *)	MW		1.63	1.95	2.60	3.25	3.90	4.56	5.20	6.50	7.80	9.12
Water cont. up to "NW"- mark	m ³		4.95	6.09	7.82	9.62	10.94	11.19	13.28	15.45	17.80	22.18
Transport weight at 8 bar	t		6.0	7.1	8.4	10.3	12.0	13.2	15.4	17.4	20.6	25.8
Service weight at 8 bar	t		12.5	15.0	18.5	22.5	26.0	28.0	33.0	38.0	44.0	55.0
Press. Loss comb. Chamber	mbar		10.5	10.5	10.5	10.5	10.5	11.0	12.0	13.0	12.5	12.0
Gas contents up to boiler end	m ³		3.00	3.80	4.80	6.25	7.40	8.80	10.00	11.20	14.60	19.20
Boiler dimensions	Length L	mm	4050	4650	5050	5450	5700	5900	6150	6500	6800	7300
	Width B	mm	2100	2150	2300	2450	2550	2600	2750	2900	3050	3300
	Height H	mm	2350	2400	2550	2700	2800	2850	3000	3150	3300	3550
Ground frame	length L1	mm	3200	3800	4200	4600	4800	5000	5200	5500	5800	6300
	width B1	mm	1400	1450	1550	1650	1750	1800	1900	2000	2100	2300
Conn. piece distances												
steam take-off	L2	mm	1800	2050	2250	2450	2500	2600	1650	1850	1850	2000
Nominal widths and pressures												
Steam take-off												
at design pressure												
6 bar	PN**)	DN	150	150	200	200	250	250	250	300	300	350
8 bar	PN**)	DN	125	125	150	200	200	200	200	250	250	300
10 bar	PN**)	DN	100	125	125	150	150	200	200	200	250	250
13 bar	PN**)	DN	100	100	125	125	150	150	150	200	200	200
16 bar	PN**)	DN	80	100	100	125	125	150	150	150	200	200
20 bar	PN 40	DN	80	80	100	100	125	125	150	150	150	200
25 bar	PN 40	DN	65	80	80	100	100	125	125	125	150	150
Safety valve make lesser												
at design pressure												
6 bar	PN 16	DN	50	50	65	65	65	80	80	100	100	100
8 bar	PN 16	DN	40	40	50	65	65	65	65	80	80	100
10 bar	PN 16	DN	40	40	50	50	65	65	65	65	80	80
13 bar	PN 25	DN	32	40	40	50	50	50	65	65	65	80
16 bar	PN 25	DN	32	32	40	40	50	50	50	65	65	65
20 bar	PN 40	DN	25	32	32	40	40	40	50	50	65	65
25 bar	PN 40	DN	25	25	32	32	40	40	40	50	50	50
Feeding	PN***)	DN	32	32	40	40	50	50	50	65	65	80
Drainage	PN 40	DN	25	32	32	32	40	40	40	50	50	50
Venting	PN 40	DN	20	20	20	20	20	20	20	20	20	20

*) layout at 10 bar and a feed water temperature of 102°C

***) up to 10 bar and up to DN 200 PN 16, exceeding 10 bar and up to DN 150 PN 40.

All further steam take-off conn. pieces PN 25.

****) up to 10 bar PN 16, exceeding 10 bar PN 40.

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi) ; 1 BHP = 33,480 BTU/hr = 9.803 KW

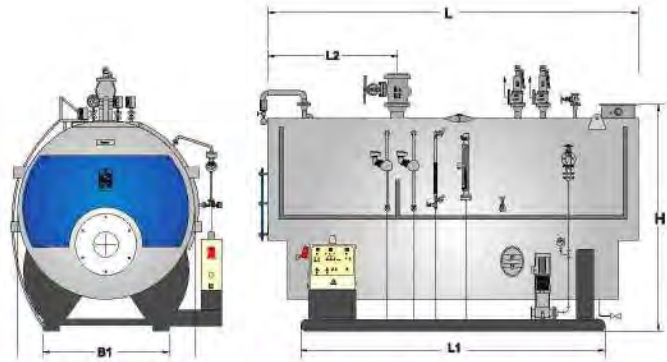
All Specifications are subject to change without notice.



Steam boiler type

PSBH5

- for the combustion of fuel oil or gas generating saturated steam
- design pressure up to 25 bar
- steam output 2. - 14.0 t/hr
- thermal capacity 1.63 - 9.12 MW



Boiler type		PSBH5	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0
Rated capacity		t/hr	2.08	2.61	3.12	4.16	5.20	6.25	7.30	8.33	10.41	12.50	14.61
Steam output		t/hr	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0
Thermal Capacity *)		MW	1.30	1.63	1.95	2.60	3.25	3.90	4.56	5.20	6.50	7.80	9.12
Water cont. up to "NW"- mark		m ³	4.95	6.09	7.82	9.62	10.94	11.19	13.28	15.45	17.80	21.10	23.25
Transport weight at 8 bar		t	6.0	7.1	8.4	10.3	12.0	13.2	15.4	17.4	20.6	24.3	27.2
Service weight at 8 bar		t	12.5	15.0	18.5	22.5	26.0	28.0	33.0	38.0	44.0	53.0	58.0
Press. Loss comb. Chamber		mbar	7.5	7.5	7.5	7.5	7.5	8.0	8.5	9.0	8.0	8.0	8.0
Gas contents up to boiler end		m ³	3.00	3.80	4.80	6.25	7.40	8.80	10.00	11.20	14.60	17.60	20.40
Boiler dimensions													
	Length L	mm	4050	4650	5050	5450	5700	5900	6150	6500	6800	7300	7300
	Width B	mm	2100	2150	2300	2450	2550	2600	2750	2900	3050	3200	3400
	Height H	mm	2350	2400	2550	2700	2800	2850	3000	3150	3300	3450	3650
Ground frame													
	length L1	mm	3200	3800	4200	4600	4800	5000	5200	5500	5800	6300	6300
	width B1	mm	1400	1450	1550	1650	1750	1800	1900	2000	2100	2200	2400
Conn. piece distances													
	steam take-off L2	mm	2150	2200	2300	2450	2600	2700	2850	3050	3150	3400	3400
Nominal widths and pressures Steam take-off at design pressure													
	6 bar PN**)	DN	125	150	150	200	200	250	250	250	300	300	350
	8 bar PN**)	DN	100	125	125	150	200	200	200	200	250	250	300
	10 bar PN**)	DN	100	100	125	125	150	150	200	200	200	250	250
	13 bar PN**)	DN	80	100	100	125	125	150	150	150	200	200	200
	16 bar PN**)	DN	80	80	100	100	125	125	150	150	150	200	200
	20 bar PN 40	DN	65	80	80	100	100	125	125	150	150	150	200
	25 bar PN 40	DN	65	65	80	80	100	100	125	125	125	150	150
Safety valve make lesser at design pressure													
	6 bar PN 16	DN	40	50	50	65	65	65	80	80	100	100	100
	8 bar PN 16	DN	40	40	40	50	65	65	65	65	80	80	100
	10 bar PN 16	DN	32	40	40	50	50	65	65	65	65	80	80
	13 bar PN 25	DN	32	32	40	40	50	50	50	65	65	65	80
	16 bar PN 25	DN	25	32	32	40	40	50	50	50	65	65	65
	20 bar PN 40	DN	25	25	32	32	40	40	40	50	50	65	65
	25 bar PN 40	DN	20	25	25	32	32	40	40	40	50	50	50
Feeding	PN***)	DN	32	32	32	40	40	50	50	50	65	65	80
Drainage	PN 40	DN	25	25	32	32	32	40	40	40	50	50	50
Venting	PN 40	DN	20	20	20	20	20	20	20	20	20	20	20

*) layout at 10 bar and a feed water temperature of 102 C

**) up to 10 bar and up to DN 200 PN 16, exceeding 10 bar and up to DN 150 PN 40.

All further steam take-off conn. pieces PN 25.

***) up to 10 bar PN 16, exceeding 10 bar PN 40.

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in(psi) ; 1 BHP = 33,480 BTU/hr = 9.803 KW

All Specifications are subject to change without notice.

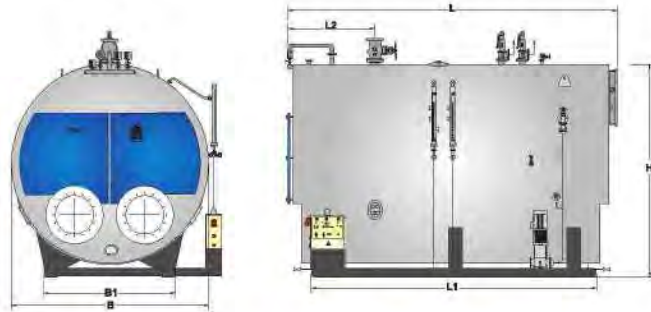
Three pass boiler

PSBH

Steam boiler type

PSBH6

- for the combustion of fuel oil or gas generating saturated steam
- design pressure up to 20 bar
- steam output 16.0 - 28.0 t/hr
- thermal capacity 10.44 - 18.27 MW



Boiler type			PSBH6	16.0	18.0	20.0	22.0	25.0	28.0	
Rated Capacity			t/hr	16.72	18.80	20.82	22.98	26.10	29.26	
Steam output			t/hr	16.0	18.0	20.0	22.0	25.0	28.0	
Thermal Capacity *)			MW	10.44	11.74	13.00	14.35	16.30	18.27	
Water cont. up to "NW"- mark			m ³	23.20	26.09	27.05	30.43	33.47	36.89	
Transport weight at 8 bar			t	29.0	32.0	35.0	40.0	43.0	50.0	
Service weight at 8 bar			t	57.0	63.0	68.0	77.0	84.0	95.0	
Press. Loss comb. Chamber			mbar	12.0	11.5	12.0	13.0	10.0	10.0	
Gas contents up to boiler end			m ³	22.5	24.5	27.5	29.5	36.0	39.0	
Boiler dimensions										
	Length	L	mm	7400	7400	7400	7700	8200	8200	
	Width	B	mm	3500	3700	3800	3950	4050	4250	
	Height	H	mm	3950	4150	4250	4400	4500	4700	
Ground frame										
	length	L1	mm	5750	5750	5750	6050	6550	6550	
	width	B1	mm	1700	1800	1800	1900	1900	2000	
Conn. piece distances steam take-off			L2	mm	2800	2800	2800	2900	2900	3000
Nominal widths and pressures Steam take-off at design pressure										
	6 bar	PN 25	DN	300	300	350	350	350	2x250	
	8 bar	PN 25	DN	250	300	300	300	300	350	
	10 bar	PN 25	DN	250	250	250	300	300	300	
	13 bar	PN 25	DN	200	200	250	250	250	300	
	16 bar	PN 25	DN	200	200	200	200	250	250	
	20 bar	PN 25	DN	200	200	200	200	200	250	
Safety valve make lesser at design pressure										
	6 bar	PN 16	DN	100	125	150	150	150	200	
	8 bar	PN 16	DN	100	100	100	125	150	150	
	10 bar	PN 16	DN	80	100	100	100	100	125	
	13 bar	PN 25	DN	80	80	80	100	100	100	
	16 bar	PN 25	DN	65	80	80	80	80	100	
	20 bar	PN 25	DN	65	65	65	80	80	80	
Feeding			PN**) DN	65	65	65	65	80	80	
Drainage			PN 40 DN	50	50	50	65	65	65	
Venting			PN 40 DN	20	20	20	20	20	20	

*) layout at 10 bar and a feed water temperature of 103°C

**) up to 10 bar PN 16, exceeding 10 bar PN 40

1 MW = 1000 KW = 860,000 Kcal/hr ; 1 Kcal/hr = 3.93 BTU/hr ; 1 bar = 14.504 psi

1 atm = 1.013 bar ; 1 kg/cm² = 14.223 lb/sq in (psi) ; 1 BHP = 33,480 BTU/hr = 9.803 KW

All Specifications are subject to change without notice.

www.Packmangroup.com



Transport, unloading and putting to place



■ Transport

The delivery of the three-pass boiler is effected - unless otherwise preferred - by lorry up to a place near the boiler room which can be reached on a normal approach road. At delivery by rail, the three - pass boiler is delivered free railway carriage up to the railway station of the installation place.

■ Unloading and putting to place

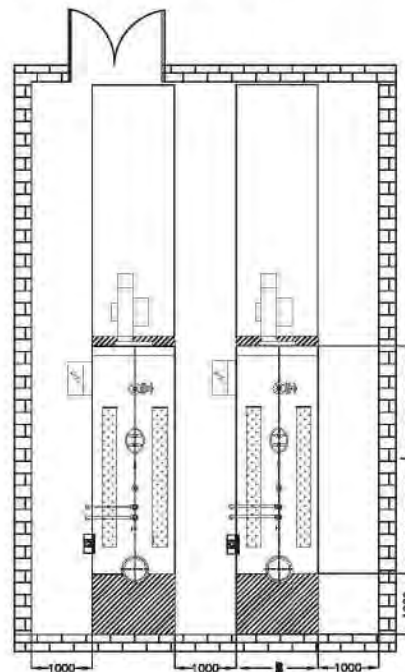
Unloading putting to place and erection can be effected by any expert - firm. We recommend the application of a crane truck if the local circumstances do not offer more favourable possibilities for putting to place. In order to avoid waiting periods, date of delivery and preparation of the crane ought to be agreed with us as early as possible.

Should the client desire to effect the above mentioned work under our supervision, We are voluntarily prepared to place one of our chief erectors at your

■ Planning of the boiler room

The example shown in the figure indicates the minimum space demand for good accessibility to the boiler without considering other plant parts such as chimney, pumps, vessels, distributor station, piping, etc. At the installation of boilers with different sizes the planning of the boiler room must be based upon the length and the height of the largest boiler. For the boiler room height observe the boiler room rules. In case of especially cramped space conditions we recommend to contact us for coordination. We are voluntarily prepared to elaborate corresponding installation proposals upon request. If delivered on skids, the three - pass boiler is installed on a plane, pressure proof floor. A special foundation is not required. Should the boiler, however, be delivered on supports only, a foundation is necessary. Documentation, showing the corresponding technical data can be sent upon request.

disposal, together with the required tools and instruments and - if necessary - the corresponding helpers and in that case the eventually required crane. In order to facilitate your dispositions, the table indicates boiler transport weights for the choose of the lifting gear, the greatest boiler dimensions as well as information on the size of the opening for putting to place. In addition it is important to consider the space required for the application of the lifting gear. The dimensions of the openings for putting to place - for horizontal transport on rolls or for vertical lowering by means of a crane or a cable winch have to be regarded as minimum dimensions for a safe putting to place. A falling below these measures requires increased caution and in extreme cases a preceding coordination with our erection department or with our local representatives.





**Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...**



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

w w w . p a c k m a n g r o u p . c o m



PACKMAN

Packman **Industrial Group**

Three Pass Firetube Hot Water & Steam Boiler - **Wetback** From 1MW - 10MW

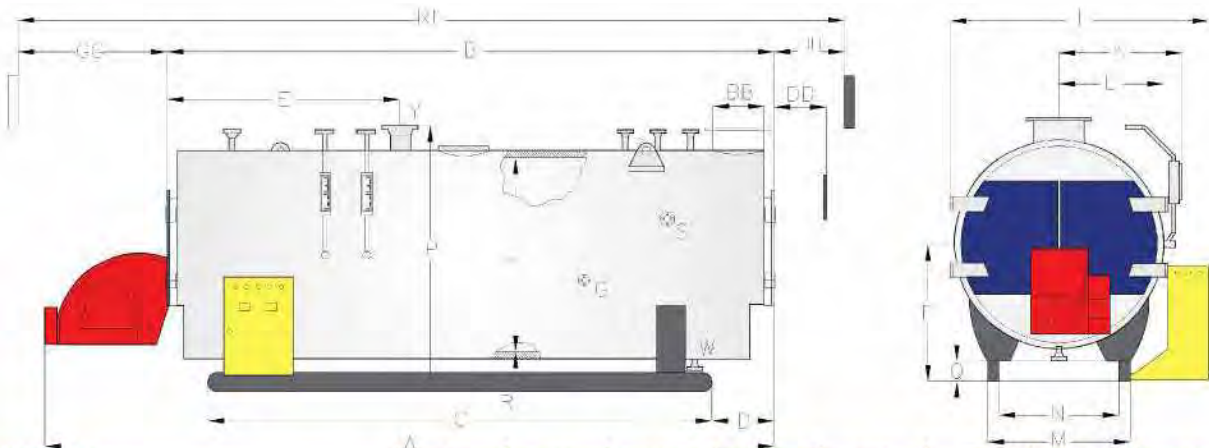
Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Three Pass firetube Steam boiler

Wetback

www.Packmangroup.com



BOILER HP.	100	125	150	175	200	250	300	350
Heating Surface (SQ..m)	37.2	46.2	55.7	63.3	74.3	89.2	111	127
Steam Volume (CU..m)	0.65	0.73	1.24	1.4	1.61	1.78	2.35	2.52
Capacity (kw)	1000	1250	1500	1750	2000	2500	3000	3500
Output Steam (ton/h at 100C)	1.56	1.95	2.34	2.73	3.12	3.9	4.68	5.47
Output (Kcal/h) x 1000000	0.86	1.07	1.29	1.50	1.72	2.15	2.58	3.01
pressure drop in boiler (mbar)	3.92	5.88	4.12	6.05	4.17	6.7	5.13	6.3

APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY BASED ON NOMINAL 82% EFFICENCY

Firing Rate Gas (m3/h)	100	125	150	175	200	250	300	350
Firing Rate oil (litter/h)	93.1	116.4	139.7	163.1	186.3	232.8	279.5	326.1
Firing Rate fuel oil (litter/h)	87.8	109.8	131.7	153.7	175.6	219.6	263.5	307.4

WEIGHT

Shipping Weight (10 bar)	4430	4800	5800	6700	7700	8500	9800	10290
--------------------------	------	------	------	------	------	------	------	-------

BOILER HP.	400	500	600	700	800	900	1000
Heating Surface(SQ..m)	148	185	223	260	297	334	371
Steam Volume (CU..m)	2.98	3.53	4.04	4.85	6.03	7.32	8.61
Capacity (kw)	4000	5000	6000	7000	8000	9000	10000
Output Steam (ton/h at 100C)	6.25	7.81	9.37	10.9	12.5	14.1	15.6
Output (Kcal/h) x1000000	3.44	4.30	5.16	6.02	6.88	7.74	8.60
pressure drop in boiler (mbar)	5.89	6.5	6.8	7.5	7.8	8.1	8.5

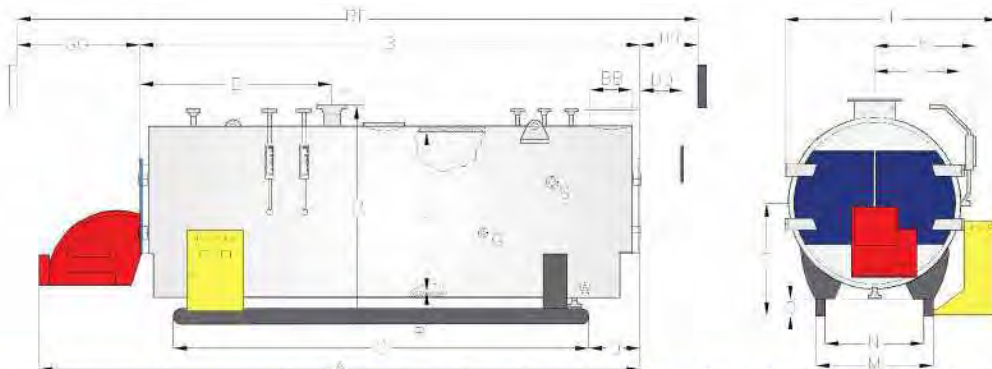
APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY BASED ON NOMINAL 82% EFFICENCY

Firing Rate Gas (m3/h)	400	500	600	700	800	900	1000
Firing Rate oil (litter/h)	372.6	465.7	558.9	652.1	745.2	838.3	931.5
Firing Rate fuel oil (litter/h)	351.3	439.2	527.1	614.9	702.7	790.6	878.4

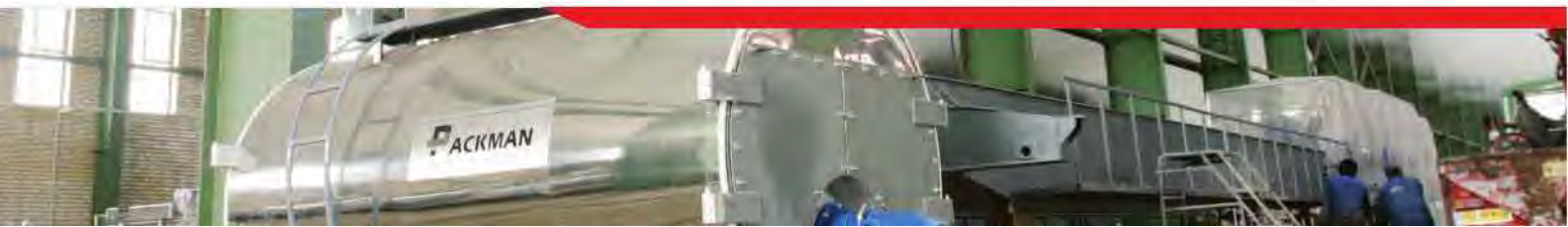
WEIGHT

Shipping Weight (10 bar)	12300	15000	17500	19800	22520	28500	33200
--------------------------	-------	-------	-------	-------	-------	-------	-------





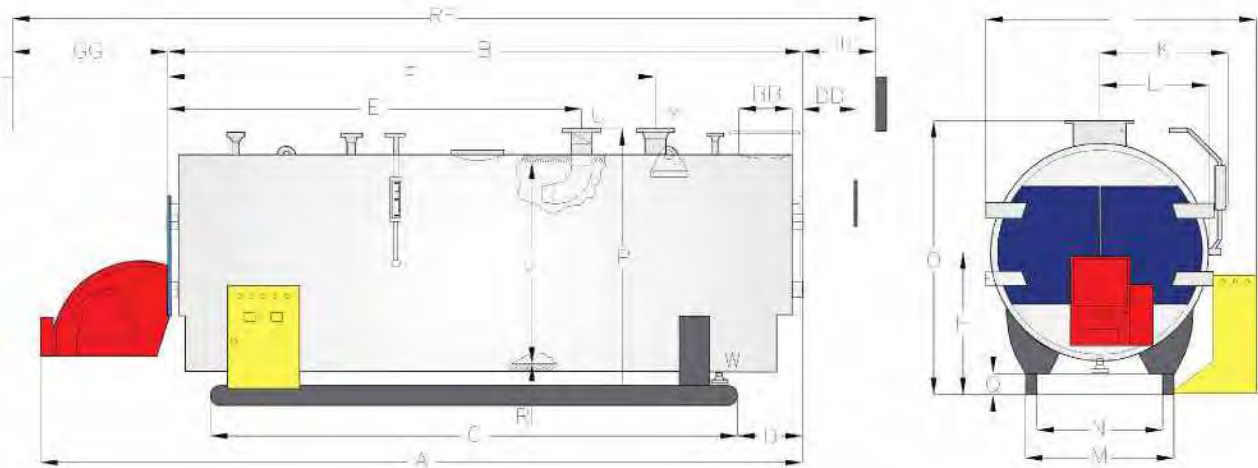
BOILER HP.	DIM	100	125	150	175	200	250	300	350	400	500	600	700	800	900	1000
LENGTHS																
Shell	B	3930	4330	4320	4720	4630	5030	5080	5370	5410	5650	5900	6100	6300	6790	7000
Base Frame	C	3260	3500	3500	3700	3800	4000	4000	4300	4320	4600	4800	4900	5100	5300	5460
Base Frame to Rear Door	D	300	490	490	600	500	600	600	580	630	690	650	690	520	750	800
Front Door to Steam Nozzle	E	980	980	1530	1620	1520	1460	1330	1600	1650	1330	1650	1540	1520	2000	2620
WIDTHS																
Overall	I	1750	1750	2150	2150	2300	2300	2600	2600	2800	2900	3200	3300	3560	3800	4200
I.D. Boiler	J	1360	1360	1580	1580	1800	1800	2000	2000	2180	2340	2500	2650	2820	3080	3300
Center to Water Column	K	850	1150	950	950	1000	1000	1200	1200	1300	1330	1430	1600	1620	2000	1800
Center to Lagging	L	750	750	850	850	870	870	1100	1100	1200	1240	1310	1310	1470	1620	1680
Base Outside	M	1000	1000	1200	1200	1300	1300	1500	1500	1600	1800	2000	2000	2200	2550	2650
Base Inside	N	850	850	900	900	1000	1000	1170	1170	1250	1450	1620	1620	1830	2150	2250
HEIGHTS																
Base to Boiler Centerline	F	1030	1030	1190	1190	1300	1300	1420	1420	1535	1630	1720	1800	1880	2070	2180
Base to Steam Outlet	P	1900	1900	2190	2190	2410	2410	2630	2630	2840	3000	3180	3340	3500	3900	4050
Base to Frame	Q	160	160	160	160	160	160	160	160	180	180	180	180	180	200	200
Base to Bottom boiler	R	330	330	390	390	390	390	410	410	440	450	460	460	460	450	500
CONNECTION																
Chemical Feed	G	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Feed Water Inlet (both side)	S	1"	1"	1 1/2"	1 1/2"	2"	2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	3"	3"	4"
Steam Nozzle (2 bar)	Y	6"	6"	6"	6"	8"	8"	8"	8"	10"	10"	12"	12"	12"	14"	14"
Steam Nozzle (10 bar)	Y	3"	3"	3"	3"	4"	5"	6"	6"	6"	6"	6"	8"	8"	10"	10"
Steam Nozzle (16 bar)	Y	3"	3"	3"	3"	3"	3"	4"	4"	4"	5"	6"	6"	6"	8"	8"
Drain	W	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2"	2"	2"	2"	2"
Vent Stake Diameter	BB	14"	14"	16"	16"	16"	16"	20"	20"	20"	24"	24"	24"	24"	30"	30"
MINIMUM BOILER ROME LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FORM																
Tube Removal	DD	450	450	500	500	700	700	700	700	780	850	950	950	1000	1050	1150
Rear door to Wall	HH	700	700	700	700	900	900	900	900	950	1000	1100	1100	1200	1200	1400
Front Door to Wall	GG	3300	3700	3600	4000	3900	4300	4200	4500	4500	4700	4900	5100	5300	5450	5800
Min. Length of Room	RF	8000	8700	8650	9500	9500	10300	10200	10800	10900	11350	11900	12400	12900	13400	14200



Three Pass firetube hot water

Wetback

www.Packmangroup.com



BOILER HP.	100	125	150	175	200	250	300	350
Heating Surface (SQ..m)	37.2	46.2	55.7	63.3	74.3	89.2	111	127
Capacity (kw)	1000	1250	1500	1750	2000	2500	3000	3500
Output (Kcal/h) x 1000000	0.86	1.07	1.29	1.50	1.72	2.15	2.58	3.01
pressure drop in boiler (mbar)	3.92	5.88	4.12	6.05	4.17	6.7	5.13	6.3

APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY BASED ON NOMINAL 82% EFFICIENCY

Firing Rate Gas (m3/h)	100	125	150	175	200	250	300	350
Firing Rate oil (litter/h)	93.1	116.4	139.7	163.1	186.3	232.8	279.5	326.1
Firing Rate fuel oil (litter/h)	87.8	109.8	131.7	153.7	175.6	219.6	263.5	307.4

WEIGHT

Shipping Weight (10 bar)	3870	4200	5200	5700	6350	7120	8850	10190
--------------------------	------	------	------	------	------	------	------	-------

BOILER HP.	400	500	600	700	800	900	1000
Heating Surface(SQ..m)	148	185	223	260	297	334	371
Capacity (kw)	4000	5000	6000	7000	8000	9000	10000
Output (Kcal/h) x1000000	3.44	4.30	5.16	6.02	6.88	7.74	8.60
pressure drop in boiler (mbar)	5.89	6.5	6.8	7.5	7.8	8.1	8.5

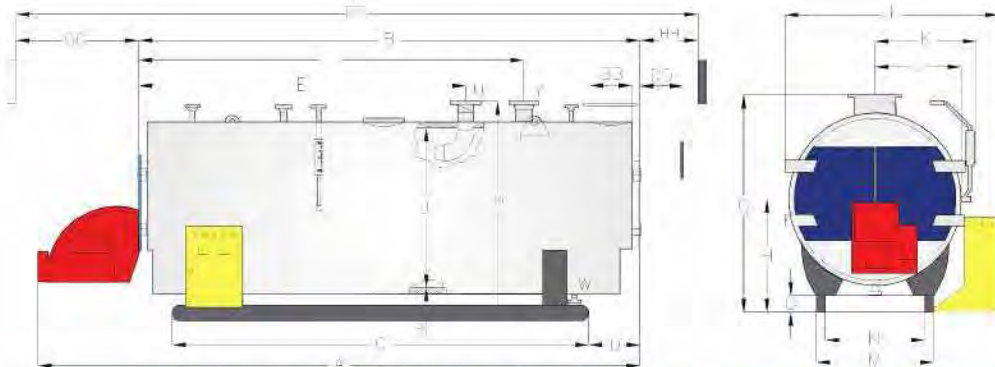
APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY BASED ON NOMINAL 82% EFFICIENCY

Firing Rate Gas (m3/h)	400	500	600	700	800	900	1000
Firing Rate oil (litter/h)	372.6	465.7	558.9	652.1	745.2	838.3	931.5
Firing Rate fuel oil (litter/h)	351.3	439.2	527.1	614.9	702.7	790.6	878.4

WEIGHT

Shipping Weight (10 bar)	11600	13050	15500	18200	22000	25700	29500
--------------------------	-------	-------	-------	-------	-------	-------	-------





BOILER HP.	DIM	100	125	150	175	200	250	300	350	400	500	600	700	800	900	1000
LENGTHS																
Shell	B	4000	4400	4340	4750	4650	5050	5100	5380	5420	5650	5900	6120	6300	6790	7000
Base Frame	C	3300	3500	3500	3700	3800	4000	4000	4300	4300	4600	4800	4900	5100	5200	5500
Base Frame to Rear Door	D	320	530	530	620	480	660	620	450	580	640	650	690	520	830	870
Front Door to Return Nozzle	E	2570	2860	2790	3180	3060	3470	3390	3670	3770	3960	4270	4500	4600	4150	4630
Front Door to Outlet Nozzle	F	3000	3360	3340	3730	3600	4020	3990	4270	4470	4660	4970	5200	5300	5060	5430
WIDTHS																
Overall	I	1810	1810	1910	1910	2150	2150	2350	2300	2500	2660	2940	3100	3260	3500	3750
I.D. Boiler	J	1320	1320	1480	1480	1640	1640	1860	1860	1970	2120	2300	2450	2620	2800	3000
Center to Water Column	K	-	-	-	-	-	-	1300	1300	1360	1430	1520	1600	1680	1770	1870
Center to Lagging	L	730	730	810	810	890	890	1000	1000	1050	1130	1220	1300	1380	1470	1560
Base Outside	M	970	970	1200	1200	1300	1300	1370	1370	1500	1670	2000	2000	2150	2200	2400
Base Inside	N	830	830	1000	1000	990	990	1050	1050	1170	1340	1620	1650	2000	1820	2000
HEIGHTS																
Base to Boiler Centerline	H	1060	1060	1130	1130	1220	1220	1350	1350	1420	1500	1670	1710	1830	1930	1990
Base to Vent Outlet	O	1970	1970	2100	2100	2300	2300	2530	2530	2660	2810	3600	3190	3500	3620	3750
Base to Return/Outlet	P	1970	1970	2100	2100	2300	2300	2530	2530	2660	2810	3600	3190	3500	3620	3750
Base to Frame	Q	160	160	160	160	160	160	160	160	180	180	180	180	180	200	200
Base to Bottom boiler	R	390	390	380	380	380	380	410	410	430	430	460	470	460	450	470
CONNECTION																
Water Return	U	4"	5"	6"	6"	6"	6"	8"	8"	10"	10"	10"	10"	10"	12"	10"
Water Out let	Y	4"	5"	6"	6"	6"	6"	8"	8"	10"	10"	10"	10"	10"	12"	10"
Drain	W	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2"	2"	2"	2"
Air Vent	T	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"
Vent Stake Diameter	BB	14"	14"	16"	16"	16"	16"	20"	20"	20"	24"	24"	24"	24"	30"	30"
MINIMUM BOILER ROME LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FORM																
Tube Removal	DD	640	640	700	700	850	850	850	850	950	1000	950	1150	1000	1050	1510
Rear door to wall	HH	850	850	900	900	1000	1000	1000	1000	1150	1200	1100	1350	1200	1200	1710
Front door to wall	GG	3300	3700	3600	4000	3900	4300	4200	4500	4500	4700	4900	5100	5300	5450	6000
Min. Length of Room	RF	8150	8950	8900	9700	9550	10350	10300	10900	11100	11550	11900	12570	12900	13400	14710



Transport, unloading and putting to place



■ Transport

The delivery of the three-pass boiler is effected - unless otherwise preferred - by lorry up to a place near the boiler room which can be reached on a normal approach road. At delivery by rail, the three-pass boiler is delivered free railway carriage up to the railway station of the installation place.

■ Unloading and putting to place

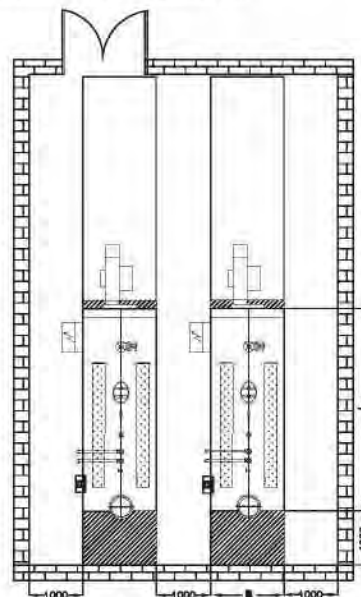
Unloading putting to place and erection can be effected by any expert - firm. We recommend the application of a crane truck if the local circumstances do not offer more favourable possibilities for putting to place. In order to avoid waiting periods, date of delivery and preparation of the crane ought to be agreed with us as early as possible.

Should the client desire to effect the above mentioned work under our supervision, We are voluntarily prepared to place one of our chief erectors at your

■ Planning of the boiler room

The example shown in the figure indicates the minimum space demand for good accessibility to the boiler without considering other plant parts such as chimney, pumps, vessels, distributor station, piping, etc. At the installation of boilers with different sizes the planning of the boiler room must be based upon the length and the height of the largest boiler. For the boiler room height observe the boiler room rules. In case of especially cramped space conditions we recommend to contact us for coordination. We are voluntarily prepared to elaborate corresponding installation proposals upon request. If delivered on skids, the three-pass boiler is installed on a plane, pressure proof floor. A special foundation is not required. Should the boiler, however, be delivered on supports only, a foundation is necessary. Documentation, showing the corresponding technical data can be sent upon request.

disposal, together with the required tools and instruments and - if necessary - the corresponding helpers and in that case the eventually required crane. In order to facilitate your dispositions, the table indicates boiler transport weights for the choose of the lifting gear, the greatest boiler dimensions as well as information on the size of the opening for putting to place. In addition it is important to consider the space required for the application of the lifting gear. The dimensions of the openings for putting to place - for horizontal transport on rolls or for vertical lowering by means of a crane or a cable winch have to be regarded as minimum dimensions for a safe putting to place. A falling below these measures requires increased caution and in extreme cases a preceding coordination with our erection department or with our local representatives.





Packman **Industrial Group**



www.Packmangroup.com

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel:

+98 311 368 61 80



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



Steam Boiler Vertical

PSBV

- Wide variety of use - Compact and light design
- Low cost
- Excellent quality and efficiency
- Long life and little maintenance work
- Reduced installation space
- Fully automatic operation



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

www.packmangroup.com

Packman once-through steam boiler **PSB** series are designed so simple in construction and manufactured at **Packman's** modern well-equipped workshops to conform to the latest regulations of EN and DIN standards. The **PSB** series are quite easy to use, and use quite powerful to meet every customer's needs.



Scope of Services

Capacity data based on saturated steam at 7 bar, feed water at 60°C, fuel oil No.2 with a net calorific value of 10750 Kcal/kg and fuel gas with a net Calorific value of 10500 kcal/kg.

Item	Model	PSBV100	PSBV150	PSBV200	PSBV300	PSBV400	PSBV500
Steam capacity	K/h	100	150	200	300	400	500
Rated capacity	K/h	120	180	240	360	480	530
Calorific capacity							
	Kw	75	112.5	150	225	300	330
	x1000 Keal/h	65	97.5	129	193.5	258	283.8
	x1000 BTU/h	256	390	512	768	1025	1128
Fuel consumption max							
	Kg/h						
	Oil No.2	7	10.6	14.1	21.2	28.2	31
	Gas	7.2	10.8	14.51	21.7	28.9	31.8
Electric power require	KW	0.88	0.92	1	1.55	1.55	1.55
Water contents	lit.	180	220	400	700	900	1000
Operation pressure adjustable	(3-10)bar						
Control stags	One				Two		
Steam tack-off DN	mm	20	20	25	32	40	50
Flue gas pipe diameter	mm	150	150	200	200	200	250
Boiler dimensions							
	Total height mm	1900	2000	2100	2300	2500	2600
	Total length mm	1100	1400	1500	2000	2050	2100
	Total width mm	800	900	1050	1350	1450	1550
Transport weight	Kg	400	600	800	1300	1600	2000
Service weight	Kg	580	820	1200	2000	2500	3000

Embodiment of the Properties Required Boiler





**Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...**



Sand Filter

PSF



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

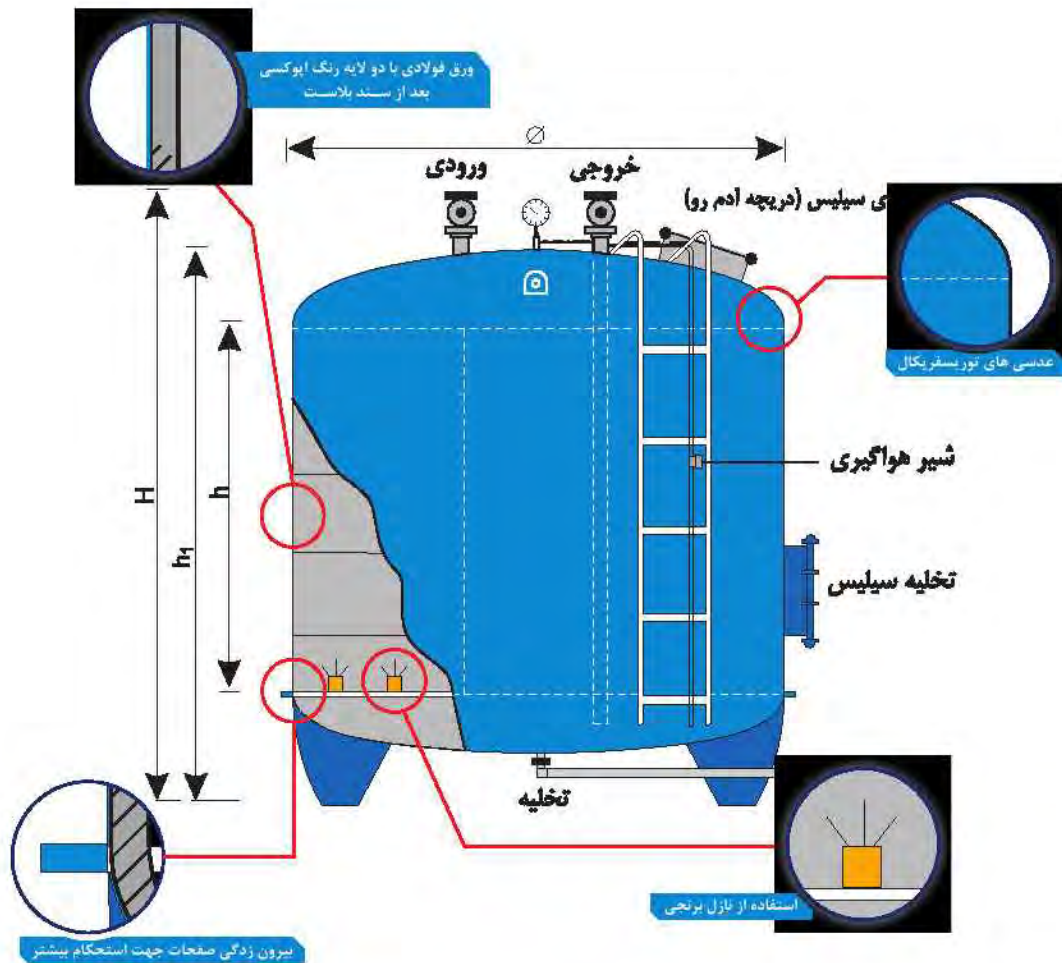
Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

[www . p a c k m a n g r o u p . c o m](http://www.packmangroup.com)

Sand filter

PSF



مدل	قطر (mm)	نازل ورودی خروجی	ارتفاع (mm)			ظرفیت بر اساس سرعت فیلتراسیون (GPM)			وزن حمل (kg)	سیلیس مورد نیاز (kg)	دبی شستشو
			H	h	h1	6 gpm/ft ²	7 gpm/ft ²	8 gpm/ft ²			
PSF - 24	600	1 1/4"	1200	-	900	18	21	24	330	300	30
PSF - 32	800	1 1/2"	1250	-	1000	33	38	43	440	400	53
PSF - 40	1000	2"	1250	-	1000	50	60	70	550	1300	83
PSF - 44	1100	2"	1250	1500	-	60	70	80	650	1500	100
PSF - 50	1250	2 1/2"	1850	1500	-	80	90	110	800	2000	130
PSF - 60	1500	3"	2300	1500	-	120	135	155	1000	3000	187
PSF - 70	1750	4"	2300	1500	-	160	185	210	1200	4000	255
PSF - 80	2000	4"	2300	1500	2000	210	245	280	1500	5300	332
PSF - 90	2250	5"	2300	1500	2000	265	300	350	1750	6700	420
PSF - 100	2500	5"	2300	1500	2000	325	380	435	2200	8300	520
PSF - 110	2750	6"	2800	1500	2000	395	460	525	2300	10000	630
PSF - 120	3000	6"	2800	1500	2000	470	550	625	2600	12000	750

- کلیه ابعاد بر حسب میلیمتر می باشد.
- دبی شستشو بر مبنای دومین مرحله شستشو یا دبی (8 Lit/s/m²) می باشد.
- فشار کار (4-8 bar)
- پوسته فیلتر از جنس فولاد با دو دست پوشش اپوکسی داخلی و دو لایه رنگ خارجی





Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



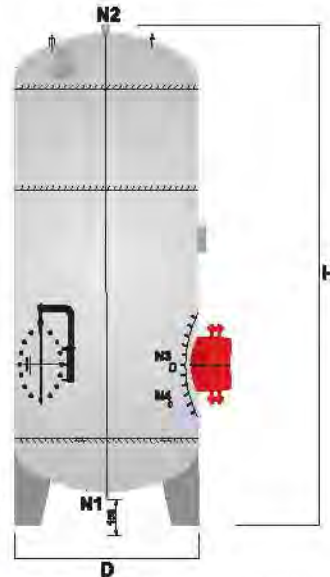
Domestic Hot Water Storage Tanks

PDHT

Domestic Hot Water Storage Tanks

Packman Company with 30 years of experience in manufacturing pressure vessels and installation equipment is one of the leading companies in this industry. Packman domestic hot water storage tank, with 600 to 12000 liter capacity. The body of these tanks is covered with two-part epoxy which will prevent further corrosion. The design process is compliant with ASME and BS. Additionally, the surfaces are sandblasted. The whole process is under full QC test. The materials used to make these tanks are either carbon Steel plate or Galvanized Steel plate according to what customers order. The 19mm diameter pipes are designed quite flexible to expansion. They carry a twenty four-month guarantee. Furthermore, dependent on capacity, the manhole cover is included on tanks.

Major problem: It takes two minutes to make hot water in buildings; this takes more in houses with more bathrooms and longer pipeline which consequently, lead to loss of time and cost. Running the tap for long time to get the hot water, utilizes a lot of cold water. Mean water loss for a three-member family is 14000 gallons per year which is a large number. Our engineers, however; have solved this problem by designing fast flow water in pipes.



- Manhole and handhole cover
- Different thermal capacity
- 19 millimeter diagonal pipe
- Sand blast
- Internal two part epoxy coatings
- 6,8,10,12- gauge sheet metal
- Standing the pressure up to 150 psi
- Tori spherical head according to ASME standard
- Cupric coil According to AMSE, BS standard

600 lit

Type	HS (ft.)	Diameter D(cm)	Total height H(cm)	Total content (ltr)	Net content (lit)
Type-1	15	60	256	630	603
Type-2		70	211	680	652
Type-3		80	164	650	622
Type-4	24	60	256	630	586
Type-5		70	211	680	636
Type-6		80	164	650	606
Type-7	32	60	256	630	571
Type-8		70	211	680	621
Type-9		80	164	650	591

800 lit

Type	HS (ft.)	Diameter D(cm)	Total height H(cm)	Total content (ltr)	Net content (lit)
Type-1	15	70	281	870	842
Type-2		80	214	900	872
Type-3		90	164	830	802
Type-4	24	70	281	870	826
Type-5		80	214	900	856
Type-6		90	167	830	786
Type-7	32	70	281	870	811
Type-8		80	214	900	841
Type-9		90	167	830	771



Domestic Hot Water Storage Tanks

1000 lit

Type	HS (f.º)	Diameter D(cm)	Total height H(cm)	Total content (ltr)	Net content (lit)
Type-1	24	80	264	1150	1105
Type-2		90	217	1145	1101
Type-3		100	170	1040	996
Type-4	32	80	264	1150	1091
Type-5		90	217	1145	1086
Type-6		100	170	1040	981
Type-7	42	80	264	1150	1072
Type-8		90	217	1145	1068
Type-9		100	170	1040	963

1500 lit

Type	HS (f.º)	Diameter D(cm)	Total height H(cm)	Total content (ltr)	Net content (lit)
Type-1	32	90	267	1465	1406
Type-2		100	217	1435	1376
Type-3		120	177	1555	1496
Type-4	42	90	267	1465	1388
Type-5		100	220	1435	1358
Type-6		120	177	1555	1478
Type-7	56	90	267	1465	1362
Type-8		100	220	1435	1332
Type-9		120	177	1555	1452

2000 lit

Type	HS (f.º)	Diameter D(cm)	Total height H(cm)	Total content (ltr)	Net content (lit)
Type-1	42	110	274	2235	2158
Type-2		125	228	2300	2223
Type-3		140	184	2175	2098
Type-4	56	110	274	2235	2132
Type-5		125	228	2300	2197
Type-6		140	184	2175	2072
Type-7	72	110	274	2230	2098
Type-8		125	228	2300	2168
Type-9		140	184	2175	2043



Domestic Hot Water Storage Tanks

2500 lit

Type	HS (f.ř)	Diameter D(cm)	Total height H(cm)	Total content (lit)	Net content (lit)
Type-1	58	120	277	2685	2582
Type-2		130	232	2525	2422
Type-3		150	186	2545	2442
Type-4	72	120	277	2685	2553
Type-5		130	231	2525	2393
Type-6		150	186	2545	2413
Type-7	83	120	277	2685	2532
Type-8		130	232	2525	2372
Type-9		150	186	2545	2392

3000 lit

Type	HS (f.ř)	Diameter D(cm)	Total height H(cm)	Total content (lit)	Net content (lit)
Type-1	72	120	302	2965	2833
Type-2		130	282	3185	3053
Type-3		140	234	2945	2813
Type-4	83	120	302	2965	2812
Type-5		130	282	3185	3032
Type-6		140	234	2945	2792
Type-7	104	120	302	2965	2774
Type-8		130	282	3185	2994
Type-9		140	234	2945	2754

3500 lit

Type	HS (f.ř)	Diameter D(cm)	Total height H(cm)	Total content (lit)	Net content (lit)
Type-1	83	140	284	3715	3562
Type-2		150	284	3885	3732
Type-3		155	239	3675	3522
Type-4	104	140	284	3715	3524
Type-5		150	283	3885	3694
Type-6		155	239	3675	3484
Type-7	112	140	284	3715	3509
Type-8		150	283	3885	3679
Type-9		155	239	3675	3469



Domestic Hot Water Storage Tanks

4000 lit

Type	HS (r.t.°)	Diameter D(cm)	Total height H(cm)	Total content (lit)	Net content (lit)
Type-1	104	140	334	4485	4294
Type-2		150	288	4315	4124
Type-3		165	243	4225	4034
Type-4	112	140	334	4485	4279
Type-5		150	288	4315	4109
Type-6		165	243	4225	4019
Type-7	120	140	334	4485	4264
Type-8		150	288	4315	4094
Type-9		165	243	4225	4004

4500 lit

Type	HS (r.t.°)	Diameter D(cm)	Total height H(cm)	Total content (lit)	Net content (lit)
Type-1	112	145	334	4800	4594
Type-2		165	268	4750	4544
Type-3		175	247	4800	4594
Type-4	120	145	334	4800	4579
Type-5		165	268	4750	4529
Type-6		175	247	4800	4579
Type-7	127	145	334	4800	4566
Type-8		165	268	4750	4516
Type-9		175	247	4800	4566

5000 lit

Type	HS (r.t.°)	Diameter D(cm)	Total height H(cm)	Total content (lit)	Net content (lit)
Type-1	120	150	338	5200	4979
Type-2		165	293	5290	5069
Type-3		175	272	5400	5179
Type-4	127	150	338	5200	4966
Type-5		165	293	5290	5056
Type-6		175	272	5400	5188
Type-7	135	150	338	5200	4952
Type-8		165	293	5290	5042
Type-9		175	272	5400	5152





**Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...**



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

w w w . p a c k m a n g r o u p . c o m



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...



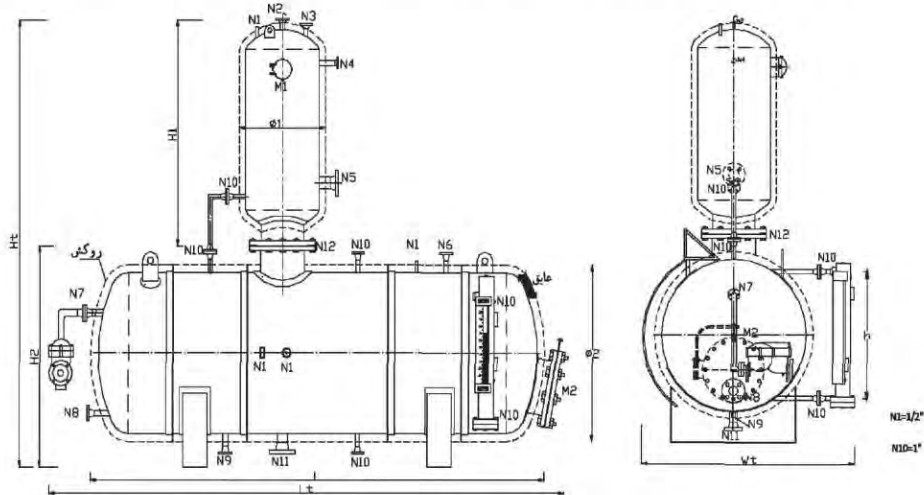
Deaerator

PDDT

A Packman Combination Boiler is a complete central heating and hot water boiler in a single, remarkably compact unit, produced to most stringent quality control

Tray type deaerator

Packman tray type deaerator is a pressurized, low-maintenance system designed to remove dissolved oxygen in boiler feedwater and eliminate carbon dioxide. The tray design is recognized as the most versatile and efficient method of reducing dissolved Oxygen content in boiler feedwater.



This type of deaerator made up from stainless steel and carbon steel. This deaerator is offered in vertical and horizontal tray configurations. The tank conforms to Section VIII of the ASME code.

- For water tube and fire tube boiler
- For Steam and hot water boiler
- Removes oxygen from feedwater
- Vertical or horizontal tray column design

Packman tray typ deaerator technical data steam

Steam boiler capacity Kg/h	Type	Deaerator capacity Lbs/h	Tray dimension		Tank dimension				Ex dimension		
			Ø1	H1	Ø2	L	H2	V	Lt	Wt	Ht
4000	PDR-10	10,000	500	1,500	1,000	2,300	1,450	1,000	2,650	1,350	2,950
7000	PDR-18	18,000	700	1,800	1,150	2,500	1,600	1,500	2,850	1,500	3,400
10,000	PDR-25	25,000	700	1,800	1,250	3,000	1,700	2,000	3,350	1,600	3,500
12,000	PDR-30	30,000	800	2,000	1,350	3,000	1,800	2,500	3,350	1,700	3,800
14,000	PDR-35	35,000	800	2,000	1,450	3,000	1,900	3,000	3,350	1,800	3,900
20,000	PDR-50	50,000	900	2,000	1,550	3,200	2,000	4,000	3,350	1,900	4,000
30,000	PDR-70	70,000	900	2,300	1,650	3,500	2,100	5,000	3,850	2,000	4,400
40,000	PDR-90	90,000	1,000	2,300	1,750	3,500	2,200	6,000	3,850	2,100	4,500
50,000	PDR-110	110,000	1,000	2,500	1,850	4,000	2,300	8,000	4,350	2,200	4,800



Equipment

- Deaerator storage tank
- Tray column
- Stainless steel trays
- Stainless steel Coating
- Inlet water valve
- Side glass
- Pressure gauge
- Feed water thermometer
- Safety valve
- Relief valve

For this type of deaerator, there is some **Optional Equipment** such as high water alarm and etc.

Packman tray typ deaerator nozzle data									
Steram boiler capacity Kg/h	Type	Deaerator capacity Lbs/h	Nozzles						
			N2	N3	N4	N5	N6	N7	N8
4000	PDR-10	10,000	1" NPT	1" NPT	1 1/4" NPT	3" FLG	1" NPT	1" NPT	1" NPT
7000	PDR-18	18,000	1 1/4" NPT	1 1/2" NPT	1 1/2" NPT	4" FLG	1 1/2" NPT	1 1/2" NPT	1 1/2" NPT
10,000	PDR-25	25,000	1 1/4" NPT	1 1/2" NPT	1 1/2" NPT	4" FLG	1 1/2" NPT	1 1/2" NPT	2" FLG
12,000	PDR-30	30,000	1 1/2" NPT	2" FLG	2" FLG	5" FLG	1 1/2" NPT	1 1/2" NPT	2" FLG
14,000	PDR-35	35,000	1 1/2" NPT	2" FLG	2" FLG	5" FLG	2" FLG	1 1/2" NPT	2" FLG
20,000	PDR-50	50,000	1 1/2" NPT	2" FLG	2 1/2" FLG	6" FLG	2" FLG	2" FLG	2 1/2" FLG
30,000	PDR-70	70,000	2" FLG	2 1/2" FLG	2 1/2" FLG	6" FLG	2" FLG	2" FLG	2 1/2" FLG
40,000	PDR-90	90,000	2" FLG	2 1/2" FLG	3" FLG	8" FLG	2 1/2" FLG	2 1/2" FLG	3" FLG
50,000	PDR-110	110,000	2" FLG	2 1/2" FLG	3" FLG	8" FLG	2 1/2" FLG	2 1/2" FLG	3" FLG

Packman tray typ deaerator nozzle data								
Steram boiler capacity Kg/h	Type	Deaerator capacity Lbs/h	Nozzles					
			N9	N11	N12	M2	M1	N8
4000	PDR-10	10,000	1 1/2" NPT	4" FLG	14" FLG	12" FLG	6"	60
7000	PDR-18	18,000	2" FLG	4" FLG	14" FLG	14" FLG	6"	60
10,000	PDR-25	25,000	2" FLG	5" FLG	14" FLG	16" FLG	6"	60
12,000	PDR-30	30,000	2" FLG	5" FLG	14" FLG	16" FLG	6"	90
14,000	PDR-35	35,000	2" FLG	5" FLG	14" FLG	16" FLG	8"	90
20,000	PDR-50	50,000	2" FLG	6" FLG	16" FLG	16" FLG	8"	100
30,000	PDR-70	70,000	2" FLG	6" FLG	16" FLG	16" FLG	8"	100
40,000	PDR-90	90,000	2" FLG	8" FLG	18" FLG	16" FLG	8"	120
50,000	PDR-110	110,000	2" FLG	8" FLG	20" FLG	16" FLG	8"	120





**Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...**



+ 9 8 2 1 4 2 3 6 2

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel: +98 31 33 68 61 80

w w w . p a c k m a n g r o u p . c o m



Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...

Condensing Boilers

PHWB-CO

- Up To 98% Efficiency
- According To ASME

 021 42 362

www.packmanindia.com

تاریخچه

شرکت پاکمن در سال ۱۳۵۴ با همکاری پنج تن از فارغ التحصیلان رشته مکانیک دانشکده فنی دانشگاه تهران با هدف فعالیت در زمینه طراحی، تامین و ساخت پروژه های تاسیساتی دایر گردید. شرکت پاکمن با بیش از ۴۰ سال تجربه موفق در راستای اجرای پروژه های تاسیساتی، نظیر پروژه های نیروگاهی و پتروشیمی، تجاری، اداری و مسکونی، استخر و پارک آبی و... با استفاده از پیشرفته ترین امکانات و تکنولوژی های ساخت انواع تجهیزات صنعتی از جمله بویلر بخار، بویلر آب گرم، بویلر چگالشی، آب شیرین کن های صنعتی، سیستم های تصفیه آب، مخازن تحت فشار، دی آریتور و ... را تولید نموده و تاکنون با شرکت ها و ارگان های معتبری در زمینه های مختلف مانند شرکت مهنا، شرکت ملی نفت ایران، صنایع پتروشیمی ایران، سازمان صنایع دفاع، ارتش جمهوری اسلامی ایران و دیگر ارگان های دولتی و خصوصی در زمینه پروژه های EPC همکاری داشته است.

با توجه به حساسیت روز افزون کشور در زمینه بهینه سازی مصرف سوخت و انرژی، استفاده از دستگاه هایی با بالاترین رده راندمان بسیار حیاتی می باشد. از این رو شرکت پاکمن به منظور استفاده بهینه از سیستم های گرمایشی اقدام به تولید بویلر های چگالشی مطابق با فناوری روز دنیا که حق امتیاز تولید آن در تمام دنیا (به جز آمریکای شمالی) در اختیار مدیریت شرکت پاکمن می باشد، نموده است. بویلر های چگالشی از انواع بویلر های مورد استفاده در سیستم های حرارت مرکزی می باشند که در چندین سال اخیر به بازار تاسیسات دنیا و ایران راه یافته اند. این بویلرها از راندمان بالاتری نسبت به بویلر های سنتی برخوردار هستند.

بویلر های چگالشی تولیدی توسط شرکت پاکمن با ویژگی های منحصر به فرد از نظر تکنولوژی ساخت و شیوه بکار گیری تجهیزات، قابل رقابت با مدل های مشابه خارجی است. این محصول با استفاده شیوه های نوین، موجب کاهش هزینه های ساخت و عملیاتی گردیده است. از جمله مزیت های برجسته و بارز بویلر های چگالشی تولیدی توسط شرکت پاکمن نسبت به مدل های جهانی مطرح، توان انجام عملیات تا بازده ۹۸٪، تولید در ظرفیت های نامحدود، حجم و ابعاد بسیار کم، انجام عملیات نگهداری و تعمیرات و خرابی بسیار کم و ... می باشد. شرکت پاکمن با توجه به سابقه و قدمت خود در پروژه های EPC مختلف داخلی و خارجی، و همچنین با بکار گیری از تجهیزات به روز، آمادگی خود را جهت همکاری در پروژه ها در زمینه ذکر شده آن شرکت را اعلام می دارد.



برخی از گواهینامه ها و تاییدیه های بویلر های چگالش شرکت پاکمن



• گواهی ثبت اختراع داخلی بویلرها
به مدت ۲۰ سال



• اختراع ثبت شده در کشور آمریکا



• تاییدیه سازمان بهینه سازی انرژی
در ارتباط با نوآوری



بویلر های چگالشی با راندمان بالای شرکت پاکمن

بویلر های چگالشی پاکمن مبتنی بر سیستم احتراق با راندمان بالا تولید آبگرم تا ۹۸ درصد می کند. از دیگر ویژگی های این بویلر ها تنظیم هوای احتراق به وسیله دریچه کنترل اتوماتیک می باشد. عملکرد سیستم دریچه کنترل عبارتست از تبدیل یا کنترل ظرفیت ورودی دستگاه (جریان سوخت و هوا) به منظور حفظ اتوماتیک دمای آب خروجی در دمای مطلوب با تلورانس $\pm 1^{\circ}\text{C}$ که در نتیجه آن سیکل های خاموش / روشن تقریباً حذف می گردند.

در ساخت این بویلر ها، همه آزمایشات مطابق با روند مقرر شده توسط انیستیتیوی (ANSI) American National Standard Institute انجام گرفته است.

به علاوه، همه بخش های مربوط به Pressure Part مطابق با آیین نامه های جامع American Society of Mechanical Engineers (ASME) می باشند. همچنین همه مواد بکار رفته در مبدل حرارتی مطابق با ضوابط American Society of Testing Material (ASTM) انتخاب شده است.

شایان ذکر است از بویلر های چگالشی شرکت پاکمن به دلیل نوع احتراق و شرایط عبور سیال از داخل کویل، به عنوان آب شیرین کن حرارتی نیز می توان استفاده نمود.

بنابراین در جائیکه در سیستم های شیرین کن معمولی از بخار برای گرم کردن آب دریا استفاده می شود، در بویلر های چگالشی شرکت پاکمن آب دریا را می توان مستقیماً وارد دستگاه نمود، که اینکار هزینه اضافی سیکل ژنراتورهای بخار در سیستم های معمول شیرین کن را حذف می کند و هم چنین مصرف سوخت را نیز بمیزان قابل توجهی کاهش می دهد.

مواد مصرفی در ساخت بویلر چگالشی

در ساخت بویلر های چگالشی از رده فولاد زنگ نزن استفاده شده است که به دلیل دارا بودن نیکل و کروم ماده مقاوم تری نسبت به رده ۴۰۰ خواهد بود.

رنج تولید محصول و بازار هدف

بویلر های چگالشی شرکت پاکمن در ظرفیت های ۱۰/۰۰۰ تا ۴/۰۰۰/۰۰۰ کیلوکالری در ساعت حتی تا فشار کاری ۱۹۰ بار ساخته می شود. مبدل یکپارچه استنلس استیل استفاده شده در بویلر ها به صورت کویل عمودی بر اساس ظرفیت ساخته می شود. به دلیل ساختار یکپارچه و متریال مصرفی بویلر های چگالشی قابلیت کارکرد مستقیم و قابلیت تولید آب گرم بهداشتی را به صورت درخواستی دارد.

از این رو این محصول پیشنهاد ویژه ای به محل هایی که نیاز به آبگرم بهداشتی و گرمایش دارند توصیه می گردد و در پایانه هایی که دمای برگشت آب پایین تر از ۵۰ درجه سانتی گراد می باشد بیشترین راندمان را خواهد داشت.

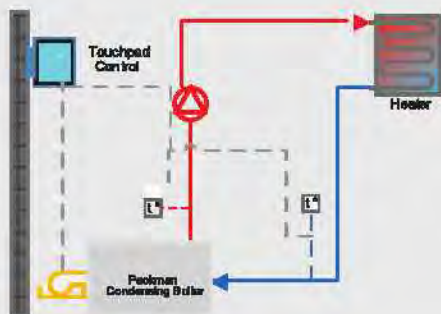
مدارس، ساختمان های اداری، تجاری و مسکونی که از گرمایش کف و یا سیستم نوین مانند فن کویل استفاده می کنند، استخرها، محل هایی که فقط آبگرم بهداشتی می خواهند و پلنت های تولید آب شیرین از جمله موارد کاربرد بویلر های چگالشی پاکمن خواهند بود.



کاربردها، کارکرد، کنترل و تجهیزات جانبی بویلر های چگالشی شرکت پاکمن

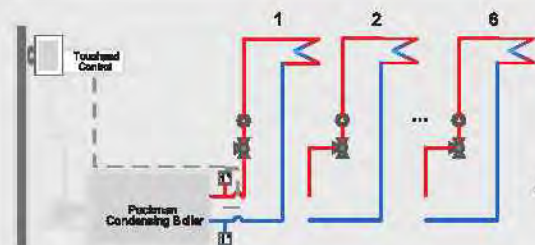
بویلر های چگالشی شرکت پاکمن با توجه به ویژگی ها، کاربردهای وسیعی دارد. همچنین شیوه عملکرد نوینی در این سیستم دیده شده است که قابل بحث و بررسی است.

امکان اتصال به BMS و کنترل فرآیند



- قابلیت کنترل از راه دور توسط اپراتور جهت تنظیم برنامه ریزی گرمایش و تنظیم درجه حرارت سیستم
- پشتیبانی از پروتکل های مختلف ارسال اطلاعات و فرامین
- ارسال Command, Status & Fault report از طریق تابلو برق PLC به سیستم کنترل مرکزی ساختمان
- تنظیم اتوماتیک هوای ورودی به مشعل جهت رسیدن به بالاترین راندمان سیستم

امکان کنترل بار مصرفی



- امکان کنترل کارکرد بویلر تا ۱۶ درصد ظرفیت کل بویلر
- تنظیم میزان جریان آبگرم خروجی به صورت اتوماتیک و دستی
- تنظیم کارکرد مشعل با توجه به دمای آب رفت و برگشت و میزان مصرف ساختمان

امکان استفاده مستقیم از بویلر



- اتصال مستقیم به مصرف کننده بدلیل نوع خاص احتراق و همچنین متریکال مصرفی مانند استخر و صنایع مورد نیاز به گرمایش با آبگرم
- قابلیت کارکرد در دمای آب ورودی نزدیک به صفر
- قابلیت حصول اختلاف دمای ورودی و خروجی تا ۹۰ درجه سانتیگراد
- استفاده از بویلر در سیستم آب شیرین کن صنعتی

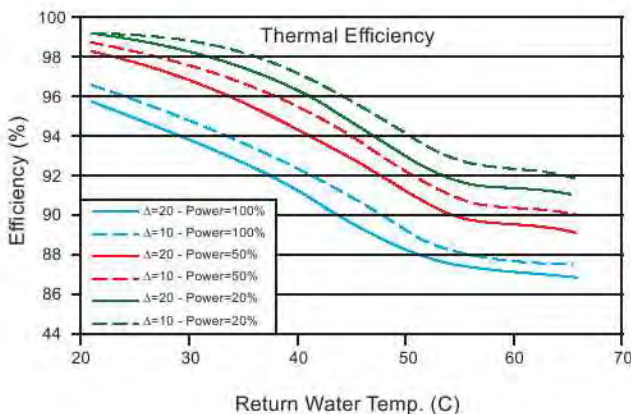


ویژگی های بویلر های چگالشی شرکت پاکمن

- قابلیت کارکرد در دماهای متفاوت از 5 تا حدود 120 °C
- ساخته شده از ظرفیت 40,000 - 10,000,000 Kcal/h
- توان تحمل فشار کاری تا ۱۹۰ بار
- با قابلیت کارکرد با هر نوع آب بدون نیاز به سختی گیر
- طراحی ویژه با قابلیت عدم تشکیل رسوب
- استفاده از بویلر به صورت مستقیم بدون نیاز به مبدل حرارتی
- با تعمیرات و نگهداری آسان
- توانایی حصول راندمان ۹۸٪
- دارای مشعل مخصوص جهت ایجاد احتراق ویژه با کمترین میزان آلاینده‌گی
- عملکرد مشعل به صورت Modular و در رنج ۱۶٪ تا ۱۰۰٪ ظرفیت بویلر
- قابلیت کارکرد با سوخت گاز و در شرایط ویژه به صورت دوگانه سوز
- قابلیت اتصال دودکش پلی اتیلن بدون نیاز به ارتفاع زیاد
- با میزان بسیار پایین صدا در زمان کارکرد
- انجام تست فشار ۱/۵ برابر فشار کاری
- دارای تابلو برق PLC با قابلیت ارسال اطلاعات به BMS
- مناسب آب شیرین کن صنعتی، گرمایش استخر، تولید آبگرم مصرفی و...

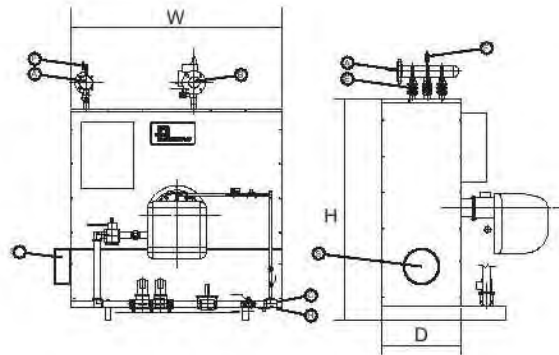
مقادیر بازده

بویلرهای چگالشی شرکت پاکمن بالاترین بازده تأیید شده در بویلر های چگالشی را دارند. این بازده بالای اختصاصی به دلیل وجود ویژگی های احتراقی و پروسه های انتقال حرارت دستگاه است که منجر به میعان هوای موجود در گازهای خروجی می شود. مقادیر بازده بستگی به دمای آب ورودی دارد. هر چه آب ورودی سردتر باشد، مقدار میعان بیشتر می شود بنابراین مقدار بازده بالاتر خواهد بود. در بویلرها آب درون سیستم گردش می کند پس آب ورودی بویلر همان آب برگشتی ساختمان است که دمای بالاتری نسبت به خط لوله آب شهر دارد. (آب موجود در شیرهای اصلی) گرمای نهان میعان به آبی که در کوئل ها گردش می کند منتقل می گردد. این انرژی گرمایی بدون هیچ انرژی اضافی ورودی به آب افزوده می گردد. با توجه به مقدار (حجم) میعان، وجود این گرمای نهان، بازده را تا حدود ۱۱ درصد افزایش می دهد. بعنوان مثال نمودار زیر ارائه می شود که تغییرات بازده بویلر مدل 500,000 Kcal/h را با دماهای مختلف آب ورودی نشان می دهد. همانطور که از معادلات انتقال حرارت پیداست. اگر ظرفیت ورودی کاهش یافته و سطح انتقال حرارت ثابت بماند (بار جزئی)، نرخ انتقال دما در واحد سطح تبادل گر حرارتی افزایش خواهد یافت. بنابراین بازده بالا خواهد رفت. نمودار حاضر افزایش در مقدار بازده را در بارهای کم (بار جزئی) در دماهای مختلف آب نشان می دهد.



Condensing Boiler

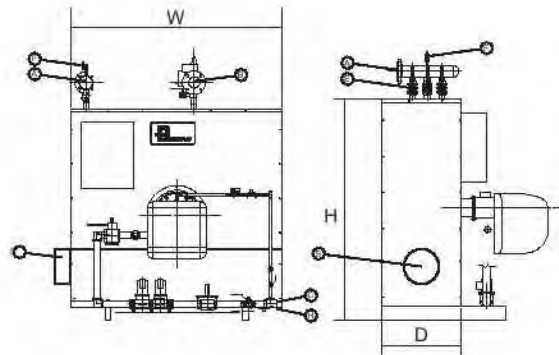
PHWB-CO



Boiler Capacity (Kcal/h)		40,000	50,000	75,000	100,000	125,000
		Boiler Model				
	Unit	PHWB-CO-40	PHWB-CO-50	PHWB-CO-75	PHWB-CO-100	PHWB-CO-125
HHV Efficiency % @ Full Load	Percent	95	95	95	95	95
HHV Efficiency % @ P	Percent	98	98	98	98	98
Type of Fuels	Type	Gas	Gas	Gas	Gas	Gas
Gas Consumption at 9,600 Kcal/m ³	m ³ / hr.	4.1-0.7	5.2-0.9	7.8-1.3	10.41-1.8	13.1-2.2
Working Pressure (bar) - <i>(Maximum Allowable Boiler Working Pressure 190 bar)</i>	bar g.	16	16	16	16	16
Design Water Temperature (°C)	°C	120	120	120	120	120
Maximum Differential Temperature (°C)	°C	100	100	100	100	100
Minimum Inlet Temperature (°C)	°C	5	5	5	5	5
Electrical Rating (ph./Hz/v)	ph./Hz/v	1/50/220	1/50/220	1/50/220	1/50/220	1/50/220
Water Content	lit	30	40	60	60	80
Recommended Water Flow Rate @ΔT=20°F	lit/min	60	75	113	150	190
Gas inlet Pressure	mbar	17.5-35	17.5-35	17.5-35	17.5-35	17.5-35
Boiler Shell Width (W)	mm	1350	1410	1410	1470	1590
Boiler Shell Depth (D)	mm	560	560	580	590	600
Boiler Shell Height (H)	mm	1400	1460	1460	1520	1640
Overall Width (W1)	mm	1350	1410	1410	1470	1590
Overall Height /Outlet (H1)	mm	1450	1510	1520	1580	1710
Transport Weight	Kg	250	280	330	350	420
Supply & Return Connection (A,B)	in	1 1/2	1 1/2	2	2	2 1/2
Gas Connection (C)	in	1/2	1/2	3/4	3/4	1
Exhaust Gas Outlet Connection (S)	in	4	4	4	4	6
Pressure safety valve Connection (G)	in	3/4	3/4	3/4	3/4	3/4
Drain Connection	in	3/4	3/4	3/4	3/4	3/4
Air Vent Connection	in	3/8	3/8	3/8	3/8	3/8

• تمامی ابعاد و وزن های اعلام شده ممکن است در زمان ساخت با حد اکثر ۱۰ درصد اختلاف مواجه شوند.





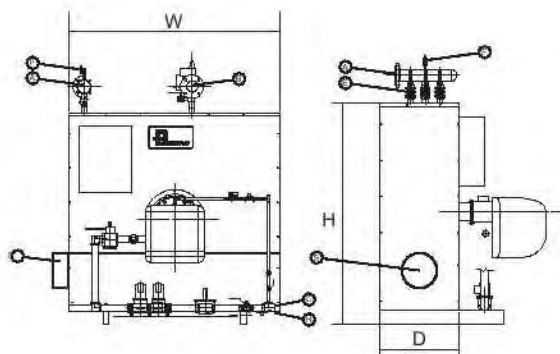
Boiler Capacity (Kcal/h)		150,000	175,000	200,000	250,000	300,000
		Boiler Model				
	Unit	PHWB-CO-150	PHWB-CO-175	PHWB-CO-200	PHWB-CO-250	PHWB-CO-300
HHV Efficiency % @ Full Load	Percent	95	95	95	95	95
HHV Efficiency % @ P	Percent	98	98	98	98	98
Type of Fuels	Type	Gas	Gas	Gas	Gas	Gas
Gas Consumption at 9,600 Kcal/m ³	m ³ / hr.	15.7-2.7	18.3-3.1	20.8-3.5	26.1-4.4	31.25-5.2
Working Pressure (bar) -	bar g.	16	16	16	16	16
<i>(Maximum Allowable Boiler Working Pressure 190 bar)</i>						
Design Water Temperature (°C)	°C	120	120	120	120	120
Maximum Differential Temperature (°C)	°C	100	100	100	100	100
Minimum Inlet Temperature (°C)	°C	5	5	5	5	5
Electrical Rating (ph./Hz/v)	ph./Hz/v	1/50/220	1/50/220	1/50/220	3/50/380	3/50/380
Water Content	lit	100	110	130	140	170
Recommended Water Flow Rate @ΔT=20°F	lit/min	225	260	300	375	450
Gas inlet Pressure	mbar	17.5-35	17.5-35	17.5-35	20-35	20-35
Boiler Shell Width (W)	mm	1710	1830	1960	1830	1830
Boiler Shell Depth (D)	mm	600	610	630	650	680
Boiler Shell Height (H)	mm	1760	1880	2010	1880	1880
Overall Width (W1)	mm	1710	1830	1960	1830	1830
Overall Height /Outlet (H1)	mm	1830	1960	2090	1960	1960
Transport Weight	Kg	490	550	630	640	700
Supply & Return Connection (A,B)	in	2 1/2	3	3	3	3
Gas Connection (C)	in	1	1 1/2	1 1/2	1 1/2	1 1/2
Exhaust Gas Outlet Connection (S)	in	6	6	8	8	8
Pressure safety valve Connection (G)	in	3/4	1	1	1 1/4	1 1/4
Drain Connection	in	3/4	3/4	3/4	3/4	3/4
Air Vent Connection	in	3/8	3/8	3/8	3/8	3/8

• تمامی ابعاد و وزن های اعلام شده ممکن است در زمان ساخت با حد اکثر ۱۰ درصد اختلاف مواجه شوند.



Condensing Boiler

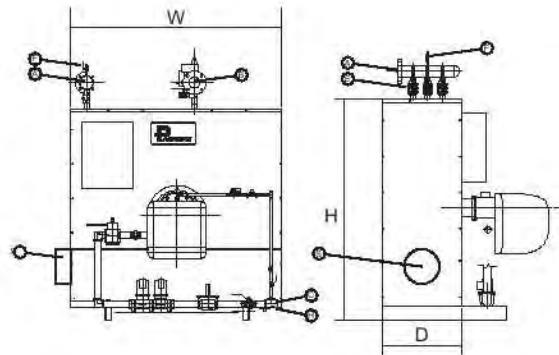
PHWB-CO



Boiler Capacity (Kcal/h)	Unit	400,000	500,000	600,000	700,000	800,000
		Boiler Model				
		PHWB-CO-400	PHWB-CO-500	PHWB-CO-600	PHWB-CO-700	PHWB-CO-800
HHV Efficiency % @ Full Load	Percent	95	95	95	95	95
HHV Efficiency % @ P	Percent	98	98	98	98	98
Type of Fuels	Type	Gas	Gas	Gas	Gas	Gas
Gas Consumption at 9,600 Kcal/m ³	m ³ / hr.	41.6-6.95	52.1-8.7	62.5-10.4	72.9-12.15	83.4-13.9
Working Pressure (bar) - <i>(Maximum Allowable Boiler Working Pressure 190 bar)</i>	bar g.	16	16	16	16	16
Design Water Temperature (°C)	°C	120	120	120	120	120
Maximum Differential Temperature (°C)	°C	100	100	100	100	100
Minimum Inlet Temperature (°C)	°C	5	5	5	5	5
Electrical Rating (ph./Hz/v)	ph./Hz/v	3/50/380	3/50/380	3/50/380	3/50/380	3/50/380
Water Content	lit	210	280	330	330	410
Recommended Water Flow Rate @ΔT=20°F	lit/min	600	755	900	1050	1200
Gas inlet Pressure	mbar	20-35	70-139	70-139	70-139	70-139
Boiler Shell Width (W)	mm	1830	1960	1960	1960	2020
Boiler Shell Depth (D)	mm	770	830	910	910	960
Boiler Shell Height (H)	mm	1880	2010	2010	2010	2070
Overall Width (W1)	mm	1830	1960	1960	1960	2020
Overall Height /Outlet (H1)	mm	2000	2130	2140	2140	2200
Transport Weight	Kg	820	1040	1160	1160	1380
Supply & Return Connection (A,B)	in	4	4	5	5	5
Gas Connection (C)	in	1 1/2	2	2	2	2
Exhaust Gas Outlet Connection (S)	in	8	10	10	10	12
Pressure safety valve Connection (G)	in	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Drain Connection	in	3/4	3/4	3/4	3/4	3/4
Air Vent Connection	in	3/8	3/8	3/8	3/8	3/8

• تمامی ابعاد و وزن های اعلام شده ممکن است در زمان ساخت با حد اکثر ۱۰ درصد اختلاف مواجه شوند.





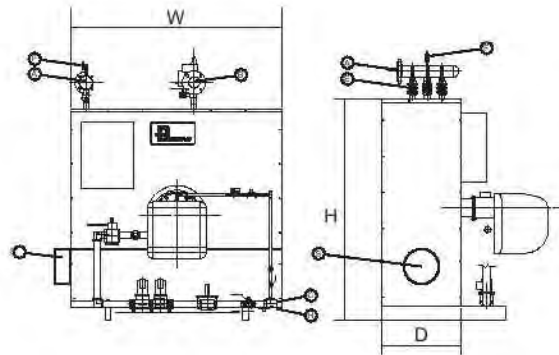
Boiler Capacity (Kcal/h)	Boiler Model					
	Unit	PHWB-CO-1000	PHWB-CO-1250	PHWB-CO-1500	PHWB-CO-1750	PHWB-CO-2000
HHV Efficiency % @ Full Load	Percent	95	95	95	95	95
HHV Efficiency % @ P	Percent	98	98	98	98	98
Type of Fuels	Type	Gas	Gas	Gas	Gas	Gas
Gas Consumption at 9,600 Kcal/m ³	m ³ / hr.	104.2-17.4	130.3-21.8	156.3-26.1	182.3-30.4	208.4-34.8
Working Pressure (bar) - <i>(Maximum Allowable Boiler Working Pressure 180 bar)</i>	bar g.	16	16	16	16	16
Design Water Temperature (°C)	°C	120	120	120	120	120
Maximum Differential Temperature (°C)	°C	100	100	100	100	100
Minimum Inlet Temperature (°C)	°C	5	5	5	5	5
Electrical Rating (ph./Hz/v)	ph./Hz/v	3/50/380	3/50/380	3/50/380	3/50/380	3/50/380
Water Content	lit	480	620	740	830	990
Recommended Water Flow Rate @ΔT=20°F	lit/min	1510	1880	2250	2630	3010
Gas Inlet Pressure	mbar	70-139	70-139	70-139	70-139	70-139
Boiler Shell Width (W)	mm	2080	2140	2200	2320	2320
Boiler Shell Depth (D)	mm	1040	1110	1160	1180	1290
Boiler Shell Height (H)	mm	2130	2190	2250	2370	2370
Overall Width (W1)	mm	2080	2140	2200	2320	2320
Overall Height /Outlet (H1)	mm	2260	2350	2410	2530	2580
Transport Weight	Kg	1590	1970	2280	2550	2960
Supply & Return Connection (A,B)	in	5	6	6	6	8
Gas Connection (C)	in	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Exhaust Gas Outlet Connection (S)	in	14	14	16	16	16
Pressure safety valve Connection (G)	in	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2
Drain Connection	in	3/4	3/4	3/4	3/4	1
Air Vent Connection	in	3/8	3/8	3/8	3/8	3/8

• تمامی ابعاد و وزن های اعلام شده ممکن است در زمان ساخت با حد اکثر ۱۰ درصد اختلاف مواجه شوند.



Condensing Boiler

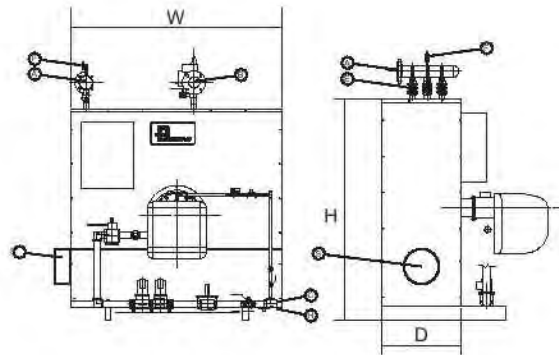
PHWB-CO



Boiler Capacity (Kcal/h)		2,250,000	2,500,000	2,750,000	3,000,000	4,000,000
		Boiler Model				
	Unit	PHWB-CO-2250	PHWB-CO-2500	PHWB-CO-2750	PHWB-CO-3000	PHWB-CO-4000
HHV Efficiency % @ Full Load	Percent	95	95	95	95	95
HHV Efficiency % @ P	Percent	98	98	98	98	98
Type of Fuels	Type	Gas	Gas	Gas	Gas	Gas
Gas Consumption at 9,600 Kcal/m ³	m ³ / hr.	234.4-39.1	260.4-43.4	286.5-47.8	312.5-52.1	416.7-69.5
Working Pressure (bar) - <i>(Maximum Allowable Boiler Working Pressure 190 bar)</i>	bar g.	16	16	16	16	16
Design Water Temperature (°C)	°C	120	120	120	120	120
Maximum Differential Temperature (°C)	°C	100	100	100	100	100
Minimum Inlet Temperature (°C)	°C	5	5	5	5	5
Electrical Rating (ph./Hz/v)	ph./Hz/v	3/50/380	3/50/380	3/50/380	3/50/380	3/50/380
Water Content	lit	1090	1240	1340	1470	2013
Recommended Water Flow Rate @ΔT=20°F	lit/min	3380	3760	4135	4510	6010
Gas inlet Pressure	mbar	70-139	70-139	70-139	70-139	70-139
Boiler Shell Width (W)	mm	2320	2440	2510	2510	2870
Boiler Shell Depth (D)	mm	1360	1450	1450	1520	1550
Boiler Shell Height (H)	mm	2370	2490	2560	2560	2940
Overall Width (W1)	mm	2320	2440	2510	2510	4050
Overall Height /Outlet (H1)	mm	2580	2700	2770	2770	3440
Transport Weight	Kg	3220	3640	3920	4230	5700
Supply & Return Connection (A,B)	in	8	8	8	8	10
Gas Connection (C)	in	3	3	3	3	3
Exhaust Gas Outlet Connection (S)	in	16	20	20	20	24
Pressure safety valve Connection (G)	in	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Drain Connection	in	1	1	1	1	1
Air Vent Connection	in	3/8	3/8	3/8	3/8	3/8

• تمامی ابعاد و وزن های اعلام شده ممکن است در زمان ساخت با حد اکثر ۱۰ درصد اختلاف مواجه شوند.





Boiler Capacity (Kcal/h)		5,000,000	6,000,000	7,000,000	8,000,000	10,000,000
		Boiler Model				
	Unit	PHWB-CO-5000	PHWB-CO-6000	PHWB-CO-7000	PHWB-CO-8000	PHWB-CO-10000
HHV Efficiency % @ Full Load	Percent	97	97	97	97	97
HHV Efficiency % @ P	Percent	98.9	98.9	98.9	98.9	98.9
Type of Fuels	Type	Gas	Gas	Gas	Gas	Gas
Gas Consumption at 9,600 Kcal/m ³	m ³ / hr.	520.83-89.8	625-104.16	729.166-121.5	833.3-138.8	1041.6-173.6
Working Pressure (bar) - <i>(Maximum Allowable Boiler Working Pressure 190 bar)</i>	bar g.	16	16	16	16	16
Design Water Temperature (°C)	°C	120	120	120	120	120
Maximum Differential Temperature (°C)	°C	100	100	100	100	100
Minimum Inlet Temperature (°C)	°C	5	5	5	5	5
Electrical Rating (ph./Hz/v)	ph./Hz/v	3/50/380	3/50/380	3/50/380	3/50/380	3/50/380
Water Content	lit	2500	3100	3500	4100	5000
Recommended Water Flow Rate @ΔT=20°F	lit/min	7511	9013	10515	12017	15022
Gas inlet Pressure	mbar	70-139	70-139	70-139	70-139	70-139
Boiler Shell Width (W)	mm	3000	3100	3200	3300	3400
Boiler Shell Depth (D)	mm	1400	1500	1600	1700	1800
Boiler Shell Height (H)	mm	3000	3100	3200	3300	3400
Overall Width (W1)	mm	4300	4400	4800	5000	5000
Overall Height /Outlet (H1)	mm	3400	3500	3600	3700	3800
Transport Weight	Kg	6000	6800	7200	8000	9900
Supply & Return Connection (A,B)	in	10	10	12	12	12
Gas Connection (C)	in	3	3	3	3	3
Exhaust Gas Outlet Connection (S)	in	36	38	40	40	44
Pressure safety valve Connection (G)	in	3	3	3	3	4
Drain Connection	in	2	2	2	2	2
Air Vent Connection	in	1	1	1	1	1

• تمامی ابعاد و وزن های اعلام شده ممکن است در زمان ساخت با حد اکثر ۱۰ درصد اختلاف مواجه شوند.



اجرای دودکش بویلر های چگالش

اجرای دودکش بویلر های چگالشی مواردی دارد که باید مورد توجه قرار بگیرد.

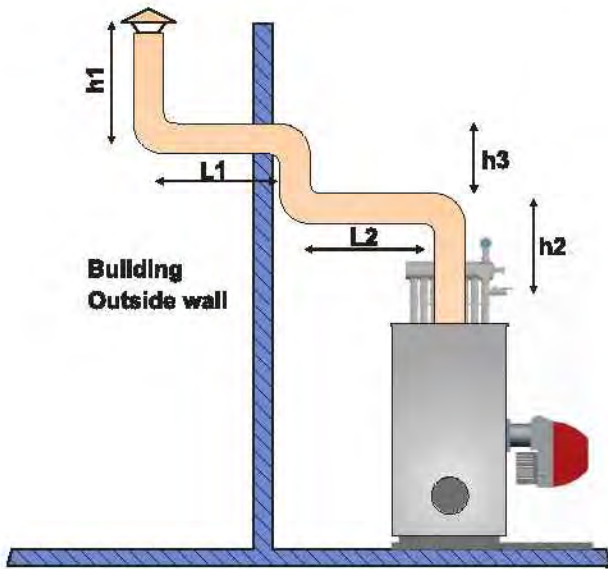
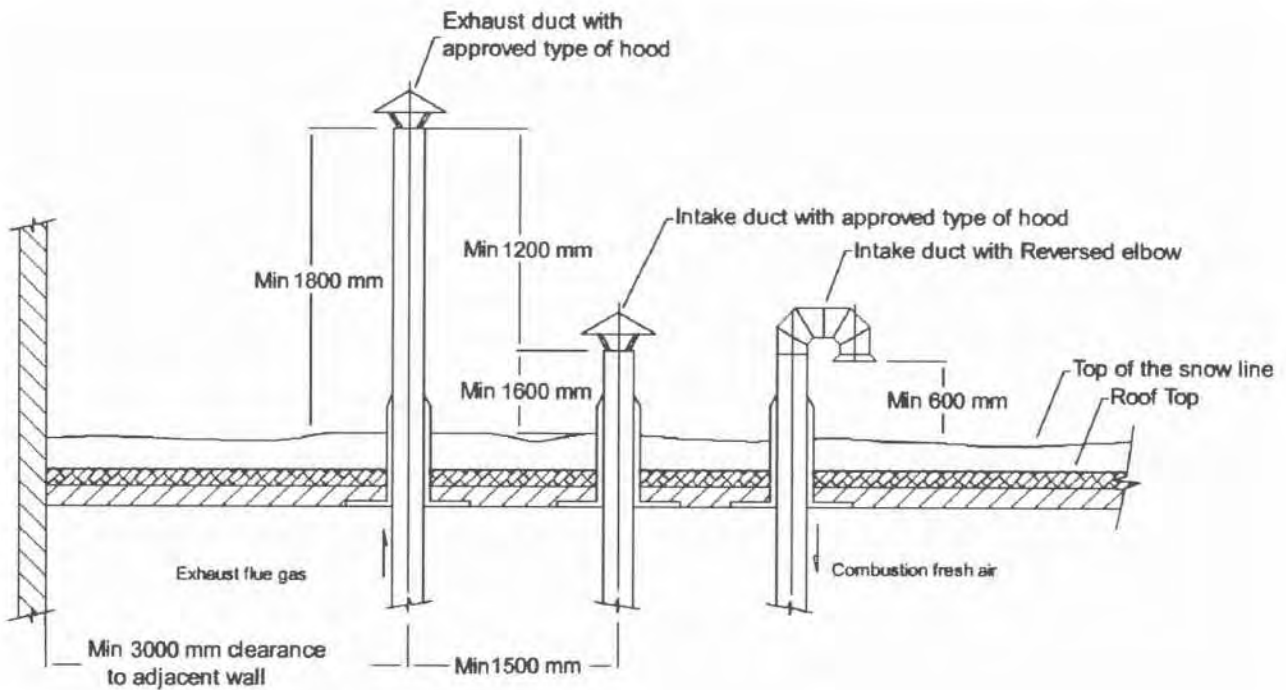
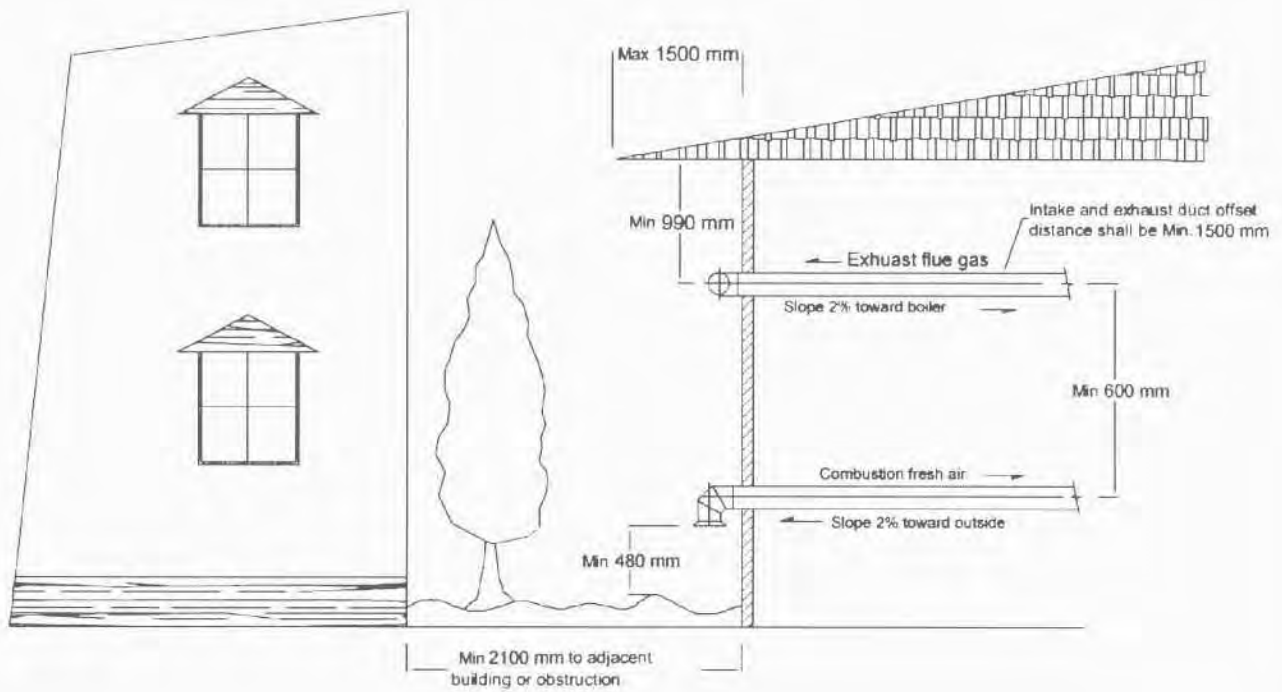
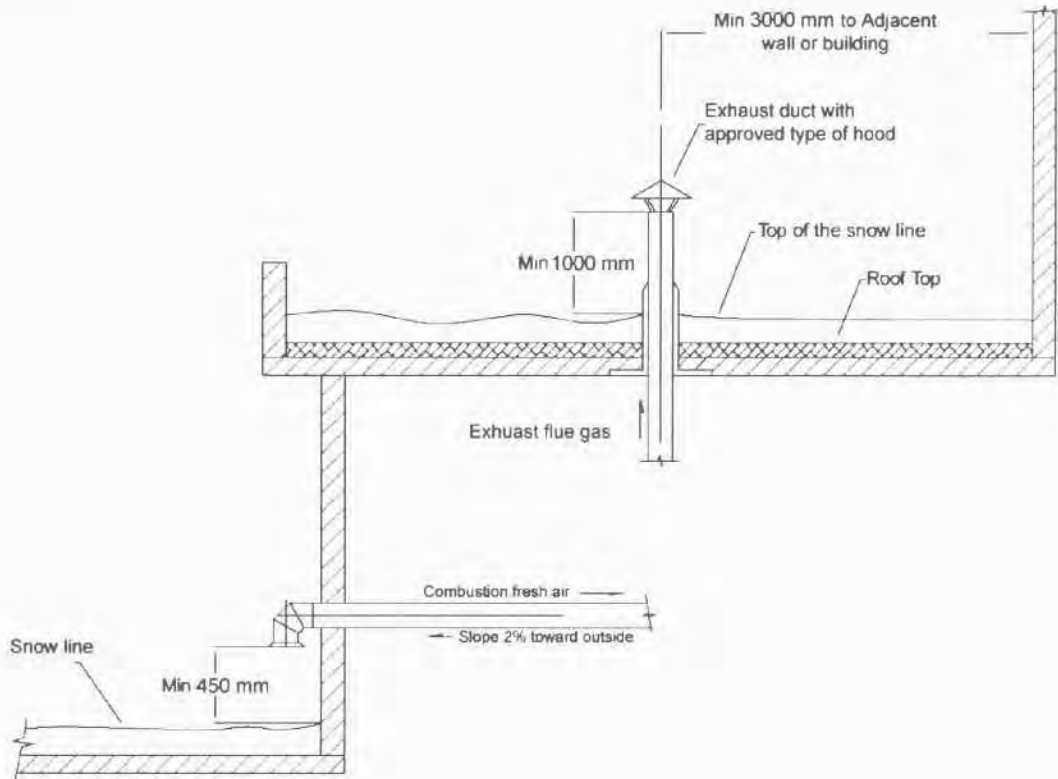


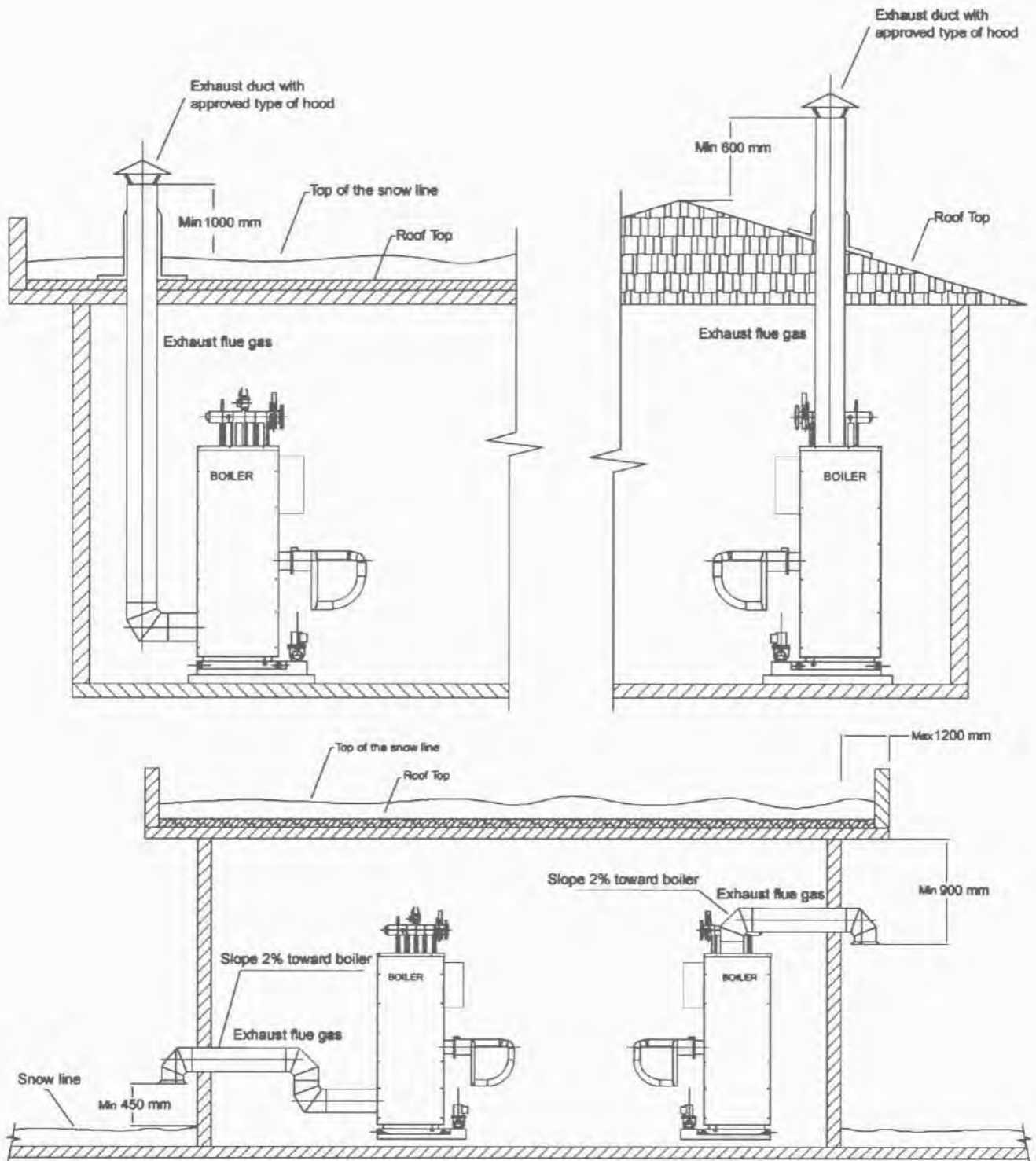
Figure 10: Direct Vent





Condensing Boiler

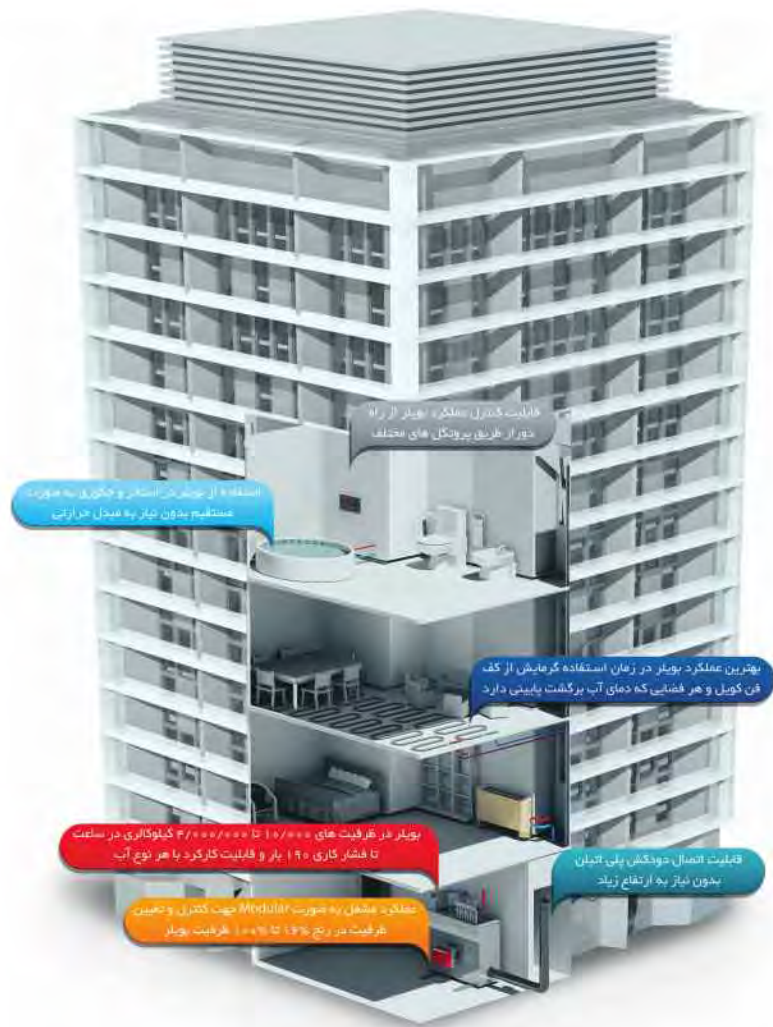
PHWB-CO



www.Packmangroup.com



**Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ,...**



+98 21 42 362

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel:

+98 31 33 68 61 80

www.packmangroup.com



Packman **Industrial Group**

Two Pass Horizontal Steam Boiler

Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment ...



www.Packmangroup.com

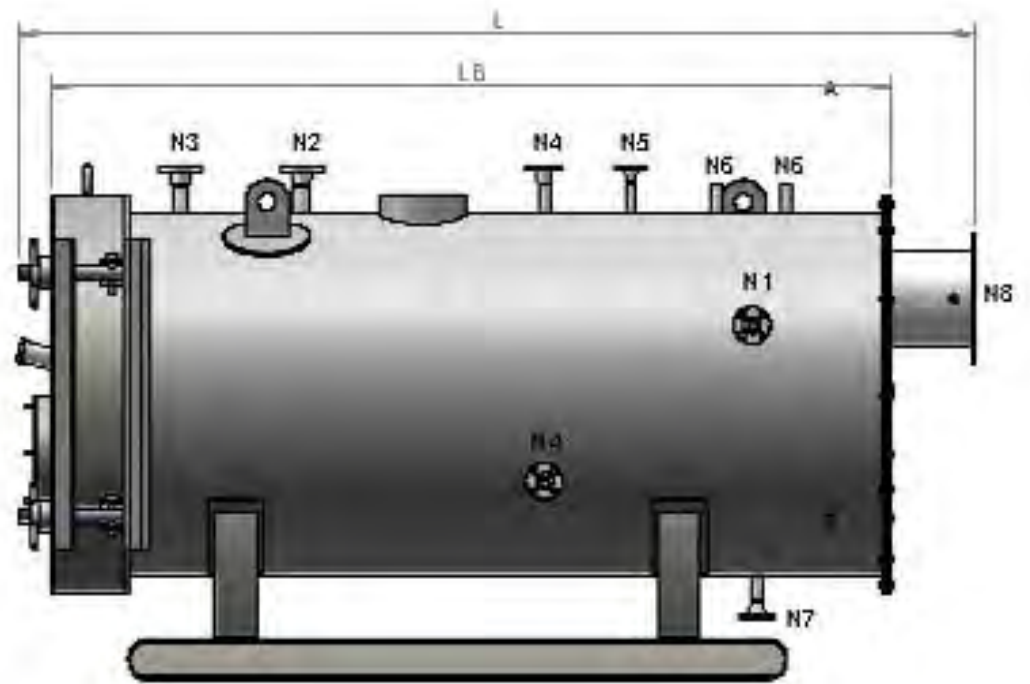
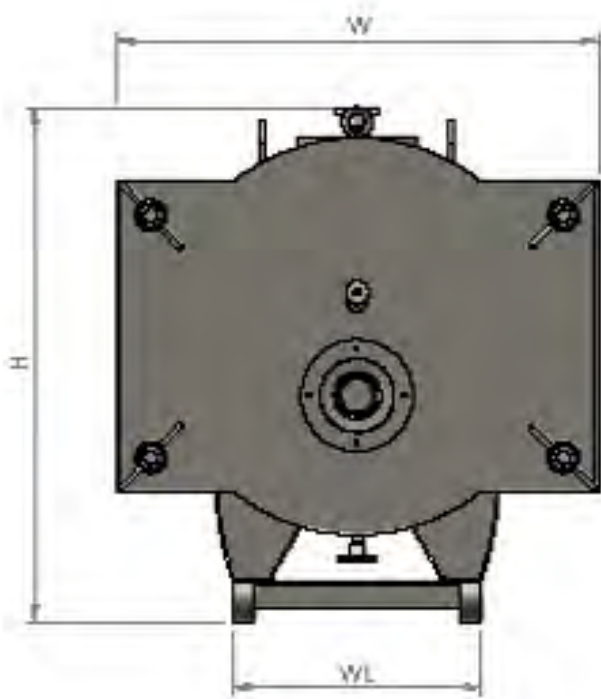
Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel:

+98 311 368 61 80



BOILER HP.	100	150	200	300	400	500	
L	2570	2570	2570	2800	2800	2800	
W	1210	1270	1330	1390	1460	1550	
H	1315	1390	1450	1500	1580	1660	
LB	2200	2200	2200	2400	2400	2400	
WL	640	660	700	720	770	820	
Weight	1130	1250	1400	1650	1810	2030	
	Service	Size					
N1	Feed Water	1"	1"	1"	1"	1"	1"
N2	Steam Outlet	1"	1"	1 1/2"	1 1/2"	2"	2"
N3	Instrument	1"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
N4	Level Control	1"	1"	1"	1"	1"	1"
N5	Vent	3/4"	3/4"	3/4"	3/4"	1"	1"
N6	Safety Valve	3/4"	3/4"	3/4"	1"	1 1/2"	1 1/2"
N7	Drain	1"	1"	1"	1"	1"	1"
N8	Flue Stack	8"	8"	8"	10"	10"	10"

- All dimension in milimeter
- Dimensions calcualtes with approximatly 10 percent tolerence





PACKMAN

Manufacturer of Boilers, Thermal Oil Heaters
Heat Exchangers, Pressure Vessels, Storage Tanks &
Water Treatment Plants

PWP PACKMAN WATER - PAK



www.Packmangroup.com
info@packmangroup.com

PACKMAN

Head Office: 2 No. 10th Street .
Bokharest Ave. Tehran. Iran.
Tel: +98 21 88739075-9 , 88731618
Fax: +98 21 88737131
Email: info@packmangroup.com
www.packmangroup.com
Factory: Packman St., Basige St.,
Imam khomeini Ave., Isfahan - Iran



PWP PACKMAN WATER - PAK



Industrial Water Heating Systems

Boiler Type	Heat Output	$\Delta T=40^{\circ}C$	$\Delta T=50^{\circ}C$	$\Delta T=60^{\circ}C$	$\Delta T=70^{\circ}C$	$\Delta T=80^{\circ}C$
Model	Kcal/h	Lit/h	Lit/h	Lit/h	Lit/h	Lit/h
P.W.P-100	100000	3000	2400	2000	1700	1500
P.W.P-150	150000	4500	3500	3000	2500	2250
P.W.P-200	200000	6000	4500	4000	3400	3000
P.W.P-250	250000	7000	6000	5000	4300	3500
P.W.P-400	400000	12000	9500	8000	7000	6000
P.W.P-500	500000	15000	12000	10000	8600	7500
P.W.P-600	600000	18000	14500	12000	10000	9000
P.W.P-700	700000	21000	17000	14000	12000	10500
P.W.P-800	800000	24000	20000	16000	13800	12000
P.W.P-1000	1000000	30000	24000	20000	17000	15000
P.W.P-1250	1250000	37500	30000	25000	21600	18750
P.W.P-1600	1600000	48000	38000	32000	27700	24000
P.W.P-2500	2500000	75000	60000	50000	43000	37500





Packman **Industrial Group**

POEX

Packman Open Expansion Tank

From 100 - 6000 lit 3-6mm shell thickness

Manufacturer of Boilers, Thermal Oil Heaters, Heat Exchangers
Pressure Vessels, Storage Tanks & Industrial Water Treatment Equipment,...

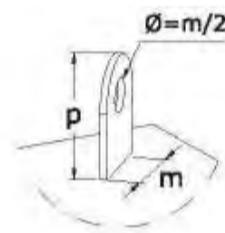
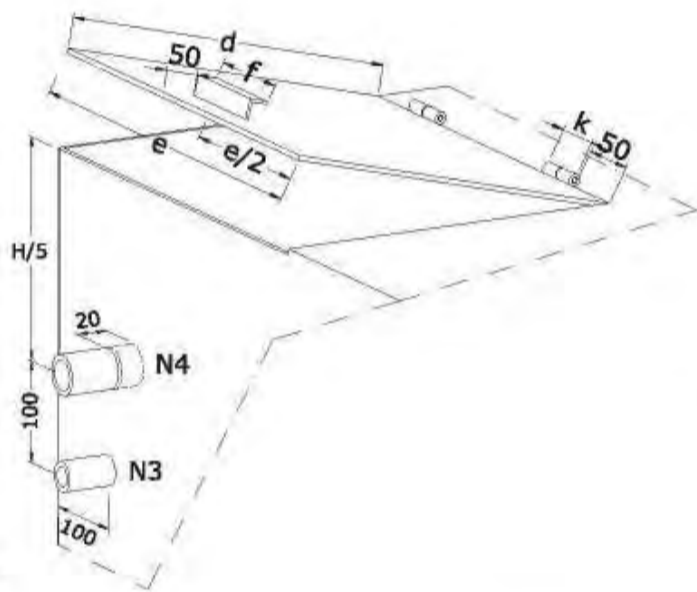
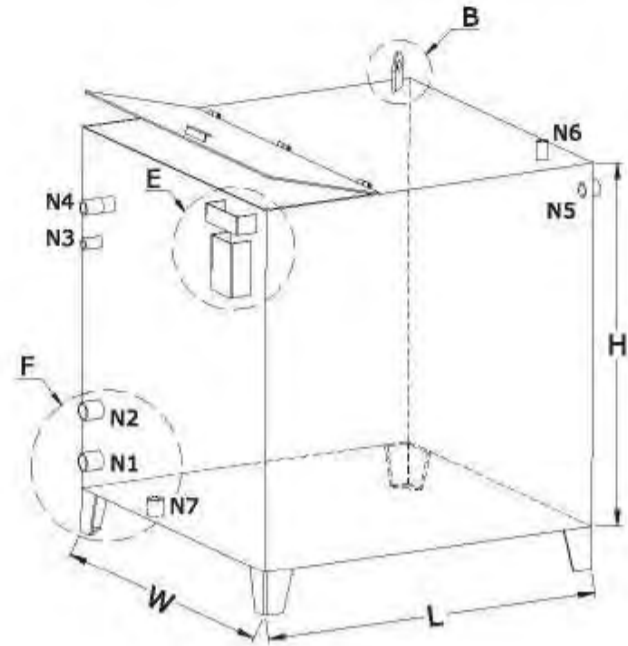
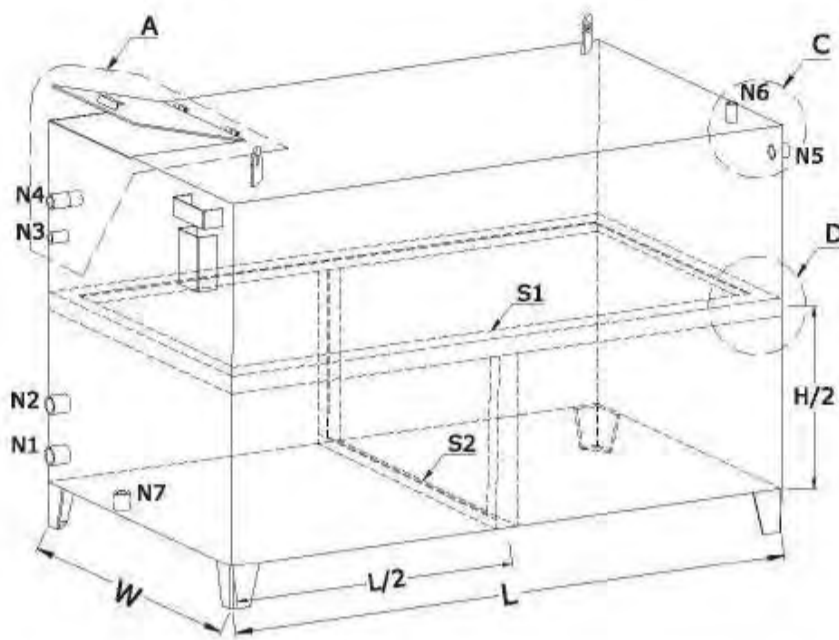


ردیف	ظرفیت (Lit.)	مدل	ضخامت و ابعاد منبع				ابعاد پایه ها		ابعاد درب و متعلقات				قلاب گیر	مشخصات نازل ها							وزن (Kg)	
			L	W	H	t	a	b	d	e	f	N x k Ø		N x m x p x t	آب سردشی	انبساط	پرکن دائمی	پرکن سریع	سرریز	ونت		تخلیه
															N1	N2	N3	N4	N5	N6		N7
1	100	EOH-1	400	400	600	3	80	100	200	400	100	2x40x10	1x60x60x8	3/4"	3/4"	3/4"	1"	1 1/4"	3/4"	3/4"	35	
2	125	EOH-1.25	500	500	500	3	80	100	250	500	100	2x40x10	1x60x60x8	3/4"	3/4"	3/4"	1"	1 1/4"	3/4"	3/4"	41	
3	150	EOH-1.5	500	500	600	3	80	100	250	500	100	2x40x10	1x60x60x8	3/4"	3/4"	3/4"	1"	1 1/4"	3/4"	3/4"	46	
4	200	EOH-2	500	500	800	3	80	100	250	500	100	2x40x10	1x60x60x8	3/4"	3/4"	3/4"	1"	1 1/4"	3/4"	3/4"	57	
5	250	EOH-2.5	500	500	1000	3	80	100	250	500	100	2x40x10	1x60x60x8	1"	1"	3/4"	1"	1 1/4"	3/4"	3/4"	68	
6	300	EOH-3	550	550	1000	3	80	100	275	550	100	2x40x10	1x60x60x8	1"	1"	3/4"	1"	1 1/4"	3/4"	3/4"	76	
7	350	EOH-3.5	600	600	1000	3	80	100	300	600	100	3x40x10	1x60x60x8	1"	1"	3/4"	1"	1 1/4"	3/4"	3/4"	84	
8	400	EOH-4	650	650	1000	3	80	100	325	650	100	3x40x10	1x60x60x8	1"	1"	3/4"	1"	1 1/4"	3/4"	3/4"	95	
9	500	EOH-5	720	720	1000	3	80	100	360	720	100	3x40x10	1x60x60x8	1 1/4"	1 1/4"	1"	1 1/4"	1 1/2"	1"	1"	105	
10	600	EOH-6	800	750	1000	3	80	100	400	750	100	3x40x10	1x80x100x10	1 1/4"	1 1/4"	1"	1 1/4"	1 1/2"	1"	1"	110	
11	700	EOH-7	900	800	1000	4	80	100	450	800	100	3x40x10	1x80x100x10	1 1/4"	1 1/4"	1"	1 1/4"	1 1/2"	1"	1"	170	
12	800	EOH-8	900	900	1000	4	80	100	450	900	100	3x40x10	1x80x100x10	1 1/4"	1 1/4"	1"	1 1/4"	1 1/2"	1"	1"	180	
13	900	EOH-9	1000	900	1000	4	80	100	500	900	100	3x40x10	1x80x100x10	1 1/4"	1 1/4"	1"	1 1/4"	1 1/2"	1"	1"	195	
14	1000	EOH-10	1000	1000	1000	4	80	100	500	500	100	3x40x10	1x80x100x10	1 1/2"	1 1/2"	1"	1 1/4"	1 1/2"	1 1/4"	1"	205	
15	1200	EOH-12	1200	1000	1000	4	100	120	500	500	100	3x40x10	2x80x100x10	1 1/2"	1 1/2"	1"	1 1/4"	1 1/2"	1 1/4"	1"	235	
16	1500	EOH-15	1500	1000	1000	4	100	120	500	500	100	3x40x10	2x80x100x10	1 1/2"	1 1/2"	1"	1 1/4"	1 1/2"	1 1/4"	1"	275	
17	1750	EOH-17.5	1750	1000	1000	5	100	120	500	500	100	3x40x10	2x80x100x10	1 1/2"	1 1/2"	1"	1 1/4"	1 1/2"	1 1/4"	1"	390	
18	2000	EOH-20	2000	1000	1000	5	100	120	500	500	100	3x40x10	2x80x100x10	2"	2"	1 1/4"	1 1/2"	2"	1 1/2"	1"	435	
19	2500	EOH-25	2000	1250	1000	5	100	120	500	500	100	3x40x10	2x80x100x10	2"	2"	1 1/4"	1 1/2"	2"	1 1/2"	1"	480	
20	3000	EOH-30	2000	1500	1000	5	120	140	500	500	100	3x40x10	2x80x100x10	2"	2"	1 1/4"	1 1/2"	2"	1 1/2"	1 1/4"	540	
21	3500	EOH-35	2000	1750	1000	5	120	140	500	500	100	3x40x10	2x80x100x10	2"	2"	1 1/4"	1 1/2"	2"	1 1/2"	1 1/4"	605	
22	4000	EOH-40	2000	2000	1000	5	120	140	500	500	100	3x40x10	2x80x100x10	2"	2"	1 1/4"	1 1/2"	2"	1 1/2"	1 1/4"	665	
23	4500	EOH-45	2000	1800	1250	5	120	140	500	500	100	3x40x10	2x80x100x10	2 1/2"	2 1/2"	1 1/2"	2"	2 1/2"	2"	1 1/2"	695	
24	5000	EOH-50	2000	2000	1250	5	120	140	500	500	100	3x40x10	2x80x100x10	2 1/2"	2 1/2"	1 1/2"	2"	2 1/2"	2"	1 1/2"	750	
25	5500	EOH-55	2250	2000	1250	6	120	140	500	500	100	3x40x10	2x80x100x10	2 1/2"	2 1/2"	1 1/2"	2"	2 1/2"	2"	1 1/2"	980	
26	6000	EOH-60	2250	2200	1250	6	120	140	500	500	100	3x40x10	2x80x100x10	2 1/2"	2 1/2"	1 1/2"	2"	2 1/2"	2"	1 1/2"	1050	

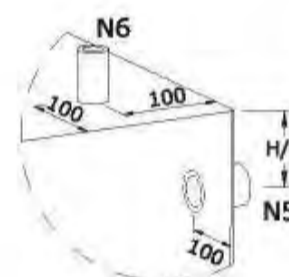
توجه:

- جنس و ضخامت ورق برای ساخت منابع انبساط باید مطابق با سفارش ساخت ابلاغ شده به کارگاه باشد ولی در هر حال ضخامت ورق نباید از آنچه در جدول بالا درج شده کمتر باشد.
- برای تقویت وجوه منبعی که طول آنها بیشتر از ۱.۵ متر است، باید از قطعات نبشی استاندارد ۸۰×۸۰ میلی متر با طول مناسب استفاده شود، بطوریکه نبشی های تقویتی در وسط ارتفاع هر چهار وجه جانبی منبع قرار داده شده و مانند یک قاب کاملاً به یکدیگر متصل و در فواصل مناسب (هر ۲۵۰ میلی متر) به بدنه منبع جوشکاری شوند، (مطابق قاب نشان داده شده با مشخصه S1 در شکل بالا).
- برای وجوه بالا و پایین منبعی که به دلیل محدودیت عرض ورق، ناگزیر دو تکه ساخته می شوند، لازم است از قطعات نبشی استاندارد ۸۰×۸۰ میلی متر با طول مناسب (مطابق قاب نشان داده شده با مشخصه S2 در شکل بالا) استفاده شود و به قاب با مشخصه S2 متصل گردد.
- برای باز و بسته شدن درب منبع، لولاهایی با مشخصات درج شده در جدول که با فاصله مناسبی از یکدیگر و لبه درب نصب می شوند تعبیه گردد. همچنین از یک قطعه نبشی استاندارد ۸۰×۸۰ با اندازه دایره شده در جدول و موقیت نشان داده شده برای دستگیره استفاده شود.
- قطعات پایه باید از جنس بدنه منبع و هم ضخامت با آن و مطابق شکل بالا و اندازه های داده شده در جدول فوق بوده و برای کف پایه ها باید ورق سه گوش به اندازه قاعده شان در نظر گرفته شده و از طرف داخل به آنها جوش داده شود.
- پس از اتمام عملیات موتاژ و جوشکاری، گوشه های تیز با سنگ زنی حذف شوند.
- پس از ساخت دستگاه و قبل از ارسال برای تست هیدرواستاتیک (آزمون نشستی آب)، شماره سریال دستگاه باید در پشت درب (از طرف داخل) با شماره زن حک گردد.
- رنگ آمیزی این منابع باید مطابق با دستورالعمل کلی آماده سازی و رنگ آمیزی سطوح یا جدول درج شده در این نقشه صورت گیرد، همچنین در مورد منابع گالوانیزه فقط خطوط جوش با اپوکسی پوشش داده شوند.
- کلیه ابعاد و اندازه ها به میلی متر هستند مگر غیر از آن درج شده باشد.

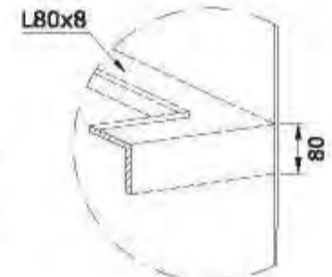




DETAIL 'B'

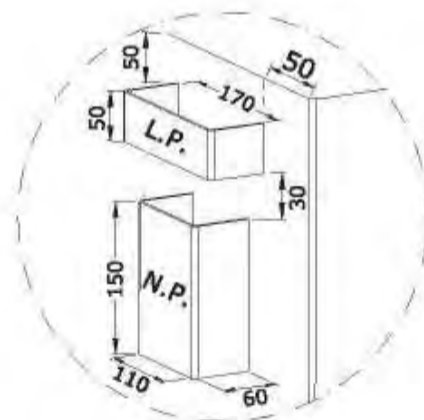


DETAIL 'C'

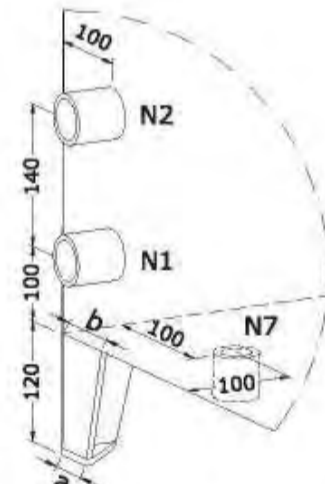


DETAIL 'D'

DETAIL 'A'



DETAIL 'E'



DETAIL 'F'





Packman **Industrial Group**



www.Packmangroup.com

Head Office: No. 2 , 10th St. Bokharest Ave., Tehran-Iran

Tel: +98 21 42 362 - 88 73 90 75-9 - 88 73 16 18 Fax: +98 21 88 73 71 31

Factory: Packman St. Basige St. Imam khomeini Ave. Isfahan. Iran.

Factory Tel:

+98 311 368 61 80