Dal 1932
Officine Giudici
Eiettori a misura di futuro

STEAM JET LIQUID HEATERS

Installation in tanks

The steam jet liquid heaters use steam to raise the temperature of water or other liquids by direct steam injection.
They assure continuous and efficient heating, distributing the heat uniformly and avoiding stratification of liquid at different temperatures inside the tank.
Steam jet heaters prevent the typical vibrations and condensation shocks with material damage so often associated with simple perforated steam pipes.
Operation is extremely efficient because the heat in the steam is absorbed by the liquid to be heated to approximately 10% of the liquid saturation temperature.

HTR JET 16 IN_Threaded/flanged connection Cast iron

HTR JET 16 IN_thereaded connection Stainless steel

Operation

The steam enters the heater as it immerses in the cold liquid. It passes through the nozzle that converts the pressure to kinetic energy. In the mixing throat the highspeed jet creates a depressurisation which draws the fluid to be heated through circular holes.
The mixed and heated fluid goes through a diffuser and leaves the heater with a higher pressure and a reduced speed, but still sufficient to keep the liquid circulating in the tank.
In this way a good thermal exchange is ensured.
During the start-up, using relatively cold water or if the liquid temperature is about 80°-90°C, the steam condensation might be accompanied by noise and vibration. As a remedy, a small pipe can be fitted to an auxiliary connection to draw atmospheric air to the heater through a valve.
The air added into the area around the nozzle, cushions the steam bubbles and prevents their sudden collapse as the steam condenses.
In addition, the air increases the agitation of the liquid.
If the steam pressure needs to be adjusted in order to adapt the steam amount to a lower demand, it is recommended to operate with an open/close shut-off valve to prevent the setting of a insufficient pressure ratio.

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Materials

Threaded BSP connection : Ø 1/2 ÷ 2”

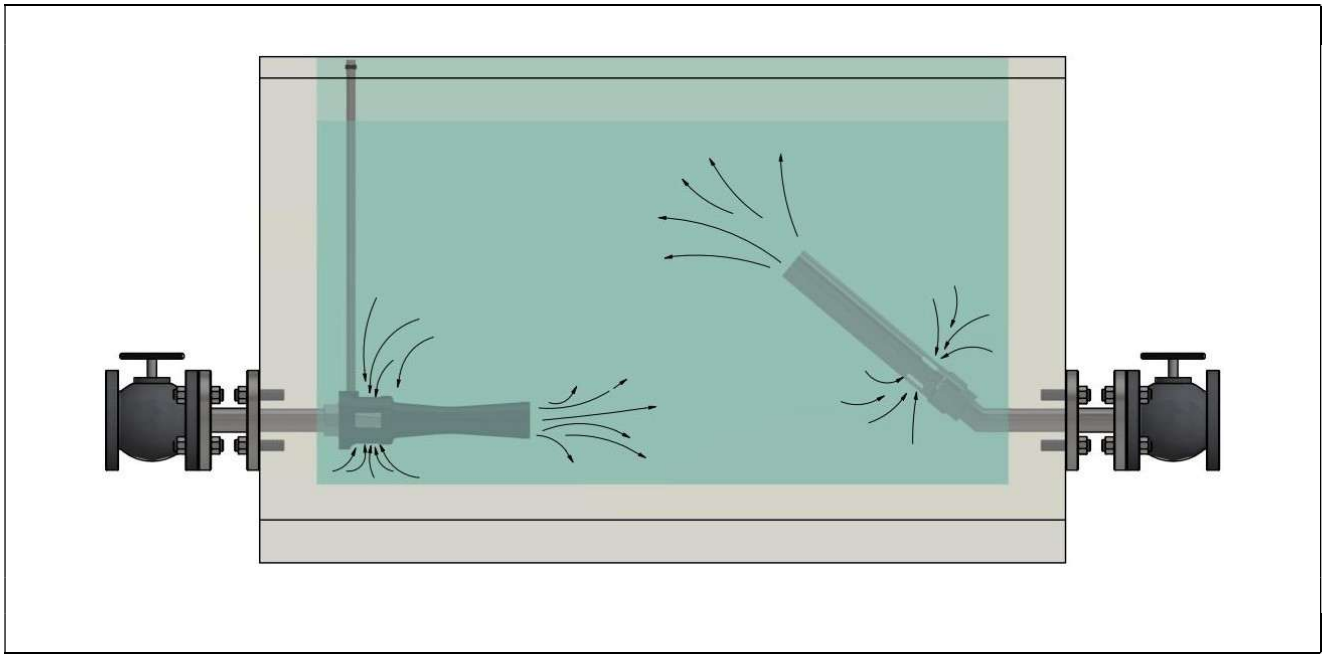
- Body and motive nozzle in bronze
- Body and motive nozzle in SS 304/316
- Body in cast iron, motive nozzle in SS304/316

Threaded flanged connection: Ø 1/2 ÷ 2”
Body in cast iron, nozzle in AISI 304

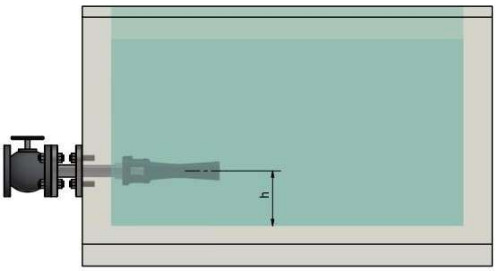
Air valve in brass or AISI 304.
Specific materials on demand

Installation

For the best possible performance, heaters are installed horizontally into the tank at a low level (water level approx. 1 or 2 mt. above the heater).
In general, arrange the injectors at one end of the tank, discharging along its length and ensure that the heater discharge does not impinge on any internal baffles, stays or pipework.
Mount the steam valve (vertical flow direction) as near as possible to the heater above the maximum liquid level.
The maximum recommended steam supply pressure for the steam injection is 11 bar.
Higher pressure may cause noise and vibration within the feed tank, usually due to the impingement of the steam on the opposite side of the tank.
The steam feed pipe can be laid inside or outside the tank.
For high heating duties several heaters can be installed, by uniformly placing them in the tank. (see recommended layout).

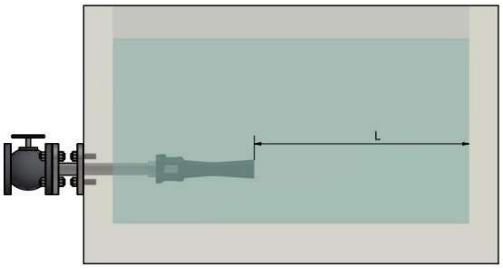


Recommended layouts:



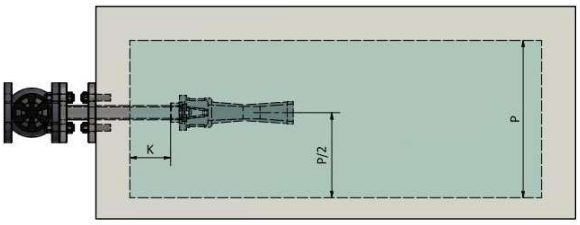
Front view

Min 120 mm for 3/4" – 1";
Min 140 mm for 1" – 1"/4;
Min 150 mm for 1"1/2 – 2""



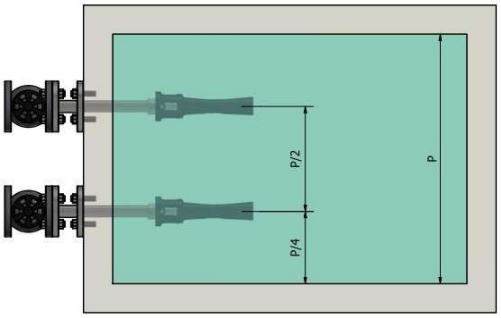
Front view

Min 250 mm for 2 –4 bar;
Min 500 mm for 4 – 7 bar;
Min 750 mm for 7 – 10 bar

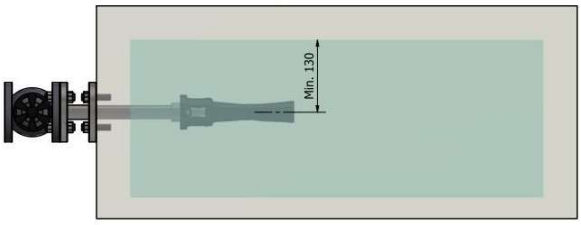


Plan view

K~ 130 -200 mm



Plan view



Plan view (alternative arrangement)
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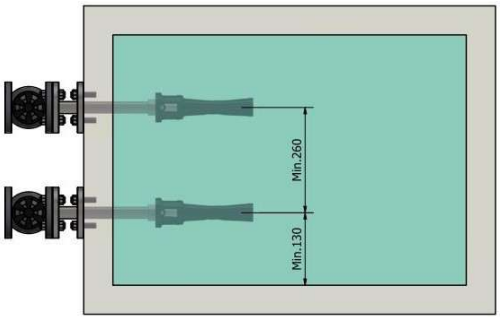

Plan view (alternative arrangement for two heaters)

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Steam flow rate table

The data shown are calculated with the enthalpy of the steam

HTR1 – Ø 1/2		
Pressure [bar g]	Steam flow rate [kg/h]	Heat [Kcal/h]
1	35	22.630
2	51	33.205
3	68	44.485
4	85	55.815
5	101	66.515
6	117	77.240
7	133	87.980
8	149	98.735
9	164	108.840
10	180	119.615

HTR2 – Ø 3/4		
Pressure [bar g]	Steam flow rate [kg/h]	Heat [Kcal/h]
1	53	34.270
2	78	50.780
3	104	68.040
4	129	84.705
5	153	100.760
6	177	116.850
7	201	132.965
8	225	149.100
9	249	165.250
10	273	181.415

HTR3 – Ø 1”		
Pressure [bar g]	Steam flow rate [kg/h]	Heat [Kcal/h]
1	83	53.670
2	122	79.430
3	162	105.985
4	201	131.985
5	239	157.400
6	277	182.870
7	314	207.715
8	352	233.255
9	389	258.165
10	426	283.085

HTR4 – Ø 1”1/4		
Pressure [bar g]	Steam flow rate [kg/h]	Heat [Kcal/h]
1	120	77.595
2	177	115.235
3	234	153.090
4	289	189.770
5	344	226.550
6	398	262.750
7	453	299.665
8	507	335.970
9	560	371.650
10	613	407.355

HTR5 – Ø 1” 1/2		
Pressure [bar g]	Steam flow rate [kg/h]	Heat [Kcal/h]
1	188	121.560
2	227	147.790
3	365	238.795
4	452	296.800
5	538	354.315
6	623	411.290
7	708	468.350
8	792	524.830
9	875	580.705
10	958	636.615

HTR6 – Ø 2”		
Pressure [bar g]	Steam flow rate [kg/h]	Heat [Kcal/h]
1	301	194.630
2	443	288.415
3	586	383.380
4	725	476.065
5	863	568.350
6	999	659.515
7	1135	750.820
8	1270	841.580
9	1404	931.785
10	1538	1.022.040

To calculate the steam consumption required proceed as follows:
Ma : massa of water in kg/h
Ti : Starting water temperature in °C
Tf : Final water temperature in °C
Pm : Steam pressure in bar g
H : Enthalpy of steam in kJ/kg
Mv: Calcultated steam mass in kg/h
Mv = Ma* (Tf - Ti) / (H – Tf)
Enthalpy is in kCal / kg. To convert it from kJ / kg divide by 4.2
Calculation example:
We want to heat 3.5 m^3 / h of water from 15 to 60 ° C, with steam at 4 bar g.
Mv = 3500 * (60 -15) / (654 – 60) = 265 kg/h
Steam heater mod. HTR4 - 1”1/4 is chosen.

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Overall Dimensions | **AISI 316**

Mod.	∅ D	∅ G	∅ B	L	Ch.
HTR1	½”	39	34	210	32
HTR2	¾”	49	42	250	40
HTR3	1”	55	48	320	45
HTR4	1” ¼	60	60	380	50
HTR5	1” ½	70	70	460	57
HTR6	2”	80	80	560	67

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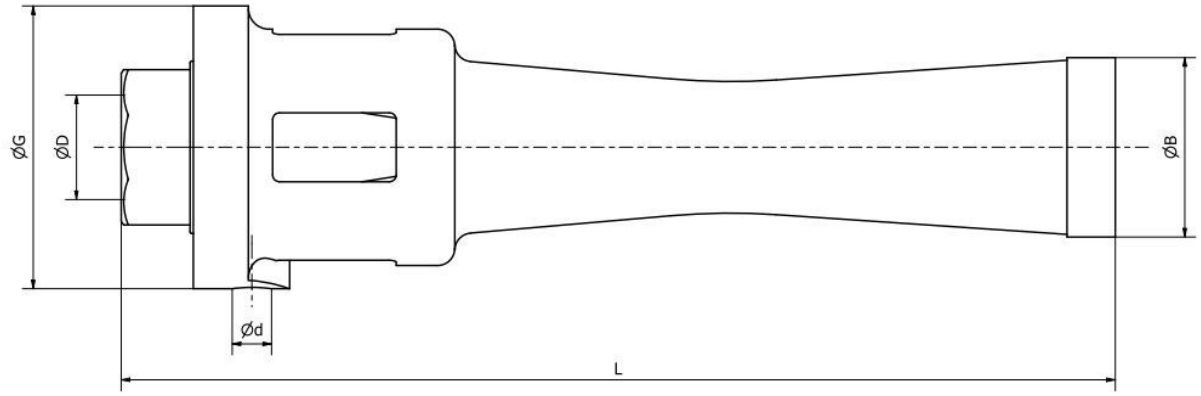
Overall dimensions | **Cast iron/SS**



Mod.	∅ D	∅ G	∅ B	L	∅ d
HTR1	½”	60	40	190	1/8”
HTR2	¾”	69	46	250	1/4”
HTR3	1”	83	53	290	1/4”
HTR4	1” ¼	93	57	330	1/4”
HTR5	1” ½	106	67	383	1/4”
HTR6	2”	126	84	445	3/8”