MasterTherm
HEAT PUMP SYSTEM

- Energy saving up to 80%
- Use free environmental energy
- Selection of temperature and operation mode by using remote control
- Tried, Tested, Trusted Swimming Pool Heat Pumps

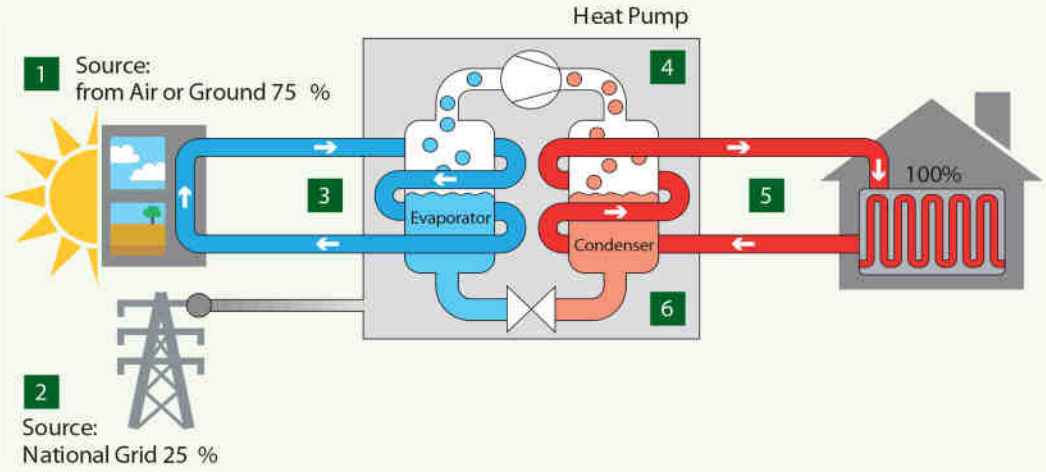
MasterTherm

Heat Pump operating Principle and Energy Formula

Heat pump system components

A heat pump heating system consists of 3 components: the heat source, the heat pump itself and a heat distribution and storage system.

Heat pumps are able to produce more energy than they consume by using the conventional refrigeration cycle to absorb heat from the environment and raise it to a suitable level for heating.



1 75% of the energy is taken from the environment i.e. the air or ground and transferred to the heat pump.

2 25% of the energy is sourced from the national grid in the normal way of supplying your electricity. This is used to operate the heat pump but with very low consumption.

3 The energy from the air or ground is transferred to the refrigerant inside the heat pumps evaporator. This causes the temperature of the refrigerant to rise and change state from liquid to gas.

4 The refrigerant gas is then compressed, using an electrically driven compressor, reducing its volume but causing its temperature to rise significantly.

5 A heat exchanger (condenser) then extracts the heat energy from the hot refrigerant to heat water for central heating, underfloor heating or domestic hot water.

6 After giving up its heat energy the refrigerant turns back into a liquid and is able to absorb energy from the environment, allowing the cycle to begin again.

Thermodynamic Cycle

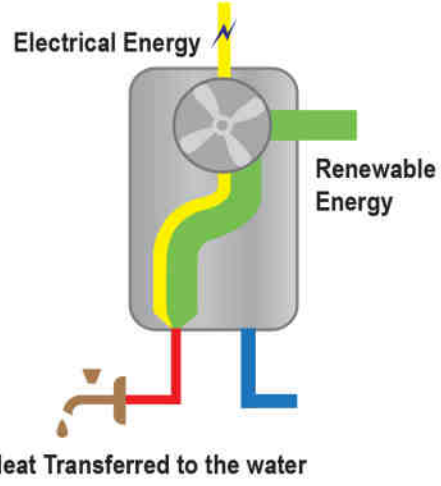
A-B External air is sucked inside the pump through a fan, when passing through the fins of the evaporato, the air gives its heat and lose 10ºC approx finally it is expelled.

1-2 The refrigrant fluid goes through the evaporator and absorbs the heat given by the air. During this process it changes its physical status and evaporate keeping temperature and pressure almost constant (0ºC : 5 bar)

2-3 The refrigerant fluid crosses the compressor and experience a pressure rising which involves an increase of Temperature. At the end of the process the fluid is overheated vapor and its temperature pressure are 70ºC and 20 bar respectively.

3-4 Within the condenser, the refrigerant gives its heat to the water which warms up. By doing this, the regrigerant condensate at constant pressure (20 bar) and then experience a significant reduction of temperature. (70 to 40ºC)

4-1 The refrigerant fluid pass through the expansion valve, suddenly loose both pressure and temperature and partially evaporate thus returning to the initial to conditions of temperature and pressure. (40 to 0ºC, 5 bars) The thermodynamical cycle now repeat again.



Heat Pump Energy Formula

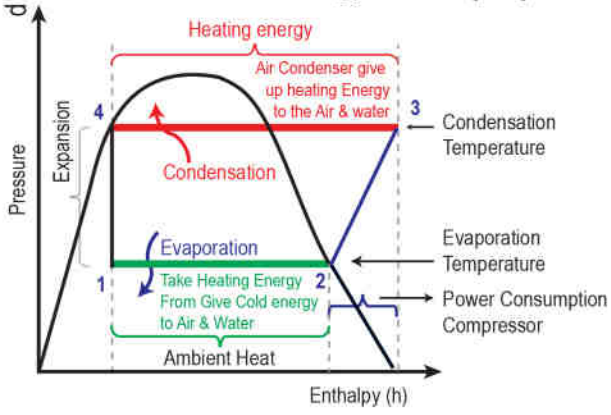
25 (Electrical Energy)

\+

75 (Air Heat)

= 100 (Hot Water)

$$C.O.P = \frac{\text{Heat Energy Out Put}}{\text{In Put Energy}} = \frac{(3\text{-}4)}{(2\text{-}3)}$$

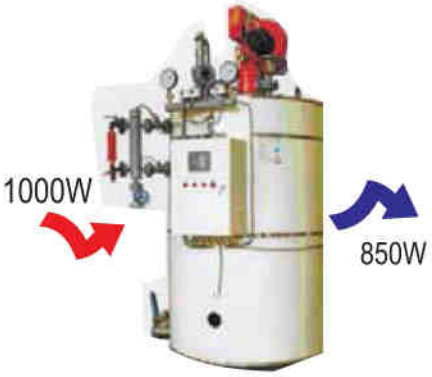


Energy input & output information for various water heating equipments

Electric Water Heater

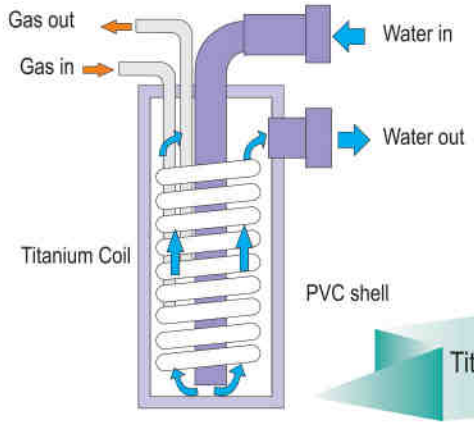
Heat Pump

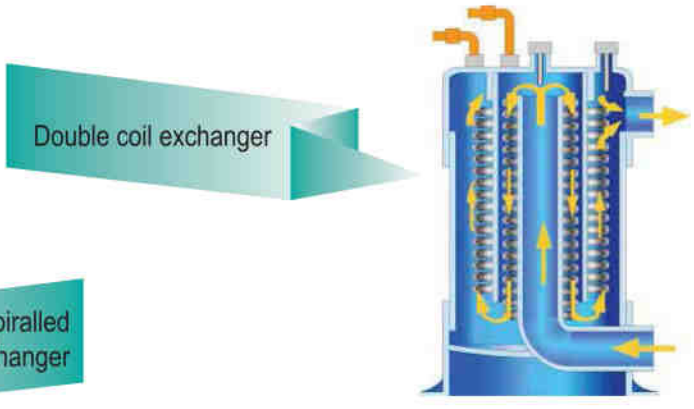
Gas/Oil



Aqua Master energy efficient heat pump components

A. Copeland , Daikin, Sanyo, Mitsubishi and Panasonic compressor.
B. R410a, R407a, R134a or R22 environmental refrigerant.
C. Emerson expansion valve.
D. Saginomiya 4-way valve
E. FLH fan.
F. Hi-Tech self-made high efficency double coil heat exchanger.
G. Hi-Tech self designed multi-functional digital control panel.





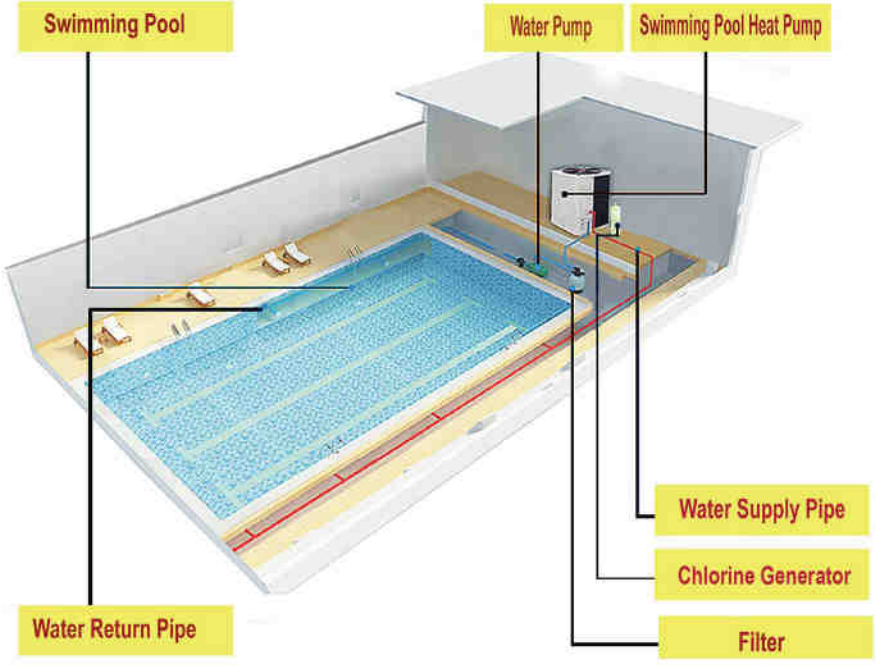
Heat Pumps Brine - Water Water - Water

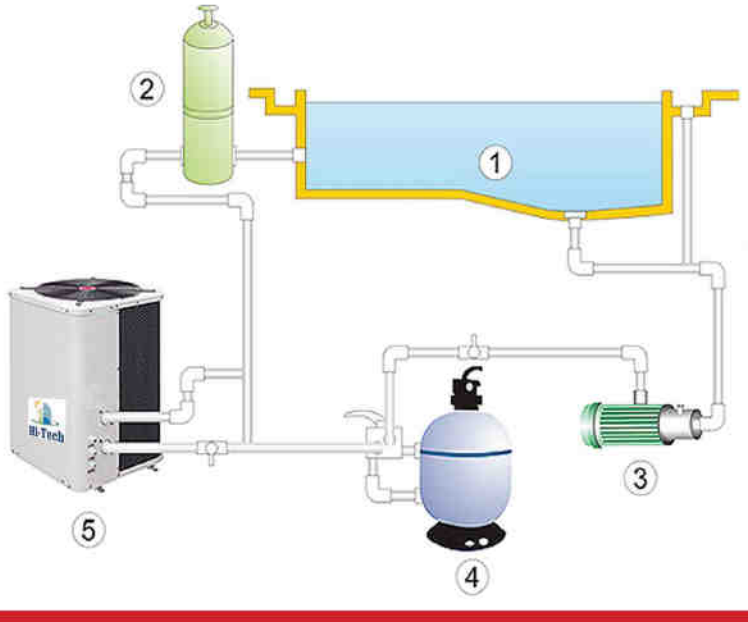
Aqua Master

1 compressor unit *2 compressor unit*

Upgraded version of the very successful ground-water (water-water) system, particularly suitable for applications with the ground collector. The performance range is graded over a wide range from about 7 to 64 kW, which covers a wide spectrum of applications. The AquaMaster heat pump operates with high efficiency and extreme reliability. With the output water temperature up to 60° C it is also suitable for renovation of older residential houses. The unit can be retrofitted with a desuperheater to achieve high efficiency and higher temperature of the DHW supply system. Another advantage is the exceptionally low noise compressor, mounted on an anti-vibration frame, the unit can be safely placed anywhere without being bothered by noise. The AquaMaster unit is a proven product offering quality components, modern technology and controls, a wide basic and additional equipment and above all an excellent price-performance ratio.

Layout for temperature controlled air to water swimming pool heat pump system





NOTES

1. Swimming Pool
2. Chlorine Generator
3. Pump
4. Filter Tank
5. Commercial Pool Heat Pump

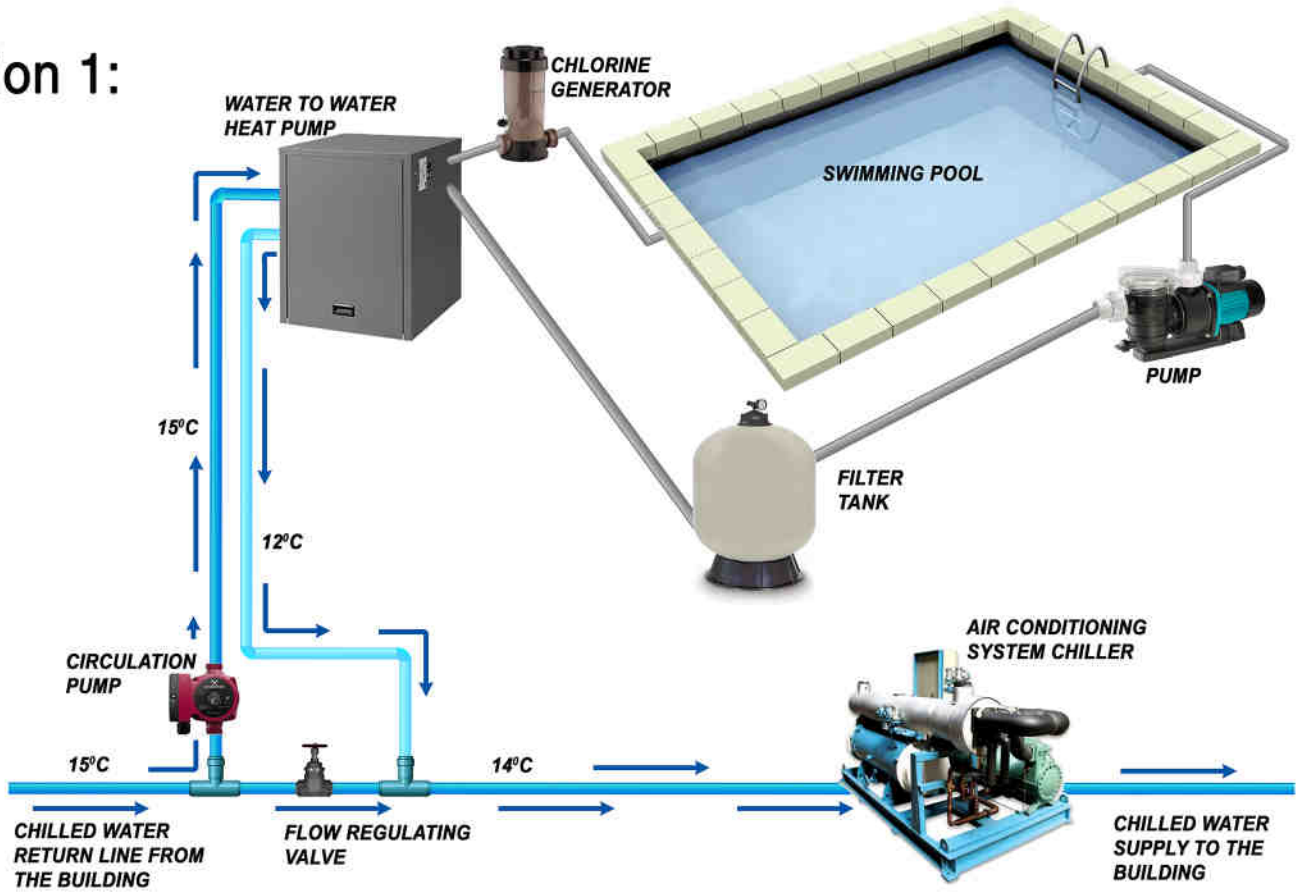
Technical Data & Seclection Chart for Aqua Master Swimming Pool Air to Water Heat Pump

Model	UNIT	HT-018	HT-024	HT-036	HT-050	HT-060	HT-090
Heating Capacity	kW	8.8	13	17.5	21	25	35
	BBTU/h	30000	45000	60000	72000	85000	120000
Cooling Capacity	kW	5.8	8.5	11.5	14.5	17.5	25
	BTU/h	20000	29000	40000	49500	59000	86000
Power Input	kW	1.9/2.1	2.9/3.1	3.8/4.1	4.6/5.2	5.4/6.3	7.6/8.4
Running Current	A	8.6/9.6	13.2/14.1	17.3/18.7	8.2/9.2	9.6/11.2	13.6/15.0
Power supply	V/PH/Hz			220-240/1/50			
Compressor Number		1	1	1	1	1	2
Compressor				Rotary			
Heat Exchanger				Titanium			
Fan Number		1	1	1	1	1	2
Fan direction		Horizontal	Horizontal	Horizontal	Vertical	Vertical	Vertical
Noise	dB(A)	51	54	54	56	56	61
Water Connection	mm	50	50	50	50	50	63
Water flow volume	m3/h	3	4.5	6	5	6	8
Water pressure Drop	kPa	10	10	10	12	12	15
Unit Dimensions	cm	**100x42x65**	**70x74x83**	**70x74x83**	**70x74x84**	**99x74x113**	**149x74x113**
Net weight	kg	66	73	95	125	126	250
Suitable for swimming pool size	Volume m^3	12	19.5	30	34.8	42	63
	Surface Area m^2	8	13	20	23	28	42

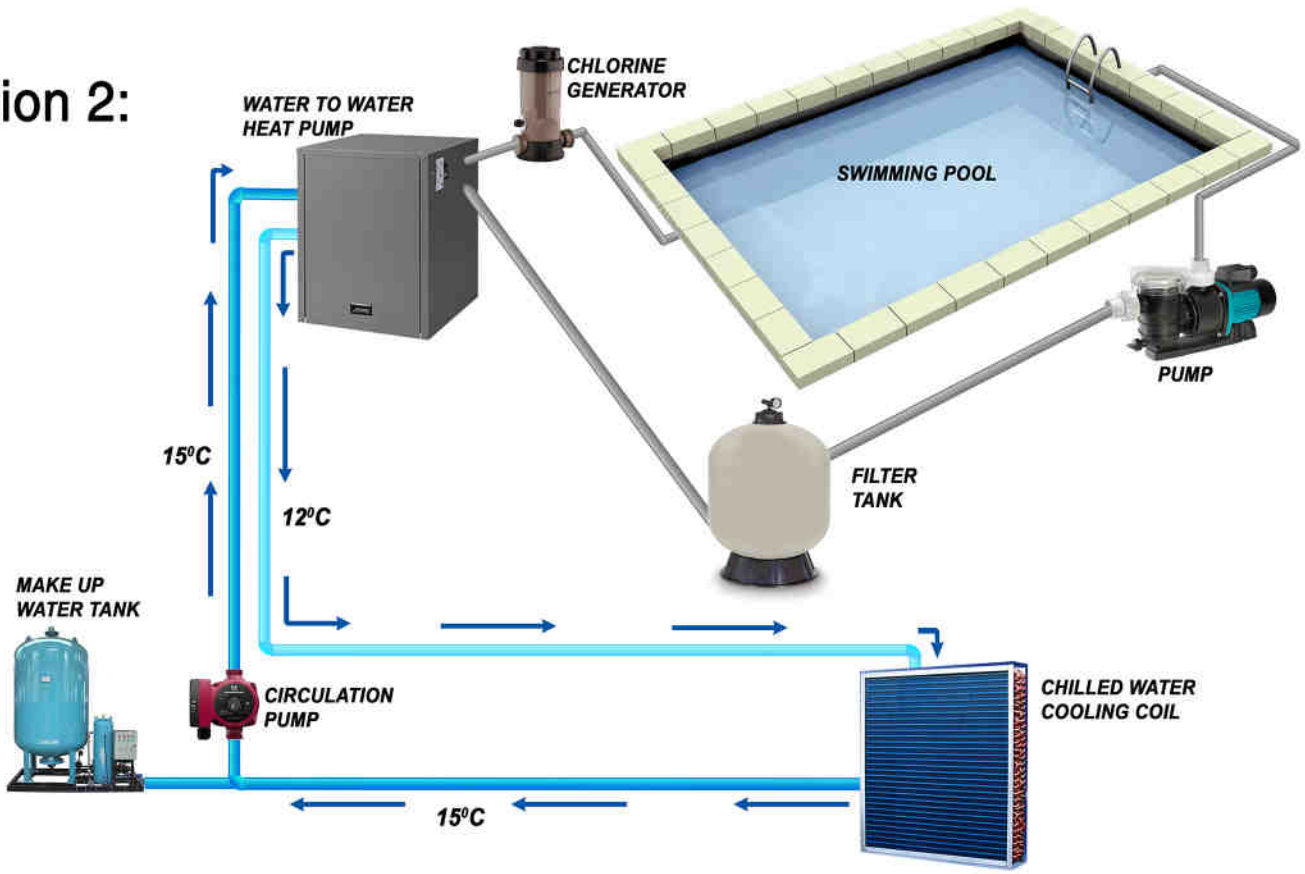
Model	UNIT	HT-120	HT-150	HT-180	HT-240	HT-400	HT-500
Heating Capacity	kW	45	55	85	105	160	210
	BTU/h	150000	188000	290000	358000	550000	720000
Cooling Capacity	kW	30	38	60	75	120	150
	BTU/h	103000	130000	205000	256000	410000	510000
Power Input	kW	9.5/10.4	11.8/13.5	18.4/20.8	21.6/26	34.2/41.6	46.3/56.2
Running Current	A	16.9/18.5	21/24.1	32.8/37	38.6/46.3	61/74.2	81.8/99.1
Power supply	V/PH/Hz			380-400/3/50			
Compressor Number		2	2	3	4	3	4
Compressor				Scroll			
Heat Exchanger				Titanium			
Fan Number		2	2	3	3	3	4
Fan direction		Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Noise	dB(A)	61	62	63	64	64	65
Water Connection	mm	63	63	63	110	110	110
Water flow volume	m3/h	10	13	20	25	35	50
Water pressure Drop	kPa	15	20	20	24	24	26
Unit Dimensions	cm	**150x78x125**	**150x78x125**	**205x90x182**	**225x125x223**	**250x125x222**	**285x125x222**
Net weight	kg	265	290	535	820	1040	1100
Suitable for swimming pool size	Volume m^3	84	110	143	190	300	450
	Surface Area m^2	56	73	95	125	200	300

Layout for temperature controlled water to water swimming pool heating only

Option 1:



Option 2:



Technical Data & Selection Chart for Aqua Master
Swimming Pool Water to Water Heat Pump (for heating only)

Model	UNIT	HTW024	HTW036	HTW050	HTW060	HTW090	HTW120	HTW150	HTW180	HTW500
Heating Capacity	kW	13	17.5	21	25	35	45	55	85	210
	BTU/h	45000	60000	72000	85000	120000	150000	188000	290000	720000
Cooling Capacity	kW	8.5	11.5	14.5	17.5	25	30	38	60	150
	BTU/h	29000	40000	49500	59000	86000	103000	130000	205000	510000
Power Input	kW	2.9/3.1	3.8/4.1	4.6/5.2	5.4/6.3	7.6/8.4	9.5/10.4	11.8/13.5	18.4/20.8	46/57
Running Current	A	13.2/14.1	17.3/18.7	8.2/9.2	9.6/11.2	13.6/15.0	16.9/18.5	21/24.1	32.8/37	82/100
Power supply	V/PH/Hz	220-240/1/50						380-400/3/50		
Compressor Number		1	1	1	1	2	2	2	3	4
Compressor		Scroll								
Heat Exchanger		Titanium								
Noise	dB(A)	54	54	56	56	61	61	62	63	64
Water Connection	mm	50	50	50	50	63	63	63	63	110
Required water source flow (m3/h)										60
Water flow volume	m^3/h	4.5	6	5	6	8	10	13	20	100
Water pressure Drop	kPa	10	10	12	12	15	15	20	20	48
Unit Dimensions	cm	**70x74x83**	**70x74x83**	**70x74x84**	**99x74x113**	**149x74x113**	**150x78x125**	**150x78x125**	**205x90x182**	**300x225x225**
Net weight	kg	73	95	125	126	250	265	290	535	1100
Suitable for swimming pool size	Volume m^3	19.5	30	34.8	42	63	84	110	143	450
	Surface Area m^2	13	20	23	28	42	56	73	95	300

MasterTherm

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