

Standard Symbols – Heating and Cooling Schematics

Scope

Symbols for equipment and line annotations for mechanical schematics. Symbols may also be used for general arrangement drawings and single line heating and cooling schemes.

Basic geometry

Dimensions refer to size as shown on a drawing when printed full size. Equipment shown on general arrangements will be sized according to the proposed size of the equipment divided by the scale of the drawing.

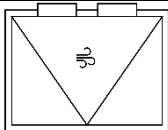
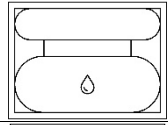
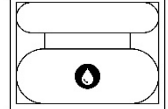
Primary Equipment

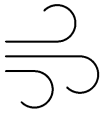
General

All equipment symbols are shown with no ancillary products, such as valves, attached. Where a placeholder for a valve is required, for example with Radiators, a connecting circle is shown which may be replaced by the required valve symbol. Refer to the Pipeline Symbols set for Valve and other pipeline ancillary symbols.

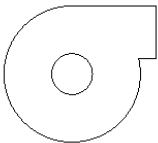
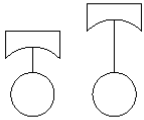
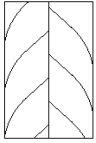
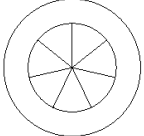
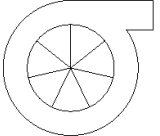
Chillers

There are three basic methods by which chillers operate, air-cooled, water-cooled or absorption. Each of these require connecting to different pieces of equipment to operate, therefore it is important to understand which method of cooling is being employed.

Chiller type	Symbol
Air cooled	
Water cooled	
Absorption	

Chilling method	Symbol
Air	
Water	
Absorption	

The method by which work is done within the chiller may also vary, especially with air and water-cooled units. If this is specified for the unit, a range of symbol components are provided to show that the function of the chiller is achieved by axial fans, centrifugal fans, scroll fans, reciprocal, screw or turbocor machinery.

Machine type	Symbol
Axial	
Centrifugal	
Reciprocal	
Screw	
Scroll	
TurboCor	

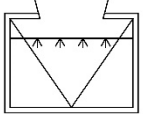
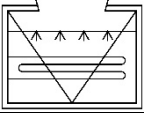
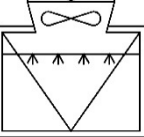
Cooling Towers

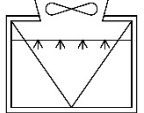
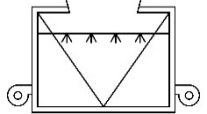
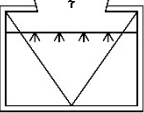
Cooling towers cool fluids by drawing air through a spray stream of the fluid. This air flow may be achieved by one of three methods, natural draught, induced draught or forced draught. The way in which the air passes through the fluid is also relevant to the cooling tower operation, this is either by cross-flow or counter-flow, symbols are provided for each of these scenarios.

Induced draught cooling towers have fans that entrain air through the top of the unit, usually axial fans, Forced draught cooling towers have fans that force air from the bottom of the unit, usually centrifugal fans. Symbols for both options are provided, but not for all possible scenarios.

Cooling towers may be fitted with “Plume abatement” coils, to reduce the visible vapour outflow from the unit, these may be represented by the addition of a heating coil symbol to the top of the unit symbol.

To denote that a cooling tower is of the closed loop type, the addition of a pipework loop within the symbol may be used. If no loop is shown, it may be assumed that the tower is of the open loop type.

Cooling Tower type	Symbol
Open loop	
Closed loop	
Plume abatement	

Draught type	Symbol
Induced draught	
Forced draught	
Natural draught	

Evaporative Coolers

Evaporative Coolers, also known as Swamp Coolers, cool an air stream by extracting latent energy from a water source changing phase by evaporation in the air stream, usually via a cooling pad. They are commonly used for residential cooling purposes but may be used on a larger scale for industrial warehouses and workshops.

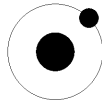
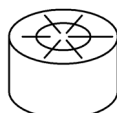
Evaporative coolers do not use refrigerants or compressors to achieve a cooling effect on the air stream.

Chilling method	Symbol
Evaporation	

Boilers

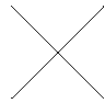
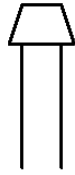
Boilers are available in a huge variety of shapes and sizes. The symbols provided make no reference to the geometric form or mounting details of a boiler. The only aspects covered by the symbols are what type of fluid is produced (hot water or steam) and the fuel used to generate heat (electricity, gas, oil, wood (biomass) or hydrogen).

Heated Medium	Symbol
Steam	
Water	
Water - Condensing	

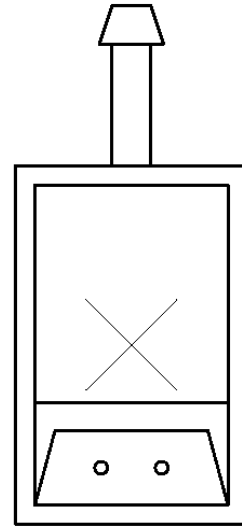
Fuel type	Symbol
Electricity	
Gas	
Hydrogen	H ₂ or 
Oil	
Wood (biomass)	

Boiler Flues

Symbol parts for flues are provided for top, left or right-hand mounted flues. The flue symbols are created to be attached to the insertion point of the boiler symbols, as shown in the images below:



Flue origin point



Flue attached to Boiler

Flues	Symbol
Left mounted	
Top mounted	
Right mounted	

Heating Emitters

These are devices at the end of a run of heating pipe, usually, or an electrically powered device to provide heating to a space. Devices using air for heating are covered in the Ventilation Schematics symbol set.

Radiator

Simple convective heating panel symbols are provided but no other iterations, such as multiple panels, reflective panels or convective corrugations are shown, these may be detailed in the specification or schedules.

Towel Rail

A huge variety of heated towel rails are available, the symbols provided only differentiate between the method of heating provided, which will be either by heating water or electricity.

Overdoor Heater

Symbols provided for overdoor heaters will only differentiate between the method of heating deployed, hot water or electricity, with an ambient option also available. It is assumed that all overdoor heaters are fan assisted. This symbol includes air curtains.

Overdoor heaters are differentiated from similar heat emitting devices by downward pointing arrows.

Trench Heater

Symbols provided for trench heaters will only differentiate between the method of heating deployed, hot water or electricity and the method of heat movement, which may be fan assisted, which includes a fan symbol or by convection, which has no requirement for a symbol to denote this.

Trench heaters are differentiated from similar heat emitting devices by upward pointing arrows.

Radiant Panel

Symbols provided for radiant panels will only differentiate between the method of heating or cooling deployed, chilled water, hot water or electricity.

No symbolic differentiation is made between ceiling, wall or floor mounted units.

Gas-fired Heater

Space heating device providing heat by directly burning a fuel gas. No symbolic differentiation is made for the type of gas to be burnt. Differentiation is made for fan provision within the heater.

Electric Heater

Space heating device providing heat by electric heating element(s). Differentiation is made for fan provision within the heater.

Cooling Emitters

Cooling is most commonly provided by air systems, refer to the Ventilation Symbols set.

Chilled Beams

Chilled beams are presented as Generic, Chilled Water cooled and Fan Assisted. Other symbol parts may be used for other types or combinations of product options. No differentiation is made between Active and Passive Chilled Beams, this would be denoted by the addition of an Outside Air supply and/or by specification.

Radiant Panel

Refer to Heating Emitters section above.

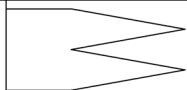
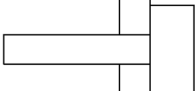
Heat Exchange and Storage

Heat Exchangers

Only a generic heat exchanger symbol is supplied. Differentiation between Plate and Shell and Tube types may be made by the addition of annotation or by specification.

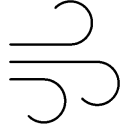
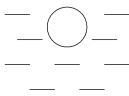
Calorifiers

Similar to shell and tube heat exchanger, but with hot water storage. Options for showing coils and immersion heaters as shown in table below.

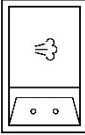
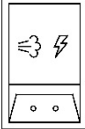
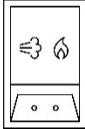
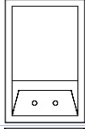
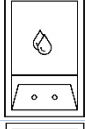
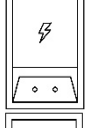
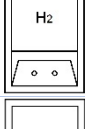
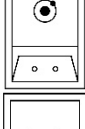
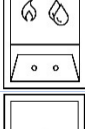
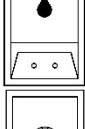
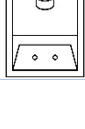
Calorifier component	Symbol
Coil	
Coil - alternative	
Immersion heater	

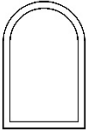
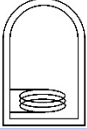
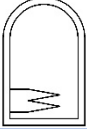
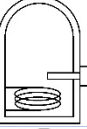
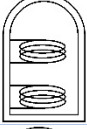
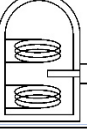
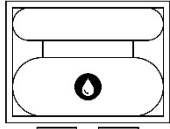
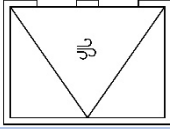
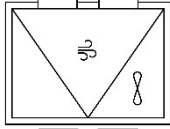
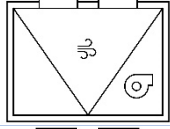
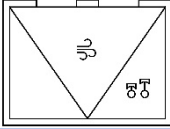
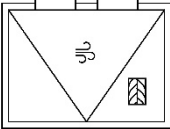
Heat Pumps

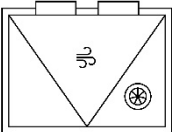
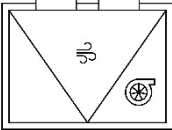
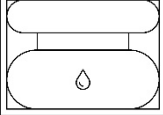
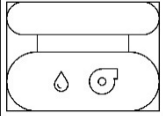
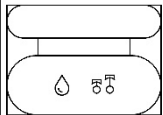
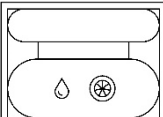
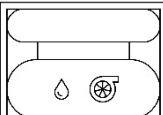
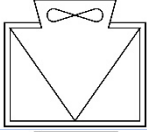
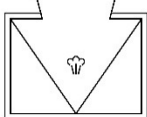
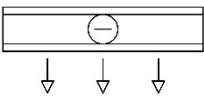
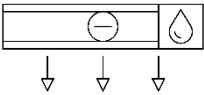
Heat pumps are differentiated by the source of heat used. This may be from air, ground or water sources. Symbolic differentiation is made between these sources.

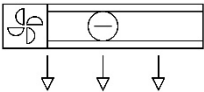
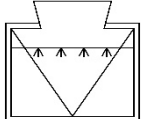
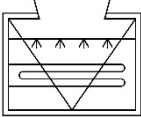
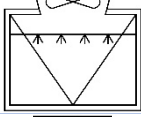
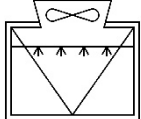
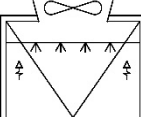
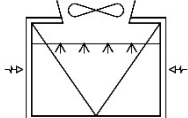
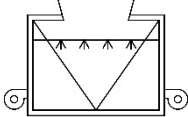
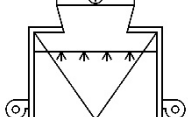
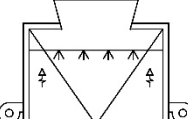
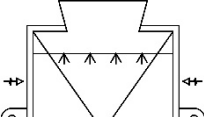
Heat Source	Symbol
Air	
Ground	
Water	

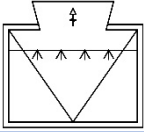
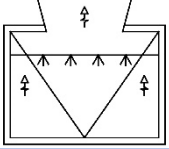
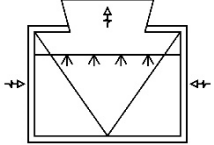
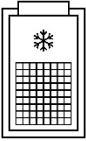
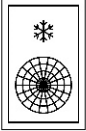
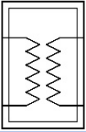
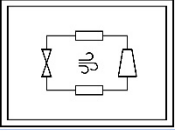
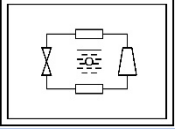
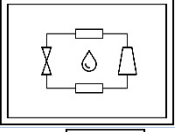
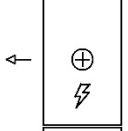
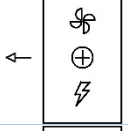
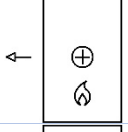
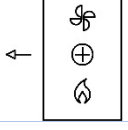
Symbols and Abbreviations

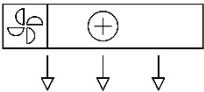
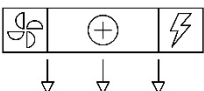
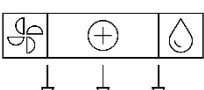
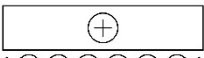
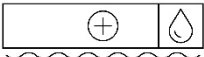
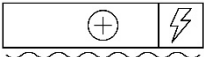
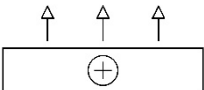
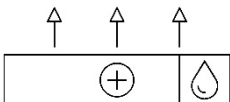
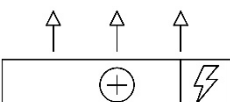
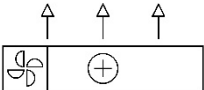
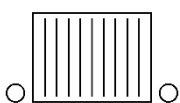
Heating and Cooling Symbols			
Product	Abbreviation	Symbol	
Boiler Steam	B		
Boiler Steam Elec	B		
Boiler Steam Gas	B		
Boiler Water	B		
Boiler Water Condensing	B		
Boiler Water Elec	B		
Boiler Water Gas	B		
Boiler Water Hydrogen	B		
Boiler Water Hydrogen – alt	B		
Boiler Water Condensing Gas	B		
Boiler Water Oil	B		
Boiler Water Wood (biomass)	B		

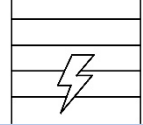
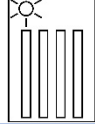
Calorifier	Cal	
Calorifier Single Coil	Cal	
Calorifier Single Coil – alt	Cal	
Calorifier Single Coil with Immersion Heater	Cal	
Calorifier Twin Coil	Cal	
Calorifier Twin Coil with Immersion Heater	Cal	
Chiller - Generic	Ch	
Chiller Absorption	Ch	
Chiller Air Cooled	Ch	
Chiller Air Cooled Axial Fans	Ch	
Chiller Air Cooled Centrifugal Fans	Ch	
Chiller Air Cooled Reciprocating	Ch	
Chiller Air Cooled Screw	Ch	

Chiller Air Cooled Scroll	Ch	
Chiller Air Cooled TurboCor	Ch	
Chiller Water Cooled	Ch	
Chiller Water Cooled Centrifugal	Ch	
Chiller Water Cooled Reciprocating	Ch	
Chiller Water Cooled Screw	Ch	
Chiller Water Cooled Scroll	Ch	
Chiller Water Cooled TurboCor	Ch	
Cooler – Adiabatic	CoA	
Cooler – Dry Air	CoDA	
Cooler – Evaporative	CoE	
Cooling – Chilled Beam	CB	
Cooling – Chilled Beam – ChW	CB	

Cooling – Chilled Beam – Fan Assisted	CB	
Cooling – Radiant Panel	RP	
Cooling – Radiant Panel – ChW	RP	
Cooling Tower	CT	
Cooling Tower Closed Loop	CT	
Cooling Tower Induced Draft	CT	
Cooling Tower Induced Draft Plume Abatement	CT	
Cooling Tower Induced Draft Counter Flow	CT	
Cooling Tower Induced Draft Cross Flow	CT	
Cooling Tower Forced Draft	CT	
Cooling Tower Forced Draft Plume Abatement	CT	
Cooling Tower Forced Draft Counter Flow	CT	
Cooling Tower Forced Draft Cross Flow	CT	

Cooling Tower Natural Draft	CT	
Cooling Tower Natural Draft Counter Flow	CT	
Cooling Tower Natural Draft Cross Flow	CT	
DX Outdoor	DXO	
DX Outdoor side fan	DXO	
Heat Exchanger	HE	
Heat Pump – Air Source	HP	
Heat Pump – Ground Source	HP	
Heat Pump – Water Source	HP	
Heater – Electrical	Htr	
Heater – Electrical – Fan Assisted	Htr	
Heater – Gas	Htr	
Heater – Gas – Fan Assisted	Htr	

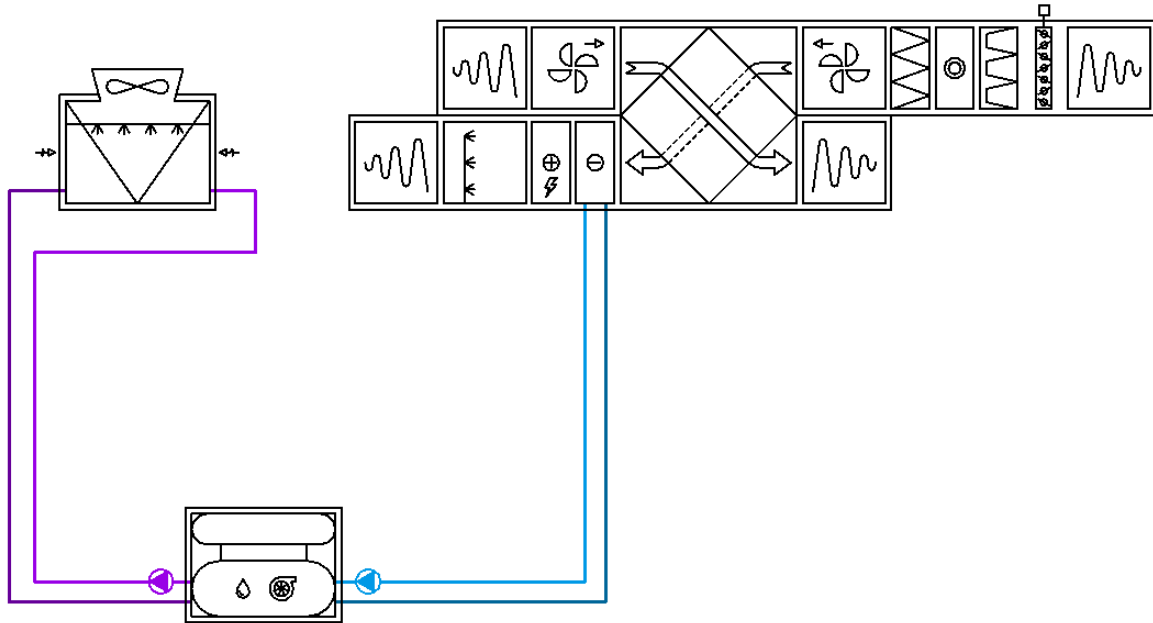
Heater – Over Door – Fan Assisted	ODH	
Heater – Over Door – Elec	ODH	
Heater – Over Door - LTHW	ODH	
Heater – Radiant Panel – Heating	RP	
Heater – Radiant Panel – Heating – LTHW	RP	
Heater – Radiant Panel – Heating – Elec	RP	
Heater+Cooling – Radiant Panel – LTHW+ChW	RP	
Heater – Trench	TH	
Heater – Trench – LTHW	TH	
Heater – Trench - Elec	TH	
Heater – Trench – Fan Assisted	TH	
Radiator – Elevation	RAD	
Radiator – Plan view	RAD	

Radiator – Towel Rail – LTHW		
Radiator – Towel Rail – Elec		
Solar Panel – Evacuated Tube		

Use examples

Schematics are simplified to demonstrate symbol usage; they do not imply any engineering principles.

Chilled Water Circuit



Radiator Heating Circuit

