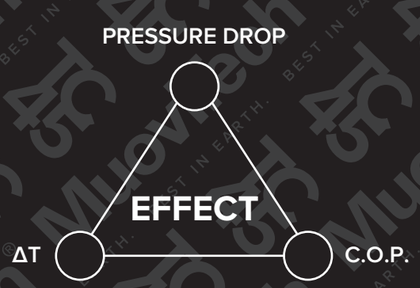
ADVANTAGES

DEEPER BOREHOLES
LESS PRESSURE DROP
LOWER INSTALLATION COSTS
LOWER OPERATING COSTS
SOLVES THE ISSUE OF LACK OF SPACE
GREATER FLEXIBILITY
MORE PROJECTS



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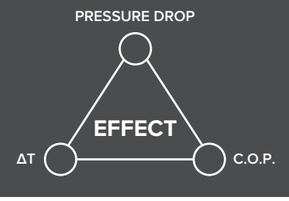
TURBOCOLLECTOR 45

DEVELOPED TO MANAGE DEEPER BOREHOLES AND MAKE HEAT PUMPS MORE EFFICIENT.

TURBOCOLLECTOR **45**



THE TREND FOR GEOTHERMAL ENERGY SYSTEMS IS TO HAVE DEEPER BOREHOLES AND MORE EFFICIENT HEAT PUMPS. THIS REQUIRES A NEW TYPE OF COLLECTOR IN ORDER TO MEET MARKET EXPECTATIONS.

DEVELOPED FOR HEAT PUMPS
When we here at MuoviTech developed the TurboCollector 45 mm, we listened to the market in order to understand the challenges we faced. New, more efficient heat pumps and deeper boreholes were the future. We created a product that solved the problem, with high pressure drop in deep boreholes and easy installation. The result was the TurboCollector 45 mm.

PRESSURE DROP
Deeper boreholes, together with traditional 40 mm collectors, create too much of a pressure drop. A heat pump usually copes with a pressure drop of between 70-90 kPa. A flow rate of 36 l/min is approaching the limit of what is possible, even as deep as 180 metres. The equivalent for the TurboCollector 45 mm is 310 metres.

EASY TO INSTALL
The Turbo Collector 45 mm is specifically designed for 115 mm boreholes. We make maximum use of the borehole diameter without causing any trouble during installation. It is just as easy to install as a 40 mm collector, and much more so than a 50 mm collector. The TurboCollector 45 mm is supplied in a double-wound roll of up to 400 metres, which creates the perfect circumstances for a smooth and easy installation. A 50 mm collector is always supplied with 2 single-wound roles, which is more difficult to manage in the field.

COST-EFFICIENT
Drilling for geothermal energy is often a significant investment. The installation cost can be reduced effectively, by drilling deeper but with fewer holes. This means there is need for fewer collection wells, casing, ditches, etc.
The Turbo Collector 45 mm also provides the geothermal energy system with a better total economy throughout its lifespan. With low borehole resistance and low pressure drop, the TurboCollector 45 mm creates the best conditions for the heat pump to do its job as efficiently as possible.

LACK OF SPACE
A lack of space in urban environments can create problems for geothermal energy systems. It can be difficult to obtain drilling permits for multiple boreholes or over a significant area. The TurboCollector 45 mm allows the same total number of borehole metres to be made over a smaller area, thanks to its improved pressure loss properties.

TURBODESIGN
The Turbo Collector 45 mm has our patented turbo design with a grooved interior. The Turbo Collector has a lower borehole resistance and can extract energy from the ground in a more efficient way, particularly with low flow. The combination of the 45 mm dimension and the turbo design allows the TurboCollector 45 mm to cope with both high and low flow rates, without compromising the heat pump's efficiency.

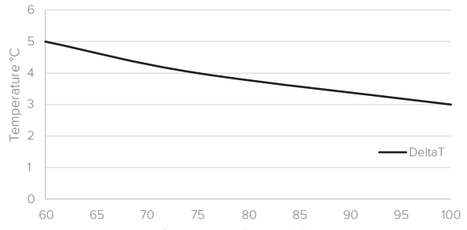
A LOW PRESSURE DROP IS ESSENTIAL FOR THE GEOTHERMAL ENERGY SYSTEM TO WORK EFFECTIVELY. IF THE PRESSURE DROP IS TOO HIGH, THIS LEADS TO A WORSE ΔT, C.O.P. AND POWER IN THE HEAT PUMP.

PRESSURE DROP, ΔT AND C.O.P. ARE LINKED
The temperature difference between the input and output of heat transfer fluid (Delta T) depends on the flow rate. When the flow rate drops, the fluid is cooled more, which results in an increase of Delta T. The optimal Delta T for heat pump function is generally around 3°C. With an increase in ΔT, the evaporation temperature in the heat pump drops. A lower evaporation temperature reduces the power of the heat pump and its COP (Coefficient of Performance), see below.

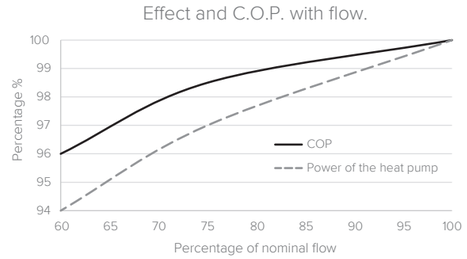
The diagram shows when Δ T is at 3°C, as the power and COP of the heat pump are at 100%. When Δ T increases to 4 degrees, the C.O.P. drops by 1.5% and power drops by 3%. When Δ T reaches 5 degrees, the COP drops by 4% and power drops by 6%. Note that a ΔT of 4 degrees is still acceptable, but any higher will negatively affect the heat pump's performance.

The values may vary for different heat pumps, but nevertheless give a clear image of the trend. The calculations do not reflect the circulation pump's power.

Change in ΔT with flow.



Effect and C.O.P. with flow.



EXAMPLE
Let's calculate a project with a heat pump of 60 kW. We will need a total of a 1200 metres of boreholes and the nominal flow for the heat pump is 3 l/sec. The available pressure drop that the heat pump can manage at nominal flow is **80 kPa**. We will choose to bore 5 x 240 metres; the flow rate per borehole is therefore 0.6 l/sec.

Standard collector 40 mm
With a standard collector 40 mm, the pressure drop will be **120 kPa**. In this case, the heat pump cannot manage to reach the nominal flow it needs. This will result in a higher Δ T, lower COP and a lower power output from the heat pump.

Turbo Collector 45 mm
If we instead choose to install a TurboCollector 45 mm, the pressure drop is **68 kPa**. The heat pump obtains the necessary flow. The geothermal energy system then has the right conditions to function effectively.