

TURBOCOLLECTOR®

BY MuoviTech®

TURBOCOLLECTOR® GIVE HIGH COP

- Lower operating time for the circulation pump
- 5-10% faster payback of the entire system
- Lower borehole resistance with lower flow rate

TURBO COLLECTOR®
BY MuoviTech

ALL THE BENEFITS OF TURBOCOLLECTOR®

- WITH THE SYSTEM CONDITIONS:

- Reynolds Number less than 2000
- High viscos fluid
- High concentration of antifreeze
- Cooling mode with oscillation loads

MuoviTech®

BEST IN EARTH.

GEOTHERMAL PROBES TURBO PE100 /PERC/ HIGH EFFICIENT SYSTEM

GLOBAL PATENT



APPLICATION

Geothermal probes for extraction energy from the ground.



WHAT IS THE GEOTHERMAL PROBE?

Ground source heat exchangers (GSHEX's) are integral elements of ground heat pump installation. We recommend Turbo Collector GSHEX's which is a patented development of the traditional GSHEX (with helical fins as opposed to the traditional smooth pipe) its proven to be better with its heat transfer and lower energy input from circulation pumps.



TURBOCOLLECTOR® PROPERTIES

- ✓ high efficient installation
- ✓ lower running cost of the system
- ✓ available as different models and types
- ✓ 100% made by specialistics
- ✓ flow and pressure qualified

PROPERTIES	UNIT	VALUE	TEST METHOD
Density	[kg/m ³]	959	ISO 1872-2 / ISO 1183
Melt index	[g/10min]	0.25	ISO 1133 190°C / 5.0kg
Tensile modulus	[MPa]	1100	ISO 527-2
Long-term crawl modulus	[MPa]	1200	DIN 19537-2 A
Short-term crawl modulus	[MPa]	210	DIN 19537-2 A
Coefficient of linear expansion	[mm/m/°C]	0.20	ASTM D 696 (20-90°C)
Thermal conductivity	[W/m/°C]	0.4	-
MRS value	[MPa]	10	ISO 12162 / ISO 9080
Thermal stability	OIT, 210°C [MIN]	>20	EN 728
Carbon Black content	[%]	≥2	ATM D 1603

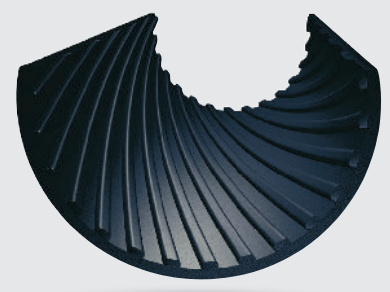
TYPE OF TURBOCOLLECTOR®

2x40mm TURBO COLLECTOR®	PE	40x2.4	PN10 PE100 SDR17
2x40mm TURBO COLLECTOR®	PE	40x3.0	PN12.5 PE100 SDR13.6
2x40mm TURBO COLLECTOR®	PE	40x3.7	PN16 PE100 SDR11
2x32mm TURBO COLLECTOR®	PE	32x2.0	PN10 PE100 SDR17
2x32mm TURBO COLLECTOR®	PE	32x3.0	PN16 PE100 SDR11
4x40mm TURBO COLLECTOR®	PE	40x2.4	PN10 PE100 SDR17
4x40mm TURBO COLLECTOR®	PE	40x3.0	PN12.5 PE100 SDR13.6
4x40mm TURBO COLLECTOR®	PE	40x3.7	PN16 PE100 SDR11
4x32mm TURBO COLLECTOR®	PE	32x2.0	PN10 PE100 SDR17
4x32mm TURBO COLLECTOR®	PE	32x3.0	PN16 PE100 SDR11



BENEFITS FOR USERS

Better heat conductivity, high COP coefficient, same installation method, low operating costs, same investment value, faster payback of entire system.



GEOHERMAL PROBES TURBO PE100 /PERC/ HIGH EFFICIENT SYSTEM

GLOBAL PATENT



ENERGETIC PARAMETERS

Heat transfer inside of ground source installations is measured by borehole resistance R_b and it has an influence for COP coefficient. Both parameters can be improved only by TurboCollector exchangers.

	SMOOTH COLLECTOR		TURBOCOLLECTOR®	Turbulent flow characteristic inside of MuoviTech TurboCollector systems is achieved by the same running parameters of circulation pump.
	Low flow rate	High flow rate		
THERMAL RESISTANCE	HIGH -	LOW +	LOW +	
PRESSURE DROP	LOW +	HIGH -	LOW +	

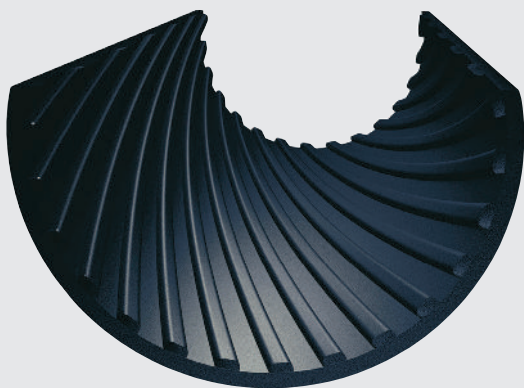
Ground Source t temperature increase of 1°C improves COP coefficient.

$$\eta_{\text{CARNOT}} = \frac{T \text{ [K]}}{T - t \text{ [°C]}}$$

$$COP = \eta \cdot 0,5$$

BENEFITS FOR END USERS

- TurboCollector® gives faster pay back time and a greater value on sale.
- TurboCollector® allows the heat pump to use less energy because it runs with a lower flow rate.
- Heat pump service life is longer and require less maintenance.
- The characteristics of TurboCollector® make the heat pump works longer time before turning over to direct electricity at peak loads.



WHAT IS THE MAGIC?

TurboCollector® is a patented development with fins inside the pipe. The fins gives more turbulent flow and extract more energy than a traditional smooth pipe.



TURBOCOLLECTOR 45

TurboCollector 45mm is designed to be the optimal choice for 115mm boreholes. It has many benefits such as: Easy installation, high flow rate, low borehole resistance and more.

EASY INSTALLATION IN A 115MM UNDERGROUND PIPE

The 45 mm TurboCollector have been designed to allow installation in a 115mm borehole. They are as easy to install as the 40 mm collector, and considerably easier to install than the 50mm Collector. The 45mm TurboCollector can be installed, in one coil, in a borehole as deep as 500m, where as a 50mm collector must always be in two coils.

INCREASED FLOW RATE

The flow rate of a 45mm TurboCollector can be adjusted to be higher than a 40mm collector. Measurements have shown that TurboCollector 45mm can achieve a flow rate that's 33% higher compared to the 40mm collectors with a flat inside using the same circulating pump delivery head.

SMALLER BOREHOLE RESISTANCE

In a 115mm borehole, the borehole resistance using TurboCollector 45mm is on average 11% smaller compared to the 40mm collector.

IMPROVED ENERGY CONSUMPTION

The surface area of the 45mm TurboCollector is 12.5% larger compared to the 40mm collectors, meaning that with equal flow rates, the 45mm Turbo ground loops benefit from a considerably smaller pressure loss. This translates into significantly smaller circulating pump energy consumption.

Heat exchanger	Flow rate	Pressure drop	Energy consumption
Single U-pipe 40mm SDR17 Smooth	0,6	152	91,2
Single U-pipe 45mm SDR17 Turbo	0,6	93	57,4
Single U-pipe 50mm SDR17 Smooth	0,8	79	59,3
	Minimum flow rate (l/s)	Pressure drop (kPa)	Added energy consumption of the circulation pump due to pressure drop and flow rate(W)

All cases. Antifreeze: Ethanol 25%, Working temperature: 0°C and Borehole depth: 300 m

The table shows the differences in pressure drop and energy consumption of the circulation pump. TurboCollector 45mm has the lowest energy consumption even compared to 50mm. The energy consumption can differ between different models of the circulation pump.

PRODUCT DIMENSIONS

2x45mm PE45x4,1 PN16 SDR11

2x45mm PE45x2,6 PN10 SDR17

Collectors can be ordered in standard lengths between 60-500 meters.

The coils are designed to be optimal for transportation and easy installations.



MuoviTech®

BEST IN EARTH.

BRÄMHULT - MYNÄMÄKI - FETSUND - NIEPOLOMICE - NOORDWIJKERHOUT - RAMSBOTTOM - NASHVILLE
www.muovitech.com

MANIFOLD SYSTEM / SUPPLY (FLOW) AND RETURN



APPLICATION

An indoor central panel of system which connects ground exchangers with the heat pump installed inside of building.



WHAT IS THE MANIFOLD SYSTEM?

Manifolds are build to connect ground exchangers in one system. They may be used same by small and large installations depends on available space inside of the boiler room. Equiped with 1" (DN25) ball valves on its supply (flow) part and flowmetres on return part. Each manifold is factory-build, individual customized and qualified by 5 bar pressure before dispatch.



PROPERTIES

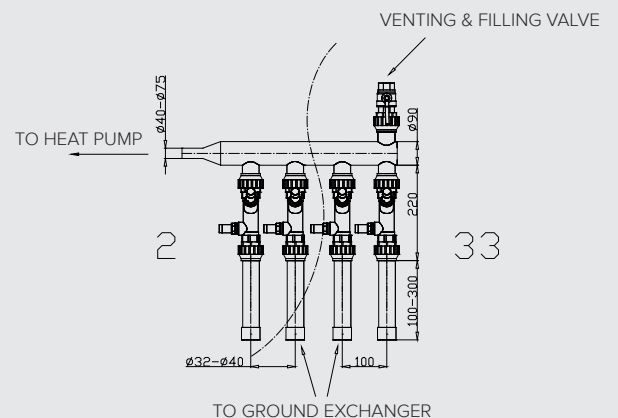
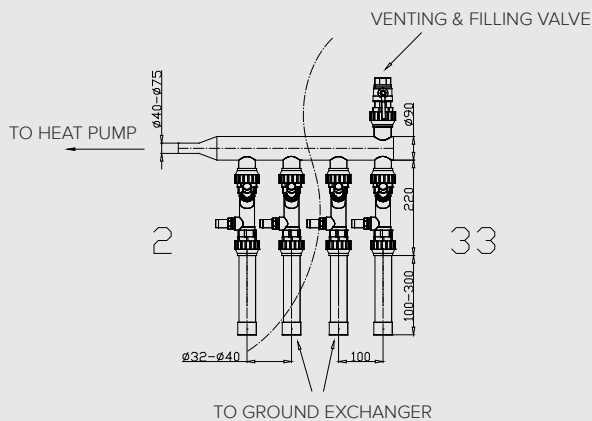
- ✓ Low flow resistance of the system
- ✓ Flow and pressure qualified
- ✓ Easy adjusting system
- ✓ Available as different models and types
- ✓ Angle flow metres with self-cleaning flow scale



MANIFOLD PIPE EQUIPED WITH SHUTT OFF VALVES / SUPPLY (FLOW) PART



MANIFOLD PIPE EQUIPED WITH AN ENGLE FLOW METRES / RETURN PART



PRODUCT:

- 2-port manifold pipe equiped with shutt off ball valves
- 3-port manifold pipe equiped with shutt off ball valves
- 4-port manifold pipe equiped with shutt off ball valves
- 5-port manifold pipe equiped with shutt off ball valves
- 6-port manifold pipe equiped with shutt off ball valves
- 7-port manifold pipe equiped with shutt off ball valves
- 8-port manifold pipe equiped with shutt off ball valves

PRODUCT:

- 2-port manifold pipe equiped with engle flow metres
- 3-port manifold pipe equiped with engle flow metres
- 4-port manifold pipe equiped with engle flow metres
- 5-port manifold pipe equiped with engle flow metres
- 6-port manifold pipe equiped with engle flow metres
- 7-port manifold pipe equiped with engle flow metres
- 8-port manifold pipe equiped with engle flow metres

MANIFOLD BOX



APPLICATIONS

Device for stabilizing the parameters of the operation ground source to heat pump.



WHAT IS THE MANIFOLD BOX?

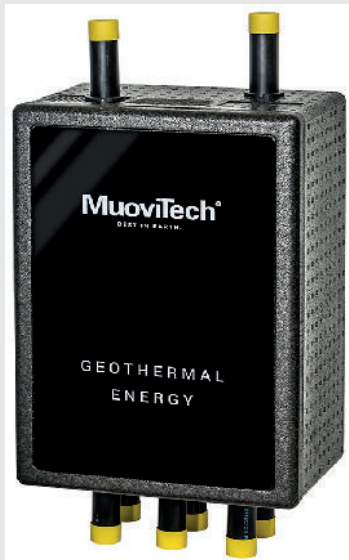
Manifold Box to use outside / inside the building. Heat-insulated casing of polypropylene foam EEP. Equipped with flowmeters DN25 with adjustable from 2-16 l/min or 10-40 l/min. Dedicated to small installations.



PROPERTIES

Fully-equipped manifold box. Ready to connect 2 - 3 ground exchangers. Equipped with 1" (DN25) ball valves on its supply (flow) part and linear flowmeters 1" (DN25) on return part. Available in configurations with Angle flowmeters with self-cleaning flow scale and temperature measurement on the main pipe.

MATERIAL: Polypropylene foam EEP
SIZE: 600x400x260mm



Possibility configurations of manifold box according individual project

PRODUCT:

2-ports manifold box

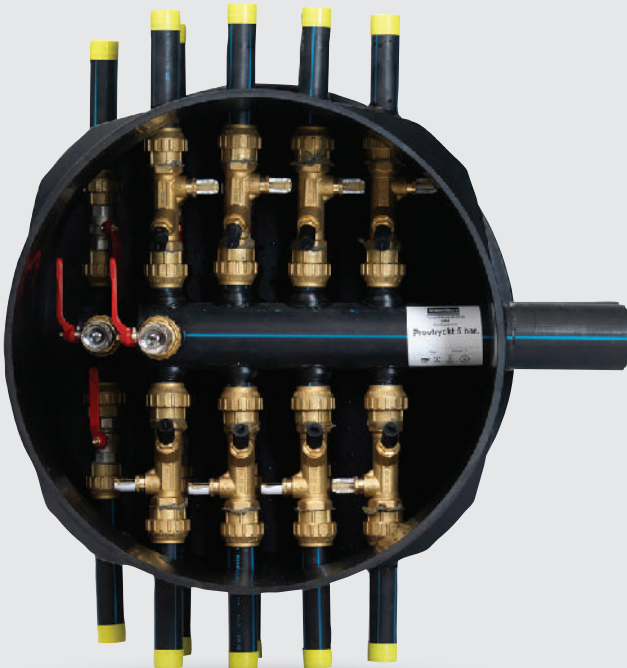
3-ports manifold box

MANIFOLD CHAMBERS / ACCESS UP TO 20 EXCHANGERS



WHAT IS THE MANIFOLD CHAMBER?

The central panel of system which connects ground exchangers with the heat pump installed inside of building. Chambers are built to connect from 2 to 28 exchangers in one system. They are equipped with 1" (DN 25) ball valves on its supply (flow) part and flowmetres on return part. Each chamber is factory-built, individually customized and qualified by 5 bar pressure before dispath.



PROPERTIES

- ✓ Angle flow metres with self-cleaning flow scale
- ✓ Lower flow resistance of system
- ✓ Highly durability for impact
- ✓ Highly resistance to deformation
- ✓ Easy adjusting system
- ✓ Available as different models and types
- ✓ Flow and pressure qualified



MANIFOLD CHAMBERS / ACCESS UP TO 28 EXCHANGERS

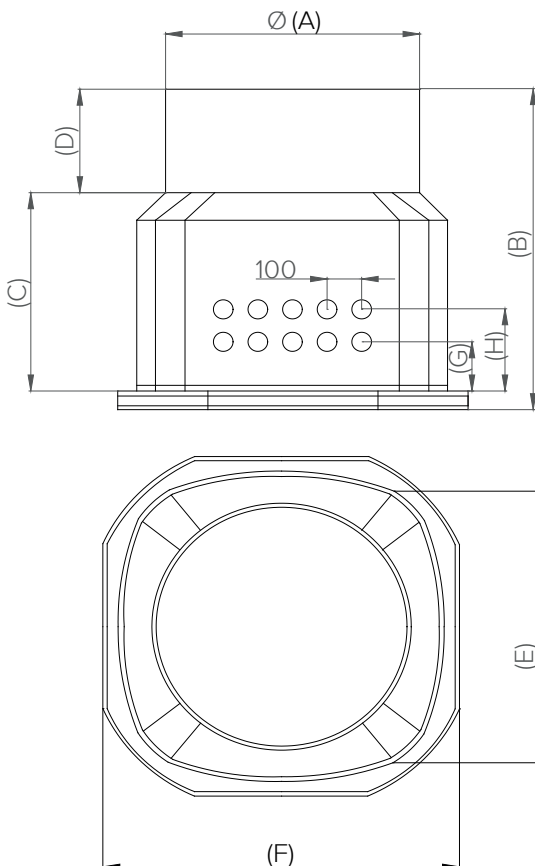


PROPERTIES

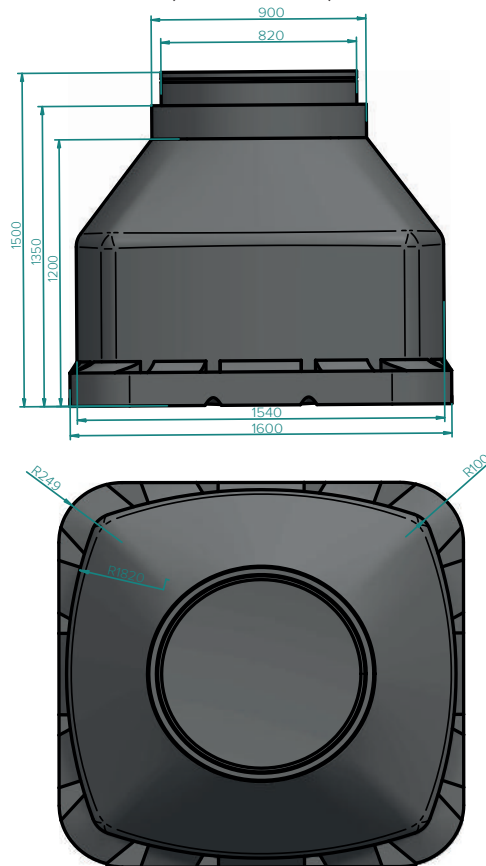
- ✓ Low flow resistance of the system
- ✓ Compensating bottom against the devastating ground water
- ✓ Highly durability for impact
- ✓ Highly resistance to deformation
- ✓ Angle flow metres with self-cleaning flow scale
- ✓ Easy acces for maintenance
- ✓ Easy adjusting system
- ✓ Water tight construction
- ✓ Available as different models and types
- ✓ Flow and pressure qualified



MANIFOLD CHAMBER
(DN 850, 1200)



MANIFOLD CHAMBER
(DN 1600)



MANIFOLD	A	B	C	D	E	F	G	H
DN 850	650	85	530	270	750	900	120	350
DN 1200	650	1050	840	160	1200	1200	120	350
DN 1600	820	1500	1200	300	1540	1600	350	580

GEOHERMAL FLUIDS / MuoviCol-P / MuoviCol-G



WHAT IS GEOHERMAL FLUID?

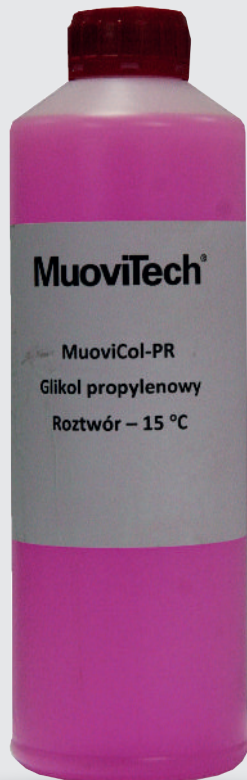
As carrier fluids in geothermal, solar and cooling systems. Available as concentrate and solution (brine). MuoviCol is enriched with additives like corrosion inhibitors, anti-foam agents, acidity regulators and pigment. Freezing temperature of fluid depends on concentration of the solution.



PROPERTIES

Traditional propylene glycol (MPG) antifreeze. Environment-friendly. Safe for human and environment. Enriched with corrosion inhibitors, antifoam agents, pH stabilizers, biocides and pigment.

- ✓ Base raw material: propylene glycol
- ✓ Freeze temperature: - 15 °C
- ✓ Boiling temperature: 103 °C
- ✓ pH: 7,5 - 9,0
- ✓ Specific weight: 1,02 (g/cm3)
- ✓ Viscosity (20°C): 3,15
- ✓ Thermal conductivity (W/mK): 0,457



Main component: propane -1.2-diol; monopropylene glycol

Content	15-30%
Nr CAS	57-55-6 Nr



Main component: glycerine

Content	0-18%
Nr CAS	57-55-6

MUOVITERM - RE - FILLING MATERIAL FOR BOREHOLE



MUOVITERM DESCRIPTION

MuoviTerm is a dry mortar, made of natural clay minerals with the chemical resistance particularly designed for refilling of the geothermal wells.

MuoviTerm is a reconstituted product which requires only the addition of water. The technical characteristics MuoviTerm exhibit can only be achieved if the material is mixed with the appropriate volume of water. Mix in a mixer-pump unit to obtain a completely homogeneous component. MuoviTerm containing a specific binding agent that exhibits particularly high resistance to water is aggressive against the concrete. MuoviTerm contains selected ingredients and are therefore suitable for use in water protection areas to protect groundwater. All properties in MuoviTerm allows the injection provides a permanent high thermal efficiency. The thermal efficiency of the entire system largely depends on the energy which must be transferred as easily as possible between the rock and the heat transfer fluid with loss as low as possible. With MuoviTerm achieved a permanent connection between the rock and the collector through the optimized clay and mineral mix.



TECHNICAL SPECIFICATION

Mixing Parameter
 1m^3 readymix =
1050 kg of MuoviTerm
+ 631 l water

Technical Specification

Density of ready-mix:
approx. 1.65 kg/m³

Viscosity (t0): 50 ± 70 s

Water separation <1.0%

Thermal conductivity:
approx. 2.0 W/mK

Delivery and storage

25kg sacks on pallets.
Storing in a dry place.



BENEFITS OF USING MUOVITERM

- ✓ High thermal conductivity (approx 2.0 W / mK)
- ✓ Permanent contact between the collector and rock
- ✓ Provides a more uniform heat exchange by the system
- ✓ Protects groundwater
- ✓ Keeps a constant volume at all times
- ✓ Mix only with water in the workplace
- ✓ User friendly
- ✓ Resistant to sulphate
- ✓ Controlled during production



*All data described in the product data sheet is measured under laboratory conditions of a normal measurement tolerances.

TURBOCOLLECTOR®

BY **MuoviTech**®

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