



KOMO®

Technical approval-with-product certificate

K84660/03



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Valid until Indefinite Dated 2019-03-01
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GEROTHERM® Geothermal Systems

HakaGerodur AG

STATEMENT BY KIWA

This technical approval-with-product certificate is based on Guideline/BRL 5219 "Plastics piping systems intended for geothermal heat exchange in closed loops" dated 15-10-2021, issued according to the Kiwa-Regulation for Certification.

The quality system and product characteristics in association with GEROTHERM® Geothermal Systems are audited periodically and the performances of GEROTHERM® Geothermal Systems in its application are assessed and the starting-points for the assessment are audited periodically.

On this basis Kiwa declares that:

- a justified confidence exists, that the GEROTHERM® Geothermal Systems delivered by the certificate holder at delivery fulfill:
 - the technical specification laid down in this technical approval-with-product certificate,
 - the product requirements as laid down in this technical approval-with-product certificate and in the BRL, provided that GEROTHERM® Geothermal Systems have been marked with the KOMO®-mark in a manner as indicated in this technical approval-with-product certificate;
- the with the GEROTHERM® Geothermal Systems composed borehole heat exchangers provide the performances as described in this technical approval-with-product certificate and comply to the requirements as laid down in this technical approval-with-product certificate, provided that:
 - the application conditions and the technical specifications as laid down in this technical approval-with-product certificate are met;
 - the manufacturing is in accordance with the regulations and processing methods as laid down in this technical approval-with-product certificate.

Within the framework of this technical approval-with-product certificate Kiwa does not impose any inspections with regard to the production of other parts of the GEROTHERM® Geothermal Systems, nor the manufacturing of the GEROTHERM® Geothermal Systems itself.

Ron Scheepers
Kiwa

This technical approval-with-product certificate is also included on the KOMO foundation websites: www.komo.nl and www.komo-online.nl.

Users of technical approval-with-product certificate is advised to check whether it is still valid. For this purpose consult the website of Kiwa: www.kiwa.nl.

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Assessed is:

- Quality system
- Product
- Performance in the application

Periodic control

GEROTHERM® Geothermal Systems

1 TECHNICAL SPECIFICATION

This technical approval-with-product certificate relates to the Gerotherm® piping system of HDPE intended for geothermal heat exchange according to evaluation guideline BRL 5219.

The Gerotherm® plastics piping system for geothermal heat exchange consists of the following parts:

- PE100 geothermal probes with diameters 25mm, 32mm, 40mm and 50mm;
 - o Including type "VARIO" with variable wall thickness (HakaGerodur certificate K84665);
- PE100 horizontal pipes with diameters 25 – 63mm, provided in coils and bars (HakaGerodur certificate K84665);
- PE100 probe feet consisting of U-bends and plugs with diameters 25mm, 32mm, 40mm and 50mm (HakaGerodur certificate K84664);
- PE100 Y-pieces 32-40mm and 40-50mm (HakaGerodur certificate K84664);
- PE100 electrofusion couplers including elbows, T-pieces and reductions with diameters 25 – 63mm (HakaGerodur certificate K84664);
- Probe foot protection cover, weight container and iron weight (HakaGerodur certificate K84665).

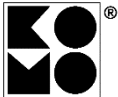
The colour of the PE100 pipes, fittings and other parts is black.

The Gerotherm® plastics piping system for geothermal heat exchange is a standard vertical system, class cold and designed to be used for operational pressures of maximum 16 bar (SDR 11) and 20 bar (SDR 9).

2 MARKING AND DESIGNATIONS

The products are marked with the KOMO®- image mark or KOMO®- word mark.

The realization of the KOMO®- image mark is as follows: :



Pipes for geothermal probes and horizontal supply and return pipes

The pipes of the geothermal probes and horizontal supply and return pipes shall be provided clearly and indelible with the following marks and designations at intervals of not more than 2 meter.

- KOMO® word or - image mark;
- Name certificate holder, factory name, logo or registered trademark;
- System name;
- Class Cold;
- Material of the pipes: PE100;
- Maximum operational pressure: 16 bar or 20 bar;
- SDR or S class;
- Maximum temperature: 20 °C;
- Nominal outside diameter(s) and wall thickness of the pipe(s) in mm;
- Production code or - date;
- "Geothermal heat" or "Aardwarmte";
- On the pipes for the geothermal probes the depth of the probe must be indicated every meter;
- Flow indication mark on the pipes for the geothermal probes.

Plastics probe feet, Y-pieces, electrofusion couplers and fittings

The minimum required marking on the products is:

- KOMO® word or -image mark (if not possible KOMO only on the smallest packaging);
- Name certificate holder, factory name, logo or registered trademark;
- Nominal outside diameter of the corresponding pipe;
- Production code or -date.

Location of the marks: on every product.

The realization of the marks is as follows: durable and indelible.



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The minimum required marking on the smallest packaging unit of the products is:

- KOMO[®] word or -image mark;
- Name certificate holder, factory name, logo or registered trademark;
- System name;
- Nominal outside diameter of the corresponding pipe in mm;
- Production code or -date

Location of the marks: on every package.

The realization of the marks is as follows: clearly and indelible on every packaging.

3 PERFORMANCES IN THE APPLICATION

3.1 Leak tightness of the geothermal piping system

The Gerotherm[®] plastics piping system is leak tight within it's application. The joints possess sufficient clamp force to resist external influences. Besides, no migration of dangerous substances from the carrier medium through the plastics products is foreseen to occur and the carrier medium has no negative influence on the mechanical characteristics of the piping system. In the table below the suitable heat carrier media are specified.

Heat transfer medium	Density at 0 °C	Frost protection
Ethylene glycol 20%	1040 kg/m ³	-10,4 °C
Ethylene glycol 20% @ 15 °C	1037 kg/m ³	-10,4 °C
Ethylene glycol 25%	1050 kg/m ³	-13,6 °C
Ethylene glycol 25% @ 15 °C	1042 kg/m ³	-13,6 °C
Ethylene glycol 30%	1059 kg/m ³	-17,1 °C
Ethylene glycol 33%	1065 kg/m ³	-19,3 °C
Propylene glycol 25%	1033 kg/m ³	-10,1 °C
Propylene glycol 30%	1039 kg/m ³	-13,5 °C
Propylene glycol 35%	1044 kg/m ³	-17,5 °C
Water 5°C	1000 kg/m ³	0,0 °C
Water 15°C	1000 kg/m ³	0,0 °C
Ethanol 20%	969 kg/m ³	-10,5 °C
Ethanol 25%	961,5 kg/m ³	-15,5 °C
Ethanol 30%	954 kg/m ³	-20,5 °C

3.2 Lifetime, nominal pressure and temperature profile

The lifetime of the Gerotherm[®] plastics piping system for geothermal heat exchange is 50 years. The nominal operating pressure to be applied is maximum 16 bar or 20 bar at a temperature of maximum 20 °C. The minimum temperature is depending on the heat carrier medium applied, see above table, with a minimum of – 20 °C.

4 PRODUCT CHARACTERISTICS

The following jointing techniques are applied for the Gerotherm[®] plastics piping system: butt fusion welding, socket fusion welding and electrofusion welding.

5 INSTALLATION INSTRUCTIONS

The supplier shall provide installation instructions, approved by Kiwa. A reference to these instructions shall be made at or near the packaging. The instructions are published in the Dutch language and contains at least specific information with regard to storage, transport, processing temperature and construction of the joints.

The installation instruction shall also include specific information regarding the putting into use as well as being in use of the Gerotherm[®] plastics piping system for geothermal heat exchange, including specific information about the heat transfer of the Gerotherm[®] plastics piping system.

6 RECOMMENDATIONS FOR USERS

Check at the time of delivery regarding the products as mentioned under "technical specification" whether:

- the supplier has delivered in accordance with the agreement;
- the mark and the marking method are correct;
- the products show no visible defects as a result of transport etc.



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Consult the installation instructions of the producer for the correct way of storage, transport and processing of the products.
if you should reject a delivery on the basis of the above, please contact:

- HakaGerodur AG

and, if necessary:

- Kiwa Nederland B.V.