Certificate

KOMO® Technical approval-with-product certificate

# K84660-5

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| Valid from | 2025-10-01 | Replaces | K84660-04 |
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## GEROTHERM® PE100 piping system for closed geothermal energy systems

## HakaGerodur AG

STATEMENT BY KIWA

This technical approval-with-product certificate is based on Guideline/BRL 5219 “Plastics piping systems intended for closed geothermal energy systems” dated 1 September 2023, issued according to the Kiwa-Regulation for Certification.

The quality system and the product characteristics are checked periodically. The performance of the GEROTHERM® PE100 piping system for closed geothermal energy systems in the application has been assessed and the principles for the assessment are periodically reassessed. Based on this, **Kiwa declares that** there is legitimate confidence that:

- Upon delivery, GEROTHERM® PE100 piping system for closed geothermal energy systems meets the requirements:
  - Of the technical specifications laid down in this Technical approval-with-product certificate;
  - The product requirements laid down in the Guideline,

provided the GEROTHERM® PE100 piping system for closed geothermal energy systems are accompanied by the KOMO® quality mark in a manner set out in this Technical approval-with-product certificate.

- The GEROTHERM® PE100 piping system for closed geothermal energy systems provide the performances as specified in this technical approval-with-product certificate, provided that:
  - The technical specification and the conditions of application laid down in this technical approval-with-product certificate are fulfilled;
  - The manufacture of the GEROTHERM® PE100 piping system for closed geothermal energy systems takes place in accordance with the regulations and/or processing methods laid down in this technical approval-with-product certificate.

Wim van Loon
Managing Director Nederland

*This Technical approval-with-product certificate is also included on the KOMO foundation websites: www.komo.nl and www.komo-online.nl.Users of this Technical approval-with-product certificate is advised to check whether it is still valid. For this purpose consult the website of Kiwa: www.kiwa.com.*

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**Assessed is:**
- **Quality system**
- **Product**

**Periodic control**

KOMO® Technical approval -with-product certificate

**K84660-5**

# GEROTHERM® PE100 piping system for closed geothermal energy systems

**TECHNICAL SPECIFICATION**

This technical approval-with-product certificate relates to plastics piping systems of HDPE intended for closed geothermal energy systems according to evaluation guideline BRL 5219.

The GEROTHERM® PE100 piping system for closed geothermal energy systems is a standard vertical system, class cold and is intended to be used with a nominal pressure of maximum 16 bar (SDR 11), 20 bar (SDR 9) or 25 bar (SDR 7,4) at a maximum temperature of + 20 °C. De minimum temperature is depending on the applied heat transfer liquid, see table 1 with a minimum of – 20 °C.

The following products are covered by this technical approval-with-product certificate:

- PE100 pipes for soil heat exchangers with diameters 25mm, 32mm, 40mm and 50mm;
    - Including type “VARIO” with variable wall thickness (HakaGerodur certificate K84665);
- PE100 feet for soil heat exchangers consisting of U-bends and plugs with diameters 25mm, 32mm, 40mm and 50mm (HakaGerodur certificate K84664);
- PE100 horizontal supply and return pipes with diameters 25 – 63mm, provided in coils and bars (HakaGerodur certificate K84665);
- 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.

**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 soil heat exchangers and horizontal supply and return pipes**

The pipes of the soil heat exchangers and the horizontal supply and return pipes shall be marked at a mutual distance of no more than 2 metres as follows.

- KOMO® word mark;
- Certificate number of the technical approval-with-product certificate;
- Name certificate holder, factory name, logo or company logo;
- System name;
- Class “Cold”;
- Material of the pipes: “PE100”;
- Maximum operational pressure: “16 bar” or “20 bar” or “25 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;
- “Bodem-warmtewisselaar” and “bestemd voor toepassing in gesloten bodemenergiesystemen” (the latter may also be provided on the packaging), (not applicable for horizontal supply and return pipes);
- The pipe for the soil heat exchanger must have a depth indication per metre. Hereby, the zero point of the depth indication must start atthe base of the soil heat exchanger (not applicable for horizontal supply and return pipes).

**Feet for soil heat exchangers, Y-pieces, electrofusion couplers and fittings**
The feet, Y-pieces, electrofusion couplers and fittings shall be marked as follows:

- KOMO® word mark or KOMO® logo (if not possible then the KOMO® word mark or KOMO® logo shall be affixed only on the smallest
  packaging);
- Name of the certificate holder, factory name, logo or company logo;
- Nominal outside diameter in mm 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.

The smallest packaging of the auxiliary parts and fittings are to be provided with at least the following information:

- KOMO® word mark or KOMO® logo;
- Certificate number of the technical approval-with-product certificate;
- Name of the certificate holder, factory name, trade name or company logo;
- Nominal outside diameter in mm of the corresponding pipe;
- “Bestemd voor toepassing in gesloten bodemenergiesystemen”;
- Production code or production date.

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

**PERFORMANCES IN THE APPLICATION**

**Leak tightness of the geothermal piping system**
The piping system is leak tight within its application. The joints possess sufficient clamp force to resist external influences. Besides, no migration
of dangerous substances from the heat transfer medium through the plastics products may occur and the carrier medium shall have no negative
influence on the mechanical characteristics of the piping system. In table 1 the suitable heat transfer media are specified.

Table 1 – Specification of the liquids suitable to be applied as heat transfer medium

| Heat transfer medium | Density at 0 °C | Resistane to frost |
|---|---|---|
| Ethyleen glycol 20% | 1040 kg/m$^3$ | -10,4 °C |
| Ethyleen glycol 20% @ 15 °C | 1037 kg/m$^3$ | -10,4 °C |
| Ethyleen glycol 25% | 1050 kg/m$^3$ | -13,6 °C |
| Ethyleen glycol 25% @ 15 °C | 1042 kg/m$^3$ | -13,6 °C |
| Ethyleen glycol 30% | 1059 kg/m$^3$ | -17,1 °C |
| Ethyleen glycol 33% | 1065 kg/m$^3$ | -19,3 °C |
| Propyleen glycol 25% | 1033 kg/m$^3$ | -10,1 °C |
| Propyleen glycol 30% | 1039 kg/m$^3$ | -13,5 °C |
| Propyleen 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 |

**Lifetime, nominal pressure and temperature profile**
The minimum lifetime of the plastics piping system 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 transfer medium applied, see table 1, with a minimum of – 20 °C.

**$K_{vs}$-values**

The $K_{vs}$-values – being the flow rate at a pressure difference of respectively 1,0 kPa, 2,5 kPa, 5,0 kPa and 10,0 kPa – of the foot of the soil heat exchanger per diameter are specified in the following tables (values representative for PN25 probe foot).

| **$K_{vs}$-values d25** | **Unit** | **Measured** |
|---|---|---|
| $K_{vs}$-value at 1,0 kPa | l / h | 819 |
| $K_{vs}$-value at 2,5 kPa | | 1.343 |
| $K_{vs}$- value at 5,0 kPa | | 1.953 |
| $K_{vs}$- value at 10,0 kPa | | 2.813 |

| **$K_{vs}$-values d32** | **Unit** | **Measured** |
|---|---|---|
| $K_{vs}$-value at 1,0 kPa | l / h | 1.363 |
| $K_{vs}$-value at 2,5 kPa | | 2.153 |
| $K_{vs}$- value at 5,0 kPa | | 3.168 |
| $K_{vs}$- value at 10,0 kPa | | 4.563 |

| **$K_{vs}$-values d40** | **Unit** | **Measured** |
|---|---|---|
| $K_{vs}$-value at 1,0 kPa | l / h | 1.937 |
| $K_{vs}$-value at 2,5 kPa | | 3.037 |
| $K_{vs}$- value at 5,0 kPa | | 4.333 |
| $K_{vs}$- value at 10,0 kPa | | 6.140 |

| **$K_{vs}$-values d50** | **Unit** | **Measured** |
|---|---|---|
| $K_{vs}$-value at 1,0 kPa | l / h | 2.227 |
| $K_{vs}$-value at 2,5 kPa | | 3.498 |
| $K_{vs}$- value at 5,0 kPa | | 4.958 |
| $K_{vs}$- value at 10,0 kPa | | 7.045 |

**PRODUCT CHARACTERISTICS**

The following jointing techniques are applied for the joints of the HDPE piping system: butt fusion welding, socket fusion welding and electrofusion welding.

**INSTALLATION INSTRUCTIONS**

The supplier shall provide installation instructions, approved by Kiwa Nederland B.V.. 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 closed geotheremal energy systems, including specific information about the heat transfer of the GEROTHERM® plastics piping system.

**RECOMMENDATIONS FOR THE USERS**

Check on delivery of the products listed under the “technical specification” whether:

- The product(s) and material(s) ordered are delivered in accordance with the agreement you made.
- The brand and the method of marking is correct
- No defects or damage is visible (for example, resulting from the transportation).

If on the basis of the foregoing you decide to proceed to rejection, please contact:

- HakaGerodur AG

and, if necessary:

- Kiwa Nederland B.V.

Carry out storage, transport and processing in accordance with the provisions as included in this product certificate and/or documents of the certificate holder.

Check whether this product certificate is still valid, consult the website www.kiwa.com/en.