2 Material properties and application limitations

Polyethylene (PE for short), is a semi crystalline thermoplastic and is a generic term for many variations of the polymer. The most common are:

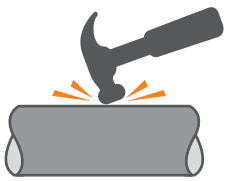
- LDPE (density: 0,9 - 0,91 g/cm²)
- MDPE (density: 0,93 - 0,94 g/cm²)
- HDPE (density: 0,94 - 0,965 g/cm²)

Aliaxis Nederland B.V. uses High Density Polyethylene (HDPE) for its products. The mechanical characteristics (elasticity, and stiffness) are important for the production of our pipes and different fittings. HDPE has a high resistance to damage from acids, bases and aqueous salt solutions. HDPE also has good resistance against light ionised radiation without becoming radioactive itself. The properties and benefits of Akatherm HDPE are highlighted in table 2.1 and 2.2.

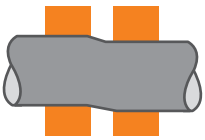
Property	Unit	Test method	Value
Density at +23°C	g/cm²	ISO 1183	0,954
Elasticity modulus (secant betw. 0,05% and 0,25% expansion)	N/mm²	ISO 527	850
Tensile creep modulus 1 hr. value 1000 hrs. value	N/mm²	ISO 899	 640 300
Bending creep modulus 1 min. value	N/mm²	DIN 54852-Z4	1000
Tensile strength	N/mm²	ISO 527 Test speed 50 mm/min	22
Elongation at break +23°C	%	ISO R 527	300
3,5% Bending stress	N/mm²	ISO 178 Test speed 2 mm/min	19
Average linear expansion coefficient	mm/*K	DIN 53752	0,18
Shore hardness		ISO 868	61
Operational temperature range without mechanical stress	°C	-	-40 bis +100
Fire behaviour		DIN 4102	B2
Water absorption at +23°C (96h)	mg	ISO 62	< 0,5
Melt Flow Rate MFR 190 / 5	g/10 min	ISO 1133	0,43

Table 2.1

2.1 Material advantages



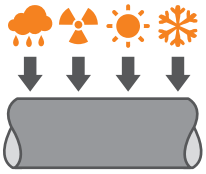
Impact-resistant and tough:
Unbreakable at temperatures above 5°C



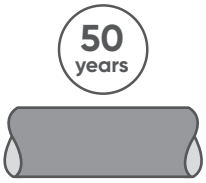
Elastic and flexible:
Adjusts to local ground movement for underground use

Thermal resistant:
Applications possible between -40°C and 80°C. Up to 100°C for short periods of time.

Chemical resistant:
Suitable for transport of polluted waste water

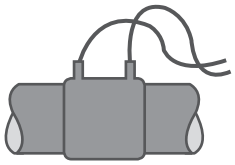


UV & weather resistant:
Unrestricted outside use through carbon black additives

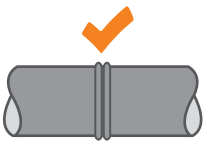


Wear resistant:
Lower cost due to long lifetime

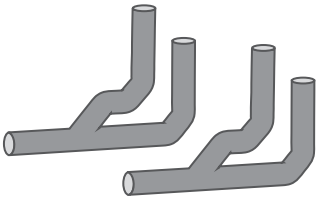
2.2. System advantages



Welded system:
Simple and secure installation using buttwelding and electrofusion



Homogeneous welded joints:
Pull tight and leak proof for a completely closed system



Prefabrication:
Fast and cost-saving installation of repetitive systems

Light in weight:
Cost saving in transport and handling

Low heat conductivity:
No condensation insulation required during short periods of cooling

Nontoxic:
100% recyclable and environmental friendly

2.3 Application limitations

The following limitations need to be taken into consideration in the design, installation and use phases of Akatherm HDPE:

- Akatherm HDPE is designed to be installed in accordance with EN12056. In respect to this standard pressurization of the pipe system is not allowed.
- Chemical resistance of Akatherm HDPE has to be taken into account. Refer to appendix A for a complete chemical resistance table of Akatherm HDPE. The lifetime of Akatherm HDPE can be affected when chemical resistance is not considered
- Akatherm HDPE pipes and fittings can be used continously at elevated temperatures. However, drainage above 80 °C is limted to 400 times per year for a duration of 1 minute per time