

**PE-Xc 5-layer-pipe**  
for underfloorheating, cooling  
and radiator connection





**Demands on the heating pipe:**

The most important component of a heating system is the heating pipe.

The PE-Xc 5-layer pipe provides the following benefits:

- very good long-term resistance during the internal pressure test
- good thermal ageing stability, thus no damages caused by thermal ageing when used in accordance with the regulations
- stress cracking resistance
- good resistance to authorized chemical solvents, i.e. also resistant to heating water additives such as inhibitors
- oxygen tightness according to DIN 4726

- installation at low temperatures possible without heat treatment
- laying with narrow bending radii
- corrosion resistance
- smooth pipe walls, i.e. minimal pressure loss and no incrustations
- good rapid crack propagation resistance and abrasion resistance
- impact resistance at low temperatures

The Becker Plastics' electron beam cross-linked PE-Xc heating pipe has all these properties. The requirements set forth in EN ISO 15875-1 for PE-Xc pipes and in DIN 4726 for heating pipes are met and even surpassed.

**Classification of operating conditions according to EN ISO 15875-1**

Application class	calculated temperature $T_D$ [°C]	operating life at $T_D$ [years]	$T_{max}$ [°C]	operating life at $T_{max}$ [years]	$T_{mal}$ [°C]	operating life at $T_{mal}$ [h]	typical application
4b	20 plus cumulative 40 plus cumulative 60 plus cumulative (see next column)	2,5  20  25  plus cumulative (see next column)	70	2,5	100	100	floorheating and low temperature radiator connection
5b	20 plus cumulative 60 plus cumulative 80 plus cumulative (see next column)	14  25  10  plus cumulative (see next column)	90	1	100	100	high temperature radiator connection

If more than one calculated temperature is generated per application class, the associated line with regard to operating life should be added, e.g. the temperature combination for a 50-year duration for class 5 comprises:

- 20°C for 14 years followed by
- 60°C for 25 years followed by
- 80°C for 10 years followed by
- 90°C for 1 years followed by
- 100°C for 100h

Please note: This standard does not apply, if base values exist for  $T_D$ ,  $T_{max}$  and  $T_{mal}$  higher than those listed in this table.

## Standard PE-Xc pipes:

Application area heating							
PE-Xc pipe measurement dimension				operating conditions according to DIN EN ISO 15875-1			
				class 4		class 5	
d <sub>n</sub> [mm]	e <sub>n</sub> [mm]	S-Value	SDR-Value	T <sub>max</sub> [°C]	pressure [bar]	d <sub>n</sub> [mm]	pressure [bar]
10,5	1,25	4,3	8,4	70	8	90	6
12	2	2,7	6	70	10	90	10
14	2	3,3	7	70	10	90	8
16	2	3,8	8	70	10	90	8
17	2	4,1	8,5	70	8	90	6
18	2	4,4	9	70	8	90	6
20	2	4,9	10	70	8	90	6
25	2,3 (2,5)	4,9	10	70	8	90	6

d<sub>n</sub> = outer diameter  
e<sub>n</sub> = wall thickness  
S = nominal pipe serial number according to ISO 4065  
SDR = standard dimension ratio, allocation of SDR values according to DIN EN ISO 15875-2

## Raw material:

The basic material consists of high density polyethylene types of a high molecular weight supplied by renowned raw material producers. Special additives prevent thermal degradation and the influence of metal ions (e.g. of brass fittings).

## Pipe production:

The pipes are extruded in a pipe extrusion process on state-of-the-art manufacturing plants, which have been optimized for the processing of polyethylene of high molecular weight. The multilayer structure is produced in a specially developed co-extrusion process. The outer protective layer of this special 5-layer-pipe keeps the oxygen barrier safe from mechanical influences.

## Crosslinking:

Crosslinking, i.e. the linking of the polyethylene molecules to a macromolecule with a spatial network is continuously done after extrusion by fast high-energy electrons on Europe's most modern and efficient electron accelerators.

Due to the crosslinking the known dropping of the internal pressure resistance - particularly when higher temperatures are concerned - is avoided. In addition, the pipe is insensitive to stress cracking and the influence of chemicals ensured by the crosslinking procedure.

## Technical properties of the Becker Plastics PE-Xc pipes:

Properties	Value	Standard
degree of crosslinking	>60%	DIN 16892
density	0,933 g/cm <sup>3</sup>	DIN 53479
tensile strength	23 N/mm <sup>2</sup>	DIN 53455
percentage of elongation	>400%	DIN 53455
elastic modulus	appr. 600 N/mm <sup>2</sup>	DIN 53457
impact strength at +23°C	250 kJ/m <sup>2</sup>	DIN 53453
thermal conductivity	0,35 W/(m*K)	DIN 52612
coefficient of linear thermal expansion	1,5*10 <sup>-4</sup> m/K	DIN 52328
oxygen tightness (with EVOH oxygen barrier)	< 0,1 mg/(l*d)	DIN 4726

Data are partly taken from the technical datasheets of the material manufacturer

## Quality assurance by internal control:

During production the PE-RT pipe of Becker Plastics has to undergo strict controls according to the relevant product standards such as EN ISO 15875 and DIN 4726.

Among other investigations, the following tests are made:

- preprocessing control of the raw material charges
- dimensional continuity and accuracy of the pipes
- mechanical-technological tests according to standard, eg internal pressure test

## Quality assurance by external control:

The most important characteristics are constantly tested within the scope of supervision contracts. Depending on the country and the type of pipe the products are supervised through: IMA-D, TGM-A, KIWA-NL.

Further monitoring contracts and certificates on demand.



As a leading manufacturer of plastic and composite material pipes for the transport of liquid and gas media, Becker Plastics offers major customers and system providers everything from one source: together with our partners, we develop innovative solutions for special applications on a customer specific basis. Our technical know-how ensures the production of premium products – from small batches through to the production of large quantities.

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