Life time expectancy of plastic pipes

All our pipes are designed for a lifetime of 50 years. Therefore „permanently“ would mean a lifetime of 50 years. Obviously there are no experiences or long term test runs for such a life time.

Therefore testing methods exists that are able to predict the expected lifetime on behalf of the special properties of polymers and statistical methods. The mentionend special property of polymers is the relation between time and temperatur in regard of macromolecular processes. This means that the same macromolecular processes happen faster at higher temperatures than at lower temperatures. Therefore testing is performed at higher temperatures to get a conclusion for the behaviour at lower temperatures over a longer period of time.

A LTHS (longterm hydrostatic stress) curve is derived from a statistical method described in ISO 9088 as SEM (standard equation method). To apply this SEM testing of pipe samples is performed for max. 1,5 years at e.g. 4 temperatures (20°C, 60°C, 95°C and 110°C). A variety of choosen pressures (loads) is applied to the samples. Related to the different temperatures and loads the samples will break after different times. Out of these „breaking points“ a mathematical correlation is derived that extrapolates a 70°C curve for 50 years. This curves shows the expected behaviour (expected breaking) of the pipe in relation of pressure and time.

For pipes made of PE-RT such LTHS curves have been determined for the generic PE-RT types and can therefore be used for our pipes (EN ISO 22391).

However in real life the load of the pipe won´t be constant in regard of temperatures and pressure loads. Therefore the application (or application conditions) play a decisive role.

The prediction of the lifetime is based on the definition of the application class. Meaning what temperatures are occuring for how long over the desired lifetime of 50 years. These temperature-time collectives are defined in ISO 10508:

Application class	T_D		T_{max}		T_{mal}		Typical field of application
	°C	Time [a] years	°C	Time years	°C	Time h	
1 [b]	60	49	80	1	95	100	Hot water supply (60 °C)
2 [b]	70	49	80	1	95	100	Hot water supply (70 °C)
3 [c]	20 30 40	0,5 20 25	50	4,5	65	100	Low-temperature under-floor heating
4	20 40 60	2,5 20 25	70	2,5	100	100	Under-floor heating and low-temperature radiators
5	20 60 80	14 25 10	90	1	100	100	High temperature radiators

In our case (underfloor heating) class 4 needs consideration. It means that it is supposed that in 50 years the pipe is exposed to 20C° for 2,5years, 40°C for 20years, 60°C for 25years, 70°C for 2,5 years and to 100°C for 100h. This is a typical temperature exposition profile of an ufh over 50 years.

Because of statistical limitations it is only valid to state that the pipe is“good“ for 50 years under consideration of the application class and the pressure level (4,6,8 or 10 bars). Lifetime predictions for longer time periods, other temperatures, other pressure levels or collectives are not possible.

Therefore a statement about a permanent maximum temperatur is not possible and won´t make any sense because a belonging pressure and time is always needed to characterize a pipe.

Because of the generic LTHS the EN ISO 22391 provides a classification according to the diameter and the wallthickness. Our PE-RT pipe 12x2 is classified as class 4 at the pressure level 10bars.

The printing on the pipe class4/6bar is needed because of the SKZ mark that only certifies class4/6bar regardless if the pipe has a higher classification according to the EN ISO 22391.

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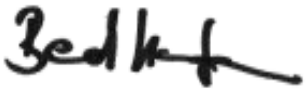

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