

History and design basis comparison of solid versus profile HDPE pipes.

Solid pipes

First HDPE pipe production started end of 1950's by production of non pressure solid wall pipes for industrial applications. Improving raw material technology and production technology soon allowed pressure pipe productions with bigger wallthickness and bigger pipes sizes. It was found that the ratio of pipe size and wallthickness behave equivalent to possible pressure applications and so the DR or SDR (Standard Dimension Ratio) has been used for the solid pipe norms worldwide. Until end of the 1980's solid pipe production up to 1200 was possible only.

Pressure pipes of big sizes due to the big wallthickness were very expensive and even if the the outstanding performance and durability as well as the low maintenance costs on longterm perspective gave big advantages to the project owners, the use caused was limited to critical applications like for the chemical industry caused by the high price.

Even if mid 1990's solid pipes were available in sizes up to 1600 mm the pipeline market asked for the following.

Price reduction to be more competitive to former pipe materials like concrete, ductile iron and GRP and at the same time availability of bigger pipe sizes up to 3600 mm, by keeping the general advanced HDPE properties.

Profile pipes

These requirements were not possible to achieve with solid pipes, even if further technology improvements were considered.

So starting the 1990's the profile pipes using a different production method and also reducing the material needed have been developed.

First designs were related to non pressure applications and for this, the pipe ringstiffness was the most comparable figure to compare with the former standard materials.

Due to several profile pipe design developments from different pipe producers at that time, a norm related to a specific pipe design was not possible and so the norm was based on the RSC (Ring Stiffness Class) as the most important property.

Nowadays, further raw material technology and profile pipe design improvements from PESTEC allow profile pipe designs for RSC even bigger than solid pipes and so also for pressure application e.g. our FKS PEG Profile Pipe for up to 10 bar.

Installation and pipe connections

General installation costs for solid and profile HDPE pipes are comparable.

Pipe connections for both can be achieved with butt welding joint method and flange joint method, whereas PESTEC FKS Profile Pipes in addition can be connected by integrated electrofusion couplers. This economical method is as fast as well as a 100% tight connection and does not need expensive flange connections or expensive butt welding equipments to connect the pipes.

Price comparison

As the profile pipe production method cost are higher compared to solid pipe production, the price efficiency of profile pipes just starts in the range of pipes bigger than 600 mm.

In general there are still price advantages for solid pipes in sizes 16-600 mm so the smallest available profile pipe sizes 300 – 600 mm are almost used if outstanding RSC is required. Based on big size pipeline long-term total cost evaluation including installation, tightness security, total performance as well as maintenance costs, profile pipes show the best benefit followed by solid HDPE pipes and in front of other material choices for most of pipeline applications.

Conclusion

Profile pipes reached a very high acceptance from pipeline designers from the start, and since about year 2000, the use of profile pipes strongly increased worldwide.

Profile pipes bigger than 600 mm are a very valuable choice for latest pipeline design for most pipeline applications.