
teppfa
The benefits of
Plastic Pipes

Contractors, specifiers and architects throughout Europe increasingly appreciate plastics as the material of choice for pipe systems to solve today's macro challenges.

Renovation projects installing leak-resistant plastic drinking water supply and distribution pipes substantially reduce spill rates of increasingly scarce drinking water stocks.

Plastic pipes are highly effective water management systems. Their almost endless innovative designs quickly mitigate any adverse impact from heavy rainfall and flooding.

Plastic pipes, chambers and tanks are contributing to building a robust infrastructure, ready for future extreme weather events. They are already well advanced in delivering on Europe's Green Deal and will continue to do so. With a proven lower carbon footprint, at the end of their service life they can be collected and recycled to start a new 100+ year service life, and so contribute to the transition to a Circular Economy.

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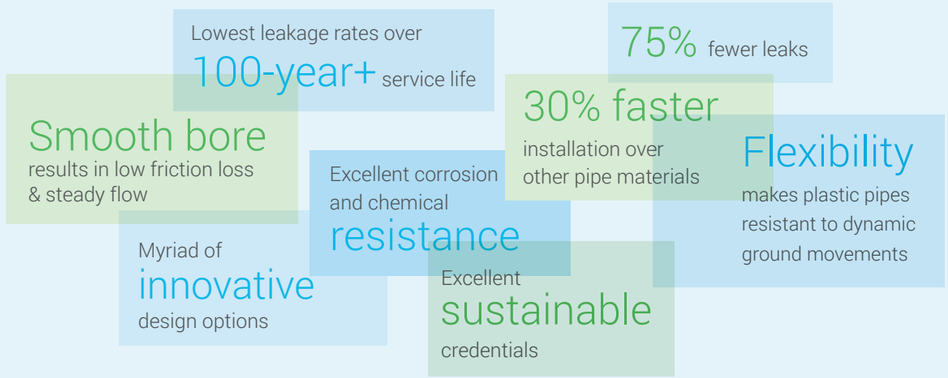
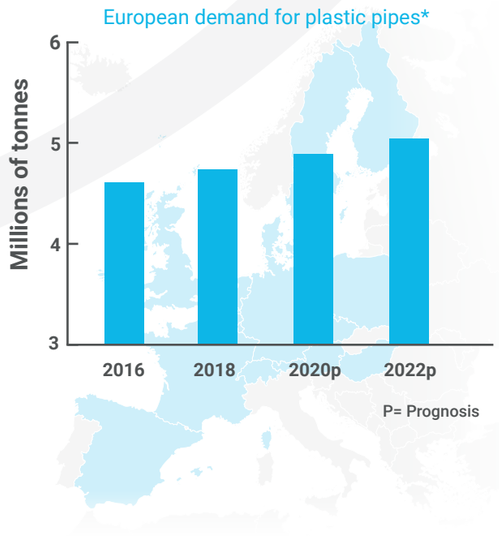


Performance

- plastic pipe use is increasing

Plastic pipes are already a highly popular and trusted material in civils and infrastructure, and large diameter plastic pipes are increasingly being used for sewer and surface water systems and for the conveyance of water.

At a time when we are seeing increasing evidence of more extreme weather events, there are many reasons for their growing popularity, including a **wide range of diameters, ease of handling** and **robustness on site,** smooth internal bores facilitating **superior flow properties,** great **corrosion and chemical resistance,** consistently low leakage rates, and an excellent performance throughout its full life cycle.



Plastic pipes used in infrastructure projects are a very long way from the single-use plastic that is causing such controversy worldwide. These pipes remain in the ground **performing 24/7** for long periods of 100 years or more, carrying out the essential tasks of transporting water, wastewater and sewage **safely and efficiently.** When they reach their end of life as water and sewer pipe systems, they can be **recycled,** meaning they have an important role to play in contributing to the **circular economy.**

*Source: Ceresana: Plastic Pipes Europe, April 2020

In fact, reference studies show that plastic pipes have **a lower carbon footprint** through their whole life cycle than other materials for pipes. Taking the entire **'cradle to grave'** cycle of raw material extraction, manufacturing, transformation into products, all transportation costs, installation, the product's lifetime of use, and disposal or transformation into other products at the end of life, is the only accurate way to assess a complete carbon footprint and thereby directly compare different pipe products. The TEPPFA website contains an extensive overview of Lifetime Cycle Assessments and Environmental Product Declarations*

* https://www.teppfa.eu/sustainability/

The importance of **good installation practice** cannot be over-emphasised, and for all products helps to ensure a longer-lasting water and sewer network. This means that **training** in installation techniques as well as in the often challenging conditions found in trenches, is essential. **The lightness of weight** of plastic pipes lend themselves to easier installations as often less equipment is required for heavy lifting, and **longer lengths** mean **fewer joints** need to be made. Good joint installation is one of the crucial areas of pipe projects as poorly made joints can be one of the first places that a pipeline fails.

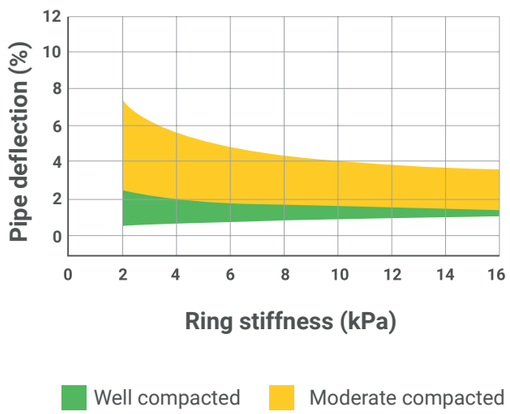
With more incidents of flooding taking place worldwide, having a **robust infrastructure system** is essential, which means being able to manage surface water more efficiently than ever before.

Flexibility is a **strength**

Buried pipes actually do need an element of flexibility. Without it they can crack or become disjointed. Gaps at the pipe joints then compromise flow performance and allow leakage. Flexible plastic pipes perform excellent when the ground starts moving. Let's have a look.

The ground is always **subject to movement,** whether that is slowly over a number of years (settlement), or rapidly due to external events like floods, extremes of heat and cold, earthquakes and earth tremors.

TEPPFA Deflection Graph*



*https://www.teppfa.eu/calculator

For these reasons, pipes that do not flex at all to accommodate changing ground conditions are actually more liable to crack or split. As soon as that happens, those pipes are no longer performing as intended, but in fact are failures. You have only to take the longstanding example of trees; the ones that survive are the ones that bend and flex in the wind.

There is a growing body of evidence* to show the advantages of plastic pipe systems being able to accommodate dynamic ground movement.

There have been many occasions where plastic pipes systems have **continued to perform** after major and catastrophic weather and planetary events, such as the **Great Hanshin Earthquake*** and by doing so have helped to continue to transport essential water supplies or wastewater and even gas to where it is needed.
A **study*** proves that flexibility is actually a massive benefit in plastic pipes.

* https://www.teppfa.eu/DynamicGroundMovementsReport

Keeping up
a good flow

Sewage and surface water commonly flows by force of gravity. The smooth inner bore of plastic pipes minimises friction loss and helps maintain a steady flow.

Long lengths mean fewer joints in the system with less opportunity for infiltration into the network or exfiltration into the surrounding soils.

Where sewage has to be transported under pressure, smooth bored plastic pipes contribute to efficient pumping with the associated cost and environmental benefits.

75%
fewer leaks

The availability of long lengths in plastic pipes mean fewer joints in the system with less opportunity for infiltration into the network or exfiltration into the surrounding soils.

In addition to less heavy lifting machinery being required and the ability to fit plastic pipes into chambers and manholes with absolute precision, as opposed to approximations when using a mechanical lifter, plastic pipe systems have shown 75% fewer leaks than rigid pipes (TEPPFA SMP Project*).

* https://www.teppfa.eu/pipefailure

Speed of
installation

Any pipe installer working on a building site knows that plastic sewer pipes take less time to install than other pipe materials.

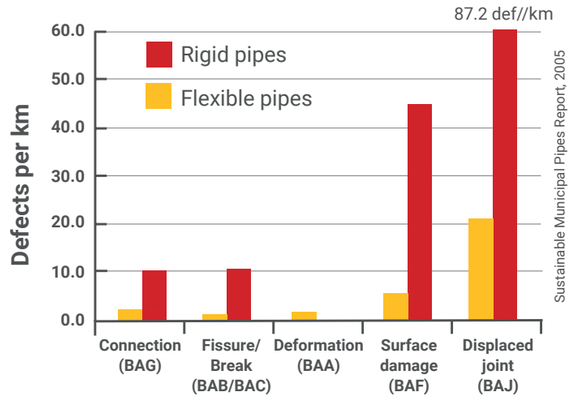
The combination of flexibility and strength is maintained despite this speed of installation, taking these pipes far into the future with long-term performance values.

Ground conditions usually change with time so there is an advantage if pipes are able to accommodate some ground movement yet retain their performance and service life.

For flexible pipes, the soil loading is distributed and supported by the surrounding soil. This means that the pipes themselves are under **lower overall loads,** whereas stiffer pipes directly resist traffic and other loading, which involves more strain.

Speed of installation proved highly beneficial at one of the UK's largest privatised road projects in Norwich. A tailored surface water system comprising 10,000 metres of twin wall plastic pipe – designed to cope with the specified traffic loads and site conditions – was installed using minimal amounts of imported granular fill and the speed of installation was seen as a distinct advantage.

Defect rate within the network (Mean)

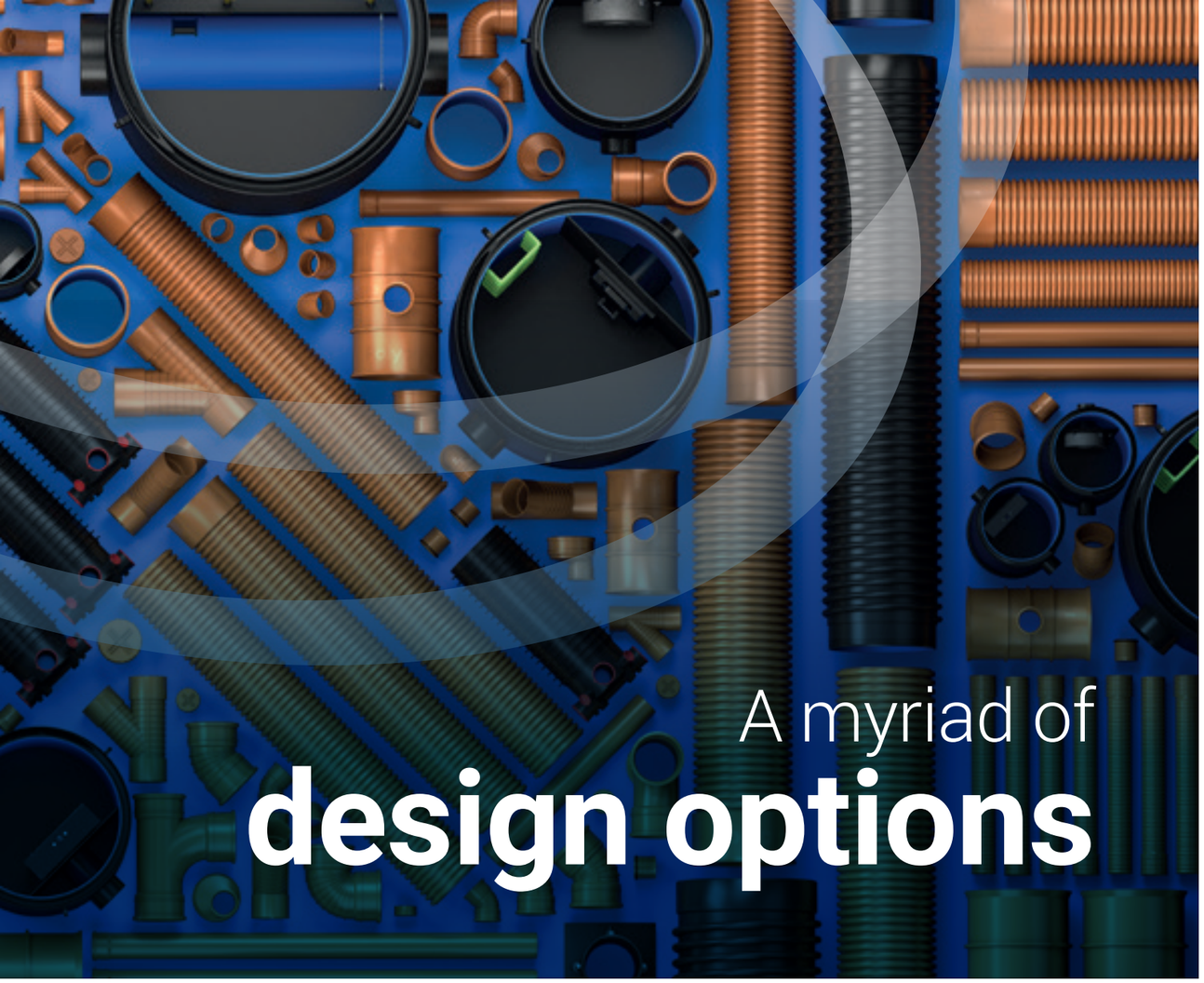


Under similar installation conditions, the plastic pipe systems are installed

30% faster than rigid pipes**

* https://www.teppfa.eu/pipefailure

**https://www.youtube.com/rigidpipes



A myriad of **design options**

Plastic pipes provide many design options, for example their increasing use for manholes and chambers, and are able to be constructed modularly off-site, then transported to site as more complete units. This minimises the number of specialised trades on site.

Plastic pipes, chambers and geo-cellular products and attenuation systems for SuDS (sustainable drainage systems) lend themselves to **innovative designs.***

*https://www.teppfa.eu/applications/

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Sustainability **credentials**

A series of independent studies* by the Flemish Institute for Technological Research (VITO) measured the environmental footprint of various types of plastic pipes systems, based on a full life cycle assessment.

The work was validated by the **Austrian Denkstatt sustainability consultancy** It was an important step in the development of Environmental Product Declarations for plastic pipes and its findings were very positive, confirming the excellent environmental performance of plastic pipes for utilities and building applications over their entire cradle to grave life-cycle.

vito

denkstatt

EPD Calculator

Typical applications

Plastic pipes lend themselves to a huge range of applications:

- Below ground utility pipes to safely transport water, sewerage and gas
- **General plumbing and heating pipes** in homes, offices and industrial buildings
- **Heating and cooling systems** below floors and within walls and ceilings for domestic and commercial buildings, to outside rainwater pipes for homes and offices
- **Sustainable flood control and surface water drainage systems f**or housing estates and industrial complexes.

In **summary**

The consistently high performance, low environmental impact, flexibility and flow advantages of plastic pipes make them ideal for many applications, and they are increasingly being specified at larger diameters. They provide effective and long-lasting solutions to the challenges of modern living in all types of environments.

Climate change is already having an impact worldwide, so developing robust infrastructure systems capable of coping with weather extremes will become increasingly vital for us all.

*https://www.teppfa.eu/environmental-footprint

Key benefits

Lowest leakage rates over
100-year+ service life

Smooth bore
results in low friction loss
& steady flow

Excellent corrosion
and chemical
resistance

30% faster
installation over
other pipe materials

Myriad of
innovative
design options

Excellent
sustainable
credentials

75% fewer leaks

Flexibility makes plastic pipes resistant to dynamic ground movements

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