

TITLE: Durably safe and economic fittings made of PE 100
for gas and water supply applications
- solution of problems

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SUMMARY

PE pipe systems enjoy an ever increasing acceptance in the market. The process of development is, however, not yet terminated. New applications demand intelligent solutions of problems. The mentioned examples show that innovative products do not only solve problems but save money and improve quality at the same time.

TEXT

Since more than 40 years PE has traditionally been used for gas and water supply applications. As a result of the positive experiences with PE materials used in the beginning, such as flexibility, resistance to corrosion and easy pipe laying PE has developed to be the leading pipe material for the increasing requirements of local distributions.

An important reason for this development is the durably tight welded connections reducing damages to a minimum and thus offering a favourable position within official damage statistics.

Another advantage resulting from the use of PE pipelines is the possibility to vary pipe lengths, thus optimizing the necessary number of joints.

In addition new innovative pipe laying operations are available, such as the horizontal flush-boring method, the relining of existing old pipelines and the ploughing-in of long pipe lengths.

In central Europe PE pipe systems of low and medium pressure rates became well established in the local gas distribution.

Due to the possibility to use PE 100 and thus to increase the operating pressure to 10 bar an increased and cost-effective use of PE can be expected for extra-urban transport pipelines as well.

In this connection England plays a leading part where homogeneous PE transport pipelines are used up to d 630 mm.

The application of PE for water supply purposes differs from country to country and from region to region for manifold reasons.

But independent from the different countries even traditional cast iron users admit that the use of PE up to DN 200 is more economic than that of cast iron pipe systems.

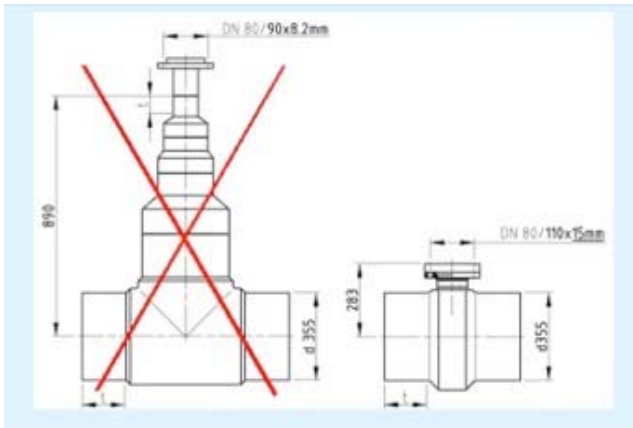
According to our experience this opinion is, however, outdated since a long time. Nowadays this limit is DN 600 or even larger—depending on the project. Different factors promote this trend towards the use of PE even for larger diameters.

Today special emphasis is given to cost saving.

A considerable reduction of cost can be achieved from the use of the Reinert-Ritz fittings program ensuring an increased safety at the same time.

1. T-PIECES

T-pieces are an essential component of pipelines. Injection moulded equal T-pieces are available in the market up to d 500 mm whereas reduced T-pieces are injection moulded only up to a diameter of 315 mm with branches limited to just a few sizes.

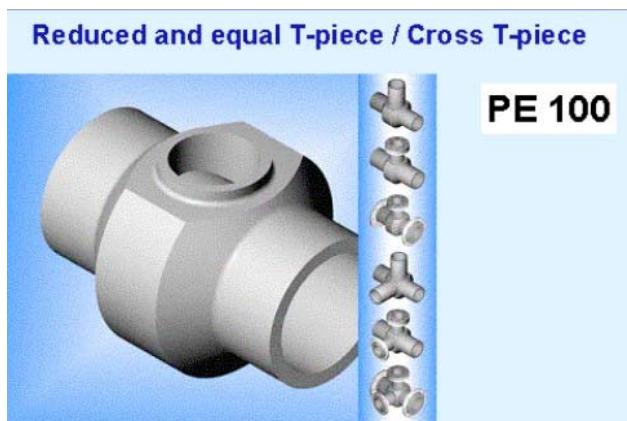


Picture 1: Comparison T-piece

Picture 1 (on the left) shows an example of the difficulty to use commercial T-pieces. In case that a hydrant has to be connected to such a T-piece, several reducers must be used to come down to the required size - a clear disadvantage.

On the right side the alternative shows the same situation with the standard fitting developed by Reinert-Ritz which is completed by a thick-walled welded special flange and which meets the same demands.

Advantages are evident: this version is more space saving, more stable, safer and lower in price. This T-piece allows thus a direct installation of the hydrant on top of the pipeline without creating problems in height and stability.



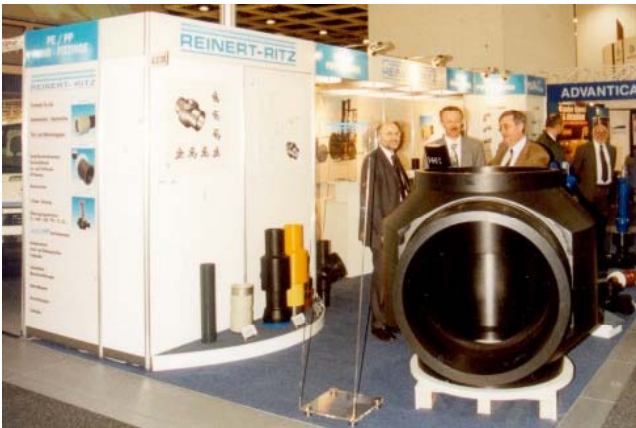
Picture 2: Different possibilities of T-pieces

The computer graph shows clearly the multitude of possibilities of this T-piece construction.

All versions are based on a solid basic body machined from a hollow bar and milled in the welding area. The user decides whether a piece of pipe, a flange connection or another fitting has to be welded in the factory. Apart from one branch scheduled for the standard piece, four branches or more with even different nominal widths may be provided.

This enables the use of PE even on unfavourable conditions of space or in case that more compact (smaller) manholes are used.

According to this principle cost-saving pipeline renovations and homogeneous PE pipelines even for larger sizes can be realized.



Picture 3: T-piece d 900 mm (for water supply up to 10 bar)

An example for water distribution applications is the use of PE T-pieces d 900 mm (picture 3) for the water supply project of VMW in Spiere – Helkijn.

Meanwhile this T-piece was successfully submitted to a hydrostatic strength test at BECETEL and released for manufacture and installation. Another example for pipeline construction applications, is Reinert-Ritz reinforced T-pieces for British Gas in London.

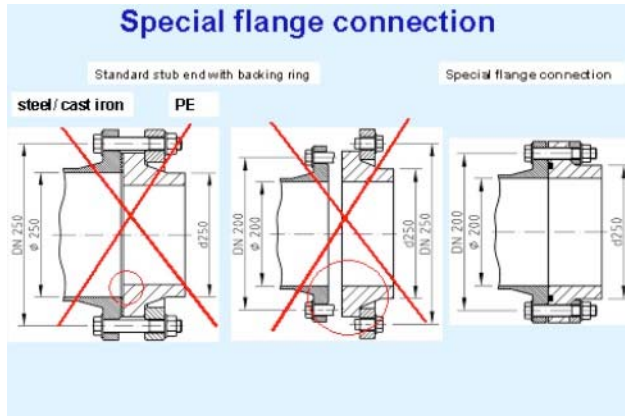


Picture 4: T-piece d 630 mm (British Gas)

2. FLANGES

2.1. Special flange connections

In PE pipelines for water supply systems flanged cast iron fittings, in the picture with dark hatching, are normally used.



Picture 5: Connection to cast iron valves

Installation of the standard flange connection will, however, result in a not welcome displacement of cross section (drawing on the left).

A reason therefore is the rather large wall thickness of PE pressure pipes and the standardization of plastic pipes according to the outside diameter and not to the nominal width.

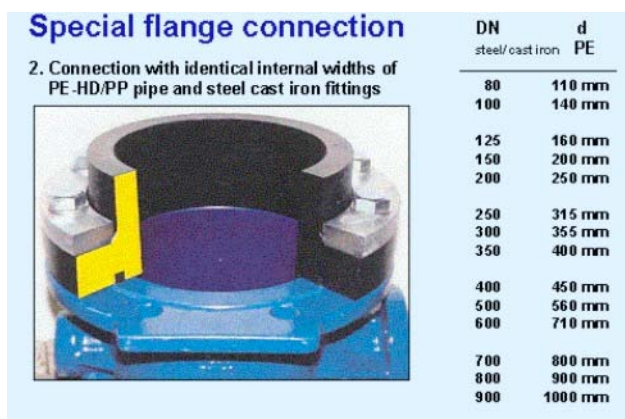
The clearly recognizable displacement resulting there from is often not detected in practice and gives rise to disturbances.

In order to avoid this loss in cross section the pipeline designer normally chooses the next smaller valve. On site at the latest it will, however, become evident that accessories cannot be installed as mating dimensions of the bolts are not identical. (Picture in the middle).

In order to be able to offer a solution for this problem, Reinert-Ritz developed the special flange connection (drawing on the right).

This is a fixed flange connection with integrated O-ring and cast iron or steel backing ring having the same mating dimensions as the existing pipeline or the valve to be connected. The advantage of this solution is the much higher stability and safety compared other alternatives and in addition cost-saving smaller valves can be used.

Higher safety is due to the short leverage between axial pipe force and force of the bolts.



Picture 6: Internal widths classification (Internal widths reduction/ costs saving)

This picture shows a special flange connection used for a cast iron fitting. For reasons of better explanation the cut surface of the PE body has been accentuated. The enclosed table shows the favourable nominal width classification.

The advantages of the reduction of nominal mating dimensions are obvious for people in practice.

2.2. HP Flanges



Picture 7: HP-flange (optimized application of force)

The standardized commercial plastic flange connection consists of a stub end and a backing ring (picture on the right). The relatively small contact face between stub end and backing ring is clearly visible. The free space between inside diameter of backing ring and outside diameter of pipe resulting from that small contact surface may – under pressure – react in a flexible way and in case of higher operating pressures and larger nominal widths may cause leakages.

The HP flange (high pressure) was developed in order to be able to offer a practicable connection for higher operating pressures and larger nominal widths.

It is a PE backing ring connection consisting of a special stub end and a ductile cast iron flange having a high-quality plastic coating.

The available contact face is fully used in order to transfer pipe forces in an optimum way. At the same time the outside diameter of the stub end is supported so that the critical area is surrounded by a circumferential chamber, thus avoiding yielding when pressure is applied.

This development ensures that flange connections for plastic pipeline constructions become safer and enables the realization of new applications up to 25 bar.

A durably safe connection is thus in the market offering all advantages of a backing ring connection and showing properties and stability of a fixed flange connection.