Root resistance now in technical regulations

The root resistance of pipe joints used to be considered as proven. This was on the assumption that roots can only grow into leaky pipe joints. This has changed on account of test results and has been taken into account on publication of the "Trees, underground pipelines and sewers" regulations. For the first time this described the **risk of penetration for tight pipe joints**: "Roots can grow not only into leaky pipes and pipe joints but also into tight pipe joints which do not offer sufficient resistance to the roots". In the revised edition of product standard EN 598, **testing for root resistance** is included in the form of a long-term test.

Test set-up for the TYTON® push-in joint

Ductile iron pipe systems with their push-in joints are **demonstrably diffusion-tight**, meaning that a supply of oxygen for the roots in the pipeline trench can be excluded. The contact pressures and contact surfaces of ductile iron pipe joints are greater than the average root pressures.

DATA + FACTS publications

- Stormwater management with ductile iron pipes
- Resource efficiency of ductile iron pipe systems
- Root resistance of ductile iron pipe joints
- Digitalisation of the water industry
- Trench shoring systems
- Ductile iron pipe systems: products and applications
- Standards, guidelines and technical rules

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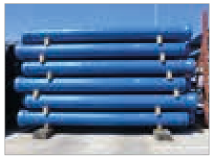
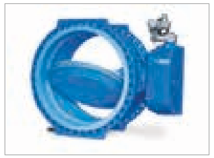
Targets and tasks of EADIPS FGR

Information, training and tutoring of specialists and students, promotion of ductile iron pipe systems in planning, installation and operation, standardisation of cast iron pipe systems, presentation of technical and commercial advantages

Products and applications





Ductile iron pipes, fittings and valves



Drinking water and wastewater pressure pipelines, sewers and drains, pipelines for extinguishing water, turbines, cooling water and snow-making equipment

EADIPS® FGR®
European Association for Ductile Iron Pipe Systems
Fachgemeinschaft Guss-Rohrsysteme

Root resistance of ductile iron pipe joints

Root penetration into wastewater pipelines as a cause of damage · Density model and oxygen model for root growth
Interactions between pipe joint and root

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Root resistance of ductile iron pipe joints

Root penetration into wastewater pipelines is a frequent cause of damage. The aim of research projects has been to find the causes of root penetration scientifically and describe the mechanisms involved when roots penetrate pipe systems. During excavations it has been established that roots penetrate push-in joints which have been assessed as being root resistant on the basis of water-tightness testing. **Therefore watertight pipes are not necessarily root resistant.** This has also been shown by the examination of various push-in joints of nominal size DN 150.

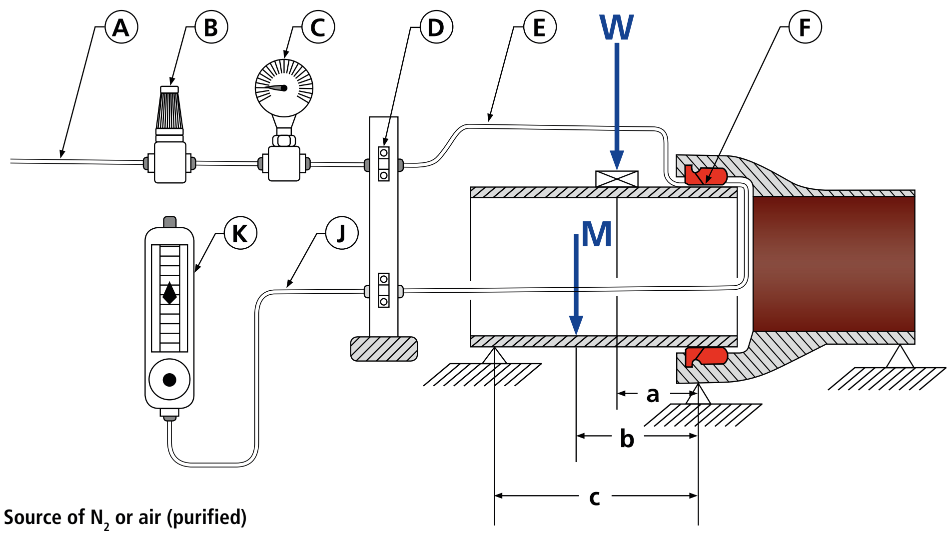
Based on the results of excavations it has also been possible to develop growth models such as the **tightness model and the oxygen model**.

The tightness model

In contrast to natural soil, the area surrounding pipelines often has a lower compaction and larger pore space. These factors influence the **direction of growth of the roots**. Also, the annular gap before the sealing element of a pipe joint can be an area which is easily opened up by roots if a supply of oxygen is available. Before roots can grow into a pipeline they must overcome the contact pressure of the seal.

The oxygen model

A lack of oxygen in sealed soil has an influence on the way that roots spread. Therefore, roots often only colonise the upper areas of the soil. Sewers are usually operated as gravity pipelines and are sufficiently ventilated by maintenance shafts. The pipeline is filled with air and, because of the gas permeability of pipes and pipe joints, oxygen can get into the soil.



A Source of N_2 or air (purified)
B Pressure regulator
C Manometer
D Joint
E PTFE tube
F Position of the PTFE tube in the joint
J Connection tube
K Flowmeter
M Total pipe weight
W Shear load to EN 598 [10], 7.2.2

Modified test for determining long-term tightness

According to the oxygen model, **roots grow towards the source of oxygen** and are therefore also found in deep pipeline trenches. This stimulus does not exist with ductile iron pipes as they are demonstrably **diffusion-tight**.

Evidence of root resistance

On the basis of this knowledge, the root resistance of diffusion-tight pipe systems with push-in joints can be proved by means of a modified test to determine the long-term tightness properties of elastomer seals by estimating the sealing pressure. Root resistance is considered to have been proven if the contact pressure of the elastomer gasket in the socket is greater than the average pressure of the root tip and also the width of the sealing surface can be assumed to be large enough to cut the root tip off from the oxygen supply in the pore space of the soil. The contact pressures determined for a TYTON® push-in joint were up to 22.2 bar without shearing load and up to 17.5 bar with shearing load. TYTON® push-in joints can be classified as root resistant.

You can find comprehensive information on the subject as well as on products and applications in our specialist articles at eadips.org