

# WATER DAMAGE IN BUILDINGS CAUSED BY LEAKING PIPES

Allianz Center for Technology (AZT)

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**Water damage in buildings is often caused by small leaks in water pipes. Often pinholes are responsible for high cost secondary damages to buildings and equipment. If it happens the long delivery times of replacement system components may result in substantial costs caused by delays during construction and business interruption.**



Typical water pipe arrangement in buildings

## DAMAGE IN PIPE SYSTEMS

The cause of leakage is often due to corrosion processes, which are influenced by the media and the ambient conditions.

Damage can also be caused by a faulty installation and the selection of unsuitable pipe materials.

## EXAMPLES OF DIFFERENT CAUSES OF DAMAGE

### STRESS CORROSION CRACKING (SCC)

SCC occurs if the following three conditions are present at the same time:

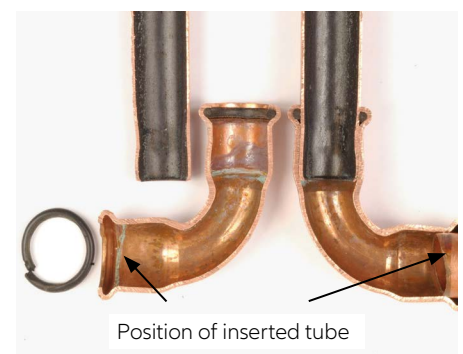
- SCC susceptible material
- tensile stress
- corrosion triggering medium

In this case a thread of a brass angle valve has broken due to high material hardness (high residual stress)



### FAULTY INSTALLATION

Because the required minimum insertion has not been provided in a press fitting (push-fit) connection, the pipe was only inserted at the very end, which caused a conical deformation. The desired constriction of the tube and thus a form fitting (and water tight) connection has not been achieved. Subsequently, the joint could declamp during operation and caused water damage.



## YOUR BENEFITS

- ✓ Independent evaluation of damage (corrosion) mechanism by AZT laboratory investigation (design, manufacturing, operation)
- ✓ Independent analysis of root cause
- ✓ Specific recommendations on material application and failure prevention

## MIX UP OF MATERIAL

In a piping system made of stainless steel a reducer of carbon steel was incorrectly installed. This material is not suitable for use in an oxygen-containing drinking water system. In combination with high-alloyed materials such as stainless steel there is also the risk of contact corrosion.

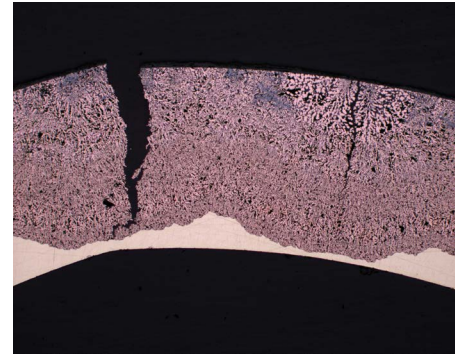
As a result, there was a locally increased corrosion potential and subsequent breakthrough on the reducer leading to water loss and damage.



## SELECTIVE CORROSION (DEZINCIFICATION)

A water meter was broken due to a fracture of the brass riser-pipe in operation. The riser was selectively corroded (dezincified). Probably a hydraulic shock has led to the final rupture of the weakened material causing a high volume water leak.

In this type of damage mechanism the zinc component is dissolved and a porous sponge copper with low strength remains.



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The Allianz Center for Technology (AZT) can investigate defective pipes, fittings and valves concerning the cause of loss. Scanning electron microscopy (SEM) as well as metallurgical and chemical analytical test methods are available in order to identify the root cause.



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