

# BAUM

# TF-Evolution

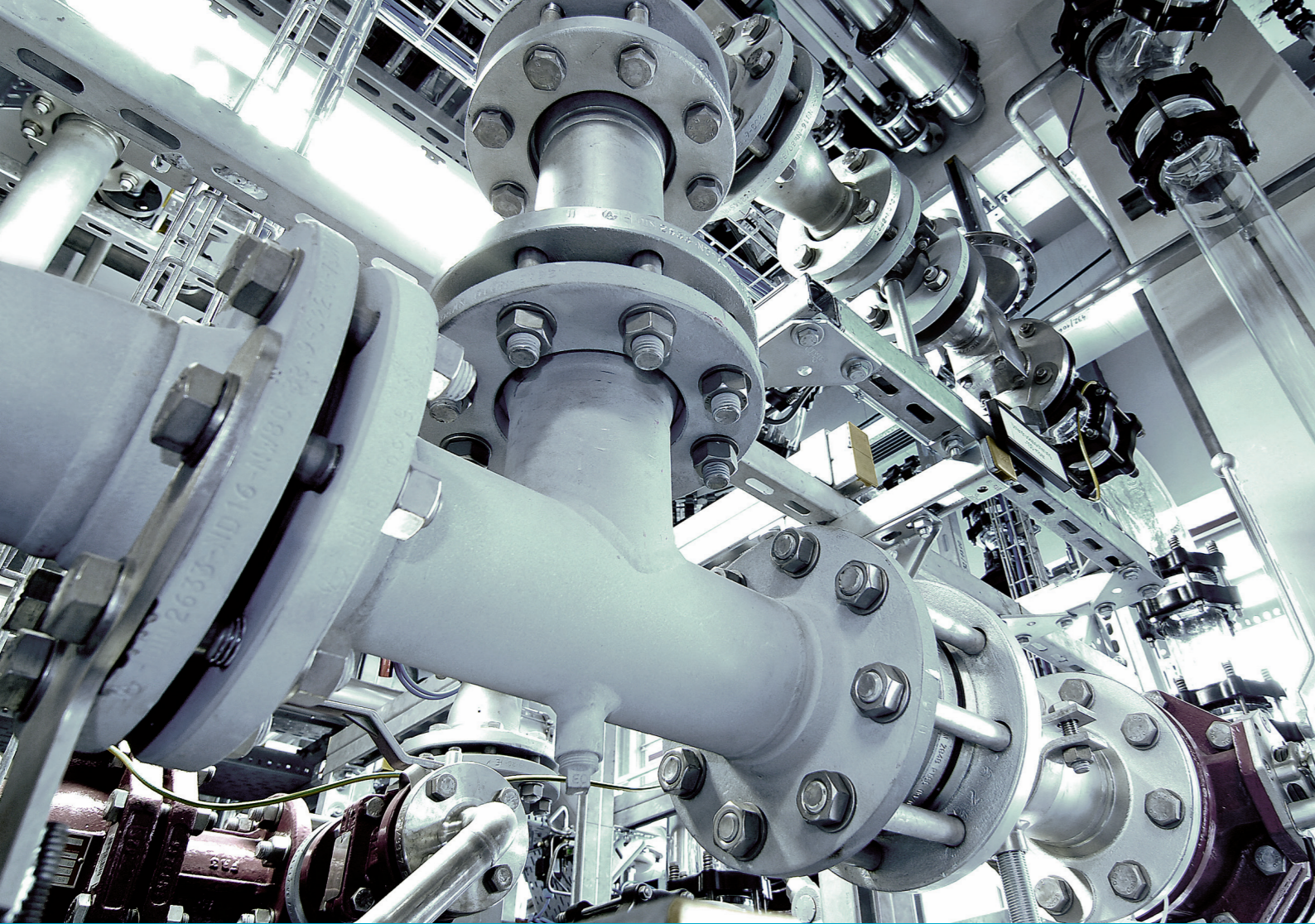
Innovative linings for least possible permeation  
and extended longevity



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## What does permeation mean?

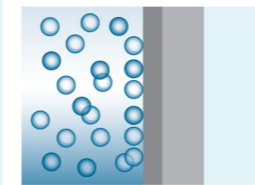
Permeation is a process in which a substance penetrates a solid on a molecular basis. This permeation process is induced by a pressure or concentration gradient in the individual body. Without the effect of external influences,

the substance always moves in the direction of lower concentration or lower pressure.

Permeation takes place in several stages:

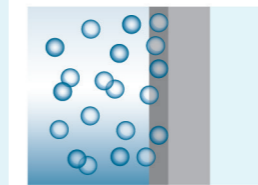
### 1. Adsorption

The substance accumulates on the surface. This can occur from the gaseous phase or in direct contact with the liquid or solid material.



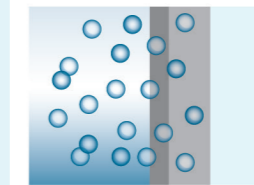
### 2. Absorption

The substance is absorbed.



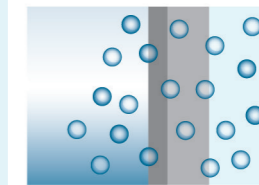
### 3. Diffusion

At this stage, the penetration of the material on a molecular level begins. The substance penetrates the solid through pores or molecular spaces.



### 4. Desorption

After the molecules have penetrated the solid, they diffuse away from the surface.



## High operational reliability for your systems

Linings made of fluoropolymer involve the risk of permeation, i.e. the penetration of the lining by the medium. In the field of piping, the medium as well as the working conditions are of decisive importance for the intensity of the permeation effect. A standard PTFE lining is suitable for many media and designed for a lifetime durability. However, certain media such as chlorine compounds have properties that may result in permeation. They penetrate the lining material and impair its mechanical properties. As a result, for example corrosion effects may occur which could endanger the operational safety of the pipeline.

### BAUM TF-Evolution for highest permeation density

BAUM TF-Evolution was developed in the laboratory and during long-term tests together with our customers under real working conditions. The BAUM TF-Evolution lining significantly reduces permeation when exposed to critical media. The permeation resistance of customized products can be tailored to the respective working conditions of the customer. In this way, individual requirements are met flexibly and reliably.

#### TF-Evolution reduces

- a discolouration of the lining.
- blistering of the lining.
- corrosion effects of the pipeline.

#### TF-Evolution increases

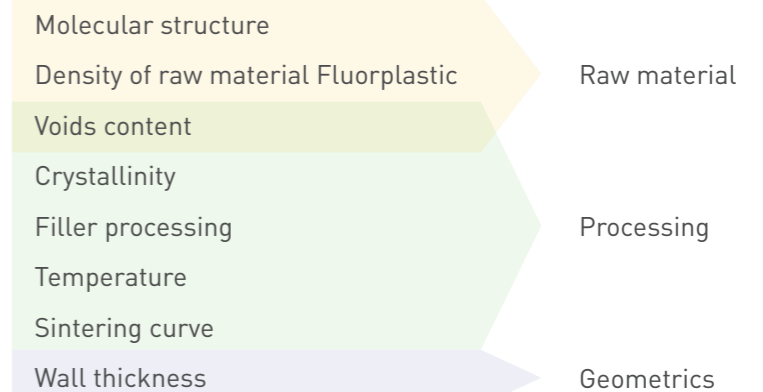
- the permeation density for the protection of the steel material.
- the operational safety of the pipeline.

## Our solution for reducing permeation

The permeation density is mainly dependent on the properties of the lining. The raw material used as well as the manufacturing processes are the decisive criteria in the development of permeation-reducing linings (see fig.). BAUM TF-Evolution is made from modified PTFE and by means of specially adapted processing methods.

With TF-Evolution, BAUM has succeeded in responding individually to the key factors and thus implementing special customer requirements.

#### Factors that can influence permeation







# Long-term tests for the safety of your installations

Long-term tests in the laboratory and with users under real conditions show the following: Compared to the lining with standard PTFE, the lining with

BAUM TF-Evolution has a considerably extended longevity when used with highly permeative media and under different working conditions.

## BAUM TF-Evolution – maximum reliability due to extended longevity

### BAUM TF-Evolution is the result of intensive research and development

By using modified fluoroplastics with a denser microstructure as well as specially adapted processing techniques, linings have been developed which, due to their lower permeability, offer a significantly longer durability when exposed to critical media and operating

conditions. Long-term tests in the laboratory as well as under real working conditions at various customers prove the considerably stronger permeation properties of BAUM TF-Evolution in comparison to standard materials.

**BAUM TF-Evolution:**  
High permeation density for maximum durability.



### Test results for HCl applications after 18 months of use

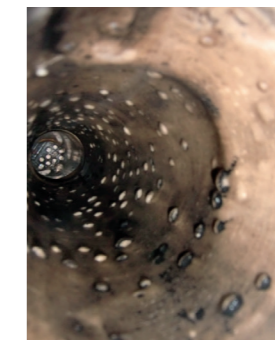
Test „HCl – P>3 bar - t ~ 160-180°C“

Standard PTFE (under normal operating conditions) Medium with low tendency to permeation



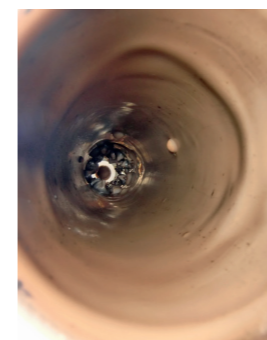
The lining has slightly discoloured, but no blisters occur. The steel material was not affected.

Standard PTFE Medium HCl



The standard quality darkens under critical media and conditions and a large number of blisters occur throughout. The steel has already been affected on the inside.

BAUM TF-Evolution, paste-extruded quality Medium HCl



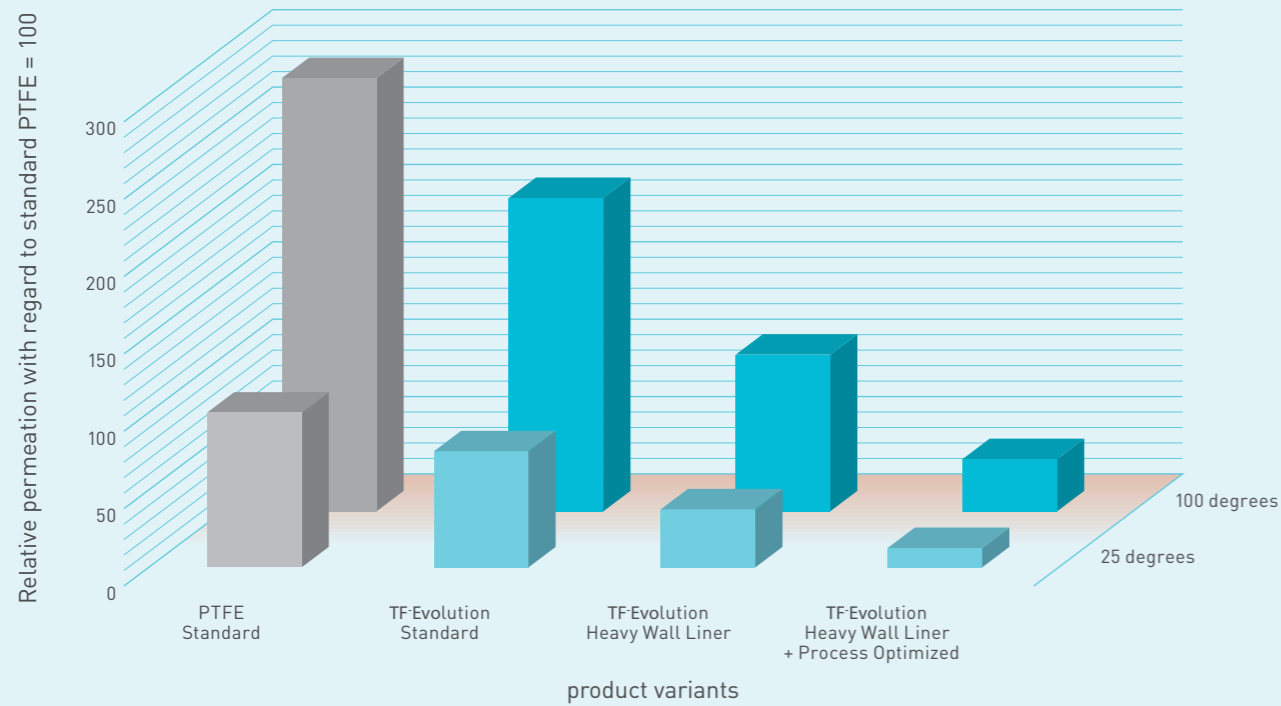
The lining has slightly discoloured, only very few blisters occur. The steel is not affected.

BAUM TF-Evolution, injection moulding process Medium HCl



The lining has slightly discoloured, no blisters occur. The steel is not affected.

Possible ways to reduce permeation through material selection, liner dimension and optimizations of the Baum product range



# BAUM TF-Evolution – tailor-made solutions for your demand

## Our customers' individual applications require specific lining qualities

Depending on material selection, liner dimensioning and processing, we implement the most appropriate solution for your requirements – for an extended longevity.

BAUM TF-Evolution (BAUM TF-Evo) can be used for the complete BAUM product

range in the piping sector. Just get in touch with us!

### Always state-of-the-art

New and changing media require a constant adaptation of the various control variables, such as raw materials and their processing.

We will continue to develop for you in the future.

### Advantages of TF-Evo

- Higher permeation density
- Increased operational safety
- Extended longevity of the pipelines
- Lower investment costs compared to special metal alloys or glass pipelines

## About us

For more than three decades our customers have relied on the expertise of BAUM in the field of fluoroplastics

A vertical range of manufacture of more than 90% and the company's own steel construction form the basis of individual solutions. Our products and manufacturing methods are continuously developed and optimized in our own laboratory. Field tests, also together with our customers, material testing in our own and external laboratories as well as all relevant certifications make us a reliable partner for your projects.

An overall concept you can trust in. As a customer, you and your individual requirements are always in the focus of our actions. From the initial contact, service and customer care are our central values. At Baum you get everything from one single source – from an individual part to a complete piping system.

This allows us to respond to your specific concerns flexibly and in the short term and to allow full bent to our creativity when it comes to special solutions. Our international sales and service network guarantees that, even abroad, you will receive your product without delay.

### What exactly does that mean for you?

Right from the beginning of a project, you have a personal contact on site, a person who understands your specific requirements and converts them into tailor-made solutions.

**BAUM provides professional service at more than 30 locations around the globe.**

In addition to our headquarters in Birkenfeld and our branches in America, Shanghai and Romania, more than 25 distributors worldwide are at your disposal providing you with their expertise and many years of experience.



Our headquarters in Birkenfeld