



## FLUOROPOLYMER COATINGS

Premium coatings and  
premium linings for all  
industrial fields

**Rudolf Gutbrod GmbH**

## COATING TECHNOLOGY FOR THE HIGHEST REQUIREMENTS

Perfect results for surface protection do not just happen by chance. Since it was established in 1964, Rudolf Gutbrod GmbH has worked successfully on continuous improvements as well as on the advancement of innovative solutions for coating technology. The Rudolf Gutbrod GmbH belongs to the leading fluoropolymer coaters in Europe.



## WE WELCOME CHALLENGES



Apart from many other factors, the success of Rudolf Gutbrod GmbH is based on the following fundamentals: On the one hand, every object to be coated starting from the smallest to the largest part is processed separately and individually – no mass production but certainly serial production. In this way, the most difficult jobs can be solved problem-free and highest requirements can be satisfied. On the other hand, Gutbrod as a private company places particular emphasis on closeness to the customer and consultation – communication, mutual understanding, and finding the best solutions together.

The highest requirements with regard to quality, reliability and safety as well as the unlimited competence and experience of Gutbrod in this special field of fluoropolymer coating have set new standards in the market time again and again and strengthened the top position of the company. The Rudolf Gutbrod GmbH cooperates from the beginning with well-known national and international raw material suppliers.



Constant dialogue with customers provides a view of their various needs and enables personal consultation, which at Gutbrod is marked by knowledge, competence, experience and interested open-mindedness. In this way, exact problem solutions which match the objective and perfect results are produced right from the beginning. Comprehensive support during order processing as well as reliable service to follow mean: At Gutbrod the customer and their requirements are the centre of focus.



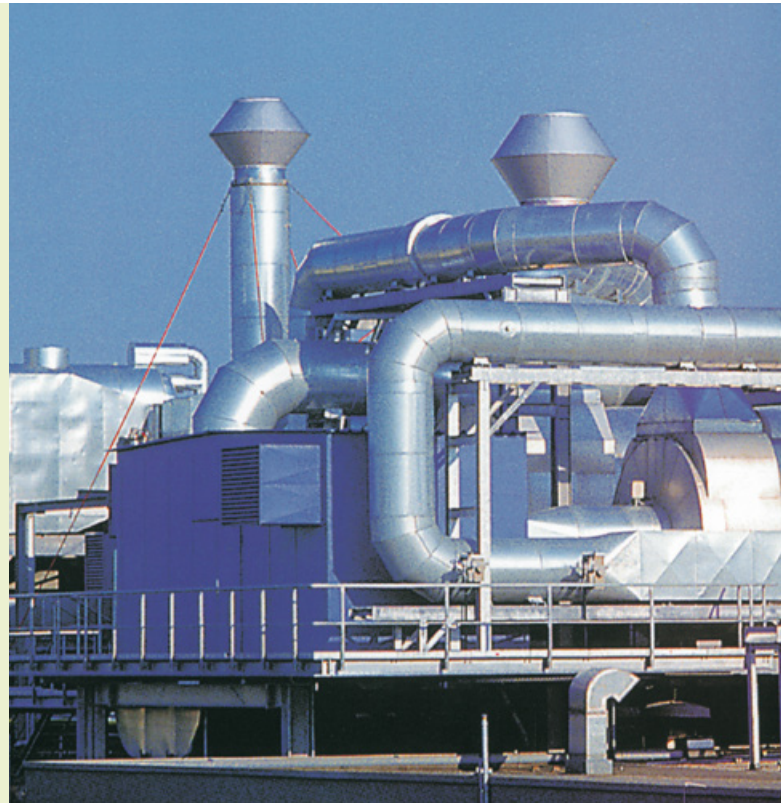
Rudolf Gutbrod GmbH – everything that characterizes a Swabian family business: Interested open-mindedness, extensive knowledge and abilities, readiness to innovate, motivation and determination to achieve, as well as a fair and respectful way of treating customers and employees.

## SATISFIED CUSTOMERS WHO TRUST IN GUTBROD

AllessaChemie	Borealis	Ineos	Robert Bosch GmbH
BASF Ludwigshafen	Cabot	Infineon	Sachtleben Chemie
BASF PharmaChemikalien	Clariant	Jungbunzlauer	Saltigo
BASF Rudolstadt	Dow Rheinmünster	KataLeuna	Sandoz
BASF Schwarzheide	DSM	Kemira	Sanofi
Bayer CropScience	Dynamit Nobel	Krohne	Siltronic
Bayer HealthCare	DyStar	Lanxess	Tectrion
Bayer MaterialScience	Endress + Hauser	Lenzing AG	Uhde
Bayer Schering	Evonik	Merck	Vinnolit
Bayer Technology Services	Fluorchemie Dohna	Momentive	Wacker Chemie
Biochemie	Haldor Topsoe	OMV	
Boehringer	Hoffmann-La Roche	PCK	

### FOR EVERY INDUSTRY THE RIGHT SOLUTION

- Pharmaceutical and chemical industry
- Semiconductor technology
- Medical engineering
- Automobile industry
- Foodstuff industry
- Textile industry
- Paper industry
- Paint industry
- Materials handling and process engineering
- Film processing
- Plant and mechanical engineering and more besides



### COMPLETE AND CERTIFIED



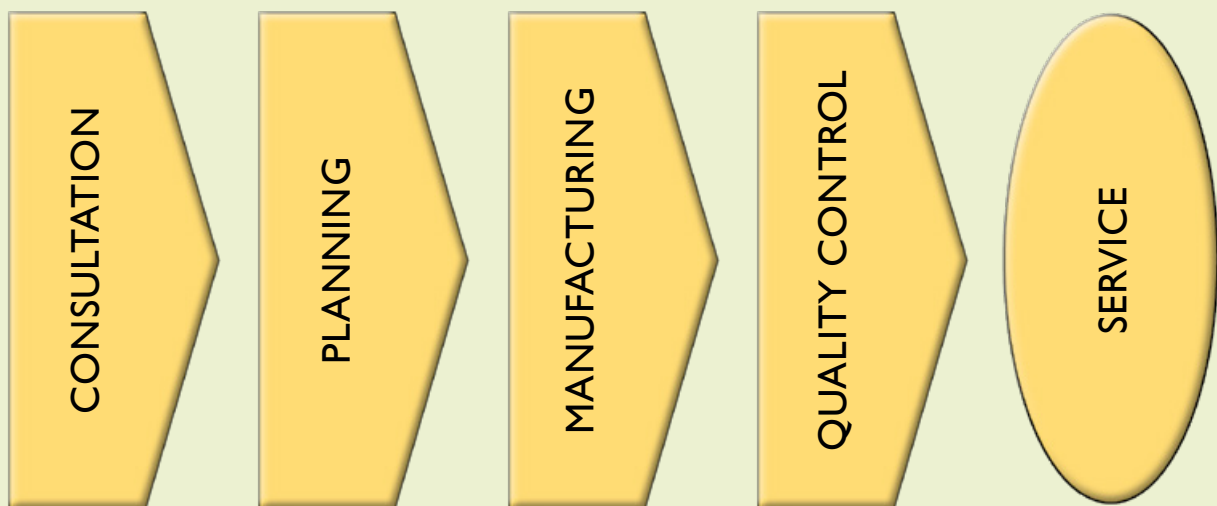
Already speak to us in your planning phase. We shall also be pleased to provide complete solutions and to take on the responsibility for your steel structure besides all the preliminaries in our headquarters, as well as in co-operation with our competent and certified partners.

Thanks to our own jig manufacture (object mounting possible with ChemResist up to 3500 kg, depending on the kind of coating weights up to ~7 tonnes can be processed, heavier parts on demand), the most modern equipping of our production resources and installations (altogether 23 stoving

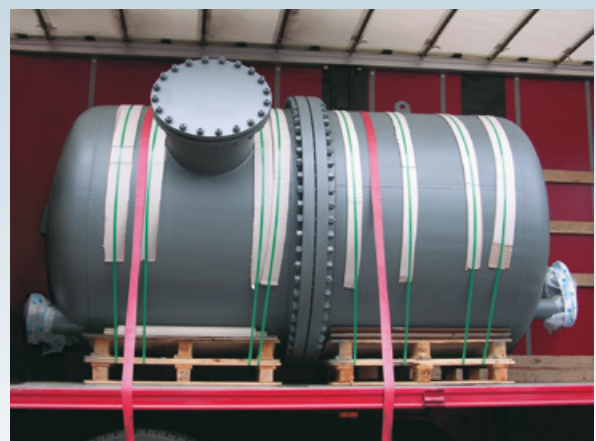
# COMPETENT IN ALL FIELDS

In order to stay competitive in today's world we offer our customers not only perfect solutions for linings and coatings, but also holistic concepts. From personal consultation to specific planning and the most modern production with pretreatment and delivery on time, you will receive everything from Gutbrod from a single supplier – competent, reliable and in the best quality. Subsequent service completes the extensive Gutbrod programme.

Rudolf Gutbrod GmbH solves everyday, standardised orders just as conscientiously as specialized, individual problems with the highest level of difficulty.



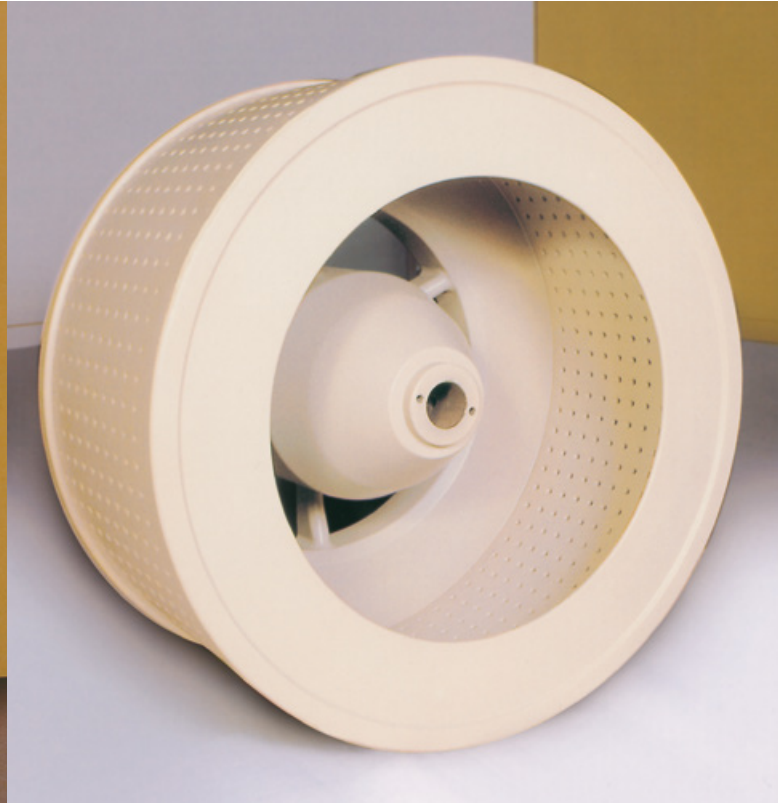
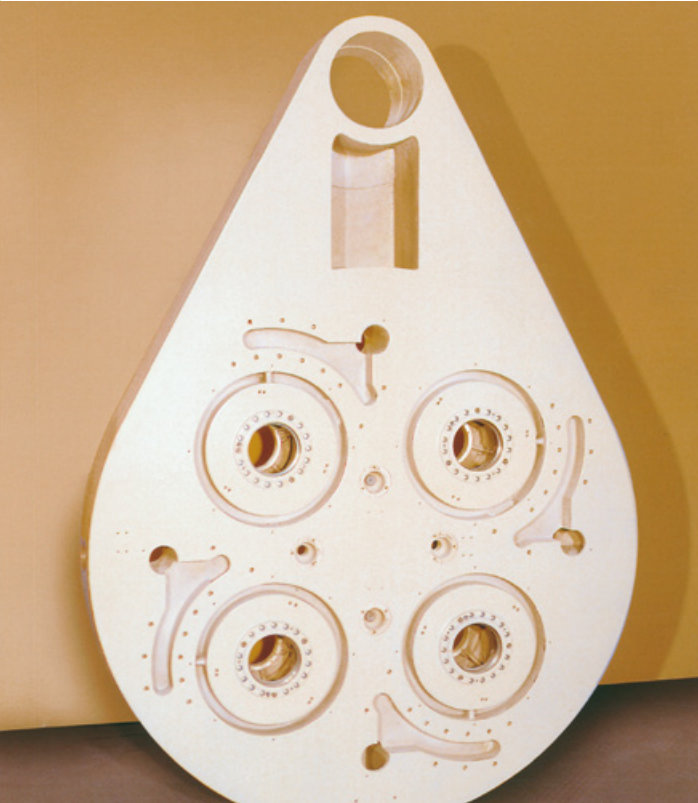
ovens with the maximum application sizes  $7 \times 5 \times 5$  m and  $9 \times 2.5 \times 2.5$  m, as well as three sandblasting halls, two with aluminium oxide, one for glass beads and/or ceramics), we manufacture using state-of-the-art technology. Our quality-management is certified in accordance to DIN EN ISO 9001:2015. Gutbrod will continue to pursue high investments in new capital equipment in the future.



## HIGHEST LEVEL OF PERFECTION LAYER FOR LAYER

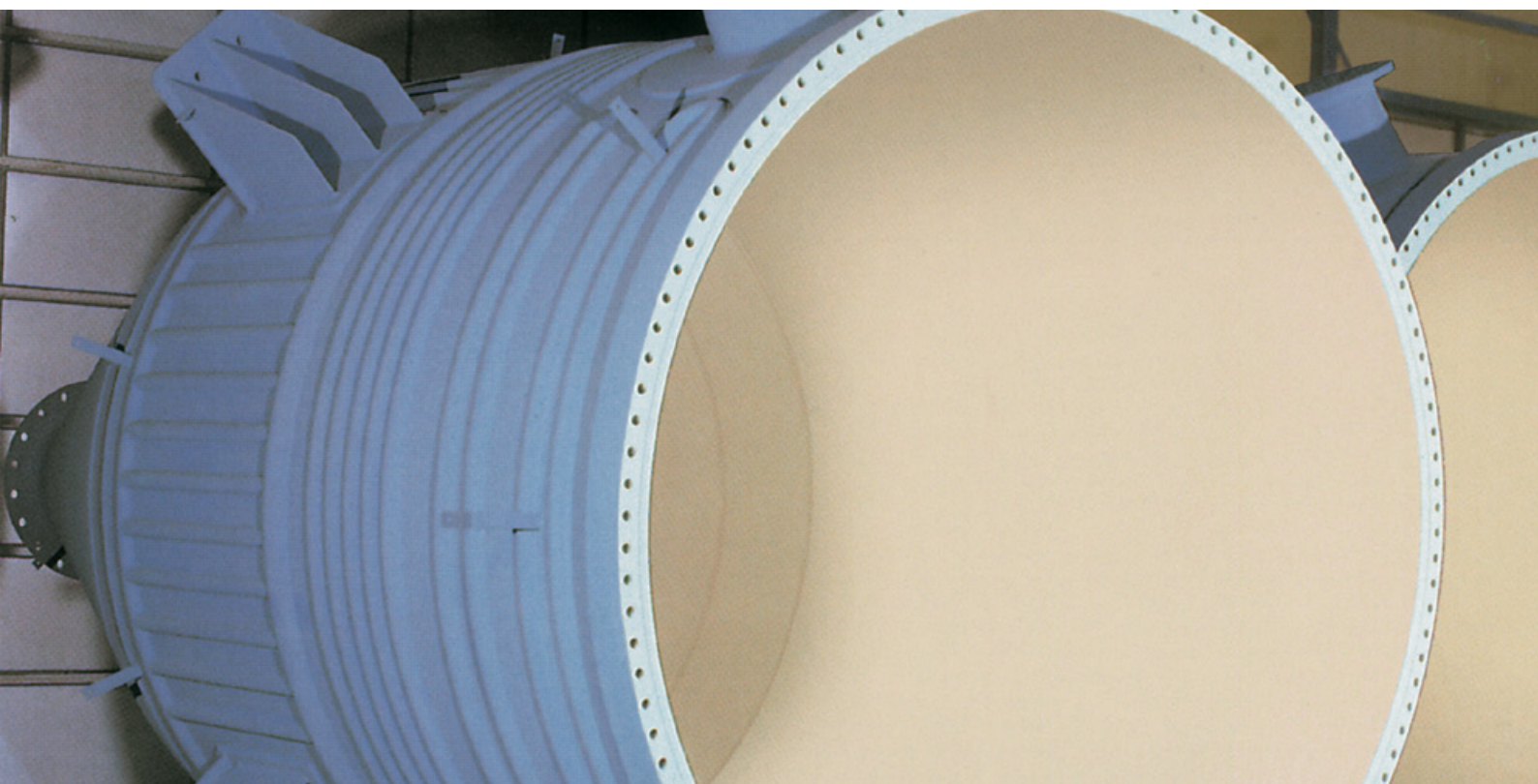
Modern industry nowadays needs the highest degree of operating reliability for its technical equipment. For this reason, apparatus, pipes and containers have to be equipped with a non-corrosive finish.

EDLON™ PFA from Gutbrod stands for a high-quality coating system consisting of two components: the material as well as the application process.



The high chemical and temperature resistance of the material makes the system universally applicable. High-performance material, the special application process as well as the high quality of workmanship together result in a smooth protective surface and thus the highest degree of long-term operating reliability. The lamination of the substrate and EDLON™ PFA is of greatest importance in this respect.

In practice, the first-class coating know-how of the Rudolf Gutbrod GmbH thus enables application over the entire temperature range of application – even, for example, with fast rotating centrifuges, as well as under vacuum conditions – to give some interesting prospects.



## SEAMLESS PROTECTION AGAINST CORROSION

EDLON™ PFA is used everywhere where high requirements are placed on corrosion protection.

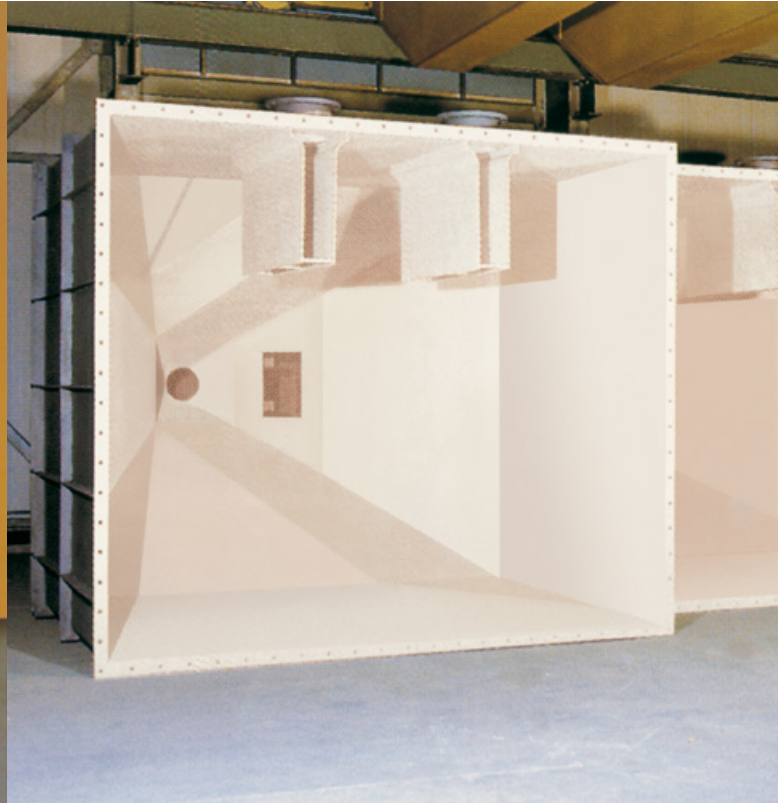
Challenging solutions for ensuring operational reliability as well as for technical equipment are required particularly in modern industry. Apparatus, pipes and containers have to be equipped with a non-corrosive finish.

This factor is particularly important, among other things, in the areas:

- Chemical and pharmaceutical industry
- Semiconductor technology
- Machine and apparatus engineering
- Emission protection

## RESISTANCE UNDER HIGH LOADS

PFA as a fully fluorinated polymer is the most resistant material after platinum and thermally stable up to 260° C. The system can be used during the operational demands of a process up to peak loads of 150° C and thereby offers safety reserves for short operational breakdowns. Practical tests are recommended before a large-scale use, particularly at high temperatures and with combinations of media.



## MULTI-FUNCTIONAL FOR MANY APPLICATIONS



The outstanding advantages of the EDLON™ PFA system are extremely various and of considerable use for the customer:

- Achievement of high layer thicknesses (up to 1.5 mm, depending on the component size and design)
- PFA as a full fluorinated polymer is the most resistant material after platinum
- Thermally stable up to 260° C
- Also available as an electrically conductive version

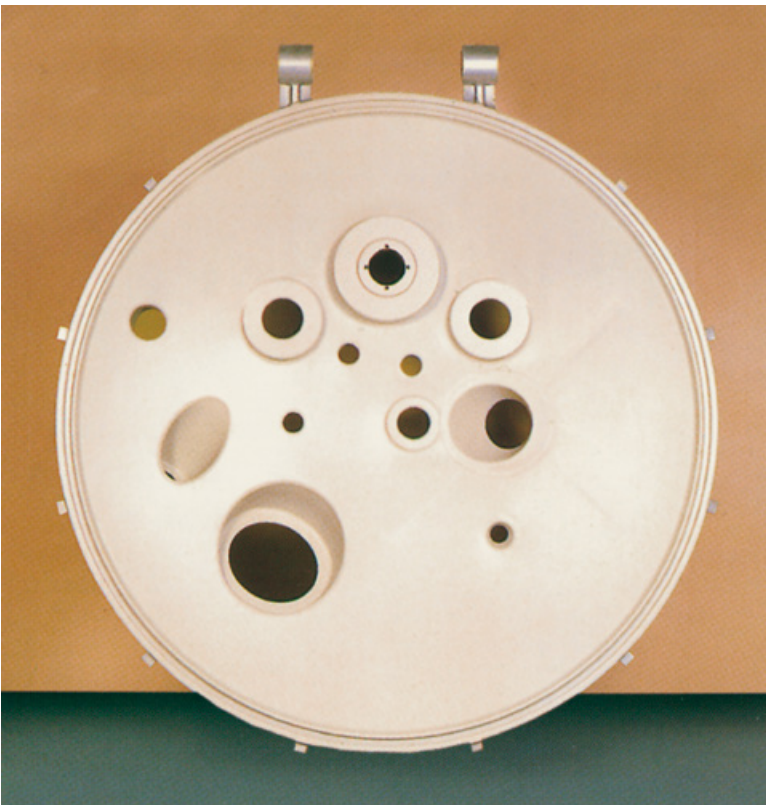


This is where Gutbrod brings in its applications know-how. Our extensive experience as well as the large number of available positive operating results serves us as a basis for assessing individual application cases.

Complex testing under operating conditions and quality controls at Rudolf Gutbrod GmbH provide the highest level of safety. Thus, for example, the non-porous nature of the coating is guaranteed by checking the pore density of the finished final layer after completion of the layer structure.

Perfect surface protection with EDLON™ PFA starts at Gutbrod with optimal preparation:

- Observance of the construction guidelines according to DIN EN 14879-1
- Pre-treatment: Thermal degreasing, (removal of oily and greasy residues), preparation of the adhesive layer by blasting with highly pure aluminum oxide
- Use of altogether 23 oven plants for sintering procedures. Maximum application sizes: 7 × 5 × 5 m and 9 × 2.5 × 2.5 m



- FDA conform
- Certified according to the Technical Directive on Air Quality Control
- Applicable up to 150° C at peak loads during operation of a process including safety reserves (depending upon the chemical exposure)
- New and interesting perspectives result under vacuum conditions
- Smooth protective layer prevents potential emissions

- EDLON™ PFA coatings are repairable under certain conditions and can be repaired on site. Long downtimes or complex return transport are thus avoidable
- Optimal surface protection with EDLON™ PFA means the highest quality with the greatest multifunctionality and economy

PFA is known as a fluoropolymer plastic that is resistant to aggressive organic and inorganic chemicals and solvents over a wide temperature range.

For all applications where common non-stick-coatings due to strong wear and chemical attacks will be destroyed, use our newly developed extraordinary **Abrasion-Resistant PFA**-coating system.

## ABRASION-RESISTANT PFA

For the first time we have created a coating-system with optimum triple effect (abrasion-resistant, chemical-resistant, classical non-stick-properties) up to a layer thickness of  $\sim 0.7$  mm – which has extraordinary advantages compared with common coating and lining systems.



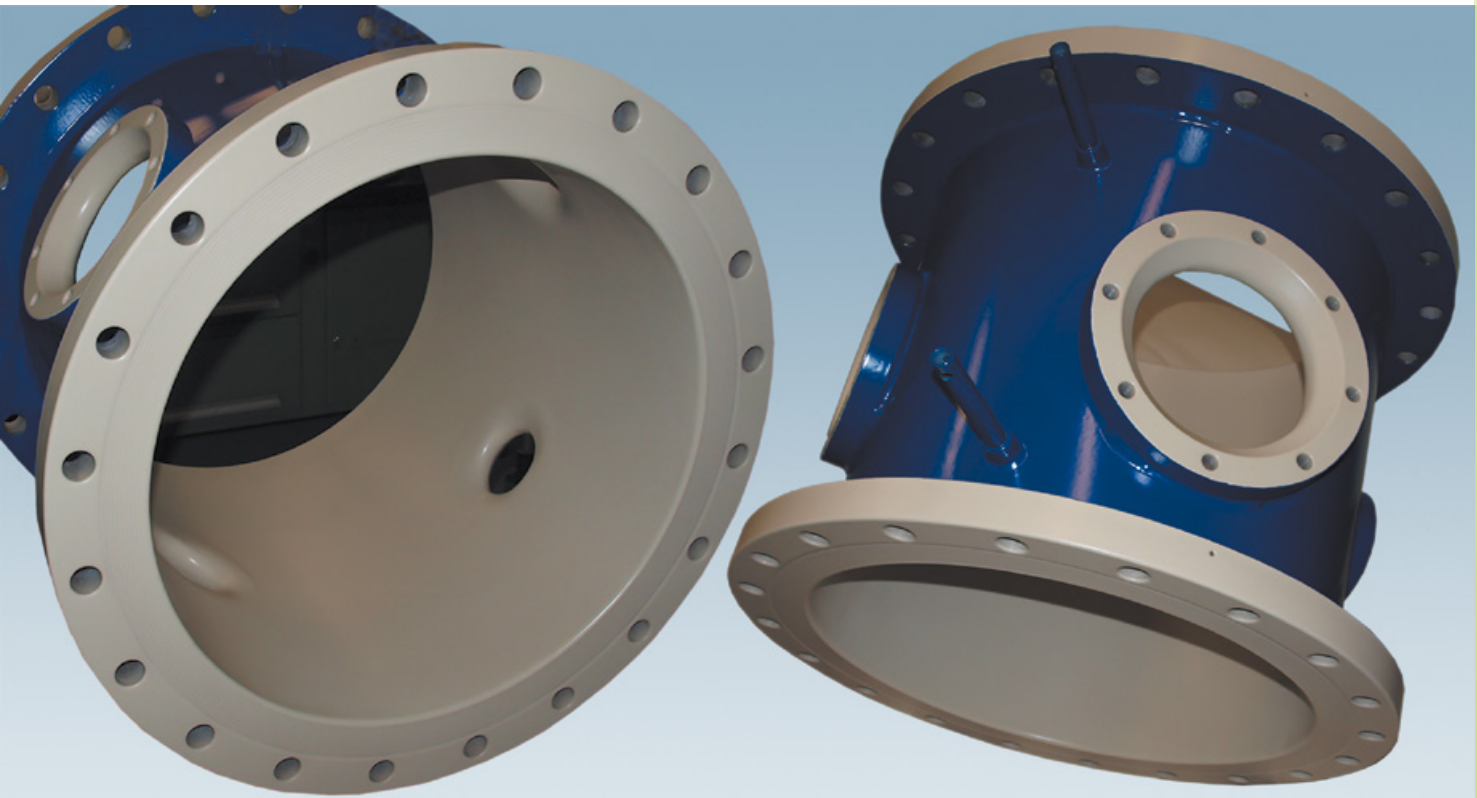
### Now still more benefits

- Abrasion-resistant
- Excellent non-stick-properties, easy to clean
- Excellent universal chemical resistance at high temperatures
- Resistance against almost all organic and inorganic chemicals
- Locally repairable
- Solvent-resistant
- Non flammable
- Cold resistant
- Very best permeation properties
- Suitable for vacuum
- Available from  $\sim 50$   $\mu\text{m}$  up to  $\sim 0.7$  mm
- Firm bond to substrate
- Seamless, homogenous coating
- FDA- and EU-compliant

# CHEMICAL PROTECTION AT HIGHEST LEVEL, WITH VERY BEST PERMEATION PROPERTIES

The material for this Fluoropolymer-coating, which will be applied with a specific method, is highly resistant against chemicals and acids, and has extraordinarily advantages, compared with common coating and lining systems:

- Seamless lining for almost all designs
- No welded joints
- Excellent bonding to substrate
- Compared with usual PFA outstanding features in permeation by using filler
- Layer thickness from ~200 µm up to ~1.5 mm

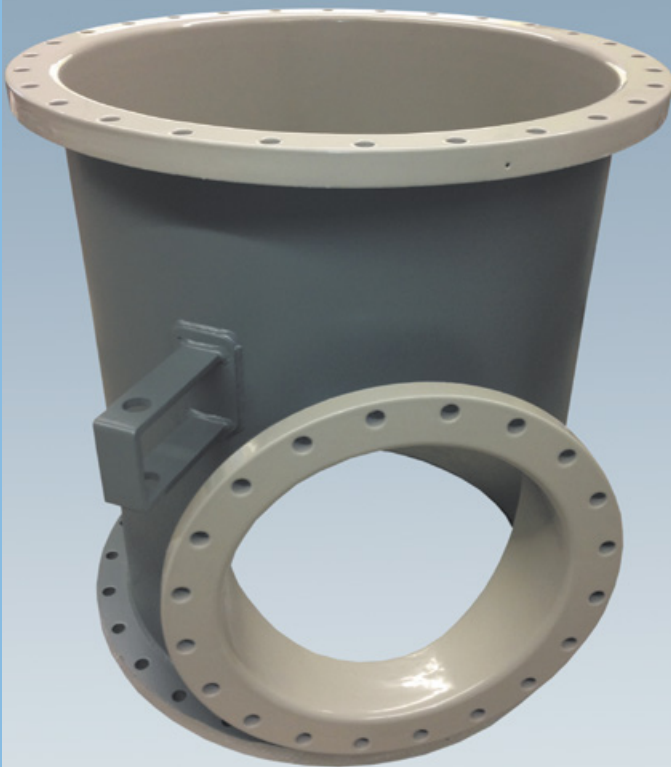


## Features of the coating

- Exceptional, universal chemical resistance at high temperatures
- Excellent when proven under clean room conditions
- Also available in the electrically conductive version
- Locally repairable
- Solvent-resistant
- Easy to clean, excellent non-stick properties
- Non flammable
- Cold resistant
- Best permeation properties
- Suitable for vacuum
- FDA- and EU-compliant

## CHEMICAL PROTECTION AT HIGHEST LEVEL, WITH VERY BEST PERMEATION PROPERTIES

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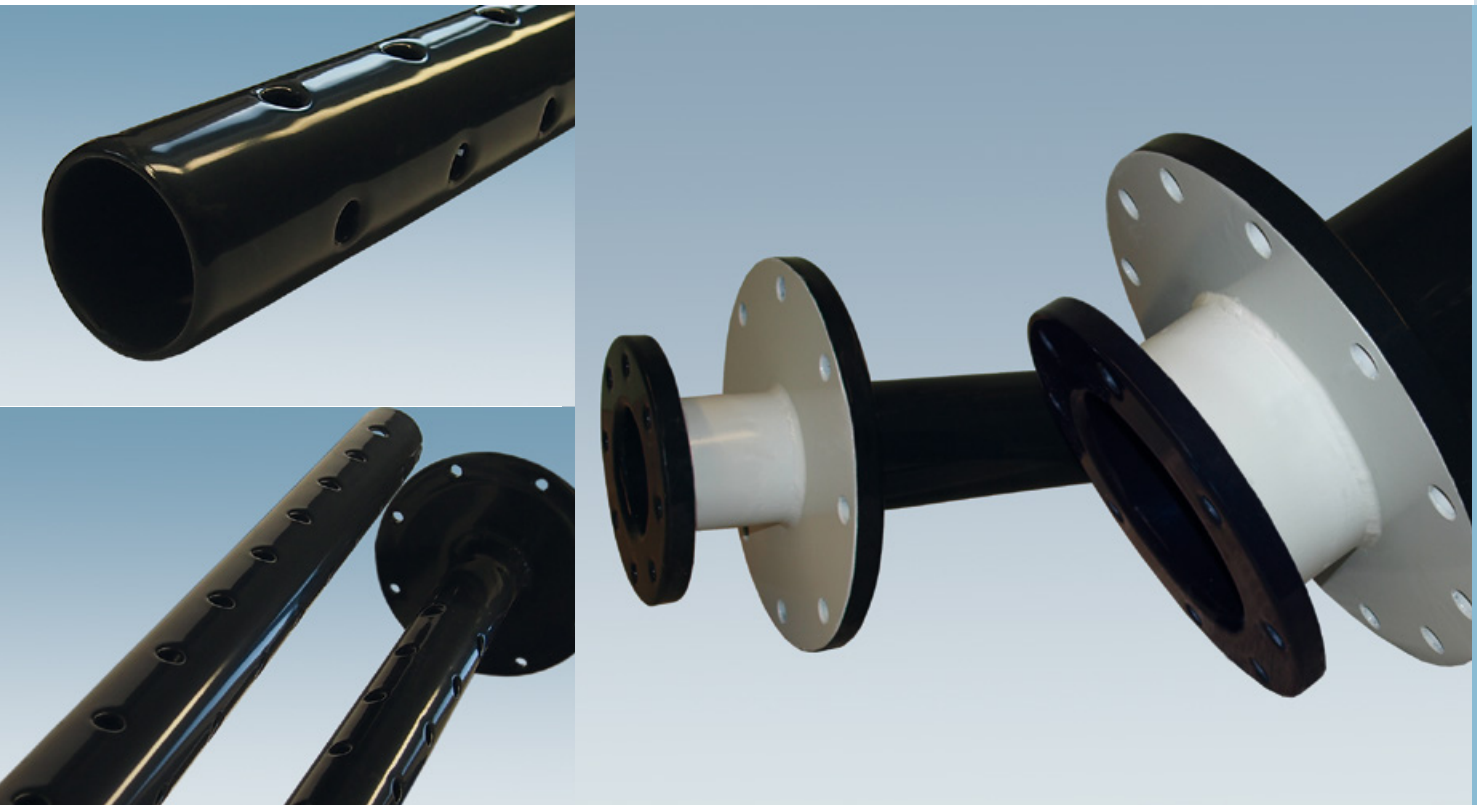


- Seamless lining for almost all designs
- No welded joints
- Excellent bonding to substrate
- Compared with usual ETFE outstanding features in permeation by using filler.
- Layer thickness from ~200 µm up to 2 mm
- Comparable in many ways to our PFA ultra<sup>+</sup> – however the more economically favourable solution.
- Exceptional, universal chemical resistance at high temperatures
- Excellent when proven under clean room conditions
- Also available in the electrical conductive version
- Locally repairable
- Solvent-resistant
- Easy to clean, excellent non-stick properties
- Non flammable
- Cold resistant
- Best permeation properties
- Suitable for vacuum
- FDA- and EU-compliant

# THE INNOVATION – ESPECIALLY FOR IMMERSION-TUBES

The material for this Fluoropolymer-coating, which will be applied with a specific method, is highly resistant against chemicals and acids, and has extraordinarily advantages, compared with common coating and lining systems.

Exceptional, universal chemical resistance at high temperatures.



- Seamless lining
- No welded joints
- No glue
- Excellent bonding to the substrate
- Variable layer thickness up to 2 mm

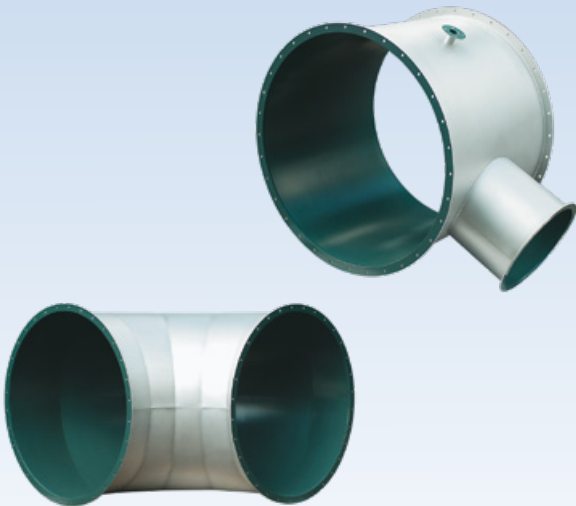
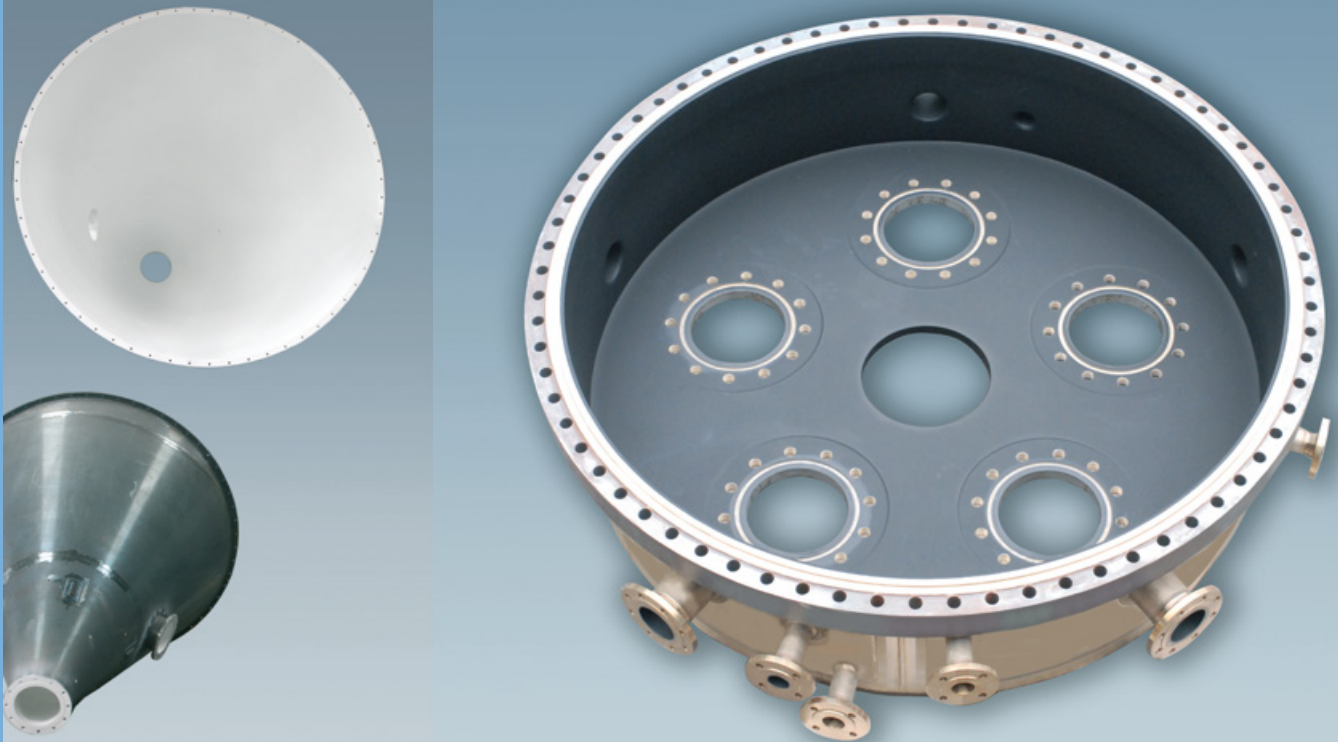
## Features of the coating

- Outstanding features in permeation by using filler
- Also available in electrical conductive version
- Locally repairable
- Solvent-resistant
- Easy to clean, excellent non-stick properties
- Non flammable
- Cold-resistant
- Best permeation properties
- Suitable for vacuum
- FDA- and EU-compliant  
in line with build up of ETFE ultra<sup>+</sup>

# WELCOME TO THE UPPER CLASS

ETFE coatings provide excellent properties against mechanical influences, are extraordinary good electrical insulators and chemically stable against nearly all media. Similarly, use at high temperatures is totally problem-free and safety is ensured by excellent non-flammability.

## ETFE



ICS-ETFE is used for coating stainless steel process and utility pipework, for example. As a special, flame-resistant interior coating, this is particularly suitable for the coating of exhaust air pipework, for example, in factories in the chip, solar cell and fibre optics industries. ICS is FM-approved – each construction part is marked separately with the FM specification. This coating is also tested according to the American safety standard Factory Mutual Research 4910 and suitable for use in clean rooms.



High tensile strength at break, good fire characteristics, durability, low intrinsic weight as well as high light and UV permeability are ideal prerequisites for this.



The coatings are used, amongst other things, in the chemical industry, the electrical industry, the automobile industry as well as in the food industry and in semiconductor technology.

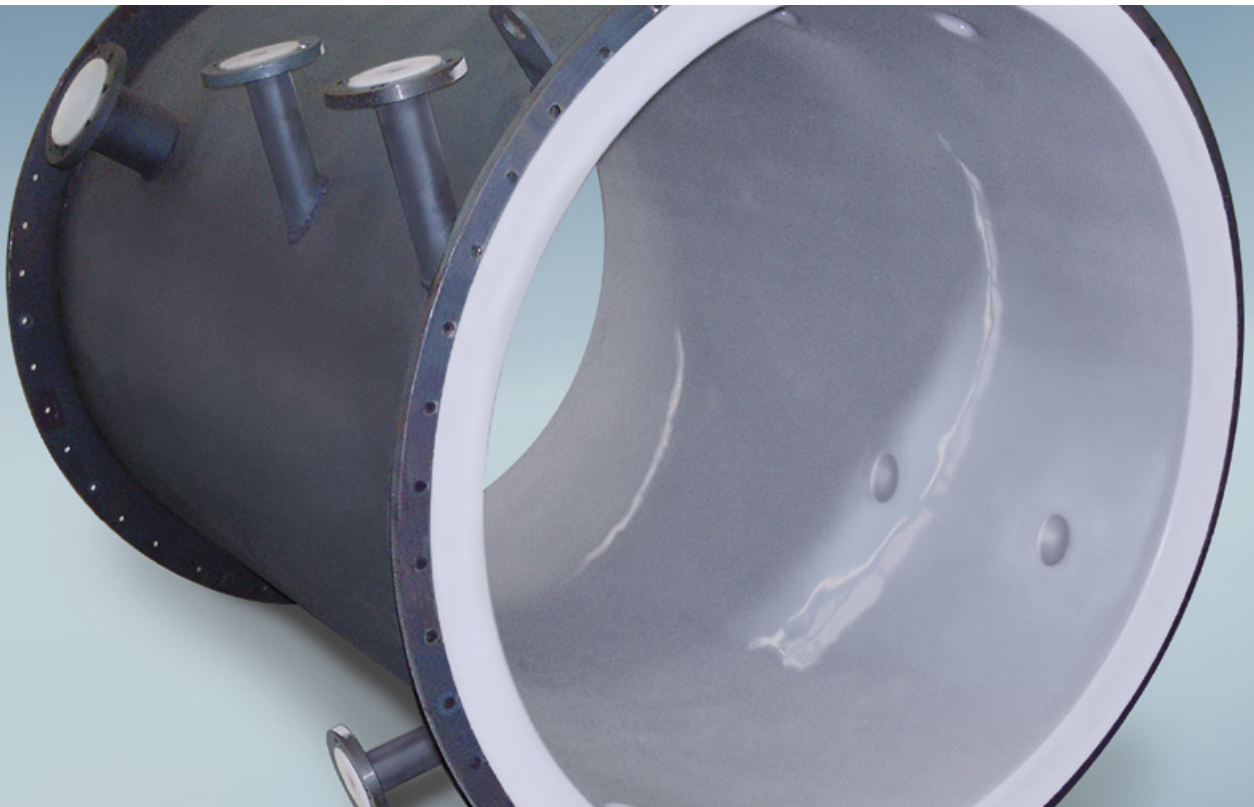
ETFE coatings are particularly well suited for use in the semiconductor and pharmaceutical industry. ETFE resists the most extreme conditions, such as e.g. the processing of high-purity grade water (molecules can still be extracted by this even from glass or ceramic).

A coating with ETFE is suitable for many construction parts. For example:

- Tubes and pipelines
- Casings and containers
- Process and utility pipes
- Centrifuges
- Reactors
- Tanks
- Inspection glass and more besides

## STRONG MATERIAL MEETS HIGHEST COMPETENCE

Just like all the other coating processes described already, an application using ETFE from Gutbrod can be accomplished efficiently and without a problem. Best possible knowledge of the subject matter, the sophisticated Gutbrod coating technology as well as the most modern working equipment culminate in optimal implementation of customer requirements and goals.



## MAXIMUM PERFORMANCE IN MANY AREAS

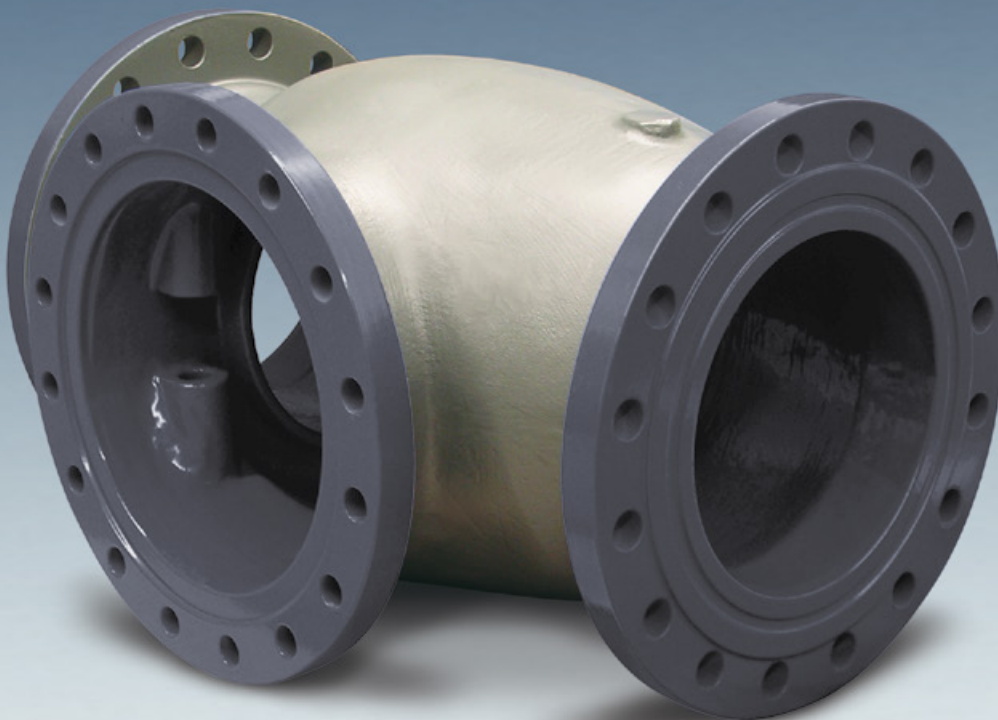
ETFE is the most stable fluoropolymer and satisfies the highest possible claims regarding quality for an optimal coating. Many of the outstanding characteristics of ETFE have already been presented. Here are some of the advantages summarized in an overview:

- Very good chemical stability with aggressive media
- Outstanding electrical characteristics. Excellent insulation properties and a low dielectric constant
- Broad temperature range of application



ETFE is a modified copolymer consisting of ethylene and tetrafluoroethylene. With ETFE, a very tough and steadfast coating with excellent chemical and corrosion resistance even at very high as well as low temperatures is possible. ETFE can be outstandingly well processed. Layer thicknesses of more than 1.5 mm can be produced, depending on the design of the construction part.

Several alternatives are available as coating process. Besides powder coating, layer thickness up to 5 mm are possible using the rotational lining procedure with ETFE (depending on the construction and geometry of the construction part). In this respect detailed information is summarised in our ChemResist brochure or in the Internet under: [www.gutbrod-ptfe.de](http://www.gutbrod-ptfe.de)



- Cold resistant
- FDA compliant
- Extremely weather-proof against exposure to sun, wind, rain and also exhaust gases
- Safety thanks to best possible flame retardancy
- Very steadfast against mechanical influences, such as e.g. vibrations and bending loads
- Extremely moisture repellent and absolutely water resistant
- Innocuous, neutral to taste and smell

- Long life-span, even under influences such as high temperatures, solvents, oils, oxidising agents, UV light, and more besides
- Electrically dissipating version available
- Anti-adhesive surface

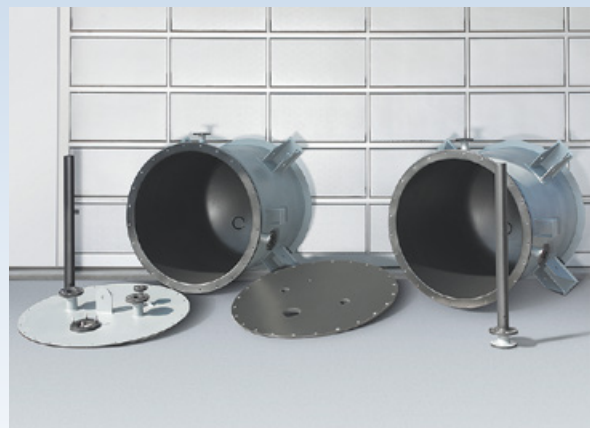
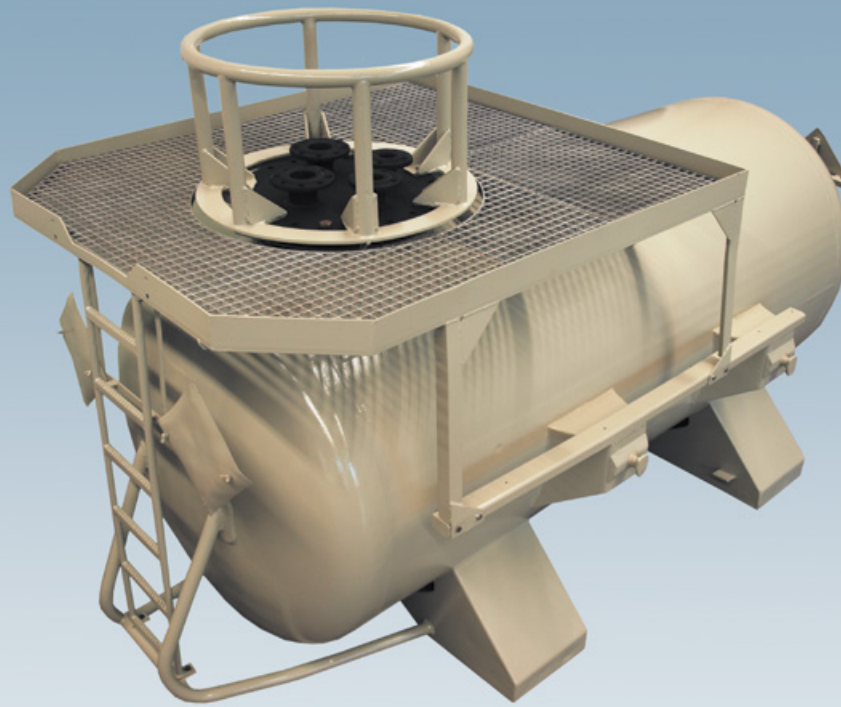
# SUSTAINABLE PROTECTION AGAINST CORROSION IN TANKS AND CONTAINERS




The fluoropolymer coating for special tank systems and containers.

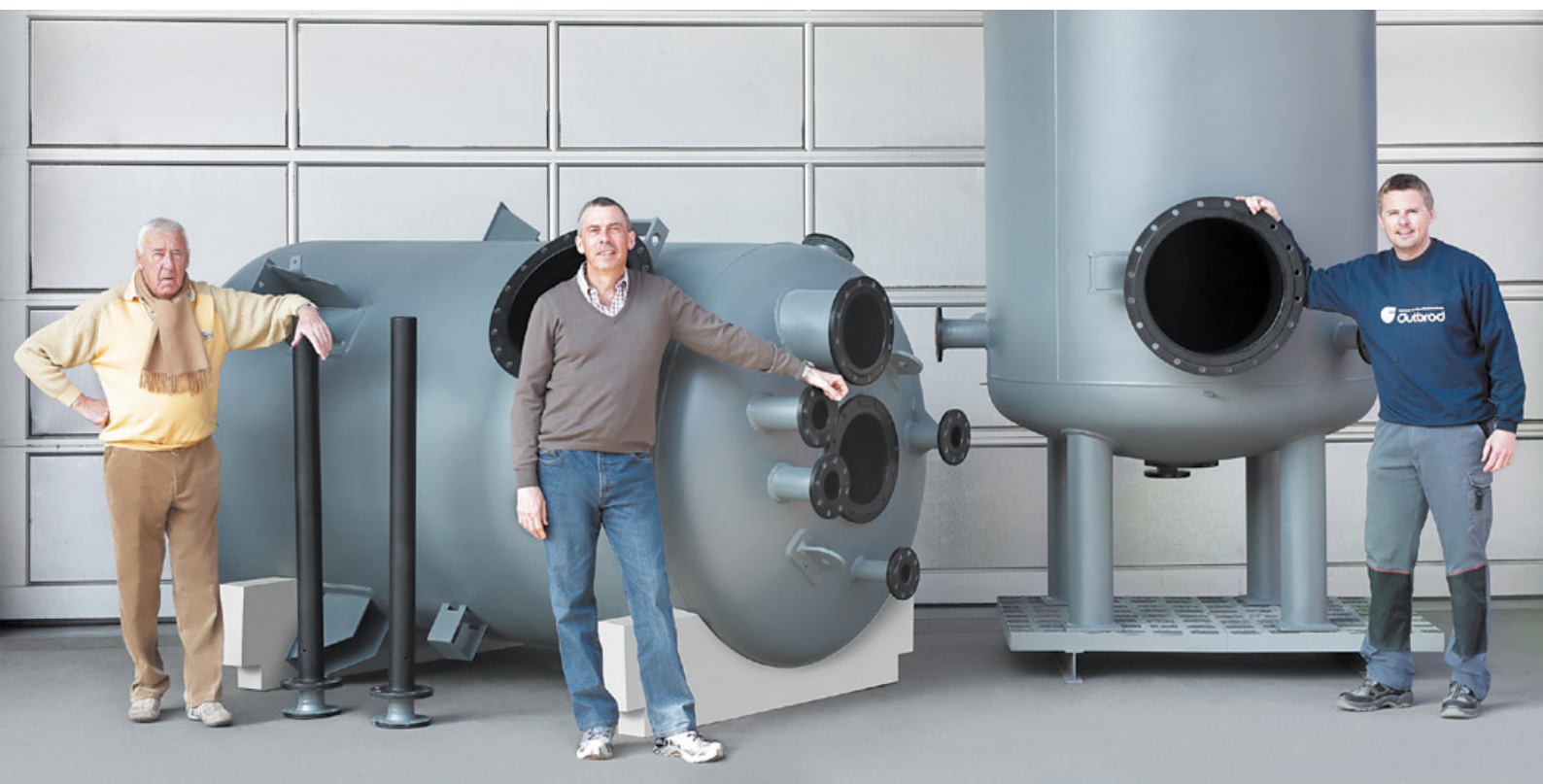
Modern tank and environmental technology requires safety and cost effectiveness.


Gutbrod stands for innovative ideas and a dedication to service in coating with fluoropolymers and other technical, high-performance materials.



Using products with the  name, a chemical and acid resistant inner coating that is sustainable and cost-effective can be applied to special tank systems and containers through an access port.

The material for this Fluoropolymer-coating, which will be applied with a specific method, is highly resistant against chemicals and acids, and has extraordinary advantages, compared with common coating and lining systems:



- Using products with the  name, tank interiors can be coated through an access port
- Seamless coating, no weld seams, no adhesives
- Outstanding features in permeation by using filler
- Universal chemical resistance in high temperature ranges
- Resistance against most known bases, solvents and acids
- Very high resistance to weathering
- Excellent mechanical stability, easy to repair
- Very high resistance to radiation

- Also available in electrical conductive version
- No stress cracks
- Easy to clean
- FDA- and EU-compliant
- Non-flammable



## EFFECTIVE AND ECONOMICAL

In global competition all sectors of industry have to adapt to the pressures for even greater productivity, better utilization of manufacturing capacities, as well as more modern technologies and newer processes.

## E-CTFE



## FIELDS OF APPLICATION



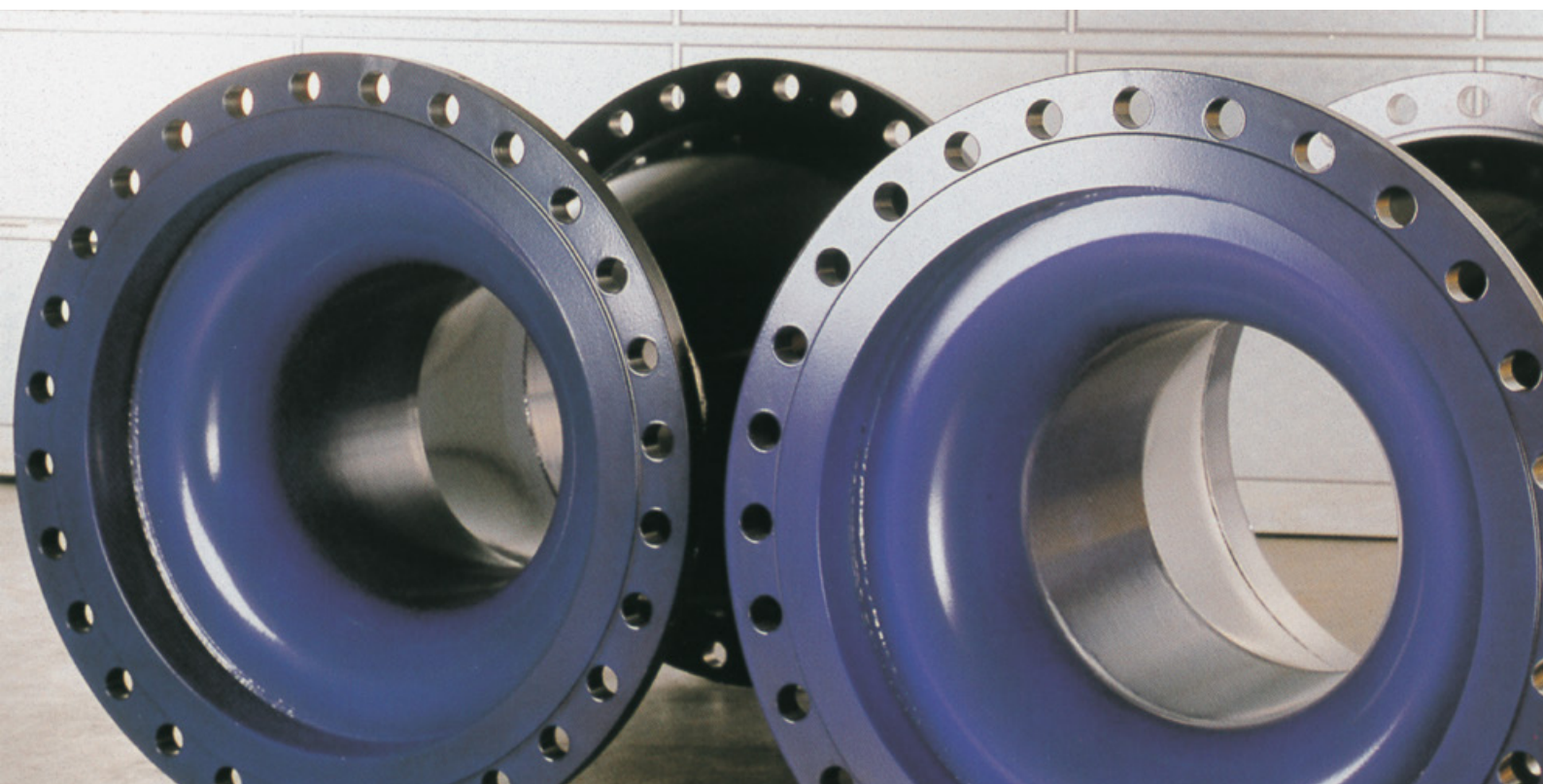
Just like ICS-ETFE, ICS E-CTFE is also suitable for the coating of stainless steel process and supply pipes, for example. As special, flame-resistant E-CTFE interior coatings, this is particularly suitable for the coating of exhaust air pipework, for example, in factories in the chip, solar cell and fibre optics industries. ICS is FM-approved – each construction part is marked separately with the FM specification. This coating is also tested according to the American safety standard Factory Mutual Research 4910 and suitable for use in clean rooms.



Corrosion protection of many kinds of industrial equipment plays an important role here. Chemical, thermal as well as mechanical stability have to withstand ever greater demands. Apart from technical aspects, economic needs also have to be able to meet increasing requirements.

E-CTFE – used in coatings from Gutbrod – was developed as a coating process with outstanding characteristics particularly for corrosion protection.

Universal chemical resistance in high temperature areas of application as well as excellent mechanical resistance qualities result in a perfect combination of robust characteristics for tough daily use. New and interesting perspectives result from this even under vacuum conditions.



## FLEXIBLE AND VERSATILE

Due to the many outstanding characteristics both in a technical and economic respect, E-CTFE – used in coatings from Gutbrod – can be used very flexibly in many fields of industry. Particularly for the semiconductor, micro-electronics, solar panel and chemical industry, the pharmaceutical sector as well as for plant and mechanical engineering, Rudolf Gutbrod GmbH offers with coatings made with E-CTFE excellent corrosion protection for working equipment used in these fields.

### Coating examples with E-CTFE

- Separators
- Armatures
- Containers
- Spring coating
- Filters
- Screw conveyors
- Galvanic baths
- Fan heaters
- Bearing flanges
- Laboratory basins
- Membranes
- Pumps
- Reactors
- Pipes
- Inspection glass
- Tanks
- Thermo-sensors
- Transportation plant
- Valve components
- Wash towers
- Heat exchangers
- Bucket wheels
- Centrifuges
- and more besides

## SAFE AND ENVIRONMENTALLY FRIENDLY

Many years of experience as well as constant improvements in powder and priming materials enable Gutbrod to achieve perfect results with coatings made with E-CTFE in best quality, even with moulded parts with the highest level of difficulty.

The distinctive feature of the coating material and electrostatic powder spraying technology hereby complement one another optimally. The layer structure and application processes produce a non-porous surface protection which is firmly



## FUNCTIONAL AND EFFECTIVE

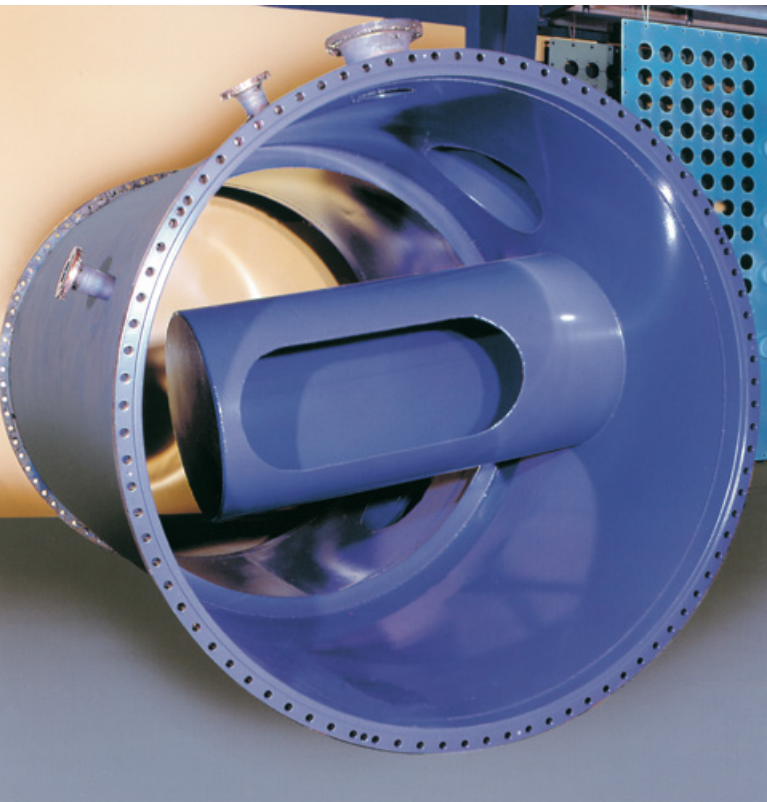
Many crucial advantages make coating with E-CTFE so functional and effective:

- Outstanding chemical resilience:  
Resistant to most technical acids, bases and solvents
- Very good electrical properties:  
Low, stable dielectric constant over a broad range of temperatures and frequencies
- Very good radiation stability:  
Excellent retention of good properties after cobalt 60; even at 200 MEGARAD E-CTFE still shows acceptable values

bound to the substrate material, with which layer thicknesses up to 1.5 mm can be achieved depending on the construction of the parts.

Before coating, each object is carefully pre-treated at Gutbrod. The construction guidelines according to DIN EN 14879-1 are observed thereby. Continuous controls during and after coating are standard. Perfect surfaces with correct layer thicknesses and non-porosity are a matter of course at Gutbrod to achieving fastidious working quality.

Corrosion protection with E-CTFE is a clean business. Because of the „dry“ procedure, no solvent is released into the air. This is good for the environment and a further argument in favour of E-CTFE used in coatings from Gutbrod.



- **Best mechanical stability:**  
Dimensionally stable drilling, turning, milling or grinding of the coated part is possible without a problem
- **Very good weathering resistance:**  
Practically no changes under the influence of weather
- **Outstanding flame-retardant properties:**  
No melting, no dripping, only charring; if the flame is removed, E-CTFE extinguishes immediately

- **Problem-free repair:**  
Small damaged spots can be repaired on site without partial dismantling; larger areas can be repaired using E-CTFE plates welded into place or by coat removal and recoating
- **Also available as an electrically dissipating version**
- **Certified according to the Technical Directive on Air Quality Control**

# COATING FOR MEDICAL TECHNOLOGY

## CHARACTERISTICS

**Biocompatibility, sterilizability and abrasion resistance** are surface characteristics which are the prerequisite for use in medical technology.

With our biocompatible coating **M-Line ultra<sup>+</sup> PA** we offer you all these properties in one surface.

Additionally our surface has an insulating effect which often is important for minimally invasive surgery.

Disturbing reflections of instrument surfaces commonly are causing problems too.

Our coating **M-Line ultra<sup>+</sup> PA** in colour black is matt and solves this problem as well.

Mechanical follow-up treatment of the surface (for fits etc.) is possible without losing her properties.

**M-Line ultra<sup>+</sup> PA is compliant according to ISO 10993** and provides you security whether you are user or patient.



## M-Line ultra<sup>+</sup> PA

## ADVANTAGES

### Features of the coating

- biocompatible
- high chemical resistance up to approx. 100°C
- can be mechanical machined
- sterilizable
- impact-proof and shockproof
- insulating



# THE COATING FOR GERMLESS SURFACES

Germs and bacteria are the matrix for infections. They increase in appropriate conditions at speed and will be passed on unwittingly from one to the other.

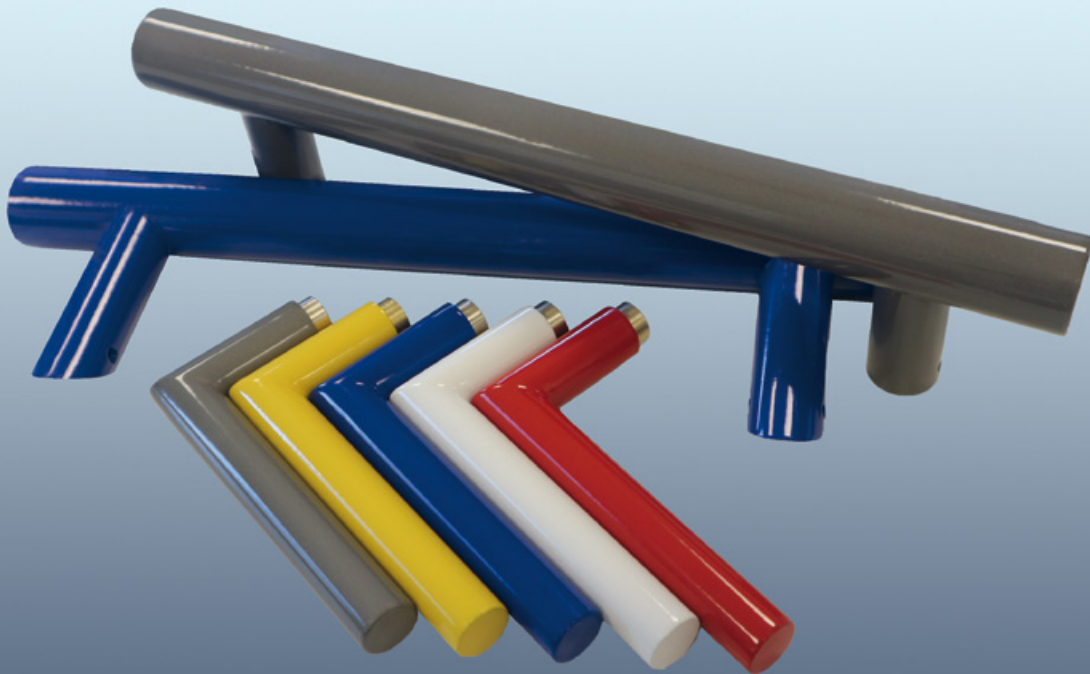
Everybody tries to shelter from infections and diseases. **M-Line Microfree** works wherever germs live and can be passed on!

- Tables
- Handholds
- Handrails in buses and trains
- Furniture
- Tools

and all the other surfaces we touch with our hands every day.

Dirt accumulates on all these surfaces, and even if it is present in small quantities, invisible to the naked eye, it represents an energy source for the growth and spread of the bacteria.

These are spread by touch, so they can invade our organism and cause serious problems there.



## WE WISH YOU A LONG AND HEALTHY LIFE!

**M-Line Microfree** not only fights bacteria, but also acts against a variety of other different pests, such as fungi, viruses or algae.

Human hands are the largest bacterial carrier and this is where the advantage of an antimicrobial coating's effect can be used.

Destroying germs before they are passed on to next is the name of the game.

The technological claim of our **M-Line Microfree** coating is, in addition to a fast working principle the extensive control of pests, high rates of destruction and the avoidance of resistances.

Of particular importance is the sustainability of the impact.

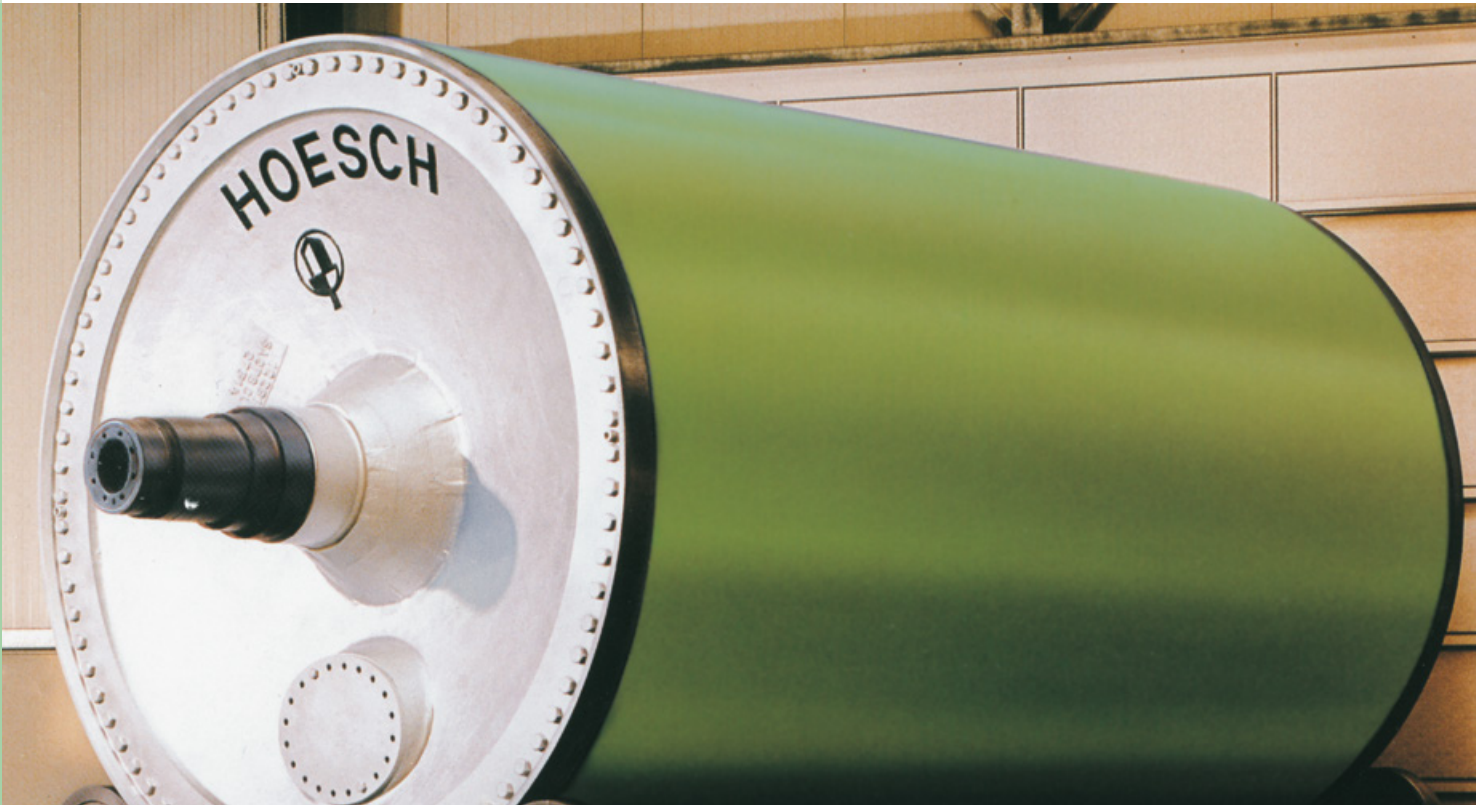
The **M-Line Microfree** coating is supposed to support health promotion and thus be a natural prophylaxis for humans.

Contrary to the previously known surfaces on this subject, the advantage of our **innovative surface** is that it works to its complete wear!

## SPACE-APPROVED AND ,HASH BROWN‘ TESTED

Everyone knows PTFE – better known under the brand name Teflon™ Coating from the American chemical company Chemours – from home as the space-approved, non-stick finish to prevent fried eggs and hash browns sticking in the frying pan.

But PTFE is also an indispensable material for industrial non-stick and dry lubrication coatings, due to the numerous positive characteristics which are unbeatable by any other plastic material. Without PTFE, many modern procedures would be inconceivable. New applications are being developed all the time.



PTFE coatings are outstandingly suitable on metals, glass and ceramics. Many years of experience and the fully developed technology from Rudolf Gutbrod GmbH in this area enable the highest level of perfection. Thereby, no limits with regard to dimensions are set either upwards or downwards. Gutbrod coats both minute objects of a few millimeters as well as giants, e.g. construction parts, with its maximum oven sizes of  $7 \times 5 \times 5$  m and  $9 \times 2.5 \times 2.5$  m.

# NOT ONLY GREAT IN THE PAN

A very attractive characteristic of PTFE is its physiological safety. This makes PTFE particularly interesting for use in the area of drinking water and in contact with food. Thus, the famous Teflon™ Coating pan is only a small excerpt from an extremely far-reaching and extensive field of application in industry.

Everything that has to run smoothly and where no product caking is desirable is a potential application for a PTFE coating.



## Practical examples:

- Scraping knife
- Baking sheets
- Containers
- Mandrels
- Colour mixers
- Pastry form rollers
- Tapered valve plugs
- Cookie cutting rollers
- Guide plates
- Glue dispensers

## ELECTROSTATIC, AIRLESS OR WITH COMPRESSED AIR – ALWAYS A SMOOTH RESULT

With Teflon™ Coatings are systems available that cover every possible need. Rudolf Gutbrod GmbH offers the right coating system – from the simple to the super non-stick coating – to match every requirement.

Also in the field of dry lubrication coatings, Gutbrod has perfect solutions to hand. One-layer systems are available, depending on the application, in many different types and qualities.

They are used everywhere where self-lubrication and dry-running operation characteristics are desired.

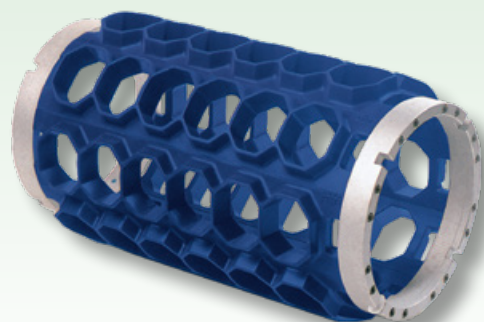
In the electrostatic procedure (powder coating), workpieces are coated perfectly without any solvents up to the highest level of difficulty, in order to achieve increased reliability concerning abrasion.



In the spraying sinter procedure (airless and compressed air process), Gutbrod works with Teflon™ Coating. The coating is sprayed on and then „sintered“ at 220° C to 420° C.

For pretreatment of the substrate, the most modern plant (defatting, aluminium oxide sandblasting) is available. Sintering capacity encompasses 23 ovens with a maximum size of 7 × 5 × 5 m and 9 × 2.5 × 2.5 m.

Controls after coating to ensure perfect surfaces, safe non-stick effect and correct layer thicknesses belong to the Gutbrod standard, as well as continuous testing of raw materials and production methods.



# NON-STICK AND DRY LUBRICATION COATINGS FOR SMOOTH APPLICATION

Teflon™ Coatings are the ideal solution in all areas of the production process where operational breakdowns can occur due to contamination or incrustation.

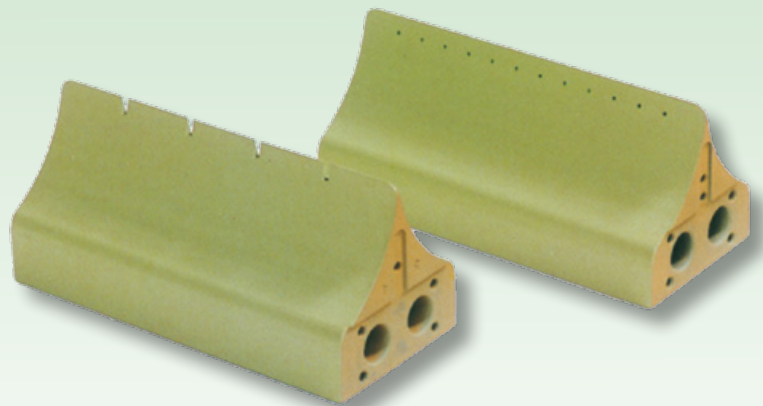
## The advantages at a glance:

- Increased production rate
- Continuous working process
- No downtimes
- No adhering of foreign substances
- Solution to reject problems
- FDA compliant
- Also available as an electrically conductive version



## Special advantages of dry lubrication coatings:

- Safe lubrication also at high pressures and extreme temperatures
- Less friction and abrasion
- Longer lubrication intervals
- Lower maintenance costs
- Clean, dry surfaces
- Controlled lubrication
- Good corrosion protection



Sol-gel coatings are becoming increasingly established in the market.

With this technology, hard ceramic layers are applied which meet the most diverse requirements.

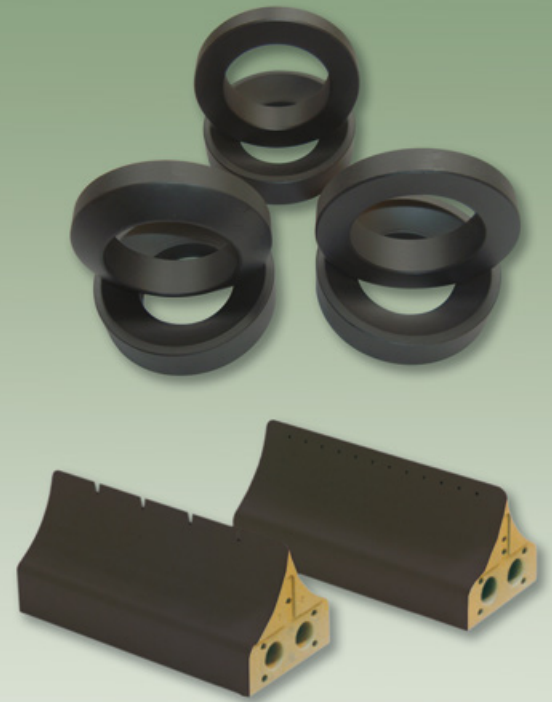
Compared to conventional fluoropolymer surfaces these surfaces are less sensitive to abrasion and high temperatures, and therefore offer many advantages.

## SOL-GEL-COATING GU SG-1

A further benefit is the low thermal load on the components due to a significantly lower baking temperature.

Our coating GU SG-1 can be used where fluoropolymers are no longer appropriate.

In addition to metallic materials, our coating GU SG-1 can also be applied to plastics and light-weight material such as CFRP.



### Applicable as

- **Non-stick coating also used for high-temperature applications up to 350°C**
  - Typical layer thickness approx. 20 – 40 µm
  - Pencil hardness 9H
  - Clearance certificate for contact with food available
- **Easy-to-clean coating also used for high-temperature applications up to 350°C**
  - Typical layer thickness approx. 5 – 10 µm
  - Pencil hardness 9H
  - Clearance certificate for contact with food available
- **Light corrosion protection**

### Typical applications

- Foodstuff industry
- Bakery industry
- Chutes, conveying systems, rollers
- Injection moulding, moulding production
- Heating plates, heating mirrors
- Blades
- Varnishing troughs
- Impellers
- Heat exchanger and more besides

# ZINC LAMELLA COATING GU-ZL

In order to be able to benefit from the excellent strength values of carbon steels in a heavily corrosive environment – in comparison with expensive stainless steels – Zinc Lamella Coating can be used.

Our Zinc Lamella Coating generates the so-called cathodic protection. The more ignoble zinc “sacrifices” itself to protect the base material. Steel can be protected in this way. The layer thickness is between 10 µm and 25 µm, for specific requirements thicker layers are possible.

For metric threaded parts it is necessary to meet the tolerances according to ISO 965, to avoid the screw thread’s agglutination and to keep the friction coefficients accordingly adjustable.

In contrast to paints, where the danger infiltration is given, this phenomenon is prevented through the „sacrificing“ impact of zinc. In salt spray tests zinc lamella coatings achieve better results than typical galvanic zinc plating, which often only reaches 96 h to 200 h in salt spraying tests (usually according to DIN EN ISO 9227).



We coat from smallest screw-parts to large parts up to a length of 8 m. Also heavy parts are possible to coat.

## Samples of application:

- Automotive
- Truck industry
- Wind turbines
- Offshore installation
- Construction industry
- Electrotechnical industry / Plant engineering

## Advantages of

### Gutbrod Zinc Lamella Coating:

- good aesthetics (colouring)
- excellent corrosion protection (240 h to 2500 h in salt spray tests, according to the requirements)
- high temperature resistance
- good chemical resistance
- environmental-friendliness
- reduced frictional properties (for screws and nuts)
- no hot solvent behave
- no risk of hydrogen embrittlement by high-strength fasteners
- electrical conductivity
- screw connection properties

## THE SOLUTION FOR TASKS OF SINTER LINING

Quite often the conventional lining and coating technologies available in the market do not fulfil the many requirements placed on them.

ChemResist puts a new emphasis in this case using a process and computer-controlled lining technology according to the rotational sinter lining process. This procedure creates a seamless lining with virtually uniform lining thickness.

High-quality fluorinated materials like ETFE, PFA and the Thermoplast PE, are used by ChemResist.

ETFE and PE are also available as electrically conducting versions. ChemResist ETFE is FDA- and EU-conform. This also applies to electrically conductive specifications.





Partly and fully fluorinated polymers offer universal and permanent resistance to acids, alkalis, solvents and chlorides. ChemResist possesses an extremely smooth and anti-adhesive surface and thus prevents bacterial adherence or growth.

In the manufacture of highly pure products (chip industry, high purity grade chemicals) ChemResist prevents impaired quality from foreign substances or dissolved metallic ions.

## **ChemResist**

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### ROTATIONAL-LINING



## FLEXIBLE AND ECONOMICAL

If special parts are to be lined, ChemResist possesses distinct advantages both from an economic as well as a qualitative point of view. The process can be adapted flexibly to the circumstances or requirements (preparation of tooling is not required). Even rigid construction specifications can be solved economically with ChemResist.

Mechanical preliminary work, as well as the use of adhesives, can be avoided. Chemical resistance and high temperature resilience remain unaffected. The permanent and homogeneous lamination to the substrate means new and interesting perspectives in use under vacuum.

ChemResist opens up new and versatile options for surface protection in almost all areas of industry to the user and the planning engineer.

CHEMICAL PROTECTION AT HIGHEST LEVEL,  
WITH VERY BEST PERMEATION PROPERTIES

## ChemResist ETFE ultra<sup>+</sup> EVOLUTION – a product of our line ultra<sup>+</sup>

The material for this Fluoropolymer-Coating, that will be applied with the Rotational-Sinter-Lining-Technology is highly resistant against chemicals and acids, and has extraordinarily advantages, compared with common coating and lining systems:

- Fully automated Rotational-Sinter-Lining-
- Technology for highest demands
- Seamless lining for almost all designs
- Excellent bonding to substrate
- Compared with conventional Fluoropolymer-Linings outstanding features in permeation by using filler
- Layer thickness up to ~5 mm



### ChemResist ETFE ultra<sup>+</sup> EVOLUTION

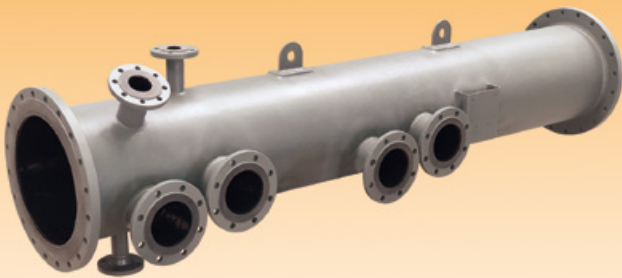
- Exceptional, universal chemical resistance at high temperatures
- Excellent when proven under clean room conditions
- Also available in electrical conductive version
- Locally repairable
- Solvent-resistant
- Easy to clean, excellent non-stick properties
- Non flammable
- Cold resistant
- Suitable for vacuum
- FDA- and EU-compliant

CHEMICAL PROTECTION AT HIGHEST LEVEL AND WITH VERY BEST PERMEATION PROPERTIES, ESPECIALLY WHEN HIGHER TEMPERATURE LOAD IS GIVEN!

## ChemResist PFA ultra<sup>+</sup> EVOLUTION – a product of our line ultra<sup>+</sup>

The material for this Fluoropolymer-coating, that will be applied with the Rotational-Sinter-Lining-Technology is highly resistant against chemicals and acids, and has extraordinarily advantages, compared with common coating and lining systems:

- Fully automated Rotational-Sinter-Lining-Technology for highest demands
- Seamless lining for almost all designs
- Excellent bonding to substrate
- Compared with conventional Fluoropolymer-Linings outstanding features in permeation by using filler
- Layer thickness up to ~4 mm (depending on the shape of the part)



### ChemResist PFA ultra<sup>+</sup> EVOLUTION

- Exceptional, universal chemical resistance, specially appropriated at high temperature load
- Locally repairable
- Solvent-resistant
- Easy to clean, excellent non-stick properties
- Non flammable
- Cold resistant
- Suitable for vacuum
- FDA- and EU-compliant

# BEST QUALITY FOR THE HIGHEST RELIABILITY

Extensive control checks of raw materials as well as continuous testing under operating conditions, constant quality controls and permanent improvements in production methods belong to the quality management activities at Rudolf Gutbrod GmbH, in order to ensure optimal working reliability during use in practice.

Thus, for example, the non-porosity of the coating is ensured by checking the finished final layer for pore density after completing the layer structure.

Furthermore, we ensure proper coating build-up according to the DIN EN 14879-1.

The interplay between our know-how, the modern facilities and equipment as well as our motivated and qualified specialists creates immaculate quality to satisfy the highest requirements.

QUALITY  
WITH NO COMPROMISES



# IMMACULATE AND ECOLOGICALLY MINDED

Our responsibility for people and the environment means that we make sure to avoid environmental pollution, to use resources sparingly, and to achieve maximum energy efficiency, in accordance with ISO 14001:2015 and ISO 50001-2018.

## Inspection/certification of the ChemResist® ETFE fluoroplastic lining system from Rudolf Gutbrod GmbH under application of thermal stress and vacuum

**Customer:** Rudolf Gutbrod GmbH, Im Schwöllbogen 10, 72581 Dettingen/Erms, Germany

**Order:** Order dated 14 January 2011

**Order number:** 600 115 575

**Subject of the inspection:** Inspection of the ChemResist® ETFE lining, applied to a column section (DN = 1000 mm, height = 1000 mm) with two flat covers

**Preparation of the column section before application of the lining:** Column section thermally degreased at 430 °C, then sand-blasted with aluminium oxide

**Inspection conditions:** Column section temperature 150 °C; pressure 25 mbar absolute (external overpressure approx. 1 bar); stress period 125 hours (> 5 days)

**Start of inspection:** 21<sup>st</sup> January 2011

**End of inspection:** 26<sup>th</sup> January 2011

**Evaluation:** 1<sup>st</sup> February 2011

**State of lining before inspection:** Thickness on container 3.6 to 4.2 mm (Ø 4.1 mm); thickness on cover 3.6 to 4.7 mm (Ø 4.2 mm); thickness on base 3.8 to 4.3 mm (Ø 4.0 mm). The lining was bubble-free and exhibited no signs of contamination or external influences.

The cover and base were sealed against the mechanically-processed flange using PTFE sealing tape (10 x 3.0 mm). The cover and base were each fastened with 28 screws, with a torque of 220 Nm applied to each screw.

**Inspection run:** Two thermal elements were attached to the container for measuring the container temperature (steel body) and ambient temperature, and were connected to measuring devices. A metal hose was connected to the vacuum pump and a digital manometer through a flange in the cover.



Industrie Service

Choose certainty.  
Add value.

Date: 2011-02-01

Our reference:  
IS-ANAS-STG/Ernst

Document:  
Ernst 600 115 575  
ETFE-Auskleidung englisch.doc

Report No. 600 115 575

This document consists of  
2 Pages,  
Page 1 of 2

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The text results refer exclusively to the units under test.



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VAT ID No. DE 234542 88  
Information pursuant to Section 2(1)  
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File: ISATAS-STG/Ernst / 2011\_02\_01  
Document: Rudolf Gutbrod 600 115 575 ETFE-Auskleidung englisch.doc  
Report No. 600 115 575



Industrie Service

After application of an absolute vacuum of 25 mbar, the entire container was placed in a convection oven. The screw connections were retightened after one hour. With applied vacuum, the column section was then heated to 150 °C in the convection oven. The column temperature was reached after 5 hours and then maintained at 150 °C.

**Temperature measurement:** Two temperature data loggers – Testo 735-1 and 735-2 (new devices with factory calibration; accuracy ± 0.2 K). A thermal element was inserted into each bore on the flange in order to measure the column section temperature. Membranovac DM 12 with D/2000 sensor (new device with factory calibration; measurement uncertainty 0.5% from measured value)

**Pressure measurement:**

**Duration of inspection:** The inspection conditions were maintained for 125 hours and recorded for documentation (column section temperature 150 °C; pressure 25 mbar absolute (external overpressure ca. 1 bar); stress period 125 hours (> 5 days)).

**State of lining after inspection:** No changes were detected as compared to the new condition before the inspection. In particular, there were no bubbles, cracks or lining detachment, etc.

### Inspection results:

Under inspection conditions, the lining exhibited no changes as compared to the new condition.

As such, ChemResist® ETFE fluoroplastic lining meets the following requirements:

- Object temperature 150 °C
- Vacuum 25 mbar absolute
- Stress period of 5 days

**Chemical resistance against media was not a part of this inspection.**

Filderstadt, 1<sup>st</sup> February 2011

Authorised assessor

Bernd Ernst



Region Baden-Württemberg  
Bereich Anlagentechnik  
Institut für Kunststoffe

# THE RUDOLF GUTBROD COMPANY: PIONEER OF SURFACE TECHNOLOGY

Rudolf Gutbrod GmbH in Swabian Dettingen/Erms continues to set new standards in innovative coating technology. The company is leading in Europe as a processor of fluorinated polymers.

The enterprise was founded in 1964 and is a pioneer in Germany in surface coating technology with fluoropolymers. It is also a licensee in Europe of well-known raw material manufacturers and is one of Europe's top addresses as far as functional coatings with non-stick effect, low friction, chemical protection and corrosion protection are concerned. State-of-the-art technology is ensured through continuous development work.



Raw material procurement is undertaken on a world-wide basis. International and permanent exchange of ideas will also ensure in the future that the highest possible quality will be maintained in solving the different requirements of our customers.





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