EDLON™ PFA

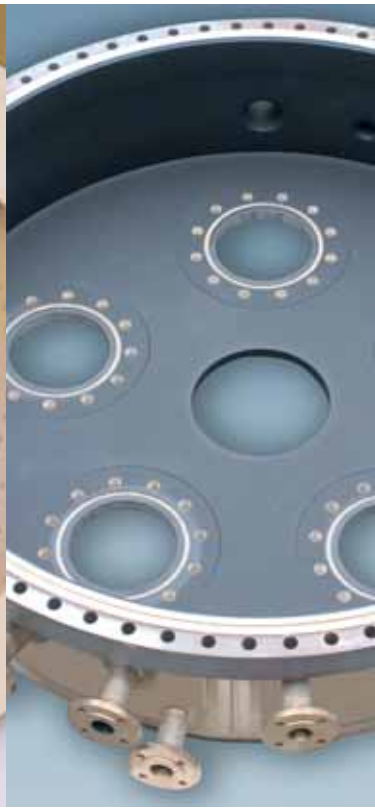
TEFLON® PTFE

HALAR® E-CTFE

ETFE

Benchmark for Surface Protection

Gutbrod



FLUOROPOLYMER COATING

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. In the meantime, the Rudolf Gutbrod GmbH company 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. It is no coincidence that Rudolf Gutbrod GmbH, which today employs more than 50 people, has been DuPont's licensee in Germany since 1967.

Benchmark for Surface Protection
Gutbrod

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:

This is what Wolfgang Gutbrod, Rudolf Gutbrod, and Michael Gutbrod stand for.

SATISFIED CUSTOMERS WHO TRUST IN GUTBROD

AllessaChemie
BASF Ludwigshafen
BASF PharmaChemikalien
BASF Rudolstadt
BASF Schwarzheide
Bayer CropScience
Bayer HealthCare
Bayer MaterialScience
Bayer Schering
Bayer Technology Services
Biochemie
Boehringer Ingelheim
Boehringer Mannheim
Cabot
Clariant
DSM
Dynamit Nobel
DyStar
Evonik
Fluorchemie Dohna
Imtech
Ineos
Infineon
KataLeuna
Kemira
Kronos Titan
Lanxess
Merck
PCK
Robert Bosch GmbH
Sachtleben Chemie
Siegle + Epple
Siltronic
Solvay
Stockhausen
Tectrion
Uhde
Vinnolit
Wacker Chemie Burghausen

FOR EVERY INDUSTRY THE RIGHT SOLUTION

- AUTOMOBILE INDUSTRY
- FOOD INDUSTRY
- TEXTILE INDUSTRY
- PAPER INDUSTRY
- PAINT INDUSTRY
- MATERIALS HANDLING AND PROCESS ENGINEERING
- FILM PROCESSING
- PLANT AND MECHANICAL ENGINEERING
- SEMICONDUCTOR TECHNOLOGY
- PHARMACEUTICAL AND CHEMICAL INDUSTRY

AND MORE BESIDES

COMPLETE AND CERTIFIED

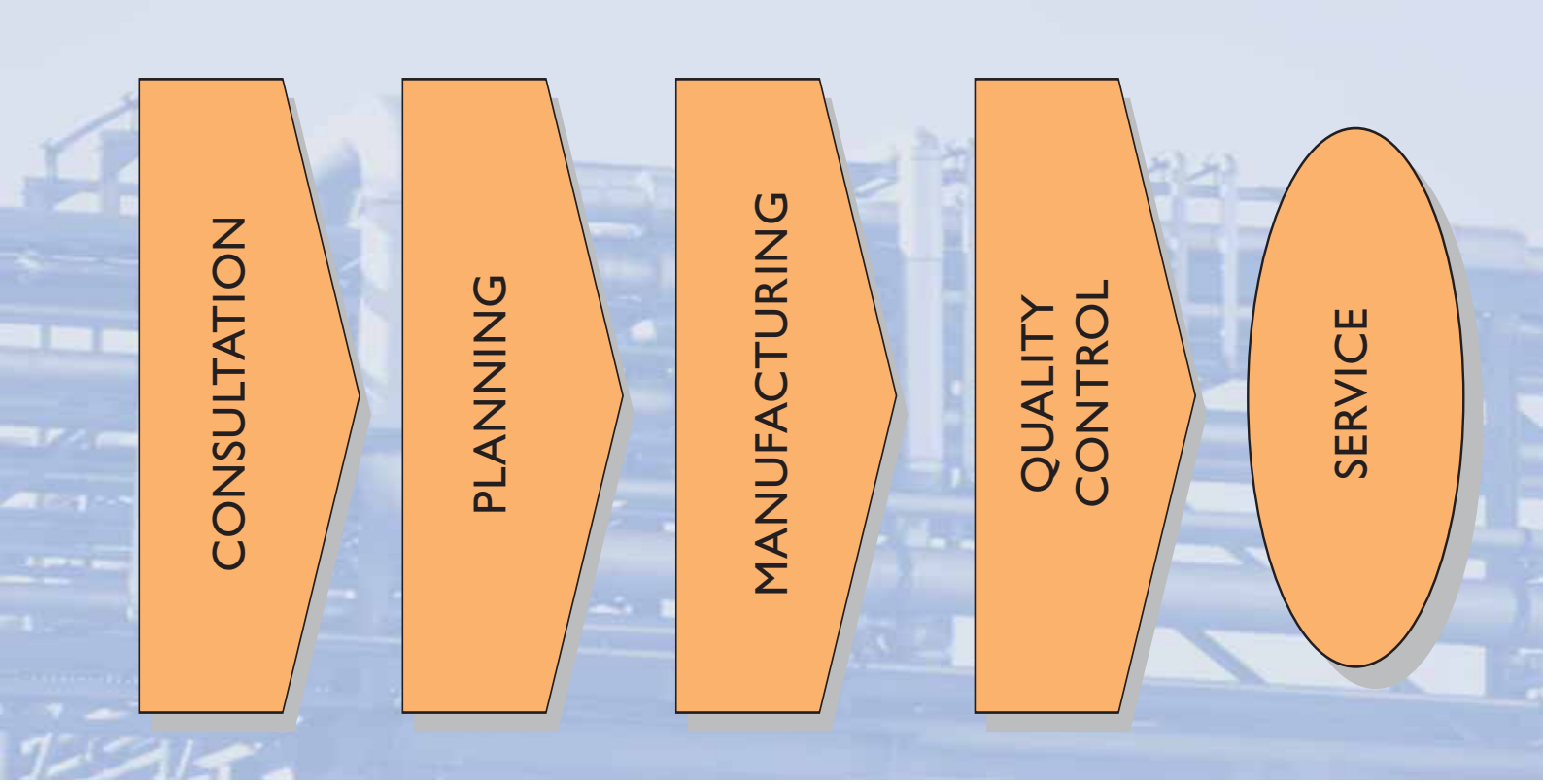
Already speak to us in your planning phase. We shall also be pleased to provide complete solutions and to take on the responsibility for your steel structure besides all the preliminaries in our headquarters, as well as in co-operation with our competent and certified partners.

Thanks to our own jig manufacture (object mounting possible with ChemResist up to 2.2 tonnes, depending on the kind of coating weights up to 35 tonnes can be processed), the most modern equipping of our production resources and installations (altogether 12 stoving ovens with the maximum application sizes 7 x 5 x 5 m and/or 9 x 2.5 x 2.5 m, as well as 3 sandblasting halls, two with aluminium oxide,

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.

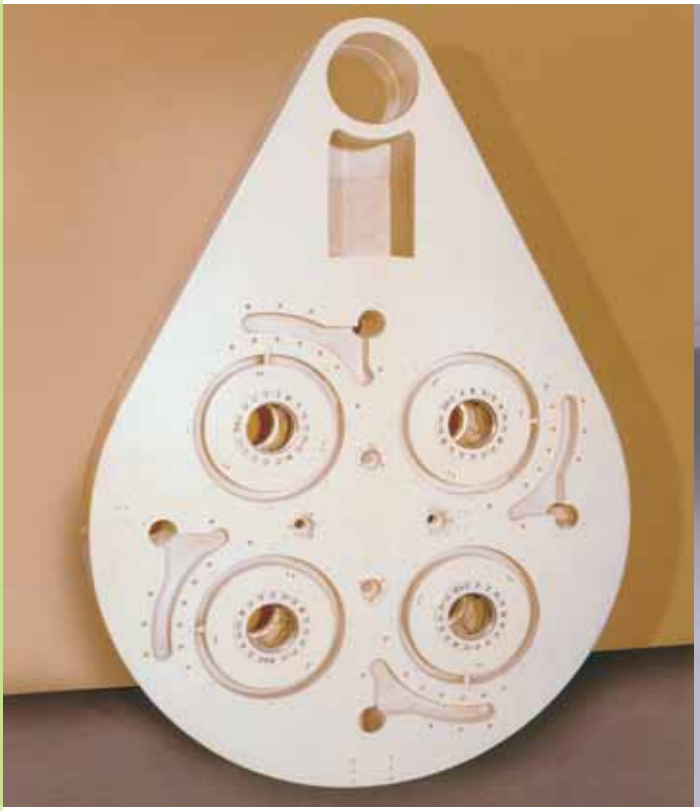


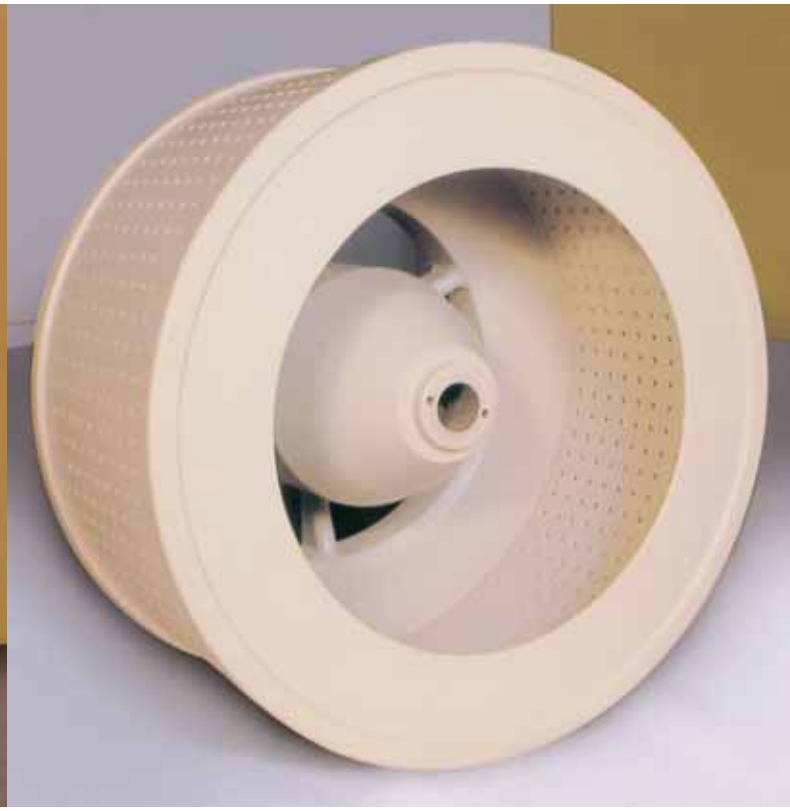
one for glass beads and/or ceramics), we manufacture using state-of-the-art technology. Our processes and procedures are certified according to the norm ISO 9001: 2000. Gutbrod will continue to pursue high investments in new capital equipment in the future.

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.





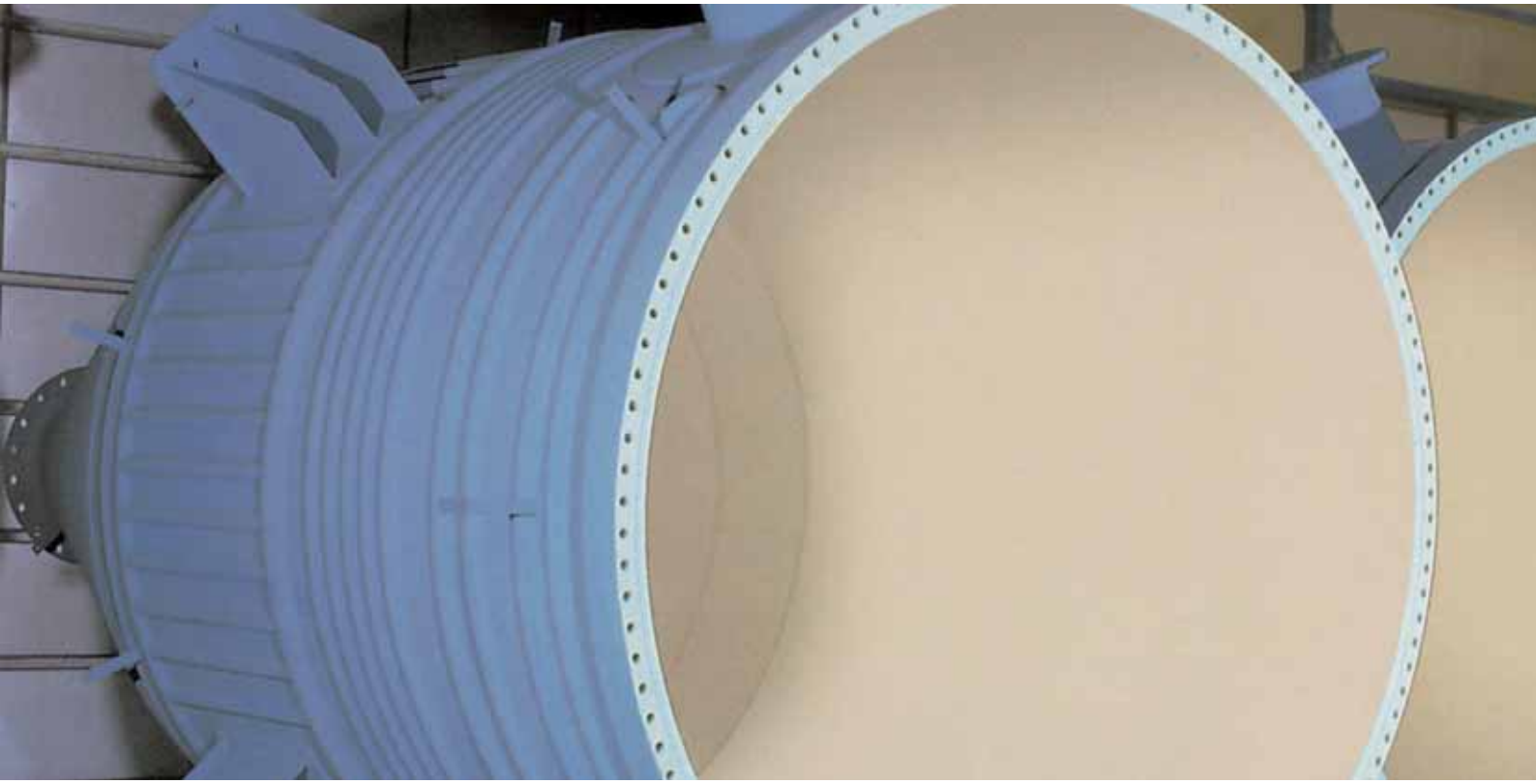
SMOOTH PROTECTION AGAINST CORROSION

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.

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.



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 resist 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.

This is where Gutbrod brings in its applications know-how. Our extensive experience as well as

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 geometry)
- PFA as a full fluorinated polymer is the most resistant material after platinum
- Thermally stable up to 260° C
- Also available as an electrically dissipating version
- FDA conform

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 sandblasting with highly pure aluminium oxide
- Use of altogether 12 oven plants for sintering procedures. Maximum application sizes: 7 x 5 x 5 m and/or 9 x 2.5 x 2.5 m

- 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 reparable 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 multi-functionality and economy

SPACE-APPROVED AND 'HASH BROWN' TESTED

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

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® 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.

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 developd 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 x 5 x 5 m and/or 9 x 2.5 x 2.5 m.

Practical examples:

- Scraping knife
- Baking sheets
- Containers
- Mandrels
- Colour mixers
- Pastry form rollers
- Tapered valve plugs
- Cookie cutting rollers
- Guide plates
- Glue dispensers
- Press plates
- Pump pistons
- Tyre moulds
- Screw conveyors
- Dough processing tooling
- Funnels
- Drying drums
- Packaging equipment

and more besides

PROCESSES

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

With Teflon® PTFE, Teflon® FEP and Teflon® PFA, three coating systems are 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. PTFE one-layer systems are available, depending on the application, in many different types and qualities.

TEFLON® PTFE

ADVANTAGES

NON-STICK AND DRY LUBRICATION COATINGS FOR SMOOTH APPLICATION

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

The general advantages at a glance:

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

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

In the electrostatic procedure (powder coating with Teflon® PFA), 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® PTFE and Teflon® FEP. 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 12 ovens with a maximum size of 7 x 5 x 5 m and/or 9 x 2.5 x 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.

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

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.

ICS Halar® is used 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.

HALAR® 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, HALAR® - 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 and HALAR® offer excellent corrosion protection for working equipment used in these fields.

Coating examples with HALAR®:

- 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 Rudolf Gutbrod GmbH to achieve perfect results with HALAR® coatings 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 HALAR® 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 HALAR® still shows acceptable values

bound to the substrate material, with which layer thicknesses up to 1500µ can be achieved depending on the construction of the parts.

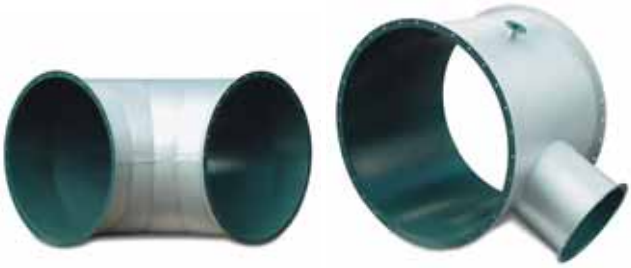
Before coating, each object is carefully pre-treated at Gutbrod. The construction guidelines according to DIN EN 14879-1 are observed thereby. Continuous controls during and after coating are standard. Perfect surfaces with correct layer thicknesses and non-porosity are a matter of course at Gutbrod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

Corrosion protection with HALAR® 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 HALAR® 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, HALAR® extinguishes immediately
- Problem-free repair:
  Small damaged spots can be repaired on site without partial dismantling; larger areas can be repaired using HALAR® plates welded into place or by coat removal and recoating
- FDA conform
- Also available as an electrically dissipating version
- Certified according to the Technical Directive on Air Quality Control

WELCOME TO THE UPPER CLASS

All outstanding characteristics which are found with coatings using HALAR® also apply when using ETFE - quite often with even better results and with significantly higher quality.



Just like ICS-Halar®, ICS-ETFE is also suitable 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.

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.

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.

FOR THE BEST ONLY THE HIGHEST QUALITY

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(s)).

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.

ETFE is a modified copolymer consisting of ethylene and tetrafluoroethylene. With ETFE, a very tough and steadfast coating with excellent

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:

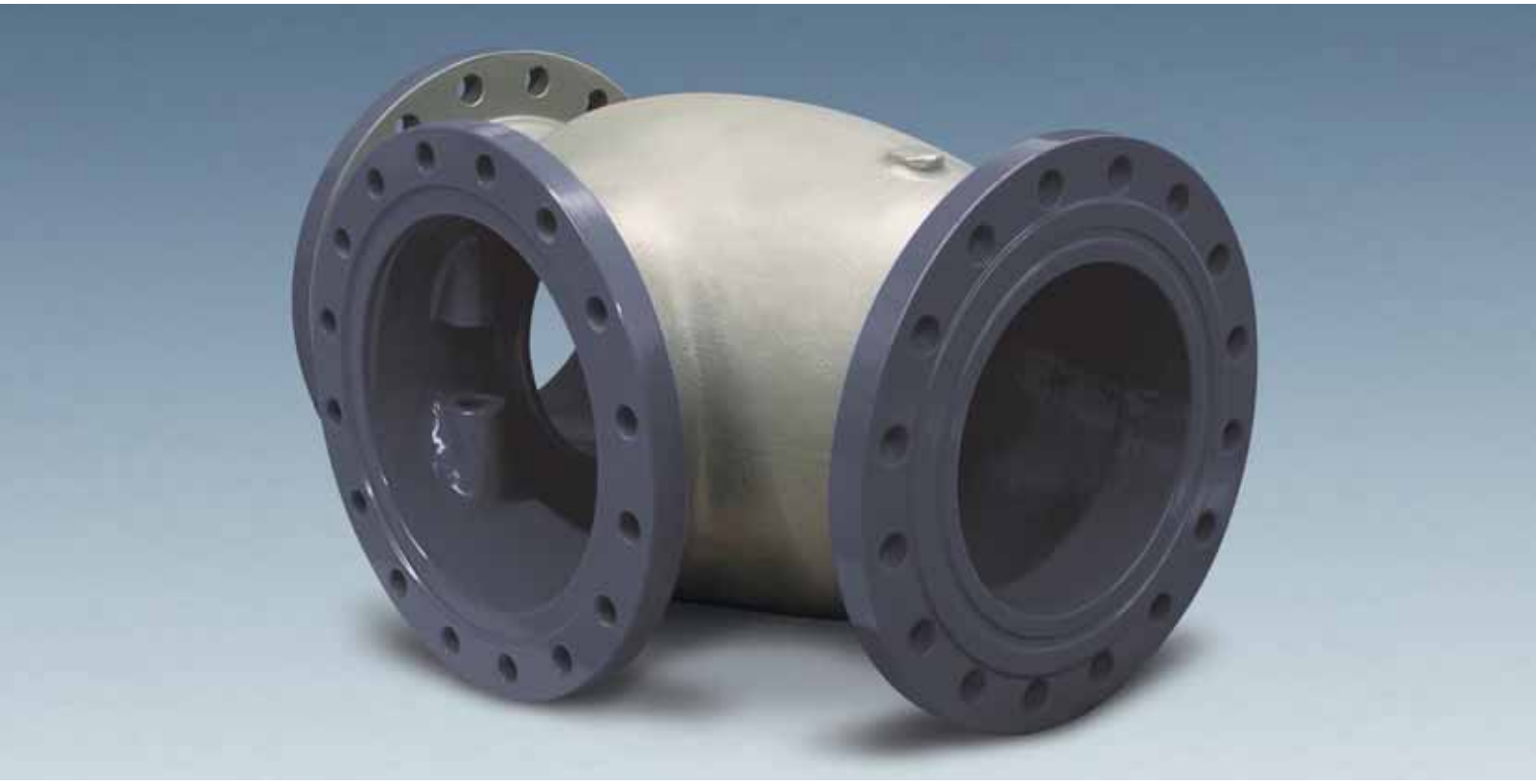
- Very good chemical stability with aggressive media.
- Outstanding electrical characteristics. Excellent insulation properties and a low dielectric constant.
- Broad temperature range of application
- Cold resistant

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 1500 micrometers can be produced, depending on the geometry of the construction part.

Several alternatives are available as coating process. Besides powder coating, layer thickness up to 7 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/produkte/chemresist/



- FDA conform
- 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

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.

IMMACULATE AND ECOLOGICALLY MINDED

It is extraordinarily important for Gutbrod that we act in an ecology-minded way during all activities and with all products. We pay attention to avoid any environmental impact and to use resources responsibly.

THE SOLUTION FOR TASKS OF SINTER LINING

ChemResist sets new accents with the process and computer-controlled lining technology in the rotational sinter lining procedure. This process creates a smooth lining with an almost uniform coating thickness. With ChemResist, high-quality part and fully fluorinated materials are used, for example, ETFE and PFA, as well as the high performance plastics PE, PP and PA. ETFE and PE are also available as electrically conducting version. ChemResist can also be supplied FDA conform upon request.

This also applies to the electrically dissipating versions (ETFE, PE). As partly and/or fully fluorinated plastics (ETFE, PFA), universal and permanent resistance exists against acids, caustic solutions, solvents and chlorides. ChemResist has an extremely smooth and anti-adhesive surface (ETFE, PFA, PA) and thus prevents the adhesion or growth of bacteria. In the production of highly pure products (chip industry, highly pure special chemicals), ChemResist prevents the impairment of quality from foreign materials or dissolved metal ions.

ChemResist
ROTATIONAL-LINING

FLEXIBLE AND ECONOMICAL

With regard to the lining of special parts, ChemResist has clear advantages both economically and qualitatively. The procedure can be adapted flexibly to new conditions and/or requirements (the preparation of tools is not necessary). Even rigid construction requirements can be economically solved with ChemResist.

Preliminary mechanical work as well as the use of adhesives can be avoided. Resistance to chemicals and high temperatures remains unchanged. As a result of the strong and homogeneous lamination to the substrate, new and interesting perspectives arise in use under vacuum.

You can obtain more information in our separate brochure "ChemResist" or in the Internet under www.gutbrod-ptfe.de/produkte/chemresist/

Benchmark for Surface Protection

Gutbrod

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 worldwide 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.

RUDOLF GUTBROD GmbH
Im Schwöllbogen 10
D- 72581 Dettingen/Erms
Tel.: +49(0)71 23-97 35-0
Fax: +49(0)71 23-97 35 30
www.gutbrod-ptfe.de
info@gutbrod-ptfe.de

All statements, information and data are given to the best of our knowledge. A guarantee, obligation or liability cannot be derived from this in any way.
Gutbrod reserves the right to make changes to the product range and to product extensions. EN_05/08