

BASIC CHEMICALS | INORGANIC SPECIALTY CHEMICALS | COATING SYSTEMS

## Corrosion Protection Systems | PROTEGOL® High Performance Coatings



## ❖❖ LEADERS IN QUALITY AND SERVICE

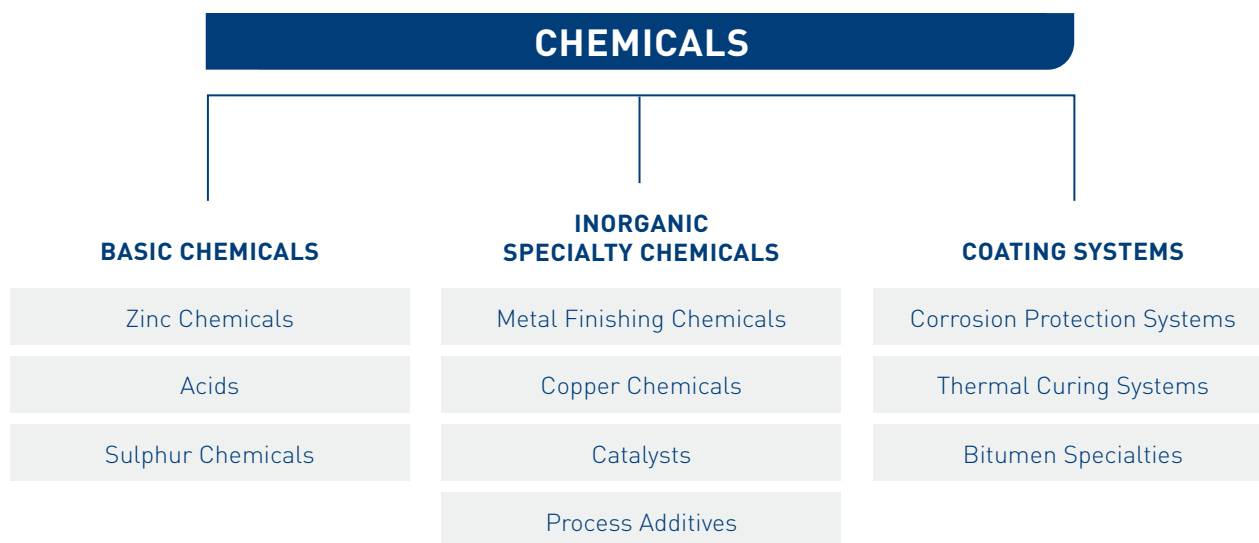
**TIB Chemicals was born following the merger of Goldschmidt TIB of Germany and Goldschmidt Química de México. The nickel chemicals specialist Königswarter & Ebell joined the TIB Chemicals Group in 2010.**

**The company is a leading international supplier of a wide range of basic chemicals, innovative inorganic specialty chemicals and high-performance coating systems.**

The largest production facilities are located in Mannheim and Hagen, Germany and San Luis Potosí, México. Our sales and distribution organisation operates worldwide. TIB Chemicals has more than 350 highly qualified employees who draw on the company's over 130 years of experience and accumulated expertise. Currently they produce and process more than 400,000 tonnes of chemicals and generate revenues of about 150 million euros a year, with an accelerating trend.

For years, the growth of TIB Chemicals has outpaced the industry average. Our success is based on the high-quality products and tailor-made solutions we develop for our customers, backed by a flexible logistics service. We are committed to supporting our customers and helping them to achieve business success.

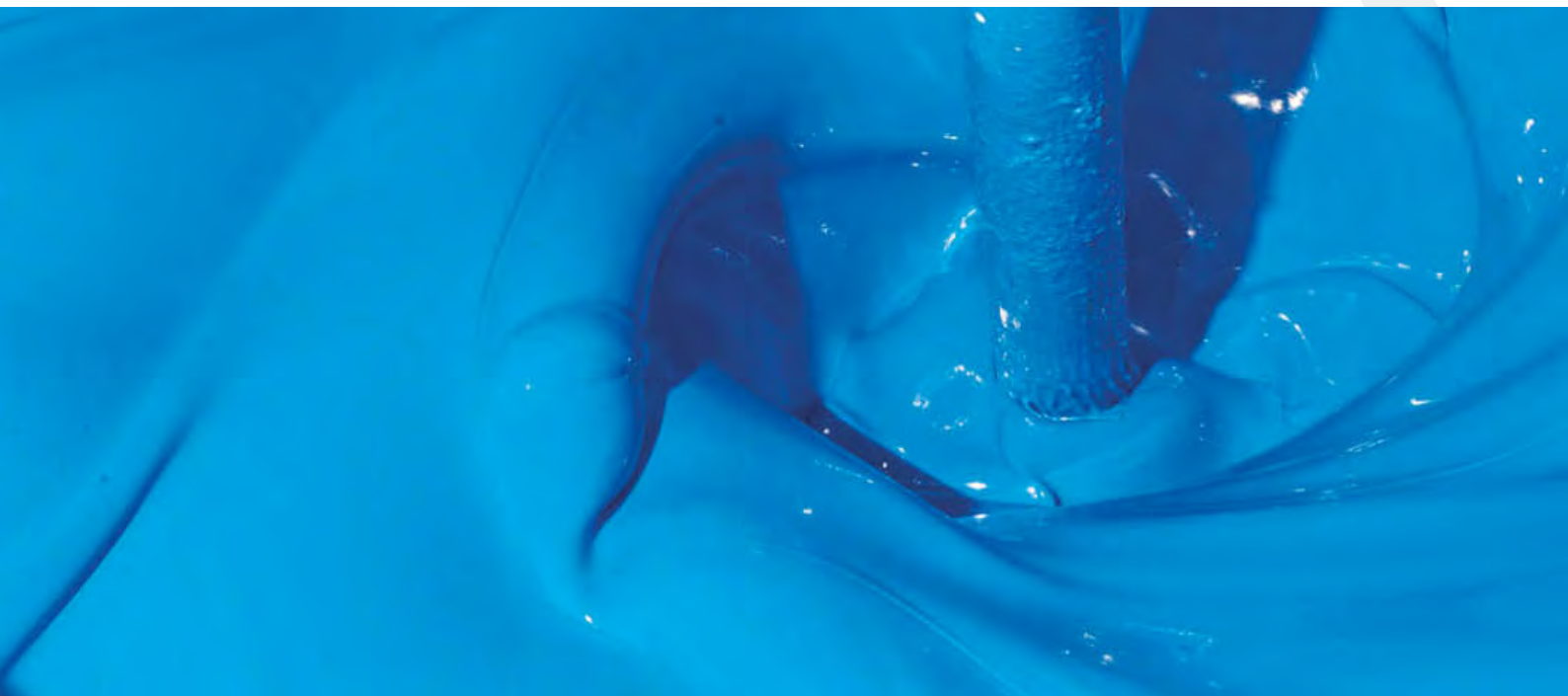
The company is divided into three business units: Basic Chemicals, Inorganic Specialty Chemicals and Coating Systems. All three act flexibly and quickly to meet our customers' wishes and needs. Together they form a strong unit with a solid financial base and the logistical and organisational structure of a large corporation.



## :: THE THREE BUSINESS UNITS OF TIB CHEMICALS

BASIC CHEMICALS	INORGANIC SPECIALTY CHEMICALS	COATING SYSTEMS
<p>These products include acids, zinc- and sulphur-based chemicals for chemical companies, the metal-working industry, hot-dip galvanising, electroplating, the textile and plastics industries, water treatment and production of foods and beverages.</p>	<p>Based on the elements tin, zinc, copper, nickel, bismuth and chromium. These special chemicals have numerous applications in todays high tech industries electroplating in the electronics and metal-working industries, performance enhancement in automotive and chemical industries, Catalysts for manufacturing resins, coatings and paints, process additives in glass, building and ceramic industries are our key markets.</p>	<p>Polyurethane- and epoxy-based coating systems to prevent corrosion of pipelines and valves, water treatment facilities and power plants. Thermal Curing Systems, such as hot dip coatings for electroplating and tool manufacturing, as well as stoving varnishes for the packaging industry. Bitumen Specialties for use in building construction, civil engineering and road paving.</p>

Our **Corrosion Protection Systems** are presented on the following pages.



## ❖❖ PROTEGOL® - HIGH PERFORMANCE COATING SYSTEMS

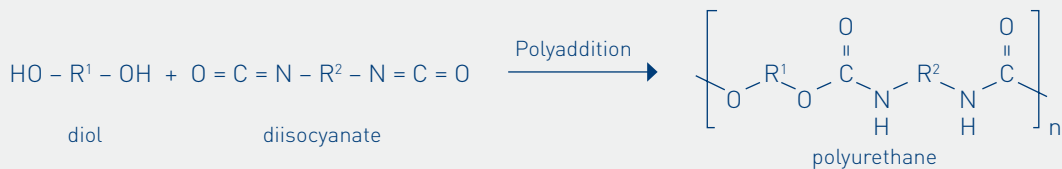
**Energy consumption and the demand for water are growing rapidly. Thus, liquid and gaseous media have to be transported via pipeline networks over increasing distances. Additionally, existing distribution pipelines are reaching the age where refurbishment is inevitable. Hence, industries are in need of anticorrosive protective coatings which demonstrate both innovative and flexible characteristics.**

With its diversified product portfolio of various multi-component liquid PROTEGOL® coatings for pipes, valves and fittings, TIB Chemicals offers a wide range of both internal and external coating systems that are not only fast curing and easy to apply, but which conform to international norms, standards and regulations.

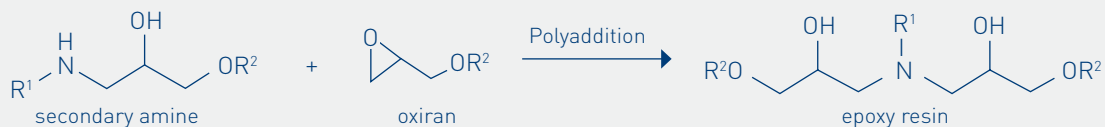
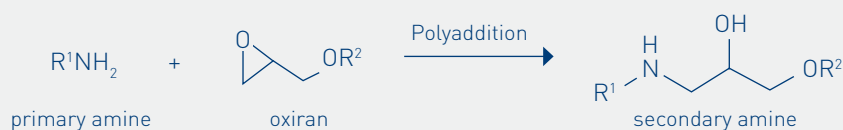
We, TIB Chemicals, have been one of the leading manufacturers of high-tech coating systems for decades and a recognised reliable supplier to all of our customers. Our extensive experience is the trademark of our high-quality coating systems and the result of constant research and development activities. We provide our customers worldwide with both standardized and tailor-made coating solutions. Furthermore, we strongly believe that the development of our coating systems can only succeed if we work closely with each individual customer and create products that aim to exceed requirements.

## ⚡ PROTEGOL® COATINGS AND THEIR CHEMISTRY

### POLYURETHANE REACTION



### EPOXY REACTION



## ⚡ PROTEGOL® - PROVIDING EFFICIENCY WITHIN NUMEROUS INDUSTRIAL AREAS

**Each year, the corrosion of steel structures causes billions of Euros of damage worldwide. Therefore, companies are constantly striving to find durable and long lasting products.**

PROTEGOL® liquid polyurethane and epoxy coatings offer reliable protection for gas, oil and water pipelines; this is the core focus of our activity.

In addition, they have an extensive track record in being used with transmission lines within refineries, power plants, sewage water facilities, condensers and cooling water pipes as well as in tanks and vessels. PROTEGOL® corrosion protection systems are mainly applied directly to the metallic surfaces such as steel, stainless steel and cast iron, and as a top coat over FBE or concrete.







## ∴ A WIDE RANGE OF APPLICATIONS: GAS - OIL - WATER - OTHER INDUSTRIES

**TIB Chemicals' coating systems are used within a wide range of corrosion protection areas such as field application, generally for pipeline rehabilitation as well as external girth weld coating, and factory application.**

In both of these areas, PROTEGOL® has a proven track record of long-term protection, together with its technical performance values and benefits relating to abrasion and impact resistance. PROTEGOL® has distinguished itself from many other corrosion protection systems due to its fast curing properties and chemical resistance characteristics even under harsh climatic conditions in regions such as Russia, the Middle East and South East Asia.

This versatility of application allows PROTEGOL® coatings to be applied in either factory or field conditions.

Factory application can be completed with relatively minor modifications to the existing equipment with the simple introduction of plural component airless hot spray equipment. This is compatible with most online factory coating facilities, even with those for multi-layer PE and PP systems.

In the field PROTEGOL® polyurethane and epoxy coatings are often used in rehabilitation projects, for field joint coatings and for new construction projects. They are specially selected for their fast curing properties, which allows inspection and backfilling to take place within a short period. Uneconomic downtime can be substantially reduced.



## ❖❖ PROTEGOL® - LONG LIFE PROTECTION AGAINST CORROSION ATTACK

### A few facts at a glance:

- PROTEGOL® solvent-free coating systems offer reliable protection against corrosion attacks even under severe soil stress conditions.
- PROTEGOL® polyurethane and epoxy coatings comply with DIN EN 10290 and DIN EN 10289 standards.
- PROTEGOL® product portfolio includes systems which have been awarded potable water certification.
- PROTEGOL® corrosion protection systems have excellent bonding properties to steel and cast iron substrates and are extremely abrasion and chemical resistant.
- PROTEGOL® coatings have been designed and formulated to be applied individually without the need for a primer.
- PROTEGOL® polyurethane coatings, due to their high abrasion resistance, can be applied as a first line of defence in HDD sections, as both a single and supporting protective coating over FBE.
- PROTEGOL® coatings can be applied within a wide temperature range without the need for pre-heating or post-curing.
- PROTEGOL® coatings can be applied and operated as non-shielding (fail/safe) coatings which do not impede CP systems.
- PROTEGOL® coatings feature highly economic characteristics such as fast curing and short back-in-service times.





## ❖❖ PROTEGOL® - PROTECTION FOR THE GAS INDUSTRY

**Our expertise lies in offering coating solutions within diverse areas of the gas industry. Over the past decades, we have gained profound experience in coating products for pipeline segments, transmission pipes, valves, bends and fittings. We are specialists in the development and manufacture of external and internal coatings.**

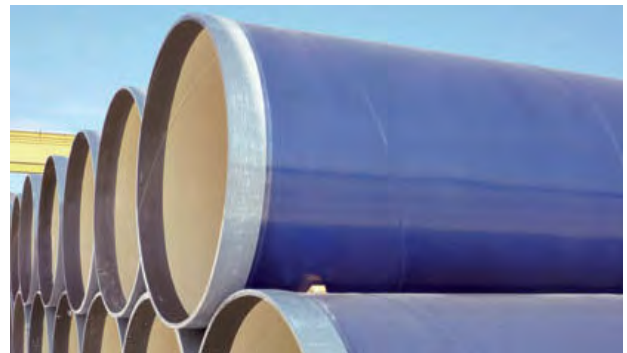
PROTEGOL® polyurethane and epoxy based products comply with DIN EN 10290 and DIN EN 10289 standards respectively, fulfilling all of the stringent requirements. In addition, product modifications can be carried out to suit specific project needs.

Gas pipelines often demand extremely high cathodic disbonding properties and a protective system operating with or without CP current, when the pipeline is grounded. PROTEGOL®, with its non-shielding properties, meets these requirements far better than many other coatings used in the industry.

Our PROTEGOL® Flowcoat products are developed for the internal protection of steel pipelines for non-corrosive gases and are designed to reduce friction within the pipeline.

# PROTEGOL® COATINGS FOR THE GAS INDUSTRY

	32 - 45 R	32 - 55 R	32 - 55 PN	32 - 60	32 - 89 S	130 HT	Flowcoat 06 LT	Flowcoat 08
Polyurethane-based	●	●	●	●	○	○	○	○
Epoxy resin-based	○	○	○	○	●	●	●	●
Application by 2K airless equipment	●	●	●	●	●	●	○	○
Application by 1K airless equipment or manual	○	○	○	○	○	○	●	●
Application by air-assisted equipment (twin cartridges)	●	○	●	●	●	○	○	○
Gravimetric mixing ratio	3.65 : 1	4.55 : 1	3 : 1	1 : 1	2.23 : 1	2.23 : 1	1.38 : 1	6.67 : 1
Volumetric mixing ratio	3 : 1	3.5 : 1	2.5 : 1	1 : 1	2 : 1	2.2 : 1	1 : 1	4.35 : 1
Maximum application thickness in one pass [µm]	2,000	2,000	5,000	2,000	1,200	800	100	150
Density comp. A+B [g/cm³]	1.45	1.63	1.50	1.20	1.49	1.45	1.30	1.34
Density comp. A [g/cm³]	1.52	1.72	1.60	1.20	1.54	1.45	1.51	1.45
Density comp. B [g/cm³]	1.24	1.24	1.24	1.20	1.39	1.45	1.09	0.95
Pot life spray application at 60 °C [sec]	30	30	30	10	120	120		
Pot life manual application at 30 °C [min]							23	180
Certificates	DIN EN 10290	DIN EN 10290, DIN 30677-2	ISO 21809-3	DIN EN 10290	DIN EN 10289	DIN EN 10289	DIN EN 10301, ISO 15741	DIN EN 10301, ISO 15741
Internal application	○	○	○	○	○	●	●	●
External application	●	●	●	●	●	●	○	○
Repair material available (2 kg and 0.5 kg twin packs)	●	●	●	●	●	●	○	○
Remarks							Friction-reducing, water-based	Friction-reducing, solvent-based





## ❖❖ PROTEGOL® - PROTECTION FOR THE OIL INDUSTRY

**PROTEGOL® two-component solvent-free liquid polyurethane and epoxy coatings have been successfully applied as internal and external coatings for oil pipelines all around the world.**

Our corrosion protection systems comply with DIN EN 10290 and DIN EN 10289 standards respectively, fulfilling all of the stringent requirements.

When it comes to technically challenging requirements in particular, PROTEGOL® has proven its high performance in various oil and gas projects, even in temperature environments ranging from -60 °C up to +150 °C.

The fact that PROTEGOL® conforms to the specification standards of most of the major oil companies expresses and confirms its flexible range of application.

Furthermore, our conductive products can be utilised for the internal lining of tanks for oil and its derivatives.

# PROTEGOL® COATINGS FOR THE OIL INDUSTRY

	32 - 45 R	32 - 55 R	32 - 55 PN	32 - 60	32 - 89 S	130 HT	TB 55 AS	TB 55
Polyurethane-based	●	●	●	●	○	○	○	○
Epoxy resin-based	○	○	○	○	●	●	●	●
Application by 2K airless equipment	●	●	●	●	●	●	●	●
Application by 1K airless equipment or manual	○	○	○	○	○	○	●	●
Application by air-assisted equipment (twin cartridges)	●	○	●	●	●	○	○	○
Gravimetric mixing ratio	3.65 : 1	4.55 : 1	3 : 1	1 : 1	2.23 : 1	2.23 : 1	4 : 1	4 : 1
Volumetric mixing ratio	3 : 1	3.5 : 1	2.5 : 1	1 : 1	2 : 1	2.2 : 1	2.7 : 1	2.7 : 1
Maximum application thickness in one pass [µm]	2,000	2,000	5,000	2,000	1,200	800	800	800
Density comp. A+B [g/cm³]	1.45	1.63	1.50	1.20	1.49	1.45	1.35	1.35
Density comp. A [g/cm³]	1.52	1.72	1.60	1.20	1.54	1.45	1.45	1.45
Density comp. B [g/cm³]	1.24	1.24	1.24	1.20	1.39	1.45	1.00	1.00
Pot life spray application at 60 °C [sec]	30	30	30	10	120	120	n.a.	n.a.
Certificates	DIN EN 10290	DIN EN 10290, DIN 30677-2	ISO 21809-3	DIN EN 10290	DIN EN 10289	DIN EN 10289	Tank lining	Tank lining
Internal application	○	○	○	○	○	○	●	●
External application	●	●	●	●	●	●	○	○
Repair material available (2 kg and 0.5 kg twin packs)	●	●	●	●	●	●	●	●
Remarks							Conductive, medium resistance IB1, IB3 and IB4b	Medium resistance IB1, IB3 and IB4b







## ❖❖ PROTEGOL® - PROTECTION FOR THE HYDRO INDUSTRY

**The result of our constant research and development has led to high performance coating systems that can be applied to water pipelines and components in contact with water, as an external coating and internal lining. Our product portfolio extends to coating solutions for steel and ductile iron pipes.**

The application fields of PROTEGOL® for the water industry comprise sewage water plants, potable water reservoirs and hydro-electric power plants.

Our approvals for drinking water include:

- The German Federal Environmental Agency (UBA) "Guideline for the Hygienic Assessment of Organic Materials in Contact with Drinking Water (KTW Guideline)"
- The German Association of the Gas and Water Industry (DVGW) worksheet W270 "The Growth of Micro-Organisms on Materials Intended for Use in Drinking Water Systems – Examination and Assessment"
- The French Association of Standardisation (AFNOR) standard XP P41-250 "Effects of Materials on the Quality of Water Intended for Human Consumption – Organic Materials"



# PROTEGOL® COATINGS FOR THE HYDRO INDUSTRY

	32 - 45	32 - 55 R	32 - 55 PN	32 - 60	32 - 48	32 - 49	32 - 99	EP Concrete Primer for PU Coatings	EP Concrete Primer for EP Coatings
Polyurethane-based	●	●	●	●	●	●	○	○	○
Epoxy resin-based	○	○	○	○	○	○	●	●	●
Application by 2K airless equipment	●	●	●	●	●	●	●	○	○
Application by 1K airless equipment or manual	○	○	○	○	○	○	●	○	○
Gravimetric mixing ratio	3.65 : 1	4.55 : 1	3 : 1	1 : 1	2.13 : 1	3 : 1	1.5 : 1	1.82 : 1	2 : 1
Volumetric mixing ratio	3 : 1	3.5 : 1	2.5 : 1	1 : 1	2 : 1	2.5 : 1	1.75 : 1	1.58 : 1	2.60 : 1
Maximum application thickness in one pass [µm]	1,000	2,000	5,000	2,000	1,500	1,500	900	n.a.	n.a.
Density comp. A+B [g/cm³]	1.45	1.63	1.50	1.20	1.28	1.35	1.50	1.10	1.10
Density comp. A [g/cm³]	1.52	1.72	1.60	1.20	1.31	1.45	1.43	1.15	1.15
Density comp. B [g/cm³]	1.24	1.24	1.24	1.20	1.22	1.20	1.66	1.00	1.00
Pot life spray application at 60 °C [sec]	30	30	30	10	30	30	540 (at 20 °C 50 min)	20 min at 30 °C	15 min at 30 °C
Certificates	DIN EN 10290	DIN EN 10290, DIN 30677-2	ISO 21809-3	DIN EN 10290					
Potable water certificates	UBA, W270					UBA, W270	UBA, W270, XP P41-250		
Internal application	●	●	○	○	○	●	●	●	●
External application	●	●	●	●	●	●	●	●	●
Repair material available (2 kg and 0.5 kg twin packs)	●	●	●	●	●	●	●	○	○
Remarks					Applicable on cast and zinc- primed cast iron	Applicable on cast and zinc- primed cast iron		Priming of concrete under PU coatings	Priming of concrete under EP coatings





## ❖❖ OTHER INDUSTRIAL SECTORS

**PROTEGOL® polyurethane and epoxy coatings offer excellent properties and are being applied in various industrial sectors. They are chemically and mechanically reliable and meet international quality standards that assure long-term durable corrosion protection.**

Their flexibility is demonstrated by the fact that they can not only be applied to metallic surfaces such as steel, stainless steel and cast iron, but also as a top coat over FBE and concrete.

The application range of PROTEGOL® extends to the anticorrosive coating of small tanks, large bullet tanks and gas storage reservoirs.

Our high performance products are being utilised as effective coating systems on steel structures in the conventional and the renewable energy sector.

Other fields of application include the internal and external coating of slurry pipelines by providing high abrasion resistance as well as the coating of piling pipes for platforms by ensuring heavy-duty corrosion protection.



## ❖❖ PROTEGOL® - DEVELOPING SOLUTIONS FOR OUR CUSTOMERS

**Sustainability and innovative solutions, quality, flexibility and forward thinking are the key factors of our vision. When engineering innovative and practicable solutions, our goal is to enhance our customers' competitiveness.**

As a customer-minded organization, our R & D strives to meet our customers' standards and requirements, both by developing new products and by adapting existing ones.

Our qualified and experienced personnel provide in-house expertise, providing a qualified response within a short period of time. We work closely together with our clients to meet their expectations at all times.

While developing optimum tailor-made solutions we naturally act in accordance with prevailing safety and security regulations and quality standards.





## ❖❖ METHODS OF APPLICATION

**A coating systems' effectiveness is governed by the selection of the best possible protective coating materials and the proper method of application. Without the right application method, any coating system will fail to excel to its full potential.**

It is part of TIB Chemicals' approval criteria that the correct application procedures in the factory and in the field are carried out exclusively by specialists. These personnel have to possess credentials which demonstrate their experienced and skilled technique.

PROTEGOL® coating systems can be applied in a variety of ways: from plural component airless hot spraying for large areas to conventional air-assisted spraying and manual application by brush or roller, which is most suitable for repair work and small or limited accessible areas.



## AUTOMATIC APPLICATION

The fastest PROTEGOL® application rates can be achieved by means of the automatic spray ring. This method has proven to be the most productive and reliable method and is not only suited for short distances such as bell hole rehabilitation, but also for the coating of the entire pipeline – either in or over the ditch and even when the pipeline is in service.

TIB Chemicals has been actively involved within the research and development phase of the first automatic spray ring for application of PROTEGOL® in the field.



PROTEGOL® two-component liquid coatings are the preferred choice, when application in the field is required. Pioneered in the early 1990s as the first two-component polyurethane coating to be selected for the external protection of field joints of pipes pre-coated in the factory with multi-layer PE and PP systems, PROTEGOL® continues setting the standard for field joint coating utilising MCL (Multi Component Liquid) systems. It remains the most widely recognised liquid coating system for field joint application today.



## MANUAL APPLICATION

Manual spraying involves airless and air-assisted spraying methods. With the plural component airless hot spray machine, production rates are increased. High coating thicknesses of PROTEGOL® coating systems can be achieved in just one single pass resulting in a homogenous and pinhole free coating.

PROTEGOL® coatings supplied in cartridges can be applied efficiently using an air-assisted spray gun. This is preferably used on smaller areas and where limited working space could make application work with a plural component airless system difficult.



Another PROTEGOL® method of application consists of manual application using a brush, spatula or roller and can be utilised to stripe-coat edges and welds or to touch up damaged areas.







## ❖❖ SURFACE PREPARATION – A FUNDAMENTAL PRE-REQUISITE

**In order to obtain satisfactory coating application results, the following fundamental factors have to be observed:**

- The steel surfaces to be coated must be dry, clean and free from all release agents (e.g. oil, grease and old paint) and must constitute a good profile.
- The degree of cleanliness should comply with ISO 8501-1, Sa 2 1/2 (SSPC-SP 10/ NACE No. 2).
- Suitable substrate preparation methods such as grit blasting must be used.
- The surface inspection should be in accordance with ISO 8501-3.
- The surface temperature during the coating application process must be at least 3 °C above the dew point.



## :: GERMANY

TIB Chemicals AG  
Business Unit Coating Systems  
Mülheimer Strasse 16–22  
68219 Mannheim  
P.O. Box 81 02 20  
68202 Mannheim  
Tel. +49 621 8901 0  
Fax +49 621 8901 902  
info.cps@tib-chemicals.com  
www.tib-chemicals.com

Rainer Kuprion  
Director Business Unit Coating Systems  
Tel. +49 621 8901 812  
Mobile +49 162 293 95 16  
rainer.kuprion@tib-chemicals.com

Maja Hornig  
Senior Sales Manager  
Tel. +49 621 8901 824  
maja.hornig@tib-chemicals.com

Jean Marc Witz  
Senior Sales Manager  
Francophony, Africa and Turkey  
Tel. +33 388 571 189  
Fax +33 388 571 189  
Mobile +33 609 165 11  
jeanmarc.witz@tib-chemicals.com

Fabrizio Scesa  
Senior Sales Manager, Italy  
Tel. +39 037 3975 224  
Fax +39 037 3975 260  
Mobile +39 348 2541 850  
fabrizio.scesa@tib-chemicals.com

Priyanka Singh  
Sales Manager  
Tel. +49 621 8901 854  
priyanka.singh@tib-chemicals.com

Lutz Hoppadietz  
Sales  
Tel. +49 621 8901 793  
lutz.hoppadietz@tib-chemicals.com

Hans-Jürgen Serbser  
Sales  
Tel. +49 621 8901 831  
hans-juergen.serbser@tib-chemicals.com

Thomas Kunath  
Technical Sales Manager  
Tel. +49 621 8901 837  
Mobile +49 162 293 95 39  
thomas.kunath@tib-chemicals.com

Michael Niedermeyer  
Technical Sales Manager  
Tel. +49 621 8901 739  
michael.niedermeyer@tib-chemicals.com

Alfred Maier  
Head of Research & Development  
Tel. +49 621 8901 852  
Fax +49 621 8901 904  
Mobile +49 162 293 95 44  
alfred.maier@tib-chemicals.com

Dr. Christina Nicoara  
Research & Development  
Tel. +49 621 8901 255  
Fax +49 621 8901 904  
christina.nicoara@tib-chemicals.com

## :: EUROPE

**Slovakia**  
AREKO, s.r.o.  
Tel. +421 243 634 044  
Fax +421 243 634 046  
areko@areko.sk  
www.areko.sk

**Spain**  
EFA 2000, S.L.  
Eckard Arlt  
Tel. +34 918 151 172  
Fax +34 918 151 477  
Mobile +34 609 001 325  
eckard@composites-rtm.com  
www.composites-rtm.com

## :: ASIA

**India**  
Vasu Chemicals  
Tel. +91 226 1449 500  
Fax +91 222 9209 624  
info@vasuchemicals.com  
www.vasuchemicals.com

**Russia**  
PROTECOR JSC  
Tel. +7 495 9891 882  
Fax +7 495 9891 883  
info@protecor.ru  
www.protecor.ru