

# SMOOTHER, CLEANER, MORE RESISTANT THE **NEW** PFAUDLER PHARMAGLASS PPG



## PFAUDLER PHARMAGLASS PPG GETTING TO THE HEART OF GLASS



### GLASS LINING FOR GMP AND FDA REQUIREMENTS

When the requirements of the Bulk Drug industry were recently studied in context of the stringent requirements of GMP and FDA, the need for a different glass was evident. Two of the requirements of the pharmaceutical industry are increased purity in order to comply with the FDA and GMP requirements and alternating alkali/acid operation. The process equipment of the chemical and pharmaceutical industries has so far been characterized by great similarity-especially in terms of glasslined reactors and components. In light of the survey, Pfaudler's response was a novel glass tailored to the needs of manufacturing pharmaceutical products, vitamins and fine chemicals.

### PFAUDLER PHARMA GLASS PPG

The Pharma Glass PPG was developed free of heavy metals, light blue color, with a smoother surface finish compared to the conventional glass and improved alkali resistance.

### PURITY OF PRODUCT

#### Metal Free Glass

During corrosive chemical reactions glass lining corrodes at a rate depending on the chemicals present and the temperatures. Ask for GMM Pfaudler WWG 9100 catalog for iso-corrosion curves. The debris of corrosion including heavy metals reduces the purity of the Active Ingredient (AI).

Pfaudler Pharma glass is practically free from heavy metals i.e. no heavy metals can be dissolved. The proportionate heavy metal content is below the analytical detection limits preserving the purity of the AI.

### CLEAN IN PLACE

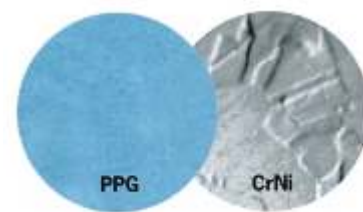
#### Smooth Surface

When Pfaudler PharmaGlass PPG was developed, one primary challenge was the surface quality. The smoother the surface fewer the incrustations is to be expected.

Pfaudler PharmaGlass PPG surface is three times smoother than the conventional glass surface.

This product incrustation is efficiently avoided, further more; the time required for cleaning is reduced significantly. The benefits are obvious: Shorter and fewer downtimes, the systems are more productive.

The extremely high surface quality is preserved even after prolonged service times. Corrosion tests have shown that its roughness after an acid or alkali attack is much lower than with commercially available glass types. The surface of Pfaudler PPG is much smoother even after a corrosive attack - than that of healthy, electro-polished stainless steel surfaces.

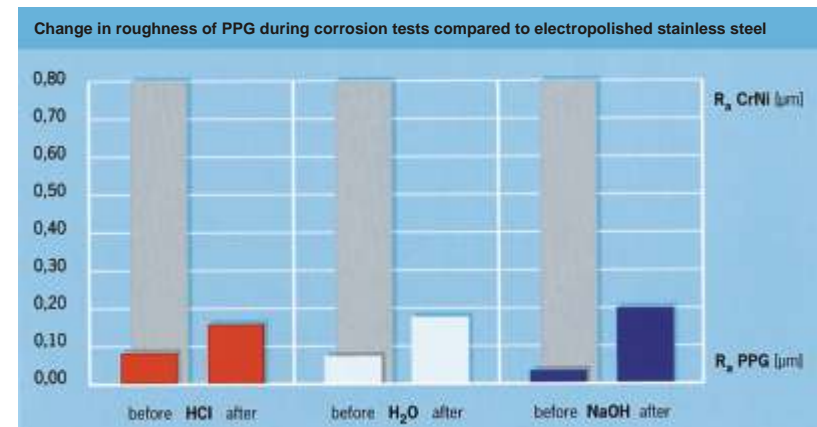


Pfaudler PharmaGlass PPG compared to CrNi. Surface structure, magnified 200 times

Property profile of Pfaudler PharmaGlass PPG	
ADK $\alpha_{20-400} 10^{-7} (K^{-1})$	97-100
Impact resistance	20-24 Nm
Dielectric strength	> 20 kV/mm
Specific electrical resistance*	> $10^9 \Omega \text{cm}$
Adhesive strength	> 100 N/mm <sup>2</sup>
Wear	< 6 mg cm <sup>-2</sup> h <sup>-2</sup>

\*at room temperature

The properties of this new product contribute significantly to an improved safety and efficiency of production processes.



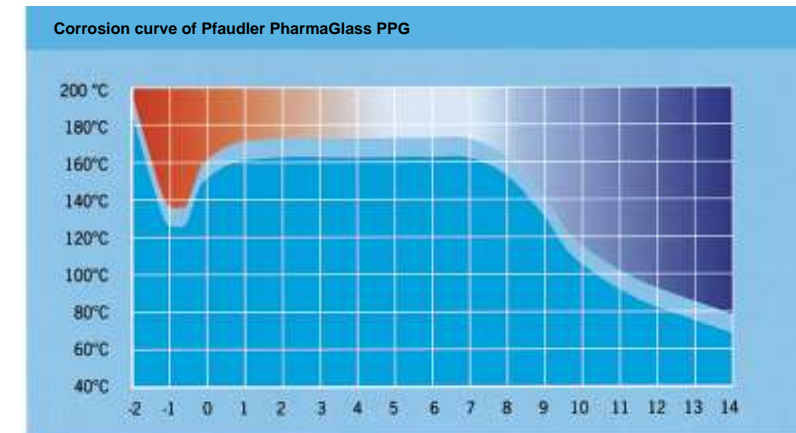
## PFAUDLER PHARMAGLASS PPG THE SOLUTION FOR ADDED PERFORMANCE

	Resistance of PPG to water	
	DIN ISO 719*	DIN ISO 720*
Sb	< 0.01	< 0.01
As	< 0.02	< 0.02
Ba	< 0.001	< 0.001
Pb	< 0.01	< 0.01
Cd	< 0.002	< 0.002
Cr	< 0.01	< 0.01
Co	0.001	0.005
Cu	0.012	0.075
Ni	< 0.005	< 0.005
Sr	< 0.001	< 0.001
Zn	< 0.01	< 0.01
Sn	< 0.05	< 0.05

Analytical detection limits according to applicable DIN standards  
The analysis was carried out on glass grains sized  
0.3 < 0.425 mm      DIN 719  
0.3 < 0.500 mm      DIN 720

**Improved optical monitoring**  
Pfaudler PharmaGlass PPG has a light-blue color, thus increasing contrast with dark blue, white or colored products. The light-blue color also improves the lighting of the reactor inside. Improved monitoring of the production process and safe verification of the cleaning result are now possible.

**Alkali Wash**  
With the PharmaGlass PPG it is possible to wash the reactor with dilute alkali (1.5%-5%) at temperatures below 70 degree C. The neutralization of any remaining acidic mass will help in cleaning and validation



pH value measured at room temperature      max. 0.1 mm/a      max. 0.2 mm/a

**IMPROVED CHEMICAL RESISTANCE TO ALKALI**  
**Higher resistance to aggressive substances**  
One of the properties characteristic of glass is its resistance to aggressive substances, even at high temperatures. Compared to other materials, glass is extremely resistant to acid media. The new Pfaudler PharmaGlass PPG for the first time combined this property with a significantly improved resistance to alkali substances

In the alkali range PharmaGlass PPG is 2.5 times better than chemical glass while it matches the acid resistance of WWG 9100.

**Greater application range**  
Equipment lined with Pfaudler PharmaGlass PPG can withstand varying loads, thus offering a greater application range. Changing between stainless steel and glassed apparatuses is practically no longer necessary. You will save real money in terms of investment and in your day-to-day operations.

Rate of corrosion	0.1 mm/a	0.2 mm/a
in pH -1	125°C	ca. 144°C
in pH 7	150-160°C	ca. 170°C
from pH 13	75°C	ca. 82°C

## DEVELOPING THE OPTIMUM SOLUTION

We will be pleased to give you detailed answers to your questions on the new Pfaudler PharmaGlass PPG. Our engineer can visit you for a detailed presentation on the new glass. As a specialist for Reactor Systems, we will assist you with all projects, from engineering and production through installation and maintenance up to retrofits. This service is offered for glasslined equipment and turn-key projects alike.

**Right from the beginning...**  
Getting us involved in your planning at an early stage could mean benefiting from the practical experience of Pfaudler companies worldwide. The use of glass may add significantly to the efficiency of your production - we will be pleased to provide you with supporting documentation for your decision-making process.

**...up the operative system**  
Implementation, operation and maintenance are our issues. Our specialists and their know-how ensure the safe, efficient and continuous operation of apparatuses and entire systems.



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