High Performance Fluoropolymers for Increased Productivity ,Improved Quality and Enhance Safety In Chemical & Petrochemicals Industry

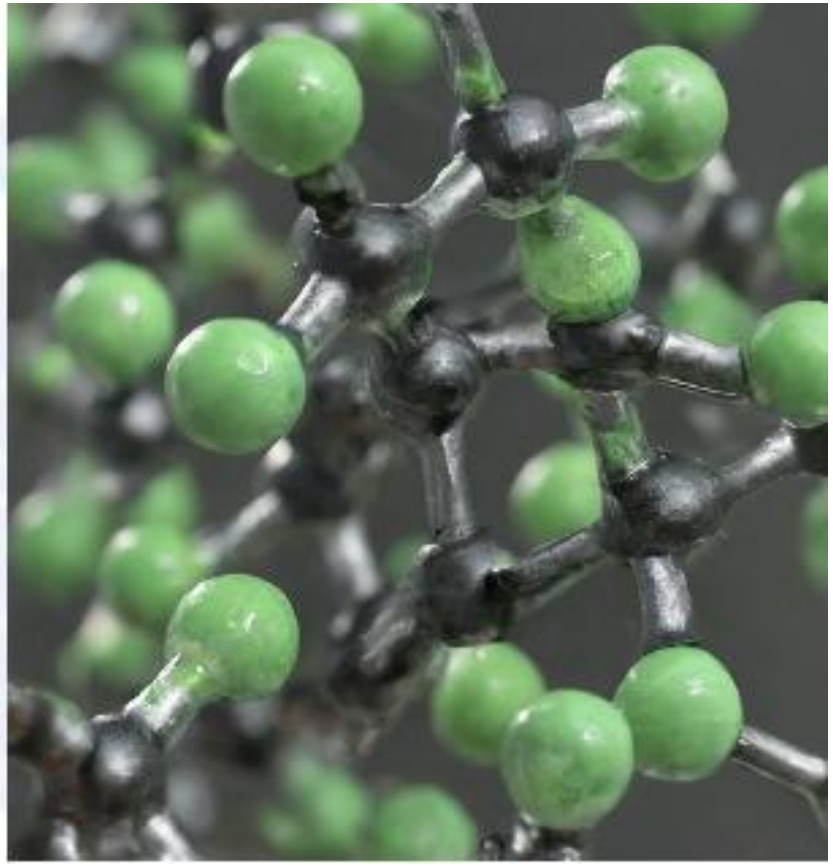
GUJARAT FLUOROCHEMICALS
VALUE THROUGH GREEN CHEMISTRY

An INOXGFL Group Company


Gujarat Fluorochemicals Ltd.
Inox Wind Ltd.
Inox Air Products Ltd
Inox Leisure Ltd.
Inox India Ltd

What are Fluoropolymers?

- Fluoropolymers are a class of synthetic polymers that contain fluorine atoms along their chains.
- Fluorine is the most electronegative element, meaning it strongly attracts electrons towards itself. PTFE, PFA, FEP, PVDF are few examples of Fluoropolymers
- This unique property gives fluoropolymers several key advantages:
  - Exceptional chemical resistance
  - Superior thermal stability
  - Low friction coefficient
  - Excellent weatherability



Benefits of Fluoropolymers in Chemical Processing

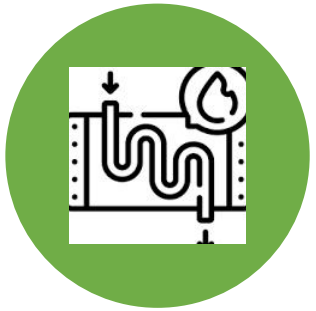
- **Enhanced equipment longevity**: Fluoropolymers resist corrosion , degradation, Extends lifespan.
- **Reduced downtime**: Less frequent replacements and repairs, saving costs, minimized downtime, increased profitability.
- **Improved product quality**: Due to Fluoropolymers' non-stick properties , product build-up and contamination is prevented.
- **Increased efficiency** : Low friction coefficients of fluoropolymers results in improved flow efficiency and reduced energy consumption.
- **Enhanced safety**: Fluoropolymers' inherent flame retardancy and chemical resistance contribute to a safer working environment.

Applications of Fluoropolymers in Chemical & Petrochemical Industry

Piping and tubing: Fluoropolymer liners or coatings protect pipes and tubing from corrosion and chemical attacks ensuring safe and reliable transportation of various chemical

Gaskets and seals: Fluoropolymer gaskets and seals create leak-proof connections preventing contamination and fugitive emissions.

Pump components: Impellers, diaphragms and other pump components made from fluoropolymers can handle aggressive chemicals effectively.



Heat exchangers: Fluoropolymer coatings/component in heat exchanger resist corrosion from process fluids.

Filtration membranes:
Fluoropolymer membranes offer superior chemical resistance and high flow rates.

Tanks and vessels: Fluoropolymer lined tank and vessels provide robust solution against corrosion from aggressive chemicals

Fluoropolymer Material Selection

Property	PTFE (Polytetrafluoroethylene)	PFA (Perfluoroalkoxy)	FEP (Fluoroethylenepropylene)	PVDF (Polyvinylidene fluoride)
Chemical Resistance	Excellent	Excellent	Excellent	Good
Temperature Range (°C)	-200 to 260	-200 to 260	-150 to 150	-20 to 105
Melting Point (°C)	327	310	260	165
Tensile Strength (MPa)	30	30	20	45
Elongation (%)	300	300	250	25
Electrical Insulator	Yes	Yes	Yes	Yes
UV Resistance	Excellent	Excellent	Excellent	Good
Transparency	Opaque	Translucent	Translucent	Opaque
Melt Processability	No	Yes	Yes	Yes

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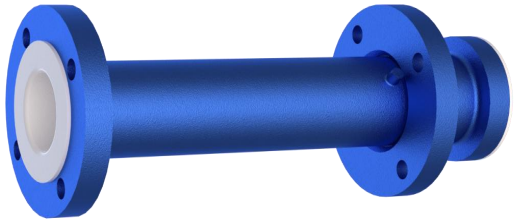
CASE STUDY

CORROSION PROBLEM IN CHEMICAL PLANTS

Fluoropolymer Linings in Chemical Plants

- **Challenge**: Traditional materials like steel and rubber used in chlor-alkali plants suffer from corrosion and degradation when exposed to chlorine and sodium hydroxide (caustic soda). This leads to frequent equipment failures, production downtime, and safety hazards.
- **Solution**: Replacing metallic components with fluoropolymer linings provides exceptional chemical resistance to chlorine and caustic soda, significantly extending equipment lifespan.
- **Results**:
  - **Reduced maintenance costs**: Extended equipment life translates to fewer replacements and repairs, leading to significant cost savings.
  - **Improved safety**: Fluoropolymer linings minimize leaks and potential chemical exposure, contributing to a safer working environment.
  - **Enhanced sustainability**: Reduced equipment replacement and lower maintenance needs contribute to a **safer** environmental footprint.

Fluoropolymer Solutions- Examples



PTFE LINED SPOOL PIPE

PFA LINED – Fitting

PTFE / PFA LINED – Ball Valves

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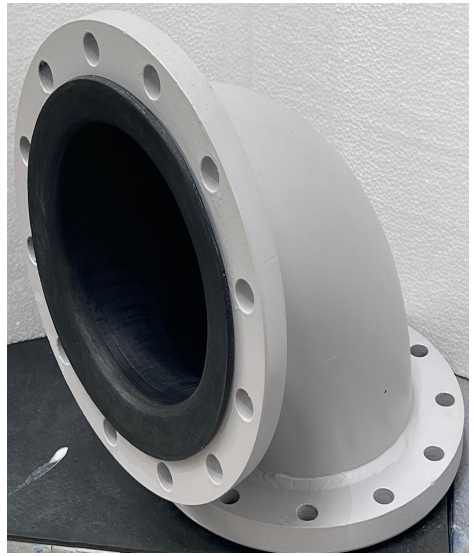
New Dev & CASE STUDY

Non metallic pumps-Chlorinated Brine Applications

Antistatic PTFE & PFA Lined Products



Application : Increase use of Antistatic Fluoropolymers - Lined pipes & fittings , valves with its interconnecting components

Challenge : Chemical plant accidents often arise from the ignition of flammable chemicals. A primary cause is the discharge of electrical sparks generated by static electricity build-up during processing. Highly exothermic chemicals and process media can generate voltages that produce sparks, posing significant safety risks

Solution:

1) High performance Antistatic fluoropolymers with its unique properties help to dissipate any charge that build up on the bores of liner
2) Availability USFDA Approved - Antistatic PTFE and PFA for static charge dissipation.
3) Recommendation of GFL trusted applicator / processors.

FDA approved

Superior Chemical Resistance

Withstands High Temperature

Increased Sustainability.

Fluoropolymers Lined Pumps

PFA LINED PUMPS

Application : Pure Brine pump, Lean brine pump, Polished brine pump, Clarified brine pump , Acidified Brine pump , Anolyte brine and Hypo Solution pumps.

Challenge : Traditional Metallic pumps used in Chlorinated Brines are very costly, Required more maintenance, difficult to handle and service support issues leads to operational down time.

Solution : PFA/PVDF lined Pumps meet the process requirements even at high temperature and pressure combinations in corrosive environments. This is cost effective serviceable, easily available

Result :

Superior Chemical Resistance

Lower Permeability

Withstands High Temperature

Increased Sustainability.

Key Differences (Non-metallic pump)

Feature	Non-metallic Pump	Titanium Pump
Material	PFA & PVDF ,	**Titanium**
Temperature resistance	Up to 180°C	**High temperatures**
Cost	Lower	**> 50 % Higher cost compared to non - metallic pumps**
Weight	Lighter	**Heavier (Causing logistic issue)**
Maintenance	Requires less maintenance	**Requires more maintenance, especially in harsh environments**
Applications	All range of highly corrosive chemicals & high solid content chemicals	Corrosive environments, high temperatures, high pressures, etc.
Reliability	Longer	**Shorter**
Service Support	Immediate	**Longer time**
Corrosion resistance	Excellent for corrosive environments	Excellent for corrosive environments
Chemical resistance	Excellent for a wide range of chemicals	Excellent for a wide range of chemicals
Delivery (Pump & Spares)	**1-2 Weeks (Minimum lead time)**	**Higher lead time**

PROMINENT APPLICATION

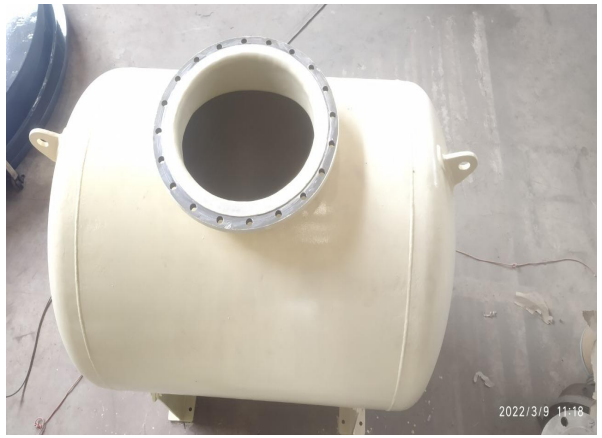
FLUOROPOLYMERS ROTOLINING

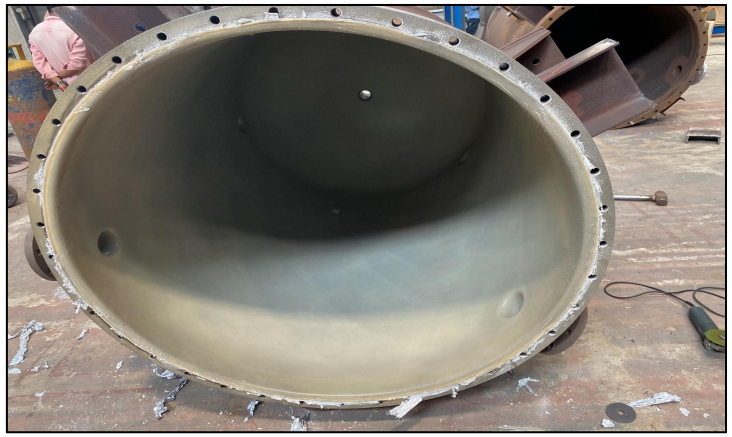
Roto Lining of PVDF/ PFA

- It is computerized controlled lining technology using rotational movement of equipment along with sintering process - creates seamless lining with virtually uniform lining thickness from 0.5mm to 6mm.
- Outstanding barrier properties that allows better protection of environment and excellent corrosion resistance under varying process conditions compared to stainless steel.
- Offers better bonding of lining to any equipment because of centrifugal action of rotating movement and ensure better life of equipment due to direct bonding without any adhesive/ any air gap.
- Suitable for Full vacuum applications.
- Most importantly – Can be repair and touch up possible at site.
- Prominent Use in Bromine Container & Process vessels offering superior corrosion resistance to condensed bromine.
- Valuable applications in various market segments -

  Chemical Processing Industries, Pulp and paper processing, Waste water treatment, Metal preparation, Petrochemicals, Food and beverage, Pesticides, General chemical processing, Nuclear waste processing, Pharmaceutical / Biotech

PVDF Roto lined Tanks, Equipments, Vessels





SUSTAINABILITY AND REGULATORY STRENGTHS

Sustainability Certification and Membership

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UNITED NATIONS GLOBAL COMPACT

SILVER | Top 15%
ecovadis
Sustainability Rating
DEC 2024

BRITISH SAFETY COUNCIL

CDP
Discloser
2024

Sustainable1
S&P Global

WASH
WATER
SANITATION
AND HYGIENE

International Organization for Standardization
ISO
20400:2017

HEALTH AND SAFETY
ISO
45001
CERTIFIED

ISO 26000 GUIDANCE ON SOCIAL RESPONSIBILITY
ISO
26000

ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

CERTIFIED
SA
8000:2014
COMPANY

ISO 37001 ANTI-BRIBERY MANAGEMENT
ISO
37001

Regulatory Compliance

ROHS - Restriction of Hazardous Substances

USP Class VI - United States Pharmacopeia

REACH - Registration, Evaluation, Authorization and Restriction of Chemicals

SVHC - Substances of Very High Concern

3A - Sanitary standards for design and fabrication of equipment

EC 10/2011 - European Commission

FDA - Food and Drug Administration

EC 1935/2004 - European Commission

WRAS - Water Regulation Advisory Scheme

Global Presence

Corporate HQ
Noida, India

Subsidiary
1. Hamburg, Germany
2. Texas, USA

Manufacturing
1. Dahej, Gujarat, India
2. RN, Gujarat, India
3. Morocco

Warehouses
1. Texas, USA
2. New Jersey, USA
3. Arizona, USA
4. Indiana, USA
5. Hamburg, Germany
6. Gujarat, India

Sales & Distribution
1. Americas: Michigan, Philadelphia, Atlanta, New Jersey, Mexico, Brazil, Argentina
2. EU: UK, Belgium, Italy, Germany,
3. ROW: South Africa, Thailand, China, Korea, Taiwan, India, Japan

THANK YOU !!