

Anti-corrosion solution re-defined



Anti-corrosion
lined pipes and fittings



LeBracs
Rubber

ООО «ТИ-СИСТЕМС» ИНЖИНИРИНГ И ПОСТАВКА ТЕХНОЛОГИЧЕСКОГО ОБОРУДОВАНИЯ
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Product Exhibit

PIPING MATERIALS



Jacket Pipe



Straight Pipe



90° Elbow



45° Elbow



Tee



Reducing Tee



Reducing Flange



Concentric Reducer



Eccentric Reducer



Cross



Instrumentation Connection



Spacer



Sight Flow Indicator



Blind Flange

LINED VESSEL



Tank Lining

VALVES



Diaphragm Valve



Ballcheck Valve



Ball Valve

LINED BELLOWS



Level Gauge



Lined Bellows



Thermostat Cover

VESSEL ACCESSORIES



Dip Pipe



Level Gauge



Flarer Tube

USAGE

Actual suitability for particular applications also depends on other factors like temperature, pressure, permeability, abrasion etc.

Chemical Class			PTFE	PFA	FEP	ETFE	ECTFE	PVDF	PP	HDPE	PVC
1.	Acids	Inorganic	+	+	+	+	+	+	○	○	+
		Organic	+	+	+	+	+	+	+	+	+
2.	Alkalies		+	+	+	+	+	○	+	+	+
3.	Salts		+	+	+	+	+	+	+	+	+
4.	Halogens		+	+	+	+	+	○	×	×	○
5.	Solvents	Aliphatic Hydrocarbons	+	+	+	+	+	+	+	+	○
		Aromatic Hydrocarbons	+	+	+	+	+	+	×	×	×
		Chlorinated Hydrocarbons	+	+	+	+	○	○	×	×	×
		Ketones	+	+	+	○	○	×	○	○	×
		Amines	+	○	○	○	○	×	○	○	×
	Alcohols	+	+	+	+	+	+	+	+	+	
	Furanes	+	+	+	+	×	×	×	×	×	
	Easters	+	+	+	+	○	○	○	○	×	
	Aldehydes	+	+	+	+	○	+	+	+	+	
6.	Phenols		+	+	+	+	+	+	+	+	×

LEGENDS

+ : Suitable
 ○ : Partially suitable
 × : Unsuitable

Note:

This chart is based on information published by resin manufacturers and should only be a general guideline

Fluoroplastics :The Perfect Solutions to Your Design Problems

Problem	Solution
	PTFE - PFA - FEP - ETFE - PVDF
Adhesion, Release	Possess extremely low surface energy in the solid state, thus providing an excellent anti-stick, non wetting contact surface.
Atmospheric Aging	Are transparent to ultraviolet light and extremely resistant to oxidation, surfaces fouling, discoloration and embrittlement.
Biodegradation	Are inert to enzymic and microbiological attack because the pure polymer does not provide nourishment or porosity for these growths
Low-Temperature Services	Retain their excellent properties even at cryogenic temperatures. In addition their impact resistance at these temperatures exceeds that of most other polymers
Contamination	Except for specialized grades, fluoropolymers are chemically inert and pure. They generally contain no additives-plasticizers, stabilizers, lubricants, or which could contaminate process fluids
Friction and Wear	Features one of the lowest coefficients of friction of any solid material. Their abrasion resistance is adaptable to demanding environment by using inorganic fillers such as glass fiber, graphite and powdered metals.
Heat	Retain their properties after exposure to temperatures beyond the limit of almost all other thermoplastic and elastomers. Depending on the end-use requirements, these resins are often rated for continuous service at temperatures as high as 260 deg. C. In certain cases, they can also withstand short excursions to higher temperatures.
Humidity	Are extremely hydrophobic and completely resistant to hydrolysis. They are good barriers to water permeation; their typical properties and dimensional stability remain unchanged even after year-long immersion in water
Light Stability	Have one of the lowest refractive indexes. They do not change their visual appearances after exposure to light ranging from ultraviolet to infrared.
Corrosion	Resist even the most aggressive organic and inorganic chemicals and solvents over a broad temperature range.
Dielectrics	Possess high dielectric strength, a low dielectric constant, low loss factors, and extremely high specific resistance. Furthermore, they surpass most materials in their level and stability of dielectric properties over a broad range of environmental conditions
Flame Resistance	Offer remarkable resistance to high temperature and flames because they have very high melting points and auto-ignition temperatures, as well as exceptional thermal degradation thresholds. Moreover, their flame propagation characteristics, such as rate of heat release and smoke generation, are very low.
Long Service Life	Exhibit outstanding retention of properties after aging, even at high temperatures and in the presence of solvents, oils, oxidizing agents, ultraviolet light, and other environmental agents. In addition, because they do not use any leachable or degradable stabilizing additives, they offer an important safety advantage when designing products for long service life.

SCOPE

- This specification covers Polytetrafluoroethylene (PTFE) lined pipes & fittings applied for conveying corrosive fluids. The contents include the requirement for construction of materials, dimensions together with standard test procedure.
- This specification covers ANSI 150lbs PTFE lined pipe, flange and fitting in nominal diameters from 1" to 12"
- The PTFE lined flange, pipe and fitting assemblies are limited for use from -28°C to 260°C Temperature limitations are based on non-corrosive test condition, and temperature limitation may be changed by aggressive environment.

CONSTRUCTION OF MATERIALS

■ THE PROPERTIES OF PTFE

• Temperature limitation

Maximum continuous service temperature :	260°C
Melt point :	327°C

- Chemical inertness
Resist to most of all chemicals. Please consult our sales engineer for detailed information.

• Coefficient of friction

Static coefficients of friction :	0.10
Kinetic coefficient of friction :	0.05

- Specific gravity ASTM D 792 2.14~2.2
- Tensile strength ASTM D638 280~350kg/cm²

• Non - stick

Surface tension	18.5 dyne/cm
Contact angle water	104°~111°
Hexadecane	37°~45°

- Elongation ASTM D638 100~300%
- Water absorption ASTM D570 <0.01%

• PTFE LINING

- The lining is made from Polytetrafluoroethylene resins conforming to the requirement of specification F 1545 and including less than 1% weight of additives.
- Specific gravity
The lining is made from PTFE resin meeting specification ASTM D792 shall have a specific gravity from 2.14 to 2.2

■ HOUSING

- Pipe and fitting
The carbon steel pipe and fittings are welded or made of seamless steel, conforming to Schedule 40, Schedule 30 or Schedule 20. For nominal diameter 1/2" ~ 6" Schedule 40 is used. For nominal diameter 8" & 10", Schedule 30 is used, Schedule 20 is used for diameter over 12"
Materials specifications supplied as standard are:

Pipe	Carbon steel Stainless steel	ASTM A53 ASTM A312
Fitting	Carbon steel Stainless steel	ASTM A234 ASTM A403

- Flange
Flange is fabricated from materials conforming to one of the following specification.

Carbon steel	ASTM A105
Stainless steel	ASTM A182

- Welding
All fusion welding is done complying with provisions of Section IX of the ASME Boiler & Pressure Vessel Code.
- Finish
The interior surfaces of all housing are clean and free of mould burrs, rust, scale or others that may adversely affect the performance of lining.



PROPERTIES OF FLUOROPOLYMERS

Properties	ASTM	Units	PTFE	PFA	FEP	ETFE	PVDF	PEEK™
Mechanical								
Specific Gravity	D792	g/cm3	2.15	2.15	2.15	1.74	1.77	1.3
Elongation %	D1457 D638	%	300-500	300	325	150-300	300-450	20-60
Tensile Strength (psi)	D1457 D1708 D638	Mpa (psi)	21-34 (3000-5000)	25 (3600)	23 (3400)	40-46 (5800-6700)	32-45 (4500-6200)	98-100 (14065-14500)
Flexural Modulus (psi)	D790	Mps (psi)	496 (72000)	586 (85000)	586 (85000)	1172 (170000)	1160 (168000)	170 (24650)
Folding Endurance	D2176	(MIT) cycles	>10 ⁶	10-500x10	5-80x10	10-27x10	N/A	N/A
Impact Strength IZOD 73°F/23°C, notched ft/lbs/in	D256	J/m (ft.lb/in)	189 (3.5)	No Break	No Break	No Break	216 (4.0)	87 1.6
Hardness Durometer Shore D	D2240	Shore D Pencil	50-65 HB	60	56Hb	72	75-85	85-86
Coefficient of Friction	D1894	--	0.05-0.10	--	0.08-0.3	0.3-0.4	0.4	0.18
Thermal								
Melting Point	D3418	°C °F	327 (621)	306 (582)	260 (500)	267 (512)	171 (340)	340 (644)
Cure Temperature	---	°C °F	379-429 (715-805)	379-399 (715-750)	360-385 (680-725)	302-323 (575-615)	129 (264)	260 (500)
Flame Rating**	UL94	--	V0	V0	V0	V0	V0	V0
Thermal Conductivity	BTU/hr/ft2 cal/sec/cm2	(°F) °C	1.7 6 x 10 ⁻⁴	1.3 6 x 10 ⁻⁴	1.4 6 x 10 ⁻⁴	1.65 5.7 x 10 ⁻⁴	1.3 3 x 10 ⁻⁴	1.73 N/A
Linear Coefficient of Thermal Expansion	D696						4.2 10 ⁻⁵ °C	2.6 10 ⁻⁵ °F-1
Limiting Oxygen Index	D2863	%	>95	>95	>95	30-36	43	24
Heat of Combustion	D240	Mj/kg (Btu/lb)	5.1 (2200)	5.1 (2300)	5.1 (2200)	13.7 (5900)	N/A	N/A
Electrical								
Dielectric Constant	D150	1 Mhz	2.1	2.1	2.1	2.6	7.72	3.20-3.30
Dielectric Strength	D149	V/um	18	80	53	79	>1080 (10mil film)	>500
Dissipation Factor	D150	1 Mhz	<0.0001)	0.0001	0.0006	0.007	0.005	0.003
Arc Resistance	D495	sec	>300	>180	300	122	>50	>40
Volume Resistivity	D257	ohm.cm	>10 ¹⁸	>10 ¹⁸	>10 ¹⁸	>10 ¹⁷	2x10 ¹⁴	4.9x10 ¹⁶
Surface Resistivity	D257	ohm/sq	>10 ¹⁸	>10 ¹⁷	>10 ¹⁶	>10 ¹⁵	5.0x10 ¹⁴	2.0x10 ¹⁶
Chemical								
Chemical/Solvent Resistance	D543	--	Excellnt	Excellnt	Excellnt	Excellnt	Very Good	Excellent
Water Absorption, 24h	D570	%	<0.01	<0.03	<0.01	<0.03	<0.04	0.5
Salt Spray Resistance(1) -on aluminum -on steel	B-117	Hours Hours	744+ 192	1000 --	744+ --	1000 --	-- --	-- --
Detergent Resistance (2) -on aluminum -on grit-blasted aluminum -on grit-blasted steel	--	Hours Hours Hours	264 642 24	-- -- --	744 600 480	-- -- --	-- -- --	-- -- --
Weather Resistance	Florida Exposure	Years Unaffected	20	10	20	15	10	20

Note:

Resistance : 5% NaCl at 35°C/95°F, hours to failure

Detergent Resistance : hours to failure

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