

## ESPECIFICACION DE TUBERIA Y ACCESORIOS CON RECUBRIMIENTO INTERIOR

### 1. ALCANCE

1.1 Esta especificación provee información de diseño aplicable a productos recubiertos. Los productos que cubren son: carretes de tubería y accesorios con los siguientes polímeros:

Polímero	Abreviatura	Especificación ASTM
Politetrafluoroetileno	PTFE	D4894 y D4895
Perfluoroalcoxialcano	PFA	D3307
Fluoruro de Polivinilideno	PVDF	D3222
Polipropileno	PP	D4101

1.2 Esta especificación cubre productos con bridas ANSI CLASE 150.

1.3 Los productos recubiertos en ésta especificación son útiles en los siguientes rangos de temperatura de operación, a menos que se especifique de otra forma:

PTFE	-20° a 500°F (-29° a 260°C)
PFA	-20° a 500°F (-29° a 260°C)
PVDF	0° a 275°F (-18° a 135°C)
PP	-20° a 225°F (-29° a 107°C)

1.4 Para aplicaciones en vacío y/o condiciones ambientales agresivas, revisar las condiciones operativas para recomendaciones del fabricante (ver como especificar productos recubiertos).

### 2. MATERIALES

#### 2.1 RECUBRIMIENTO

##### 2.1.1 PROPIEDADES FISICAS (METODO ASTM 638)

Propiedad	PTFE EXTRUIDO	PFA	PVDF	PP
<b>Resistencia a la tensión (PSI)</b>				
Longitudinal	3000	3800	5000	3000
Circunferencial	2500			
<b>Elongación (%)</b>				
Longitudinal	250	300	50	300
Circunferencial	200			

\*Valores promedio, los valores mínimos son equivalentes a los más altos que aplican las especificaciones ASTM.



2.1.2 El recubrimiento de **PFA** debe ser en color gris y hecho de resinas de copolímero de Perfluoroalcoialcano de acuerdo con ASTM D3307.

2.1.3. El recubrimiento de **PTFE** debe ser en color blanco y hecho de resinas de Politetrafluoroetileno de acuerdo con ASTM D4894 Y D4895.

2.1.4. El recubrimiento de **PVDF** debe ser en color negro y hecho de resinas de Fluoruro de Polivinilideno de acuerdo con ASTM D3222.

2.1.5. El recubrimiento de **PP** debe ser en color blanco y hecho de resinas de polipropileno de acuerdo con ASTM D4101.

## 2.2 ACCESORIOS

2.2.1 Cuerpo de acero fundido por ASTM A-216 GR. WCB, o acero al carbono A106 GR. B sin costura, o A-234 WPB, dependiendo como sea especificado.

Nota: Los accesorios bridados son fabricados con bridas fijas en acero al carbono ASTM A-216 GR. WCB., o bridas fijas o giratorias en A 105.

2.2.1 Tamaños de 1" a 10" acero al carbono cédula 40, por ASTM A-106 GR. B sin costura.

## 2.3 TUBERIA

2.3.1 Tamaño de 1" a 10", acero al carbono cédula 40, por ASTM A-106 GR. B sin costura.

2.3.2 Tamaño de 12", acero al carbono cédula 20, por ASTM A A-106 GR. B. sin costura.

2.3.3 Tamaño de 14" a 16" Consultar al fabricante.

## 3. DISEÑO Y FABRICACION

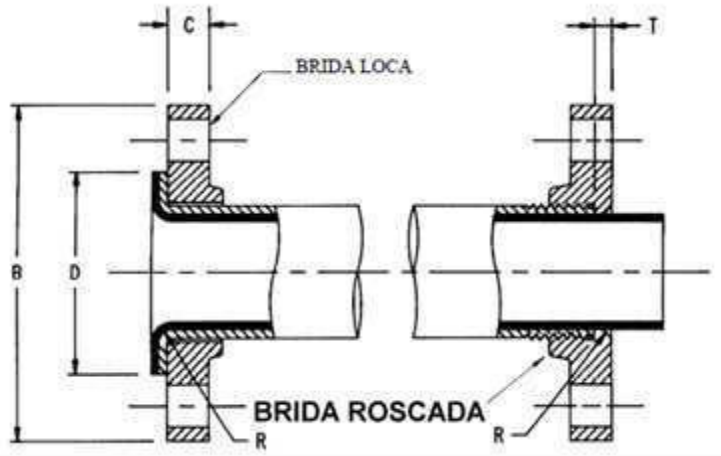
3.1 Las bridas para los productos recubiertos deben cumplir con ANSI 150, en dimensiones y arreglos de tornillería y con ANSI B16.5 en número de barrenos, a menos que se especifique de otra forma.

3.2 Las bridas slip on deben ser soldadas totalmente por atrás en los diámetros internos y externos, con el diámetro interno pulido y radiado, excepto si se usa como una brida rotatoria con stub end como cara del anillo del lado del diámetro interior el cual debe ser biselado para fijar el stub end.

3.3 Los accesorios deben cumplir con ANSI CLASE 150, y con ANSI B16.5, en dimensiones de cara a línea de centro, a menos que se especifique de otra forma.



3.4 Toda la soldadura en tubería y accesorios debe ser hecha previamente al recubrimiento para evitar daños al mismo.



### 3.5 Tolerancias de Fabricación

#### 3.5.1 Carrete de tubería

Dimensión	Tolerancia
Longitud	$\pm 1/8''$
Alineamiento de barrenos	$\pm 1/16''$
Alineamiento de bridas con la línea de centro Teórica	$\pm 1/32''$ (DE 1" a 4") $\pm 3/64''$ (DE 6" O MAS)

#### 3.5.2 Bridas

Todas las dimensiones: Por ANSI B16.5

#### 3.5.3. Conexiones

Dimensión	Tolerancia
De cara a línea de centro	$\pm 1/32''$ (DE 1" A 10") $\pm 1/16''$ (DE 12" o MAS) $\pm 1/32''$ (DE 1" A 4") $\pm 3/64''$ (DE 6" o MAS)

### 3.6 Radio mínimo en bordes interiores, para tubos y accesorios bridados

TAMAÑO	RADIO
1"	1/8"
1-1/2" Y 2"	1/4"
3" o más	3/8"



### 3.7 Espesor de pared del recubrimiento en tubería

Espesor mínimo de pared nominal (mm)

Tubería tamaño nominal	PTFE		PFA	PVDF	PP
	FIJO	DESLIZANTE			
1	3.0	3.0	3.175	3.17	3.81
1-1/2	3.0	3.0	3.175	3.42	4.06
2	3.0	3.0	3.175	3.68	4.44
3	3.5	3.5	3.175	4.19	4.44
4	3.0	4.2	3.175	4.57	5.33
6	4.0	4.0		5.08	5.58
8	4.0	4.0		5.08	5.58
10	4.0	4.0			6.35
12	4.0	4.0			6.35

Nota: Ciertos químicos pueden afectar la relación de vacío, consultar fabricante.

Recubrimiento deslizante: para otros materiales de recubrimiento diferente al PTFE

### 3.8 RANGOS DE TEMPERATURA Y PRESION

Rangos máximos de temperatura y presión para tubería, accesorios estándar con bridas clase 150 y accesorios como a continuación se menciona:

TEMPERATURA (°F)	PRESION (PSIG)
100	250
200	235
300	215
400	200
500	170

3.9 Las conexiones de PFA, PTFE, excepto bridas ciegas, bridas reducidas y conexiones para instrumento deben tener orificios de venteo de diámetro de 9/64"; los carretes de tubería excepto los recubrimientos de PVDF y PP, deben tener un orificio de venteo de 5/64" de diámetro, localizado de 3" a 6" de distancia de cada brida. Los sistemas con aislamiento pueden requerir extensiones para los orificios de venteo, cuando es necesario se deben proveer medios coples de tamaño medio de ¼" sobre los orificios de venteo antes del recubrimiento.



TABLA DE RESISTENCIA QUIMICA DEL RECUBRIMIENTO PTFE

Chemical	Compatibility
Acetaldehyde	A-Excellent
Acetamide	A-Excellent
Acetate Solvent	A-Excellent
Acetic Acid	A-Excellent
Acetic Acid 20%	A-Excellent
Acetic Acid 80%	A-Excellent
Acetic Acid, Glacial	A-Excellent
Acetic Anhydride	A-Excellent
Acetone	A-Excellent
Acetyl Bromide	A-Excellent
Acetyl Chloride (dry)	A-Excellent
Acetylene	A-Excellent
Acrylonitrile	A-Excellent
Adipic Acid	A-Excellent
Alcohols: Amyl	A-Excellent
Alcohols: Benzyl	A-Excellent
Alcohols: Butyl	A-Excellent
Alcohols: Diacetone	A-Excellent
Alcohols: Ethyl	A-Excellent
Alcohols: Hexyl	A-Excellent
Alcohols: Isobutyl	A2-Excellent
Alcohols: Isopropyl	A2-Excellent
Alcohols: Methyl	A-Excellent
Alcohols: Octyl	N/A
Alcohols: Propyl	A-Excellent
Aluminum Chloride	A-Excellent
Aluminum Chloride 20%	A-Excellent
Aluminum Fluoride	A-Excellent
Aluminum Hydroxide	A-Excellent
Aluminum Nitrate	A-Excellent
Aluminum Potassium Sulfate 10%	A-Excellent
Aluminum Potassium Sulfate 100%	A-Excellent
Aluminum Sulfate	A-Excellent
Alums	A-Excellent
Amines	A2-Excellent
Ammonia 10%	A-Excellent
Ammonia Nitrate	A-Excellent
Ammonia, anhydrous	A-Excellent
Ammonia, liquid	A-Excellent
Ammonium Acetate	A-Excellent
Ammonium Bifluoride	A-Excellent
Ammonium Carbonate	A-Excellent
Ammonium Caseinate	N/A
Ammonium Chloride	A-Excellent
Ammonium Hydroxide	A-Excellent
Ammonium Nitrate	A-Excellent
Ammonium Oxalate	N/A
Ammonium Persulfate	A1-Excellent
Ammonium Phosphate, Dibasic	A2-Excellent

Chemical	Compatibility
Ammonium Phosphate, Monobasic	A-Excellent
Ammonium Phosphate, Tribasic	A-Excellent
Ammonium Sulfate	A-Excellent
Ammonium Sulfite	A2-Excellent
Ammonium Thiosulfate	N/A
Amyl Acetate	A-Excellent
Amyl Alcohol	A-Excellent
Amyl Chloride	A-Excellent
Aniline	A-Excellent
Aniline Hydrochloride	A-Excellent
Antifreeze	N/A
Antimony Trichloride	A-Excellent
Aqua Regia (80% HCl, 20% HNO3)	A-Excellent
Arochlor 1248	A-Excellent
Aromatic Hydrocarbons	N/A
Arsenic Acid	A-Excellent
Arsenic Salts	N/A
Asphalt	A1-Excellent
Barium Carbonate	A-Excellent
Barium Chloride	A-Excellent
Barium Cyanide	A1-Excellent
Barium Hydroxide	A-Excellent
Barium Nitrate	A1-Excellent
Barium Sulfate	A-Excellent
Barium Sulfide	A-Excellent
Beer	A-Excellent
Beet Sugar Liquids	A1-Excellent
Benzaldehyde	A1-Excellent
Benzene	A-Excellent
Benzene Sulfonic Acid	A-Excellent
Benzoic Acid	A2-Excellent
Benzol	A-Excellent
Benzonitrile	A2-Excellent
Benzyl Chloride	N/A
Bleaching Liquors	A-Excellent
Borax (Sodium Borate)	A-Excellent
Boric Acid	A-Excellent
Brewery Slop	N/A
Bromine	A-Excellent
Butadiene	A2-Excellent
Butane	A-Excellent
Butanol (Butyl Alcohol)	A2-Excellent
Butter	A-Excellent
Buttermilk	A-Excellent
Butyl Amine	A2-Excellent
Butyl Ether	A1-Excellent
Butyl Phthalate	A2-Excellent
Butylacetate	A-Excellent
Butylene	A-Excellent

TABLA DE RESISTENCIA QUIMICA DEL RECUBRIMIENTO PTFE

Chemical	Compatibility
Butyric Acid	A2-Excellent
Calcium Bisulfate	N/A
Calcium Bisulfide	A-Excellent
Calcium Bisulfite	A-Excellent
Calcium Carbonate	A-Excellent
Calcium Chlorate	A-Excellent
Calcium Chloride	A-Excellent
Calcium Hydroxide	A-Excellent
Calcium Hypochlorite	A-Excellent
Calcium Nitrate	A2-Excellent
Calcium Oxide	A-Excellent
Calcium Sulfate	A-Excellent
Calgon	N/A
Cane Juice	A-Excellent
Carbolic Acid (Phenol)	A-Excellent
Carbon Bisulfide	N/A
Carbon Dioxide (dry)	A-Excellent
Carbon Dioxide (wet)	A-Excellent
Carbon Disulfide	A-Excellent
Carbon Monoxide	A-Excellent
Carbon Tetrachloride	A-Excellent
Carbon Tetrachloride (dry)	A-Excellent
Carbon Tetrachloride (wet)	A-Excellent
Carbonated Water	N/A
Carbonic Acid	A-Excellent
Catsup	N/A
Chloric Acid	A-Excellent
Chlorinated Glue	N/A
Chlorine (dry)	A-Excellent
Chlorine Water	A-Excellent
Chlorine, Anhydrous Liquid	A-Excellent
Chloroacetic Acid	A-Excellent
Chlorobenzene (Mono)	B-Good
Chlorobromomethane	A-Excellent
Chloroform	A1-Excellent
Chlorosulfonic Acid	A-Excellent
Chocolate Syrup	A-Excellent
Chromic Acid 10%	A-Excellent
Chromic Acid 30%	A-Excellent
Chromic Acid 5%	A-Excellent
Chromic Acid 50%	A-Excellent
Chromium Salts	N/A
Cider	N/A
Citric Acid	A-Excellent
Citric Oils	N/A
Clorox (Bleach)	A-Excellent
Coffee	N/A
Copper Chloride	A-Excellent
Copper Cyanide	A-Excellent

Chemical	Compatibility
Copper Fluoborate	N/A
Copper Nitrate	A-Excellent
Copper Sulfate-5%	A-Excellent
Copper Sulfate 5%	A-Excellent
Cream	A-Excellent
Cresols	N/A
Cresylic Acid	A-Excellent
Cupric Acid	A-Excellent
Cyanic Acid	A-Excellent
Cyclohexane	A-Excellent
Cyclohexanone	A-Excellent
Detergents	A-Excellent
Diacetone Alcohol	A-Excellent
Dichlorobenzene	A-Excellent
Dichloroethane	A1-Excellent
Diesel Fuel	A-Excellent
Diethyl Ether	A-Excellent
Diethylamine	D-Severe Effect
Diethylene Glycol	A2-Excellent
Dimethyl Aniline	A-Excellent
Dimethyl Formamide	A-Excellent
Diphenyl	A-Excellent
Diphenyl Oxide	A1-Excellent
Dyes	N/A
Epsom Salts (Magnesium Sulfate)	A-Excellent
Ethane	A-Excellent
Ethanol	A-Excellent
Ethanolamine	A1-Excellent
Ether	A-Excellent
Ethyl Acetate	A-Excellent
Ethyl Benzoate	A-Excellent
Ethyl Chloride	A-Excellent
Ethyl Ether	A-Excellent
Ethyl Sulfate	A-Excellent
Ethylene Bromide	A-Excellent
Ethylene Chloride	A-Excellent
Ethylene Chlorohydrin	A-Excellent
Ethylene Diamine	A-Excellent
Ethylene Dichloride	A-Excellent
Ethylene Glycol	A-Excellent
Ethylene Oxide	A-Excellent
Fatty Acids	A-Excellent
Ferric Chloride	A-Excellent
Ferric Nitrate	A-Excellent
Ferric Sulfate	A-Excellent
Ferrous Chloride	A-Excellent
Ferrous Sulfate	A-Excellent
Fluoboric Acid	A-Excellent
Fluorine	D-Severe Effect

TABLA DE RESISTENCIA QUIMICA DEL RECUBRIMIENTO PTFE

Chemical	Compatibility
Fluosilicic Acid	A-Excellent
Formaldehyde 100%	A-Excellent
Formaldehyde 40%	A-Excellent
Formic Acid	A-Excellent
Freon 113	A-Excellent
Freon 12	A-Excellent
Freon 22	A-Excellent
Freon TF	A-Excellent
Freonr 11	A-Excellent
Fruit Juice	A-Excellent
Fuel Oils	B-Good
Furan Resin	A-Excellent
Furfural	A-Excellent
Gallic Acid	B-Good
Gasoline (high-aromatic)	B-Good
Gasoline, leaded, ref.	A-Excellent
Gasoline, unleaded	A-Excellent
Gelatin	A-Excellent
Glucose	A-Excellent
Glue, P.V.A.	A-Excellent
Glycerin	A-Excellent
Glycolic Acid	A-Excellent
Gold Monocyanide	D-Severe Effect
Grape Juice	A-Excellent
Grease	A-Excellent
Heptane	A-Excellent
Hexane	A-Excellent
Honey	A-Excellent
Hydraulic Oil (Petro)	A-Excellent
Hydraulic Oil (Synthetic)	A-Excellent
Hydrazine	A-Excellent
Hydrobromic Acid 100%	A-Excellent
Hydrobromic Acid 20%	N/A
Hydrochloric Acid 100%	A-Excellent
Hydrochloric Acid 20%	A-Excellent
Hydrochloric Acid 37%	A-Excellent
Hydrochloric Acid, Dry Gas	A-Excellent
Hydrocyanic Acid	A-Excellent
Hydrocyanic Acid (Gas 10%)	A-Excellent
Hydrofluoric Acid 100%	A-Excellent
Hydrofluoric Acid 20%	A-Excellent
Hydrofluoric Acid 50%	A-Excellent
Hydrofluoric Acid 75%	A-Excellent
Hydrofluosilicic Acid 100%	A-Excellent
Hydrofluosilicic Acid 20%	A-Excellent
Hydrogen Gas	A-Excellent
Hydrogen Peroxide 10%	A-Excellent
Hydrogen Peroxide 100%	A-Excellent
Hydrogen Peroxide 30%	A-Excellent

Chemical	Compatibility
Hydrogen Peroxide 50%	A-Excellent
Hydrogen Sulfide (aqua)	A-Excellent
Hydrogen Sulfide (dry)	A-Excellent
Hydroquinone	A-Excellent
Hydroxyacetic Acid 70%	A-Excellent
Ink	A-Excellent
Iodine	A-Excellent
Iodine (in alcohol)	N/A
Iodoform	C-Fair
Isooctane	A-Excellent
Isopropyl Acetate	A-Excellent
Isopropyl Ether	A1-Excellent
Isotane	N/A
Jet Fuel (JP3, JP4, JP5)	A-Excellent
Kerosene	A-Excellent
Ketones	A-Excellent
Lacquer Thinners	A-Excellent
Lacquers	A-Excellent
Lactic Acid	A-Excellent
Lard	A-Excellent
Latex	A-Excellent
Lead Acetate	A-Excellent
Lead Nitrate	A1-Excellent
Lead Sulfamate	B-Good
Ligroin	A-Excellent
Lime	A1-Excellent
Linoleic Acid	A-Excellent
Lithium Chloride	A-Excellent
Lithium Hydroxide	A-Excellent
Lubricants	A-Excellent
Lye: Ca(OH)2 Calcium Hydroxide	A-Excellent
Lye: KOH Potassium Hydroxide	A-Excellent
Lye: NaOH Sodium Hydroxide	A-Excellent
Magnesium Bisulfate	A-Excellent
Magnesium Carbonate	A1-Excellent
Magnesium Chloride	A-Excellent
Magnesium Hydroxide	A-Excellent
Magnesium Nitrate	A-Excellent
Magnesium Oxide	A-Excellent
Magnesium Sulfate (Epsom Salts)	A-Excellent
Maleic Acid	A-Excellent
Maleic Anhydride	A-Excellent
Malic Acid	A-Excellent
Manganese Sulfate	A-Excellent
Mash	N/A
Mayonnaise	A-Excellent
Melamine	A-Excellent
Mercuric Chloride (dilute)	A-Excellent
Mercuric Cyanide	B-Good

TABLA DE RESISTENCIA QUIMICA DEL RECUBRIMIENTO PTFE

Chemical	Compatibility
Mercurous Nitrate	A-Excellent
Mercury	A-Excellent
Methane	A-Excellent
Methanol (Methyl Alcohol)	A-Excellent
Methyl Acetate	A-Excellent
Methyl Acetone	A-Excellent
Methyl Acrylate	N/A
Methyl Alcohol 10%	A-Excellent
Methyl Bromide	A-Excellent
Methyl Butyl Ketone	N/A
Methyl Cellosolve	A-Excellent
Methyl Chloride	A-Excellent
Methyl Dichloride	N/A
Methyl Ethyl Ketone	A-Excellent
Methyl Ethyl Ketone Peroxide	N/A
Methyl Isobutyl Ketone	A-Excellent
Methyl Isopropyl Ketone	A-Excellent
Methyl Methacrylate	N/A
Methylamine	A-Excellent
Methylene Chloride	A-Excellent
Milk	A-Excellent
Mineral Spirits	A-Excellent
Molasses	A-Excellent
Monochloroacetic acid	A2-Excellent
Monoethanolamine	A-Excellent
Morpholine	A2-Excellent
Motor oil	A-Excellent
Mustard	A-Excellent
Naphtha	B-Good
Naphthalene	A-Excellent
Natural Gas	A-Excellent
Nickel Chloride	A-Excellent
Nickel Nitrate	A2-Excellent
Nickel Sulfate	A-Excellent
Nitrating Acid (<15% HNO3)	A-Excellent
Nitrating Acid (>15% H2SO4)	A-Excellent
Nitrating Acid (S1% Acid)	A-Excellent
Nitrating Acid (S15% H2SO4)	A-Excellent
Nitric Acid (20%)	A-Excellent
Nitric Acid (50%)	A-Excellent
Nitric Acid (5-10%)	A-Excellent
Nitric Acid (Concentrated)	A-Excellent
Nitrobenzene	A-Excellent
Nitrogen Fertilizer	A-Excellent
Nitromethane	A-Excellent
Nitrous Acid	A-Excellent
Nitrous Oxide	A-Excellent
Oils: Aniline	A-Excellent
Oils: Anise	N/A

Chemical	Compatibility
Oils: Bay	N/A
Oils: Bone	A-Excellent
Oils: Castor	A-Excellent
Oils: Cinnamon	A-Excellent
Oils: Citric	A-Excellent
Oils: Clove	A-Excellent
Oils: Coconut	A-Excellent
Oils: Cod Liver	A-Excellent
Oils: Corn	A-Excellent
Oils: Cottonseed	A-Excellent
Oils: Creosote	A-Excellent
Oils: Diesel Fuel Oil (20, 30, 40, 50)	A-Excellent
Oils: Fuel Oil (1, 2, 3, 5A, 5B, 6)	A-Excellent
Oils: Ginger	A-Excellent
Oils: Hydraulic Oil (Petro)	A-Excellent
Oils: Hydraulic Oil (Synthetic)	A-Excellent
Oils: Lemon	A-Excellent
Oils: Linseed	A-Excellent
Oils: Mineral	A-Excellent
Oils: Olive	A1-Excellent
Oils: Orange	N/A
Oils: Palm	A-Excellent
Oils: Peanut	A-Excellent
Oils: Peppermint	A-Excellent
Oils: Pine	A-Excellent
Oils: Rapeseed	A-Excellent
Oils: Rosin	A-Excellent
Oils: Sesame Seed	A-Excellent
Oils: Silicone	A-Excellent
Oils: Soybean	A-Excellent
Oils: Sperm (whale)	A-Excellent
Oils: Tanning	N/A
Oils: Transformer	A-Excellent
Oils: Turbine	A-Excellent
Oleic Acid	A-Excellent
Oleum 100%	A-Excellent
Oleum 25%	A-Excellent
Oxalic Acid (cold)	A1-Excellent
Ozone	A-Excellent
Palmitic Acid	A2-Excellent
Paraffin	A-Excellent
Pentane	A-Excellent
Perchloric Acid	A-Excellent
Perchloroethylene	A-Excellent
Petrolatum	C-Fair
Petroleum	A2-Excellent
Phenol (10%)	A-Excellent
Phenol (Carbolic Acid)	A-Excellent
Phosphoric Acid (>40%)	A-Excellent



TABLA DE RESISTENCIA QUIMICA DEL RECUBRIMIENTO PTFE EN TUBERIAS Y ACCESORIOS

Chemical	Compatibility
Phosphoric Acid (crude)	A-Excellent
Phosphoric Acid (molten)	N/A
Phosphoric Acid (S40%)	A-Excellent
Phosphoric Acid Anhydride	N/A
Phosphorus	A2-Excellent
Phosphorus Trichloride	A2-Excellent
Photographic Developer	A-Excellent
Photographic Solutions	A2-Excellent
Phthalic Acid	A2-Excellent
Phthalic Anhydride	A-Excellent
Picric Acid	A-Excellent
Plating Solutions, Antimony Plating 130°F	A-Excellent
Plating Solutions, Arsenic Plating 110°F	A-Excellent
Plating Solutions (Brass): High-Speed Brass Bath 110°F	A-Excellent
Plating Solutions (Brass): Regular Brass Bath 100°F	A-Excellent
Plating Solutions (Bronze): Cu-Cd Bronze Bath R.T.	A-Excellent
Plating Solutions (Bronze): Cu-Sn Bronze Bath 160°F	A-Excellent
Plating Solutions (Bronze): Cu-Zn Bronze Bath 100°F	A-Excellent
Plating Solutions (Cadmium): Cyanide Bath 90°F	A-Excellent
Plating Solutions (Cadmium): Fluoborate Bath 100°F	A-Excellent
Plating Solutions, (Chromium): Barrel Chrome Bath 95°F	A-Excellent
Plating Solutions, (Chromium): Black Chrome Bath 115°F	A-Excellent
Plating Solutions, (Chromium): Chromic-Sulfuric Bath 130°F	A-Excellent
Plating Solutions, (Chromium): Fluoride Bath 130°F	A-Excellent
Plating Solutions, (Chromium): Fluosilicate Bath 95°F	A-Excellent
Plating Solutions (Copper) (Acid): Copper Fluoborate Bath 120°F	A-Excellent
Plating Solutions (Copper) (Acid): Copper Sulfate Bath R.T.	A-Excellent
Plating Solutions (Copper) (Cyanide): Copper Strike Bath 120°F	A-Excellent
Plating Solutions (Copper) (Cyanide): High-Speed Bath 180°F	A-Excellent
Plating Solutions (Copper) (Cyanide): Rochelle Salt Bath 150°F	A-Excellent
Plating Solutions (Copper) (Misc): Copper (Electroless)	A-Excellent
Plating Solutions (Copper) (Misc): Copper Pyrophosphate	A-Excellent
Plating Solutions (Gold): Acid 75°F	A-Excellent
Plating Solutions (Gold): Cyanide 150°F	A-Excellent
Plating Solutions (Gold): Neutral 75°F	A-Excellent
Plating Solutions, Indium Sulfamate Plating R.T.	A-Excellent
Plating Solutions (Iron): Ferrous Am Sulfate Bath 150°F	A-Excellent
Plating Solutions (Iron): Ferrous Chloride Bath 190°F	A-Excellent
Plating Solutions (Iron): Ferrous Sulfate Bath 150°F	A-Excellent
Plating Solutions (Iron): Fluoborate Bath 145°F	A-Excellent
Plating Solutions (Iron): Sulfamate 140°F	A-Excellent
Plating Solutions (Iron): Sulfate-Chloride Bath 160°F	A-Excellent
Plating Solutions, Lead Fluoborate Plating	A-Excellent
Plating Solutions, (Nickel): Electroless 200°F	A-Excellent
Plating Solutions, (Nickel): Fluoborate 100-170°F	A-Excellent
Plating Solutions, (Nickel): High-Chloride 130-160°F	A-Excellent
Plating Solutions, (Nickel): Sulfamate 100-140°F	A-Excellent
Plating Solutions, (Nickel): Watts Type 115-160°F	A-Excellent
Plating Solutions (Rhodium) 120°F	A-Excellent

Chemical	Compatibility
Plating Solutions, (Silver) 80-120°F	A-Excellent
Plating Solutions, Tin-Fluoborate Plating 100°F	A-Excellent
Plating Solutions, Tin-Lead Plating 100°F	A-Excellent
Plating Solutions (Zinc): Acid Chloride 140°F	A-Excellent
Plating Solutions (Zinc): Acid Fluoborate Bath R.T.	A-Excellent
Plating Solutions (Zinc): Acid Sulfate Bath 150°F	A-Excellent
Plating Solutions (Zinc): Alkaline Cyanide Bath R.T.	A-Excellent
Potash (Potassium Carbonate)	N/A
Potassium Bicarbonate	A-Excellent
Potassium Bromide	A-Excellent
Potassium Chlorate	A-Excellent
Potassium Chloride	A-Excellent
Potassium Chromate	A1-Excellent
Potassium Cyanide Solutions	A-Excellent
Potassium Dichromate	A-Excellent
Potassium Ferricyanide	A2-Excellent
Potassium Ferrocyanide	A-Excellent
Potassium Hydroxide (Caustic Potash)	A-Excellent
Potassium Hypochlorite	A2-Excellent
Potassium Iodide	A2-Excellent
Potassium Nitrate	A-Excellent
Potassium Oxalate	A2-Excellent
Potassium Permanganate	A-Excellent
Potassium Sulfate	A-Excellent
Potassium Sulfide	A-Excellent
Propane (liquefied)	A-Excellent
Propylene	A2-Excellent
Propylene Glycol	A-Excellent
Pyridine	A-Excellent
Pyrogalllic Acid	A-Excellent
Resorcinol	A2-Excellent
Rosins	A-Excellent
Rum	N/A
Rust Inhibitors	N/A
Salad Dressings	N/A
Salicylic Acid	A2-Excellent
Salt Brine (NaCl saturated)	A2-Excellent
Sea Water	A-Excellent
Shellac (Bleached)	A-Excellent
Shellac (Orange)	A-Excellent
Silicone	A-Excellent
Silver Bromide	A-Excellent
Silver Nitrate	A-Excellent
Soap Solutions	A-Excellent
Soda Ash (see Sodium Carbonate)	A-Excellent
Sodium Acetate	A-Excellent
Sodium Aluminate	A-Excellent
Sodium Benzoate	A2-Excellent
Sodium Bicarbonate	A-Excellent

TABLA DE RESISTENCIA QUIMICA DEL RECUBRIMIENTO PTFE

Chemical	Compatibility
Sodium Bisulfate	A-Excellent
Sodium Bisulfite	A-Excellent
Sodium Borate (Borax)	A-Excellent
Sodium Bromide	A2-Excellent
Sodium Carbonate	A-Excellent
Sodium Chlorate	A-Excellent
Sodium Chloride	A-Excellent
Sodium Chromate	A-Excellent
Sodium Cyanide	A-Excellent
Sodium Ferrocyanide	A-Excellent
Sodium Fluoride	A1-Excellent
Sodium Hydrosulfite	A-Excellent
Sodium Hydroxide (20%)	A-Excellent
Sodium Hydroxide (50%)	A-Excellent
Sodium Hydroxide (80%)	A1-Excellent
Sodium Hypochlorite (<20%)	A-Excellent
Sodium Hypochlorite (100%)	A-Excellent
Sodium Hyposulfate	A-Excellent
Sodium Metaphosphate	A-Excellent
Sodium Metasilicate	A-Excellent
Sodium Nitrate	A-Excellent
Sodium Perborate	A-Excellent
Sodium Peroxide	A-Excellent
Sodium Polyphosphate	A-Excellent
Sodium Silicate	A-Excellent
Sodium Sulfate	A-Excellent
Sodium Sulfide	A-Excellent
Sodium Sulfite	A-Excellent
Sodium Tetraborate	A-Excellent
Sodium Thiosulfate (hypo)	A-Excellent
Sorghum	N/A
Soy Sauce	N/A
Stannic Chloride	A-Excellent
Stannic Fluoroborate	N/A
Stannous Chloride	A-Excellent
Starch	A-Excellent
Stearic Acid	A-Excellent
Stoddard Solvent	A-Excellent
Styrene	A-Excellent
Sugar (Liquids)	A-Excellent
Sulfate (Liquors)	A-Excellent
Sulfur Chloride	A-Excellent
Sulfur Dioxide	A-Excellent
Sulfur Dioxide (dry)	A-Excellent
Sulfur Hexafluoride	N/A
Sulfur Trioxide	A-Excellent
Sulfur Trioxide (dry)	A-Excellent
Sulfuric Acid (<10%)	A-Excellent
Sulfuric Acid (10-75%)	A-Excellent

Chemical	Compatibility
Sulfuric Acid (75-100%)	A-Excellent
Sulfuric Acid (cold concentrated)	A-Excellent
Sulfuric Acid (hot concentrated)	A-Excellent
Sulfurous Acid	A-Excellent
Sulfuryl Chloride	A-Excellent
Tallow	A-Excellent
Tannic Acid	A-Excellent
Tanning Liquors	A-Excellent
Tartaric Acid	A-Excellent
Tetrachloroethane	A-Excellent
Tetrachloroethylene	A-Excellent
Tetrahydrofuran	A-Excellent
Tin Salts	A-Excellent
Toluene (Toluol)	A-Excellent
Tomato Juice	A-Excellent
Trichloroacetic Acid	A-Excellent
Trichloroethane	A-Excellent
Trichloroethylene	A-Excellent
Trichloropropane	A1-Excellent
Tricresylphosphate	A-Excellent
Triethylamine	A-Excellent
Trisodium Phosphate	A-Excellent
Turpentine	A-Excellent
Urea	A-Excellent
Uric Acid	A-Excellent
Urine	A1-Excellent
Varnish	A-Excellent
Vegetable Juice	A-Excellent
Vinegar	A-Excellent
Vinyl Acetate	A2-Excellent
Vinyl Chloride	A2-Excellent
Water, Acid, Mine	A-Excellent
Water, Deionized	A2-Excellent
Water, Distilled	A-Excellent
Water, Fresh	A-Excellent
Water, Salt	A-Excellent
Weed Killers	N/A
Whey	A-Excellent
Whiskey & Wines	A-Excellent
White Liquor (Pulp Mill)	A-Excellent
White Water (Paper Mill)	N/A
Xylene	A-Excellent
Zinc Chloride	A-Excellent
Zinc Hydrosulfite	A-Excellent
Zinc Sulfate	A-Excellent
<p>Explanation of Footnotes            1. Satisfactory to 72°F (22°C)            2. Satisfactory to 120°F (48°C)</p> <p>Ratings: Chemical Effect            A = Excellent.            B = Good, Minor Effect, slight corrosion or discoloration            C = Fair, Moderate Effect, not recommended for continuous use. Softening, loss of strength, or swelling may occur.            D = Severe Effect, not recommended for ANY use.            N/A = Information not available.</p> <p>CAUTION: Variations in chemical behavior during handling due to factors such as temperature, pressure, and concentrations can cause equipment to fail, even though it passed an initial test.</p>	