ENGINEERING GUIDE FOR HOSES

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VERSILON® HOSE ENGINEERING GUIDE

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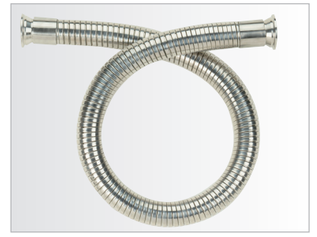
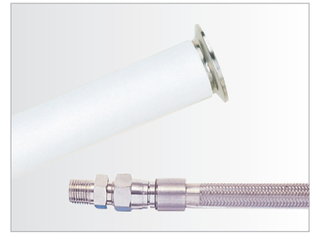


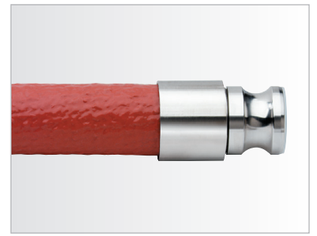
Stainless steel (Type 304) anti-kink armor casing prevents over-bending/kinking of hose and provides chafe protection for the wire braid. Casing provides an added safety feature, allowing hose assembly to weep rather than rupture if for some reason the tube should fail. Armor can be ordered full length (Accessory Code A) or with 16" cuffs at each end to reduce potential stress at the fitting (Accessory Code C). Anti-kink armor casing is strongly recommended for all TS/TB/TD/TBD assemblies 3/4" ID and larger.

Heat Shrink/Rubber & EPDM Cover/ HDPE Spiral Wrap



Polyolefin clear (PC) or white (PW) tubing is shrunk tightly to the hose with external heat. Clear (TC) and black (TB) FEP heat shrink sleeves are also available. A heat shrink sleeve generally restricts hose flexibility by a 2:1 factor. Other methods of protecting the external braid from exposure to various materials are blown-on thin wall rubber covers or thin wall PVC tubing. These options can be useful to color code applications. (Accessory Code PC, PF, R or T as applicable.) Polyolefin maximum temperature: 180°F (82°C). FEP maximum temperature: 400°F (204°C). PVC maximum temperature: 160˚F (71°C). EPDM cover or HDPE spiral wrap can also be used to protect the external braid from exposure to various materials.

Firesleeve/Insulating Cover



This cover protects the hose from external heat/ flame. It also helps insulate hot internal materials from the worker's touch. Material is braided fiberglass tubing impregnated with silicone rubber. Sleeve is normally clamped at the fittings (Accessory Code F). Firesleeve is engineered to withstand continuous temperatures from -65°F (-54°C) to +500°F (+260°C); consult specific hose type for actual maximum temperature rating of hose assembly.

Silicone Slip-On Cover

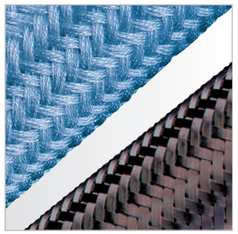
Thin wall, clear silicone tube is slipped over stainless steel or other types of braid reinforcement to produce a tight, easily cleaned cover. Can be autoclaved or SIP cleaned. Assemblies remain at maximum temperature rating. Designed for larger diameter and Flare-Thru hose assemblies. Consult factory for maximum and minimum length of sleeved assemblies.

Additional Product Services

Hose Cover Options

Various Covers and Braid Material

Process segregation sometimes requires color hose assemblies to help prevent mismatching. Heat shrink sleeves also enable the hose exterior to be cleaned more easily and prevent material from sticking in the braid interstices. Sometimes a non-metallic braid is required. The blue hose shown near right has a polypropylene braid; Kynar® braid is black.



Color Coding Options

Colors may be special ordered for TLCT/SFTL, TLCTCO and CTLCT rubber covered hose. Consult factory for minimum order requirements.

Hose Options

Custom Laser Etched Hose Tagging

Most Versilon® hoses can be tagged with a stainless steel Band-it® clamp. We can tag hoses 1/2" ID and larger*. Customers can specify information; otherwise the following default information applies:

- Maximum allowable working pressure
- Date of manufacture
- Saint-Gobain logo

* 1/4" ID and 3/8" ID hoses are tagged with a roll stamped aluminum ring.

Stainless Steel Tag Specifications

Dimensions:

- 75" x 1.94" x 0.010" thick
- 0.625" x 1.44" printing area
- Maximum characters—3 lines of 15 characters
- Attachment—one 1/4" wide Band-it® clamp

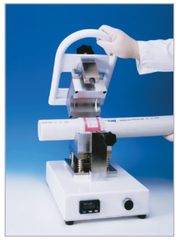
Large Stainless Steel Tag Specifications

Dimensions:

- 1.5" x 2.5" x 0.015" thick
- 0.94" x 1.75" printing area
- Maximum characters—6 lines of 15 characters
- Attachment—two 1/4" wide Band-it® clamps

SANIseal™ Hose Identification System

The SANIseal™ silicone label encapsulation system allows key information such as date of manufacture, lot number, approval criteria and re-order phone number to be permanently sealed and bonded to Versilon® hoses — with no product contact and no areas where entrapment can occur. SANIseal™ meets or exceeds FDA requirements on hose identification, is very durable, and operates at the touch of a single button. It is compatible with the full range of Versilon® hoses through 3" ID, including those with silicone, stainless steel and EPDM rubber covers. Lightweight SANIseal™ field fabrication equipment is available for convenient on-site use.

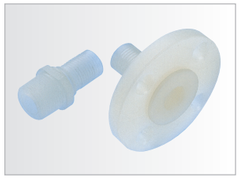


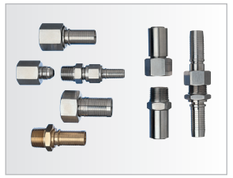
Special Alloy and Non-Metallic Fittings

Saint-Gobain has manufactured many types of special alloy and non-metallic fittings to complement our standard product line (Flare-Thru, PFA encapsulated 316 stainless steel). Materials from which we have fabricated fittings include:

- Brass
- Carbon steel
- Hastelloy® B and Hastelloy® C
- Monel®
- Titanium
- PVC
- Polypropylene
- PVDF (Kynar®)
- Solid PTFE
- FEP-coated stainless steel

This is only a partial list. Please do not hesitate to contact the factory for information on unusual fitting requirements, but bear in mind that cost and delivery schedule are directly related to the size, complexity and quantity of fittings ordered.





Steam Table

Gauge psi	Temp ˚F	Gauge psi	Temp ˚F	Gauge psi	Temp ˚F	Gauge psi	Temp ˚F	Gauge psi	Temp ˚F
5	227	45	293	85	328	150	366	230	399
6	230	46	294	86	328	152	367	232	400
7	232	47	295	87	329	154	368	234	400
8	235	48	296	88	330	156	369	235	401
9	237	49	297	89	331	158	370	237	402
10	240	50	298	90	331	160	371	239	402
11	242	51	299	91	332	162	372	241	403
12	244	52	300	92	333	164	372	243	404
13	246	53	301	93	333	166	373	245	404
14	248	54	302	94	334	168	374	247	405
15	250	55	303	95	335	170	375	249	406
16	252	56	304	96	335	172	376	251	406
17	254	57	305	97	336	174	377	253	407
18	255	58	306	98	337	176	378	255	408
19	257	59	306	99	337	178	379	257	408
20	259	60	307	100	338	180	380	259	409
21	261	61	308	102	339	182	380	261	410
22	262	62	309	104	341	184	381	263	410
23	264	63	310	106	342	186	382	265	411
24	265	64	311	108	343	188	383	267	412
25	267	65	312	110	344	190	384	269	412
26	268	66	313	112	345	192	385	271	413
27	270	67	314	114	347	194	385	273	414
28	271	68	314	116	348	196	386	275	414
29	273	69	315	118	349	198	387	277	415
30	274	70	316	120	350	200	388	279	415
32	276	71	317	122	351	202	389	281	416
32	277	72	318	124	352	204	389	283	417
33	278	73	319	126	353	206	390	285	417
34	280	74	319	128	355	208	391	295	420
35	281	75	320	130	356	210	392	305	423
36	282	76	321	132	357	212	392	355	437
37	283	77	322	134	358	214	393	375	442
38	285	78	322	136	359	216	394	385	445
39	286	79	323	138	360	218	395	405	449
40	287	80	324	140	361	220	395	455	461
41	288	81	325	142	362	222	396	510	472
42	289	82	326	144	363	224	397	560	482
43	290	83	326	146	364	226	398	585	486
44	291	84	327	148	365	228	398		

Testing and Measurement

Testing

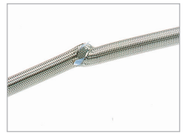
Traceability

Work orders direct every phase of assembly and testing. Records with details of each operation are individually signed off and retained with the master copy to ensure traceability in the unlikely event of a problem.

100% Pressure Test

Every assembly order is tested in accordance with ASTM requirements. Types of tests include hydrostatic, air under water, and nitrogen under water. Each and every hose is pneumatically or hydrostatically pressure tested in accordance with ASTM requirements to ensure against leakage when placed in service.

Periodic Burst Testing



Various fittings and different size hoses are periodically burst tested to verify that:

- Minimum burst pressure exceeds all catalog ratings
- Fitting retention at high pressures
- The assembly ruptures in the hose rather than caused by the fitting design or assembly

Measurement

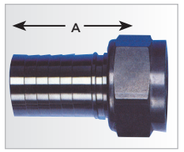
Hose Length Measurements

Versilon® hose assemblies are generally measured from end to end. The exceptions to this practice are illustrated at left. J.I.C. female swivel (Style 02), female cam and groove (Style 16) and sanitary bevel seat (Style 20) fittings are measured lengthwise from the sealing surface of the fitting.

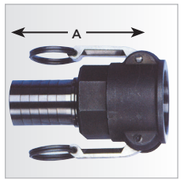
Length Tolerance

Up to 24" OAL assemblies: 1/4" (.250")
Over 24" up to 60": 1/2" (.500")
Over 60": 1%
Length tolerance for open pitch and low profile hoses: +4%/-0%
Length tolerance for chlorine hoses: +5%/-0%

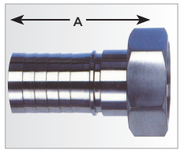
Exceptions:



JIC Female Swivel (Style 02)

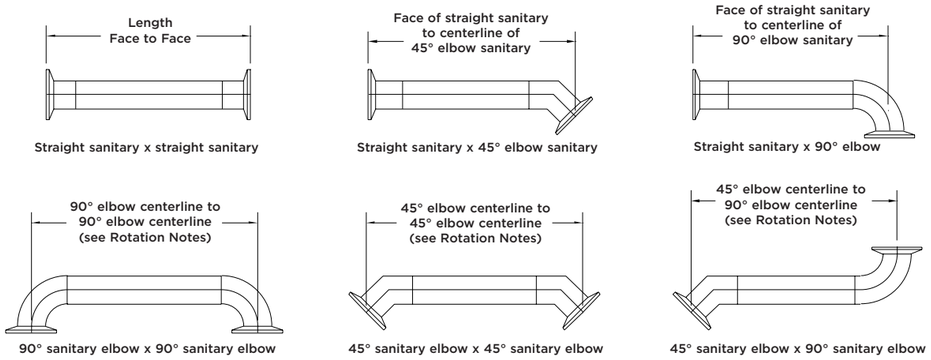


Female Cam and Groove (Style 16)



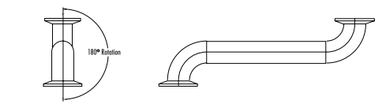
Sanitary Bevel Seat (Style 20)

The following illustrations show how to measure the overall length (OAL) of Versilon® hose assemblies, including 45° and 90° elbow fittings. Examples are shown with clamp style sanitary fittings.



Rotation Notes

When ordering double elbow hose assemblies, angular orientation between the elbows is expressed in degrees. The angle is measured counterclockwise from the centerline of the nearest fitting when the fitting is positioned at 6 o'clock to the centerline of the other fitting, as shown at right.



(Front view)
Angle orientation measured in degrees (counterclockwise)

(Side view)
180° configuration

Live Hose Length for Offset Motion in Metal Hose

For fluoropolymer hose assemblies, factor the live length shown below by 2.5 and then add the fitting lenths to arrive at recommended OAL.

Centerline Bend Radius (in.)

Intermittent Offset Motion Maximum Distance from Centerline

	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/2"	2"	3"	4"	5"	6"	8"	10"
5	2	3	3½	4	5	6	7	7¼	10¼	12¼	13½	15	18	20½
6	2¼	3¼	3¼	4½	5¼	6¼	7¼	8¼	10¾	12¾	14¼	16	19	21½
7	2⅛	3⅜	4	4¾	5¾	6¾	8¼	9¼	11½	13½	15¼	17	19¾	23
8	2½	3½	4¼	5	6	7	8¼	10	12¼	14½	16¼	18	21½	24¼
9	2⅛	3¼	4½	5¼	6½	7½	9¼	10¾	13¼	15¼	17	19	22½	25½
10	2¾	4	4¾	5½	6¾	8	9¾	11¼	13¾	16	18	20	23½	26½
11	2⅞	4⅛	5	5¾	7¼	8¼	10¼	11¾	14½	16¾	18¾	20¾	24½	27½
12	3	4¼	5¼	6	7½	8½	10¼	12¼	15	17½	19½	21½	25½	28¾
13	3⅛	4½	5½	6¼	7¾	9	10¾	12¾	15¾	18	20¼	22½	26¼	29¾
14	3¼	4¾	5¾	6½	8	9¼	11¼	13¼	16¼	18¾	21	23½	27¼	30¾
15	3⅜	4⅞	5⅞	6¾	8¼	9¾	11¾	13½	16¾	19¼	21¾	24¼	28	31¾
16	3½	5	6	7	8½	10	12¼	14	17¼	20	22½	25	29	33½
17	3⅝	5⅛	6¼	7¼	8¾	10¼	12½	14½	17¾	20½	23¼	25½	29¾	33½
18	3¾	5¼	6½	7½	9	10½	13	15	18¼	21¼	24	26	30½	34
19	3⅞	5⅜	6⅝	7¾	9¼	10¾	13¼	15¼	18¾	21¾	24½	26¾	31¼	35
20	4	5½	6¾	8	9½	11	13½	15¾	19¼	22½	25	27½	32¼	36¼
22	4⅛	5¾	7	8¼	9¾	11½	14	16¼	20	23¼	25¾	28½	33½	37½
24	4¼	6	7¼	8½	10	12	14½	17	20¾	24	26½	29½	34¾	39
26	4⅜	6¼	7½	8¾	10½	12½	15	17½	21½	25	27¾	30¾	36	40¼
28	4½	6½	7¾	9	11	13	15¾	18¼	22½	26	29	32	37½	41½
30	4¾	6¾	8¼	9½	11¾	13½	16½	19	23½	27¼	30½	33½	39	43¾
35	5¼	7¼	9	10¼	12¼	14½	18	20¾	26¼	29½	32¾	36	42	47
40	5½	7¾	9½	11	13½	15½	19	22	27	31¼	35	38½	44¾	50
45	6	8¼	10	11¾	14¼	16½	20¾	23½	28½	33¼	37	41	47½	53
50	6¼	8¾	10¾	12¼	15	17½	21½	24¾	30	35	39	43	50	56
60	6¾	9½	11¾	13½	16½	19	23¼	27	33	38¼	43	47	54½	61
70	7¼	10¼	12¼	14¾	17¾	20½	25¼	29	35½	41½	46	51	58¾	65¾
80	7¾	11	13½	15½	19	22	27	31	38	44	49½	54	62¾	70
90	8¼	11¾	14¼	16½	20¼	23½	28½	33	40½	46¾	52	57¼	66¼	74¼
100	8¾	12¼	15	17½	21¼	24½	30	35	42½	49¼	55	60½	69¾	78¼

Important Note

The values shown in the shaded portion are applicable to static bends only. For intermittent flexing, the offset motion should never be greater than 25% of the centerline bend radius.

Assembly Length (Live and Overall Length)

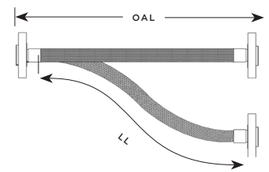
The live length and overall length of the assembly must be determined to complete the design. The live length is the flexible portion of an assembly. After the live length has been determined, the overall length is determined by adding the dimensions for the end fittings.

Motion Calculations

Axial Motion: Motion that occurs when a hose is compressed along its longitudinal axis. Axial motion is only applicable in very short lengths of annular hose only. Fluoropolymer lined hose should not be subjected to axial motion.

Offset Motion: Motion that occurs when one end of the hose is deflected in a plane perpendicular to its longitudinal axis with the ends remaining parallel. In offset applications where motion is repeated, the offset should never exceed 25% of the minimum bend radius. To calculate the required live length to achieve a desired offset, use the following calculations:

LL = $\sqrt{6YR + Y^2}$
LL = hose live length, inches
R = min. bend radius, inches
Y = offset, inches
OAL = LL + fitting length + (2x nominal hose diameter)



Note: Where offset motion "Y" occurs on both sides of hose centerline, the hose live length should be based on total travel, or 2Y. The modified calculation will be:
LL = $\sqrt{12YR + (2Y)^2}$

Material Specification References

Specifications

ASTM D1457-87
ASTM D4895-89

PTFE meets MIL-I-22129C. Assemblies to SAE 100R7. Versilon® conductive series hose TB, TBOB, BCS, etc. conforms to conductivity specifications of MIL-H-27267.

Physical properties of a hose assembly produced from a specific fluoropolymer resin will vary depending on its diameter and wall thickness. The following typical physical properties are average values as measured using test methods of the American Society for Testing and Materials. Unless otherwise noted, all tests were conducted at room temperature (73°F). Values shown were determined on 0.075" thick extruded strip or 0.075" thick molded ASTM plaques or molded ASTM durometer buttons.

IMPORTANT It is the users' responsibility to ensure the suitability and safety of Versilon® fluoropolymer hose for all intended uses, including establishing the compatibility of any fluid with the hose through which it is transmitted. Laboratory, field or clinical tests must be conducted in accordance with applicable requirements in order to determine the safety and effectiveness for use of hose in any particular application.

Fluoropolymer Physical Properties

	Durometer** Hardness Shore, A, 15s	Color	Maximum Recommended Operating Temp. °F (°C)	Tensile Strength psi (MPa)	Ultimate Elongation %	Brittle Temperature	Specific Gravity	Water Absorption %	Chemical Solvent Resistance	Folding Endurance (cycles)
ASTM Method	D2240-91			D1457, D1708, D638	D1457, D1708, D638	D746-79	D792	D570-81		
FEP	55D	Translucent	400 (204)	3400 (23)	325	-100°F	2.15	<0.01	Excellent	$5 - 80 \times 10^3$
PFA	60D	Translucent	500 (260)	3600 (25)	300	-320°F	2.15	<0.03	Excellent	$50 - 500 \times 10^3$
PTFE	58D	Translucent	500 (260)	3000-5000 (20.7 - 34.5)	300	-450°F	2.13 - 2.22	<0.01	Excellent	10^6

* 1-second reading. ** Durometer measured on outer jacket.

Note: The ratings in the charts DO NOT reflect the extent to which extraction may occur, or the extent to which fluids may undergo any physical changes in properties or composition, as a result of coming into contact with the hose. Saint-Gobain makes no representation or warranty with respect to the susceptibility of any fluid to become contaminated or undergo changes in properties or composition as a result of possible extraction of hose ingredients by the fluid to be transmitted. Certain corrosives that would be destructive to tubing with prolonged exposure can be satisfactorily handled for short periods of time if flushed with water after use. All ratings are based on room temperature (73°F). Elevated temperatures will adversely affect chemical resistance.

Application References

Electrostatic Discharge

Most applications of Versilon® fluoropolymer hoses do not require the use of a conductive inner tube. Under certain applications, however, the potential for static discharge must be considered. Static electricity can be a hazard. Under those conditions where static discharge can occur, the use of conductive Versilon® PTFE hose is recommended.

When two different materials contact each other, electrons from one material can move across its boundary and associate with the other. These electrons align themselves with the material contacted. If the two materials are good conductors of electricity, the positive and negative electrons flow back and forth between them, keeping them in balance. If one or both are insulators, the flow will not occur. A charge will then build up on the surface of one of the materials. When the charge exceeds the electric strength of the material, dielectric breakdown results.

In applying this to PTFE hose, we have to consider fluids and gases, which are poor conductors of electricity, and the flow rates of those fluids and gases. In order for a liquid or gas to be a poor electrical conductor it will generally satisfy one or both of the following conditions:

1. Be nonpolar; that is, an imbalance between protons and electrons, and/or
2. Contain a nonmixable component or a suspended solid; such as water in kerosene.

So when a liquid contacts a PTFE tube that isn't a good conductor (white PTFE innercore), the result is phase separation, and the electric charge starts to build. The rate at which static electricity builds up now becomes a function of the fluid flow rate. When the dielectric strength of the PTFE tube is exceeded, the electric charge will puncture the tube wall and ground itself on the stainless steel braid of the hose. In hydraulics, high pressures generally mean high velocities. Historically, fluids were filtered upstream of the hoses using metallic filter elements. The metallic element helped to ground the charge. But, today, most filtration is done with paper type and glass-fiber elements that have a tendency to inject an electrostatic charge into the fluid they are filtering.

Fuels and steam are two specific areas of concern.

Fuels are, for the most part, "nonconductive" liquids and have a resistivity greater than 108 ohm; i.e., gasoline and white spirits, hydrazine, benzene, diesel oils, etc. These fluids usually are transferred at fairly low velocities, but there still is a potential for an electrostatic discharge due to external factors, such as humidity and, to some extent, temperature. You should take all of these factors into account even at fluid velocities at or below 1 meter per second.

When using PTFE hose, you can offset the potential hazard of electrostatic discharge by using a conductive PTFE hose. Carbon is added to the PTFE inner wall during manufacture. The carbon layer directs the electrostatic charge down the inner diameter of the hose to the metal end fittings. This prevents the charge from building up on the inner tube wall.

It's important to examine any application where nonconductive fluids are used and any of the above conditions exist. This section is not meant to cover all conditions or situations involving fuels, steam or other media which may cause electrostatic buildup or potential discharge.

Following is a list of some of the chemicals which meet at least one of the criteria necessary to create electrostatic discharge:

Cyclohexane
Decalin
Deionized Water
Diacetone
Dibutyl Ether
Dibutyl Phthalate
Dibutyl Sebacate
Dimethyl Phthalate
Dioctyl Phthalate
Dipentene
Freon
Fuel Oil
Gasoline
Hexane
Hezene
Hydraulic Oil
Hydrazine
Kerosene
Lacquer Solvents
Lacquers
Lacquers Decalin
Mineral Oil
n-Octane
Naphtha
Naphthalene
Paint
Petroleum
Phosphate Ester
Pinene
Silicone Oils
Skydrol 500 & 700
Steam
Transformer Oil
Toluene
Turpentine
Varnish
Versilube

Technical Terms Used

Quite often, customers have questions when the subject of hose flexibility is brought up. Many different terms are used to describe this attribute of the Saint-Gobain Versilon® product line. Below are some of the formal definitions currently used in the hose industry.

Bend Radius (fluoropolymer hose and all rubber hose) — The radius of a bent section of hose measured to the inner-most surface of the curved portion (R1).

Bend Radius (metal hose) — The radius of a bent section of hose measured to the hose centerline (R2).

Minimum Bend Radius — The smallest radius at which a hose can be used.

For Metal Hose

Dynamic Bend Radius — The radius at which constant or continuous flexing occurs.

Static Bend Radius — The smallest fixed radius to which a hose can be subjected.

Force to Bend — The amount of stress required to induce bending around a specified radius. Hence, a measure of stiffness.

Pressure Definitions

Maximum Rated Working Pressure — The maximum pressure that the hose can be subjected to on a continuous basis.

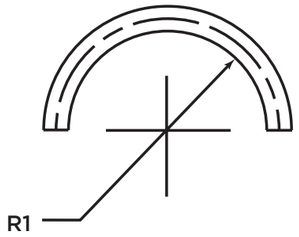
Maximum Rated Test Pressure — The maximum rated pressure is multiplied by 150% to determine the maximum rated test pressure.

Nominal Rated Burst Pressure — The average pressure at which the core or braid will rupture at ambient temperature.

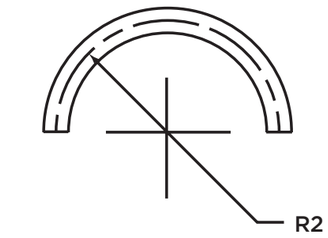
Pulsating or Shock Pressure — The performance of metal hose can be greatly reduced under this type of working pressure. Pressures are normally reduced by 50% in pulsating or shock pressure applications.

Pressure/Temperature Correction — Metal hose pressure capabilities decrease as the temperature increases. Consult the Temperature Correction Factor information on Versilon® Metal Hoses datasheet.

Pressure Drop — Pressure drop occurs in long hose runs. The amount of pressure loss in a metal hose is approximately three times that of steel pipe.



Bend Radius (all except metal hose) —
R1 measured to inside radius

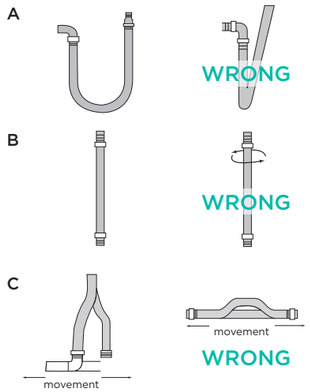


Bend Radius for metal hose —
R2 measured to centerline radius

General Hose Installation Precautions

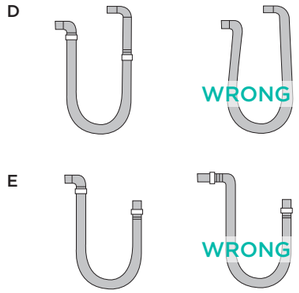
Prior to Installation

1. Examine the hose for any obvious damage. IF THE HOSE IS DAMAGED, DO NOT USE. Examples of damage may include slices to the cover, kinks, broken braid, and crushing of the hose (can reduce life and pressure rating).
2. Review application to ensure proper selection of hose has been made by examining materials, pressures, chemical compatibility, temperature and environment.
3. Hose movement should be restricted to a SINGLE PLANE (Drawing A) to minimize the resultant twisting (torque). Note: The flexing plane should also be the plane in which the bending occurs. Excessive bending will induce stress fatigue (Drawing B).
4. Axial movement should be eliminated. The hose should not be stretched or compressed along its longitudinal axis when installed in-line (Drawing C).



Installation

- Never use hose below minimum bend radius (Drawing D). Bend radii (measured to inside radius of fluoropolymer-lined hose and center-line for stainless steel metal hose) are given for individual products and sizes (consult factory for specific data). These values represent the minimum bend radius with which the hose can be properly installed. If these values are not maintained, the hose can fail prematurely. Note: In some cases, vacuum and pressure ratings are based on not exceeding 2 times minimum bend radius (consult factory for specific hose ratings).
- Do not allow severe bends (Drawing E). Severe bends can cause kinking in a hose or overstress the assembly/material, resulting in damage and ultimate failure. If severe bends cannot be avoided, use elbows designed to accommodate the direction change.
- Do not twist (torque) assembly along center-line during installation. The likelihood of leak-age/failure increases for hoses that are twisted (torqued) during assembly. The proper use of floating flanges and swivel-type fittings (i.e., J.I.C.) can eliminate improper twisting.



General Hose Installation Precautions (continued)

Hose Assemblies with PTFE, FEP Flare-Thru and PFA Encapsulated Flanged Fittings

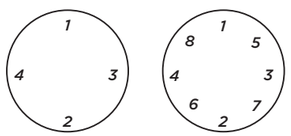
- **Flange covers should not be removed until hose is ready to be bolted into position.** Flange covers should be replaced immediately after disconnecting hose to protect sealing surfaces.
- **Gaskets are not required when hose is connected to a sealing surface made of PTFE, FEP, or PFA.** If the hose is connected to any other surface, such as metal, glass, carbon, reinforced plastic, etc., a gasket should be used.
- **Bolts should be tightened using proper bolt techniques and torque values.** The table below gives torque values for lined hoses using Class 150 flanges. Bolts should be clean and lubricated with flat washers being used to ensure correct torque.
- **For accurate tightening a torque wrench is HIGHLY recommended.** If a flange leak occurs on one side of a properly torqued flange, the bolts should not be over-torqued. Instead, loosen the bolts on the non-leaking side the same amount you tighten the bolts on the leaking side.

Nominal Hose Size

1/2"	3/4"	1"	1-1/2"	2"	3"	4"	6"	8"
10	10	10	15	25	40	30	60	75

Torque (ft.-lbs.)

Bolt Torque Sequence



Installation

Flare-Thru Fittings; Clamp Style Sanitary Ends

- For installation of W.S.I.B, open pitch hose assemblies, Saint-Gobain recommends that solid PTFE gaskets **MUST** be used to ensure a leak-tight seal. Use of other types of gaskets may result in leaks, sealing surface damage, or difficulty in installing the sanitary clamps.

Notes on Hose Assemblies with Fluoropolymer Flare-Thru Fittings

The following precautions should to be taken during removal for storage/cleaning/sterilization:

- Assemblies or components with Flare-Thru ends (including fluoropolymer-lined adapters) **MUST NEVER** be removed from the hose/piping system until they have completely cooled down to at least 70°F.
- Flare-Thru ends in assemblies **MUST ALWAYS** be restrained. Recommended methods include:
  - End caps and solid PTFE gaskets (for clamp style sanitary fittings)
  - Flange covers/blind flanges
  - Lap-joint flange with stub end and the appropriate gasketing
  - Bolts or clamps to attach the assembly to the hose/piping system

Also recommended is the use of dust plugs/caps for female and male cam and grooves.

- Assemblies or components with Flare-Thru ends that are to be pressure tested or cleaned (autoclaved) **MUST ALWAYS** have the Flare-Thru ends restrained (by end caps, flange covers, dust plugs/caps or a flange with stub end and appropriate gasketing) prior to start of the process. These devices **MUST** remain in place during heat-up and through complete cool-down to at least 70°F before removing for installation.
- Flange covers, end caps, dust plugs/caps or a flange with stub end and appropriate gasketing **MUST** be replaced immediately after disconnecting hose. Flange covers or end caps **MUST NOT** be removed until hose assembly or component is ready to be bolted or clamped into position.

Installation (continued)

Threaded End Connections (MNPT); Metallic and Plastic Pipe Fittings

- Typically, male pipe fitting (MNPT) can be effectively sealed using common PTFE sealing tape. Other types of pipe dope or sealing compounds (usually PTFE paste) should be checked to confirm compatibility with service fluids and temperatures of the application.
- Any welding near the hose assembly should be done in a manner that protects the liner and the hose from damage.

Service Life Factors

The actual service life of the hose assembly is strongly affected by its environment. Some of the factors that may influence service life include:

- **Corrosion**
  - General corrosion attack
  - Stress corrosion cracking
  - Intergranular corrosion
  - Pitting corrosion
- **Fatigue** (including)
  - High cyclic
  - Flexure
  - Pulsation
  - Vibration
  - Torsion
- **Vibration**
- **Movement of attached equipment**
  - Proper hose configuration and live length should be used when hose may be exposed to movements from attached piping, tanks or equipment (i.e., thermal growth or mechanically imposed) and/or offset.
- **Wear**

Temperature Conversion Chart

How to Use this Chart

If the temperature in the center column is Celsius, read Fahrenheit in the column to the right. If the temperature in the center column is Fahrenheit, read Celsius in the column to the left.

°C	GIVEN TEMP. (°C OR °F)	°F
-46	-50	-58
-43	-45	-49
-40	-40	-40
-37	-35	-31
-34	-30	-22
-32	-25	-13
-29	-20	-4
-26	-15	+5
-23	-10	+14
-21	-5	+23
-18	0	+32
-15	+5	+41
-12	+10	+50
-9	+15	+59
-7	+20	+68
-4	+25	+77
-1	+30	+86
+2	+35	+95
+4	+40	+104
+7	+45	+113
+10	+50	+122
+13	+55	+131
+16	+60	+140
+18	+65	+149
+21	+70	+158
+24	+75	+167
+27	+80	+176
+29	+85	+185
+32	+90	+194
+35	+95	+203
+38	+100	+212
+41	+105	+221
+43	+110	+230
+46	+115	+239
+49	+120	+248
+52	+125	+257
+54	+130	+266
+57	+135	+275
+60	+140	+284
+63	+145	+293
+66	+150	+302
+68	+155	+311
+71	+160	+320
+74	+165	+329
+77	+170	+338
+79	+175	+347
+82	+180	+356
+85	+185	+365
+88	+190	+374
+91	+195	+383
+93	+200	+392
+96	+205	+401
+99	+210	+410
+102	+215	+419
+104	+220	+428
+107	+225	+437
+110	+230	+446
+113	+235	+455
+116	+240	+464
+118	+245	+473
+121	+250	+482
+124	+255	+491
+127	+260	+500
+129	+265	+509
+132	+270	+518
+135	+275	+527
+138	+280	+536
+141	+285	+545
+143	+290	+554
+146	+295	+563
+149	+300	+572
+152	+305	+581
+154	+310	+590
+157	+315	+599
+160	+320	+608
+163	+325	+617
+166	+330	+620
+168	+335	+635
+171	+340	+644
+174	+345	+653
+177	+350	+662
+179	+355	+671
+182	+360	+680
+185	+365	+689
+188	+370	+698
+191	+375	+707
+193	+380	+716
+196	+385	+725
+199	+390	+734
+202	+395	+743
+204	+400	+752
+207	+405	+761
+210	+410	+770
+213	+415	+779
+216	+420	+788
+218	+425	+797
+221	+430	+806
+224	+435	+815
+227	+440	+824
+229	+445	+833
+232	+450	+842
+235	+455	+851
+238	+460	+860
+241	+465	+869
+243	+470	+878
+246	+475	+887
+249	+480	+896
+252	+485	+905
+254	+490	+914
+257	+495	+923
+260	+500	+932

Fluoropolymer References

Fluoropolymer Materials

Three types are used in Versilon® hose assemblies:

- PTFE (sometimes referred to as TFE) (Polyetrafluoroethylene)
- FEP (Copolymer of tetrafluoroethylene and hexafluoropropylene)
- PFA (Copolymer of tetrafluoroethylene and perfluoroalkyl)

The various types of fluoropolymer are ideal as hose materials because of the following characteristics:

- Insolubility and inertness to chemical attack
- Purity
- High thermal stability and upper service temperature
- High melting points
- Low coefficient of friction
- Low water absorptivity
- Low dielectric constant and dissipation factor
- Excellent weatherability
- Flame resistance

Purity

PTFE, PFA and FEP materials are either approved by the Food and Drug Administration or US Pharmacopeia Class VI.
See below for specific details.

Chemical Resistance

Special care must be exercised when the following materials are to be conveyed through a Versilon® fluoropolymer hose. The first three, quite simply, should never be used with PTFE, FEP or PFA. The remaining 14 can be used, but special consideration should be given when applications require both high temperature and impact resistance or involve high temperature and pressure in combination.

Never

- Elemental Sodium
- Elemental Potassium
- Elemental Lithium

Need Consideration

- Fluorine (F_2) *(Fluorine is absorbed into the fluoropolymer resin)*
- Chlorine Tri-fluoride (ClF_3) *(can be sensitive to impact ignition)*
- Bromine Tri-fluoride
- Iodine Pentafluoride
- Oxygen Difluoride
- Chlorine Difluoride
- Borane (B_2H_6) *(Only at 400°F to 500°F)*
- Aluminum Chloride *(at elevated temperatures)*
- Ammonia (NH_3)
- Amines ($R\text{-}NH_2$) (at elevated temperatures)
- Imine (R-NH)
- 70% Nitric Acid – slow oxidative attack only under pressure at 480°F
- 80% Sodium Hydroxide
- 80% Potassium Hydroxide

Industry Approval and Compliance References

Articles Intended for Food Contact

Reference: FDA 21CFR177.1550 Perfluorocarbon Resins

Covers PTFE and FEP resins, which may be safely used as articles or components of articles intended to contact food in compliance with this regulation.

3-A Sanitary Standards

3-A is a non-profit association that has established comprehensive objectives to develop and maintain uniform standards and practices for sanitary (hygienic) design and fabrication in food and beverage industries.

USDA Acceptance

The Department of Agriculture (USDA) has accepted PTFE and FEP fluoropolymer resins that comply with 21CFR177.1550 as components of materials in direct contact with meat or poultry food products prepared under federal inspection.

US Pharmacopeia Class VI

Samples of PTFE, FEP and PFA (white/natural and black anti-static PTFE and PFA) have been tested in accordance with USP protocol, and all meet the requirements for Class VI plastics. USP testing was done to support the use of these fluoropolymers in pharmaceutical processing and food processing applications. While USP Class VI certification is not required for pharmaceutical processing, many pharmaceutical customers seeking ISO-9000 certification have requested it.

Colorants in Polymers

FDA Reference: 21CFR178.3297 Colorants for Polymers

This regulation permits certain colorants for use in polymers intended for food contact. Included are TiO_2, iron oxides, all-gas channel black (carbon black) and ultra marine colorants.

Chemical Resistance Ratings

The ratings in the charts are based on the results of both laboratory and field tests. They reflect the relative capabilities of various fluoropolymer, silicone, PVC and rubber hose formulations to withstand specific chemicals.

NOTE: The ratings in the chart DO NOT reflect the extent to which extraction may occur or the extent to which fluids may undergo any physical changes in properties or composition, as a result of coming into contact with the hose.

Saint-Gobain makes no representation or warranty with respect to the susceptibility of any fluid to become contaminated or undergo changes in properties or composition as a result of possible extraction of hose ingredients by the fluid to be transmitted. Certain corrosives that would be destructive to hoses with prolonged exposure can be satisfactorily handled for short periods of time if flushed with water after use.

All ratings are based on room temperature (73°F). Chemical resistance will be adversely affected by elevated temperatures.

KEY **E = Excellent** **G = Good** **F = Fair** **X = Not Recommended** **Environment, % Conc.*** **w = Water alc = Alcohol**	**Versilon® BCP**	**Versilon® BCS**	**Versilon® BCSR**	**Versilon® BRH**	**Versilon® CBT**	**Versilon® CCT**	**Versilon® CSC**	**Versilon® CSS**	**Versilon® CSW**	**Versilon® CTLCT**	**Versilon® FGR**	**Versilon® FPD**	**Versilon® FPW**	**Versilon® GCR**	**Versilon® G-FDA**	**Versilon® MHH**	**Versilon® PSD**	**Versilon® PSTLCT**	**Versilon® Sight flow indicators**	**Versilon® SPD**
Acetaldehyde	E	E	E	E	X	X	X	X	X	E	X	F	F	X	X	X	X	E	E	F
Acetamide, 67% in w	E	E	E	G	X	X	X	X	X	E	F	E	E	F	F	F	F	E	E	E
Acetate Solvents (general)	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Acetic Acid, 10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Acetic Acid, 50-60% in w	E	E	E	-	G	G	G	G	G	E	-	E	E	-	-	-	-	E	E	E
Acetic Acid, Glacial, 100%	E	E	E	G	X	X	X	X	X	E	-	X	X	-	-	-	-	E	E	X
Acetic Anhydride	E	E	E	G	X	X	X	X	X	E	F	E	E	F	F	F	F	E	E	E
Acetone	E	E	E	G	X	X	X	X	X	E	X	F	F	X	X	X	X	E	E	F
Acetonitrile	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Acetyl Bromide	E	E	E	-	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Acetyl Chloride	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Acetylene Gas	E	E	E	E	E	E	E	E	E	E	F	E	E	F	F	F	F	E	E	E
Acrylonitrile	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Adipic Acid, 100% in alc	E	E	E	X	X	X	X	X	X	E	E	X	X	E	E	E	E	E	E	X
Air	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Alcohols General	E	E	E	G	X	X	X	X	X	E	G	G	G	G	G	G	G	E	E	G
Aliphatic Hydrocarbons	E	E	E	X	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	X
Alkyl Alcohol	E	E	E	E	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	X
Alum, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Chloride, 53% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Fluoride, 0.1% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Aluminum Hydroxide, 2% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Nitrate, 39% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Aluminum Sulfate, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Amines	E	E	E	-	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

IMPORTANT: It is the user's responsibility to ensure the suitability and safety of Saint-Gobain's hose for all intended uses, including establishing the compatibility of any fluid with the hose through which it is transmitted. Laboratory, field or clinical tests must be conducted in accordance with applicable requirements in order to determine the safety and effectiveness for use of hose in any particular application.

KEY **E = Excellent** **G = Good** **F = Fair** **X = Not Recommended** **Environment, % Conc.*** **w = Water alc = Alcohol**	**Versilon® SSW**	**Versilon® TB**	**Versilon® TBOB/TBOBHV**	**Versilon® TBOK**	**Versilon® TBOP**	**Versilon® TBOY**	**Versilon® TH**	**Versilon® TLCT/WTLCT**	**Versilon® TLCTCO**	**Versilon® TS/SBT**	**Versilon® TSS**	**Versilon® TWOB/TWOBHV**	**Versilon® TWOK**	**Versilon® TWOP**	**Versilon® TWOY**	**Versilon® WCP**	**Versilon® WCS/SBTC**	**Versilon® WCSR**	**Versilon® WCSS**	**Versilon® WTLCTPFA**	**Versilon® XFR**
Acetaldehyde	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Acetamide, 67% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Acetate Solvents (general)	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Acetic Acid, 10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Acetic Acid, 50-60% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Acetic Acid, Glacial, 100%	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Acetic Anhydride	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Acetone	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Acetonitrile	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Acetyl Bromide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Acetyl Chloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Acetylene Gas	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Acrylonitrile	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Adipic Acid, 100% in alc	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Air	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Alcohols General	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Aliphatic Hydrocarbons	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Alkyl Alcohol	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Alum, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Chloride, 53% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Fluoride, 0.1% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Hydroxide, 2% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Nitrate, 39% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Aluminum Sulfate, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aluminum Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Amines	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® BCP	Versilon® BCS	Versilon® BCSR	Versilon® BRH	Versilon® CBT	Versilon® CCT	Versilon® CSC	Versilon® CSS	Versilon® CSW	Versilon® CTLCT	Versilon® FGR	Versilon® FPD	Versilon® FPW	Versilon® GCR	Versilon® G-FDA	Versilon® MHH	Versilon® PSD	Versilon® PSTLCT	Versilon® Sight flow indicators	Versilon® SPD
Ammonia Gas	E	E	E	E	E	E	E	E	E	E	E	X	X	E	E	E	E	E	E	E
Ammonia, Anhydrous Liquid	E	E	E	E	G	G	G	G	G	E	G	X	X	G	G	G	G	E	E	G
Ammonium Acetate, 45% in w	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Bifluoride, 50% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ammonium Carbonate, 50% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ammonium Chloride, 23% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ammonium Hydroxide, 5-10% in w	E	E	E	E	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Ammonium Hydroxide, 30% in w	E	E	E	-	E	E	E	E	E	E	F	X	X	F	F	F	F	E	E	F
Ammonium Nitrate, 54% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ammonium Persulfate, 30% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Phosphate, 21% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ammonium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Sulfate, 30% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Amyl Acetate	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Amyl Alcohol	E	E	E	F	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Amyl Chloride	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Aniline	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Aniline Hydrochloride	E	E	E	F	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Antimony Salts	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Antimony Trichloride	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Aqua Regia	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	G	G	X
Aromatic Hydrocarbons	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Arsenic Acid, 20% in w	E	E	E	E	E	E	E	E	E	E	G	F	F	G	G	G	G	E	E	G
Arsenic Salts	E	E	E	-	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
ASTM Reference No. 1 Oil	E	E	E	X	X	X	X	X	X	E	E	E	E	E	E	E	E	E	E	E
ASTM Reference No. 2 Oil	E	E	E	X	X	X	X	X	X	E	E	G	G	E	E	E	E	E	E	E
ASTM Reference No. 3 Oil	E	E	E	X	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	G
Barium Carbonate, 1% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Barium Chloride, 27% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Barium Hydroxide, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Barium Salts	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Barium Sulfate, <1% in dilute acids	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Barium Sulfide	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Beer	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Benzaldehyde	E	E	E	G	X	X	X	X	X	E	X	F	F	X	X	X	X	E	E	X
Benzene	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Benzenesulfonic Acid	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Benzoic Acid	E	E	E	F	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Benzyl Alcohol	E	E	E	G	X	X	X	X	X	E	X	E	E	X	X	X	X	E	E	X
Bleach Liquor, 22% in w	E	E	E	E	E	E	E	E	E	E	F	X	X	F	F	F	F	E	E	F
Borax, 6% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Boric Acid, 4% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Bromine, Anhydrous Liquid	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® SSW	Versilon® TB	Versilon® TBOB/TBOBHV	Versilon® TBOK	Versilon® TBOP	Versilon® TBOY	Versilon® TH	Versilon® TLCT/WTLCT	Versilon® TLCTCO	Versilon® TS/SBT	Versilon® TSS	Versilon® TWOB/TWOBHV	Versilon® TWOK	Versilon® TWOP	Versilon® TWOY	Versilon® WCP	Versilon® WCS/SBTC	Versilon® WCSR	Versilon® WCSS	Versilon® WTLCTPFA	Versilon® XFR
Ammonia Gas	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonia, Anhydrous Liquid	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ammonium Acetate, 45% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Bifluoride, 50% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Ammonium Carbonate, 50% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Ammonium Chloride, 23% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Hydroxide, 5-10% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Hydroxide, 30% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Nitrate, 54% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Persulfate, 30% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Phosphate, 21% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ammonium Sulfate, 30% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Amyl Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Amyl Alcohol	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Amyl Chloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Aniline	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Aniline Hydrochloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Antimony Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Antimony Trichloride	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Aqua Regia	X	E	E	E	E	E	E	G	G	E	E	E	E	E	E	E	E	E	E	E	X
Aromatic Hydrocarbons	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Arsenic Acid, 20% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Arsenic Salts	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
ASTM Reference No. 1 Oil	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
ASTM Reference No. 2 Oil	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
ASTM Reference No. 3 Oil	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Barium Carbonate, 1% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Barium Chloride, 27% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Barium Hydroxide, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Barium Salts	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Barium Sulfate, <1% in dilute acids	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Barium Sulfide	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Beer	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Benzaldehyde	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Benzene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Benzenesulfonic Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Benzoic Acid	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Benzyl Alcohol	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Bleach Liquor, 22% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Borax, 6% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Boric Acid, 4% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Bromine, Anhydrous Liquid	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Verslon® BCP	Verslon® BCS	Verslon® BCSR	Verslon® BRH	Verslon® CBT	Verslon® CCT	Verslon® CSC	Verslon® CSS	Verslon® CSW	Verslon® CTLCT	Verslon® FGR	Verslon® FPD	Verslon® FPW	Verslon® GCR	Verslon® G-FDA	Verslon® MHH	Verslon® PSD	Verslon® PSTLCT	Verslon® Sight flow indicators	Verslon® SPD
Butadiene	E	E	E	F	E	E	E	E	E	E	F	E	E	F	F	F	F	E	E	F
Butane	E	E	E	X	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Butyl Acetate	E	E	E	F	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Butyl Alcohol	E	E	E	G	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	G
Butyric Acid	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Calcium Bisulfite, 1% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Calcium Carbonate, 25% in dilute acids	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Chlorate, 30% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Calcium Chloride, 30% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Calcium Hydroxide, 10% in glycerol	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Hypochlorite, 20% in w	E	E	E	E	E	E	E	E	E	E	F	X	X	F	F	F	F	E	E	F
Calcium Nitrate, 55% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Oxide, 3% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Calcium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Sulfate, 0.2% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Sulfate, 1% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Carbon Dioxide, Wet/Dry	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Carbon Disulfide	E	E	E	-	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Carbonic Acid	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Carbon Monoxide	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Carbon Tetrachloride	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Castor Oil	E	E	E	G	F	F	F	F	F	E	E	E	E	E	E	E	E	E	E	E
Cellosolve	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Cellosolve Acetate	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Chlorine, Dry Gas	E	E	E	X	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Chlorine, Wet Gas	E	E	E	X	E	E	E	E	E	E	F	X	X	F	F	F	F	E	E	F
Chloroacetic Acid, 20% in w	E	E	E	G	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	X
Chlorobenzene, Mono, Di, Tri	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Chloroform	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Chlorosulfonic Acid	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Chromic Acid, 10-20% in w	E	E	E	E	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Chromic Acid, 50% in w	E	E	E	E	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Chromium Salts	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Citric Acid, 10-20% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Coconut Oil	E	E	E	-	-	-	-	-	-	E	X	-	-	X	X	X	X	E	E	X
Copper Salts	E	E	E	-	-	-	-	-	-	E	X	-	-	X	X	X	X	E	E	X
Corn Syrup	E	E	E	-	-	-	-	-	-	E	X	-	-	X	X	X	X	E	E	X
Cottonseed Oil	E	E	E	G	F	F	F	F	F	E	E	E	E	E	E	E	E	E	E	E
Cresol (m, o, or p)	E	E	E	X	F	F	F	F	F	E	X	G	G	X	X	X	X	E	E	X
Cresylic Acid	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Cupric Chloride, 40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Cupric Cyanide, 10% in dilute bases	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Cupric Nitrate, 70% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Verslon® SSW	Verslon® TB	Verslon® TBOB/TBOBHV	Verslon® TBOK	Verslon® TBOP	Verslon® TBOY	Verslon® TH	Verslon® TLCT/WTLCT	Verslon® TLCTCO	Verslon® TS/SBT	Verslon® TSS	Verslon® TWOB/TWOBHV	Verslon® TWOK	Verslon® TWOP	Verslon® TWOY	Verslon® WCP	Verslon® WCS/SBTC	Verslon® WCSR	Verslon® WCSS	Verslon® WTLCTPFA	Verslon® XFR
Butadiene	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Butane	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Butyl Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Butyl Alcohol	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Butyric Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Calcium Bisulfite, 1% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Calcium Carbonate, 25% in dilute acids	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Chlorate, 30% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Calcium Chloride, 30% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Hydroxide, 10% in glycerol	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Hypochlorite, 20% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Nitrate, 55% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Oxide, 3% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Calcium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Sulfate, 0.2% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Calcium Sulfate, 1% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Carbon Dioxide, Wet/Dry	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Carbon Disulfide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Carbonic Acid	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Carbon Monoxide	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Carbon Tetrachloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Castor Oil	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Cellosolve	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Cellosolve Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Chlorine, Dry Gas	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Chlorine, Wet Gas	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Chloroacetic Acid, 20% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Chlorobenzene, Mono, Di, Tri	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Chloroform	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Chlorosulfonic Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Chromic Acid, 10-20% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Chromic Acid, 50% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Chromium Salts	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Citric Acid, 10-20% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Coconut Oil	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Copper Salts	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Corn Syrup	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Cottonseed Oil	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Cresol (m, o, or p)	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Cresylic Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Cupric Chloride, 40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Cupric Cyanide, 10% in dilute bases	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Cupric Nitrate, 70% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® BCP	Versilon® BCS	Versilon® BCSR	Versilon® BRH	Versilon® CBT	Versilon® CCT	Versilon® CSC	Versilon® CSS	Versilon® CSW	Versilon® CTLCT	Versilon® FGR	Versilon® FPD	Versilon® FPW	Versilon® GCR	Versilon® G-FDA	Versilon® MHH	Versilon® PSD	Versilon® PSTLCT	Versilon® Sight flow indicators	Versilon® SPD
Cupric Sulfate, 13% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Cyclohexane	E	E	E	X	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Cyclohexanone	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Detergent Solutions	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Diacetone Alcohol	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Dibutyl Phthalate	E	E	E	F	F	F	F	F	F	E	F	E	E	F	F	F	F	E	E	F
Dichlorobenzene	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Diesel Fuel	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Diethylamine, 2.5% in w	E	E	E	G	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Diethylene Glycol	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Diethyl Ether	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Dimethylformamide	E	E	E	G	X	X	X	X	X	E	F	E	E	F	F	F	F	E	E	F
Dimethylsulfoxide	E	E	E	X	X	X	X	X	X	E	X	F	F	X	X	X	X	E	E	X
Dioctyl Phthalate	E	E	E	G	F	F	F	F	F	E	X	E	E	X	X	X	X	E	E	X
Dioxane	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Ether	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Ethyl Acetate	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Ethyl Alcohol (Ethanol)	E	E	E	E	X	X	X	X	X	E	F	F	F	F	F	F	F	E	E	F
Ethyl Benzoate	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Ethyl Chloride	E	E	E	E	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Ethyl Ether	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Ethylamine, 70% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ethylene Bromide	E	E	E	X	X	X	X	X	X	E	X	E	E	X	X	X	X	E	E	X
Ethylene Chlorohydrin	E	E	E	G	X	X	X	X	X	E	X	G	G	X	X	X	X	E	E	X
Ethylene Diamine	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ethylene Dichloride	E	E	E	F	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Ethylene Glycol	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ethylene Oxide	E	E	E	X	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	X
Fatty Acids	E	E	E	X	X	X	X	X	X	E	F	G	G	F	F	F	F	E	E	F
Ferric Chloride, 43% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferric Nitrate, 60% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferric Salts	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ferric Sulfate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferrous Chloride, 40% in w	E	E	E	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferrous Salts	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ferrous Sulfate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Fluoborate Salts	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Fluoboric Acid, 48% in w	E	E	E	G	E	E	E	E	E	E	E	X	X	E	E	E	E	E	E	E
Fluorine Gas	G	G	G	X	X	X	X	X	X	G	X	X	X	X	X	X	X	G	G	X
Fluosilicic Acid, 25% in w	E	E	E	E	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	E
Formaldehyde, 37% in w	E	E	E	G	X	X	X	X	X	E	F	F	F	F	F	F	F	E	E	F
Formic Acid, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Formic Acid, 40-50% in w	E	E	E	G	G	G	G	G	G	E	G	E	E	G	G	G	G	E	E	G

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® SSW	Versilon® TB	Versilon® TBOB/TBOBHV	Versilon® TBOK	Versilon® TBOP	Versilon® TBOY	Versilon® TH	Versilon® TLCT/WTLCT	Versilon® TLCTCO	Versilon® TS/SBT	Versilon® TSS	Versilon® TWOB/TWOBHV	Versilon® TWOK	Versilon® TWOP	Versilon® TWOY	Versilon® WCP	Versilon® WCS/SBTC	Versilon® WCSR	Versilon® WCSS	Versilon® WTLCTPFA	Versilon® XFR
Cupric Sulfate, 13% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Cyclohexane	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Cyclohexanone	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Detergent Solutions	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Diacetone Alcohol	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Dibutyl Phthalate	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Dichlorobenzene	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Diesel Fuel	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Diethylamine, 2.5% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Diethylene Glycol	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Diethyl Ether	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Dimethylformamide	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Dimethylsulfoxide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Dioctyl Phthalate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Dioxane	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ether	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ethyl Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Ethyl Alcohol (Ethanol)	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ethyl Benzoate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ethyl Chloride	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Ethyl Ether	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ethylamine, 70% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Ethylene Bromide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ethylene Chlorohydrin	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ethylene Diamine	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Ethylene Dichloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ethylene Glycol	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ethylene Oxide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Fatty Acids	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Ferric Chloride, 43% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferric Nitrate, 60% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferric Salts	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Ferric Sulfate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferrous Chloride, 40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ferrous Salts	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Ferrous Sulfate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Fluoborate Salts	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Fluoboric Acid, 48% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Fluorine Gas	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X
Fluosilicic Acid, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Formaldehyde, 37% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Formic Acid, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Formic Acid, 40-50% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

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*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
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Environment, % Conc.*
w = Water alc = Alcohol

	Verslon® BCP	Verslon® BCS	Verslon® BCSR	Verslon® BRH	Verslon® CBT	Verslon® CCT	Verslon® CSC	Verslon® CSS	Verslon® CSW	Verslon® CTLCT	Verslon® FGR	Verslon® FPD	Verslon® FPW	Verslon® GCR	Verslon® G-FDA	Verslon® MHH	Verslon® PSD	Verslon® PSTLCT	Verslon® Sight flow indicators	Verslon® SPD
Formic Acid, 98% in w	E	E	E	G	G	G	G	G	G	E	F	E	E	F	F	F	F	E	E	F
Freon 11	E	E	E	X	E	E	E	E	E	E	G	E	E	G	G	G	G	F	F	G
Freon 12	E	E	E	X	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	E
Freon 22	E	E	E	X	E	E	E	E	E	E	F	E	E	F	F	F	F	F	F	F
Freon 113	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	F	F	-
Fruit Juice	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Fuel Oil	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Furfural	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Gallic Acid, 17% in acetone	E	E	E	E	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Gasoline, Automotive	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Gelatin	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Glucose, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Glycerol, (Glycerin)	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Glycolic Acid, 70% in w	E	E	E	-	G	G	G	G	G	E	F	E	E	F	F	F	F	E	E	F
Heptane	E	E	E	X	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Hexane	E	E	E	X	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Hydrazine	E	E	E	E	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Hydrobromic Acid, 20-50% in w	E	E	E	E	E	E	E	E	E	E	F	X	X	F	F	F	F	E	E	F
Hydrobromic Acid, 100% in w	E	E	E	E	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Hydrochloric Acid, 10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydrochloric Acid, 37% in w	E	E	E	G	E	E	E	E	E	E	F	X	X	F	F	F	F	E	E	F
Hydrocyanic Acid	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Hydrofluoric Acid, 10% in w	E	E	E	E	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Hydrofluoric Acid, 25% in w	E	E	E	G	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Hydrofluoric Acid, 40-48% in w	E	E	E	G	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Hydriodic Acid, 55-58% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Hydrogen Gas	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydrogen Peroxide, 3% in w	E	E	E	G	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Hydrogen Peroxide, 10% in w	E	E	E	G	E	E	E	E	E	E	F	E	E	F	F	F	F	E	E	F
Hydrogen Peroxide, 30% in w	E	E	E	G	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Hydrogen Peroxide, 90% in w	E	E	E	X	F	F	F	F	F	E	X	F	F	X	X	X	X	E	E	X
Hydrogen Sulfide	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydroquinone, 7% in w	E	E	E	X	E	E	E	E	E	E	F	G	G	F	F	F	F	E	E	F
Hypochlorous Acid, 25% in w	E	E	E	G	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	X
Iodine, 50 ppm in w	E	E	E	G	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Isobutyl Alcohol	E	E	E	E	X	X	X	X	X	E	F	X	X	F	F	F	F	E	E	F
Isooctane	E	E	E	X	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	G
Isopropyl Acetate	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Isopropyl Alcohol	E	E	E	E	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	G
Isopropyl Ether	E	E	E	X	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	G
Jet Fuel, JP8	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Kerosene	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Ketones	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Verslon® SSW	Verslon® TB	Verslon® TBOB/TBOBHV	Verslon® TBOK	Verslon® TBOP	Verslon® TBOY	Verslon® TH	Verslon® TLCT/WTLCT	Verslon® TLCTCO	Verslon® TS/SBT	Verslon® TSS	Verslon® TWOB/TWOBHV	Verslon® TWOK	Verslon® TWOP	Verslon® TWOY	Verslon® WCP	Verslon® WCS/SBTC	Verslon® WCSR	Verslon® WCSS	Verslon® WTLCTPFA	Verslon® XFR
Formic Acid, 98% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Freon 11	G	E	E	E	E	E	E	F	F	E	E	E	E	E	E	E	E	E	E	E	G
Freon 12	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E
Freon 22	F	E	E	E	E	E	E	F	F	E	E	E	E	E	E	E	E	E	E	E	F
Freon 113	-	E	E	E	E	E	E	F	F	E	E	E	E	E	E	E	E	E	E	E	-
Fruit Juice	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Fuel Oil	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Furfural	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Gallic Acid, 17% in acetone	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Gasoline, Automotive	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Gelatin	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Glucose, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Glycerol, (Glycerin)	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Glycolic Acid, 70% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Heptane	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hexane	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrazine	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrobromic Acid, 20-50% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydrobromic Acid, 100% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydrochloric Acid, 10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Hydrochloric Acid, 37% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Hydrocyanic Acid	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrofluoric Acid, 10% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrofluoric Acid, 25% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrofluoric Acid, 40-48% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydriodic Acid, 55-58% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Hydrogen Gas	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydrogen Peroxide, 3% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrogen Peroxide, 10% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrogen Peroxide, 30% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrogen Peroxide, 90% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hydrogen Sulfide	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Hydroquinone, 7% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Hypochlorous Acid, 25% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Iodine, 50 ppm in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Isobutyl Alcohol	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Isooctane	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Isopropyl Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Isopropyl Alcohol	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Isopropyl Ether	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Jet Fuel, JP8	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Kerosene	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ketones	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Verslon® BCP	Verslon® BCS	Verslon® BCSR	Verslon® BRH	Verslon® CBT	Verslon® CCT	Verslon® CSC	Verslon® CSS	Verslon® CSW	Verslon® CTLCT	Verslon® FGR	Verslon® FPD	Verslon® FPW	Verslon® GCR	Verslon® G-FDA	Verslon® MHH	Verslon® PSD	Verslon® PSTLCT	Verslon® Sight flow indicators	Verslon® SPD
Lacquer Solvents	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Lactic Acid, 3-10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Lactic Acid, 85% in w	E	E	E	E	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	G
Lard, Animal Fat	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Lead Acetate, 35% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Lead Nitrate, 27% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Lead Salts	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Lemon Oil	E	E	E	-	X	X	X	X	X	E	E	X	X	E	E	E	E	E	E	E
Limonene-D	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Linoleic Acid	E	E	E	X	X	X	X	X	X	E	X	G	G	X	X	X	X	E	E	X
Linseed Oil	E	E	E	G	F	F	F	F	F	E	F	E	E	F	F	F	F	E	E	F
Lubricating Oils, Petroleum	E	E	E	X	X	X	X	X	X	E	G	G	G	G	G	G	G	E	E	G
Magnesium Carbonate, 1% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Chloride, 35% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Hydroxide, 10% in dilute acids	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Nitrate, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Sulfate, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Maleic Acid, 30% in w	E	E	E	X	X	X	X	X	X	E	X	G	G	X	X	X	X	E	E	X
Malic Acid, 36% in w	E	E	E	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Manganese Salts	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Manganese Sulfate, 34% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Mercuric Chloride, 6% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mercuric Cyanide, 8% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mercurous Nitrate, 10% in dilute acids	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Mercury	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mercury Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Methane Gas	E	E	E	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Methyl Acetate	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Methyl Alcohol (Methanol)	E	E	E	E	X	X	X	X	X	E	F	G	G	F	F	F	F	E	E	F
Methyl Bromide	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Methyl Chloride	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Methyl Ethyl Ketone	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Methyl Isobutyl Ketone	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Methylene Chloride	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Methyl Methacrylate	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Milk	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Mineral Oil	E	E	E	X	G	G	G	G	G	E	E	X	X	E	E	E	E	E	E	E
Mineral Spirits	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Molasses	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Monoethanolamine	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Motor Oil	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Naphtha	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Naphthalene	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
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Environment, % Conc.*
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	Verslon® SSW	Verslon® TB	Verslon® TBOB/TBOBHV	Verslon® TBOK	Verslon® TBOP	Verslon® TBOY	Verslon® TH	Verslon® TLCT/WTLCT	Verslon® TLCTCO	Verslon® TS/SBT	Verslon® TSS	Verslon® TWOB/TWOBHV	Verslon® TWOK	Verslon® TWOP	Verslon® TWOY	Verslon® WCP	Verslon® WCS/SBTC	Verslon® WCSR	Verslon® WCSS	Verslon® WTLCTPFA	Verslon® XFR
Lacquer Solvents	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Lactic Acid, 3-10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Lactic Acid, 85% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Lard, Animal Fat	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Lead Acetate, 35% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Lead Nitrate, 27% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Lead Salts	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Lemon Oil	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Limonene-D	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Linoleic Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Linseed Oil	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Lubricating Oils, Petroleum	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Magnesium Carbonate, 1% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Chloride, 35% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Hydroxide, 10% in dilute acids	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Nitrate, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Magnesium Sulfate, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Maleic Acid, 30% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Malic Acid, 36% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Manganese Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Manganese Sulfate, 34% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Mercuric Chloride, 6% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mercuric Cyanide, 8% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mercurous Nitrate, 10% in dilute acids	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Mercury	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mercury Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Methane Gas	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Methyl Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Methyl Alcohol (Methanol)	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Methyl Bromide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Methyl Chloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Methyl Ethyl Ketone	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Methyl Isobutyl Ketone	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Methylene Chloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Methyl Methacrylate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Milk	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mineral Oil	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Mineral Spirits	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Molasses	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Monoethanolamine	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Motor Oil	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Naphtha	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Naphthalene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X

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*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

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Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® BCP	Versilon® BCS	Versilon® BCSR	Versilon® BRH	Versilon® CBT	Versilon® CCT	Versilon® CSC	Versilon® CSS	Versilon® CSW	Versilon® CTLCT	Versilon® FGR	Versilon® FPD	Versilon® FPW	Versilon® GCR	Versilon® G-FDA	Versilon® MHH	Versilon® PSD	Versilon® PSTLCT	Versilon® Sight flow indicators	Versilon® SPD
Natural Gas	E	E	E	X	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Nickel Chloride, 40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nickel Nitrate, 75% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nickel Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nickel Sulfate, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nitric Acid, 10% in w	E	E	E	E	E	E	E	E	E	E	G	F	F	G	G	G	G	E	E	G
Nitric Acid, 35% in w	E	E	E	X	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Nitric Acid, 68-71% in w	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	G	G	X
Nitrobenzene	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Nitromethane	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Nitrous Acid, 10% in w	E	E	E	-	E	E	E	E	E	E	X	G	G	X	X	X	X	E	E	X
Nitrous Oxide	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Oils, Animal	E	E	E	-	F	F	F	F	F	E	-	E	E	-	-	-	-	E	E	-
Oils, Essential	E	E	E	-	X	X	X	X	X	E	-	X	X	-	-	-	-	E	E	-
Oils, Hydraulic (Phosphate Ester)	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Oils, Hydrocarbon	E	E	E	-	X	X	X	X	X	E	-	G	G	-	-	-	-	E	E	-
Oils, Vegetable	E	E	E	-	F	F	F	F	F	E	-	E	E	-	-	-	-	E	E	-
Oleic Acid	E	E	E	X	X	X	X	X	X	E	F	G	G	F	F	F	F	E	E	F
Oleum, 25% in w	E	E	E	-	E	E	E	E	E	E	-	G	G	-	-	-	-	E	E	-
Ortho Dichlorobenzene	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Oxalic Acid, 12% in w	E	E	E	E	G	G	G	G	G	E	G	E	E	G	G	G	G	E	E	G
Oxygen	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Ozone, 300pphm	E	E	E	G	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	X
Palmitic Acid, 100% in ether	E	E	E	G	X	X	X	X	X	E	G	G	G	G	G	G	G	E	E	G
Paraffins	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Peracetic Acid, 1% @ 40°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perchloric Acid, 67% in w	E	E	E	G	G	G	G	G	G	E	X	X	X	X	X	X	X	E	E	X
Perchloroethylene	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Phenol, 5-10% in w	E	E	E	E	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	X
Phenol, 91% in w	E	E	E	E	F	F	F	F	F	E	X	G	G	X	X	X	X	E	E	X
Phosphoric Acid, <10% in w	E	E	E	G	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	E
Phosphoric Acid, 25% in w	E	E	E	G	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Phosphoric Acid, 85% in w	E	E	E	G	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Phosphorous Trichloride Acid	E	E	E	E	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Photographic Solutions	E	E	E	G	E	E	E	E	E	E	G	G	G	G	G	G	G	E	E	G
Phthalic Acid, 9% in alc	E	E	E	-	F	F	F	F	F	E	F	G	G	F	F	F	F	E	E	F
Phthalic Anhydride, 9% in alc	E	E	E	-	X	X	X	X	X	E	F	E	E	F	F	F	F	E	E	F
Picric Acid, 1% in w	E	E	E	G	E	E	E	E	E	E	X	X	X	X	X	X	X	E	E	X
Plating Solutions	E	E	E	E	E	E	E	E	E	E	E	X	X	E	E	E	E	E	E	E
Potassium Carbonate, 55% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Chloride, 20% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Potassium Cyanide, 33% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Dichromate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® SSW	Versilon® TB	Versilon® TBOB/TBOBHV	Versilon® TBOK	Versilon® TBOP	Versilon® TBOY	Versilon® TH	Versilon® TLCT/WTLCT	Versilon® TLCTCO	Versilon® TS/SBT	Versilon® TSS	Versilon® TWOB/TWOBHV	Versilon® TWOK	Versilon® TWOP	Versilon® TWOY	Versilon® WCP	Versilon® WCS/SBTC	Versilon® WCSR	Versilon® WCSS	Versilon® WTLCTPFA	Versilon® XFR
Natural Gas	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Nickel Chloride, 40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nickel Nitrate, 75% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nickel Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nickel Sulfate, 25% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Nitric Acid, 10% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Nitric Acid, 35% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Nitric Acid, 68-71% in w	X	E	E	E	E	E	E	G	G	E	E	E	E	E	E	E	E	E	E	E	X
Nitrobenzene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Nitromethane	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Nitrous Acid, 10% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Nitrous Oxide	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Oils, Animal	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Oils, Essential	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Oils, Hydraulic (Phosphate Ester)	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Oils, Hydrocarbon	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Oils, Vegetable	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Oleic Acid	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Oleum, 25% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Ortho Dichlorobenzene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Oxalic Acid, 12% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Oxygen	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ozone, 300pphm	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Palmitic Acid, 100% in ether	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Paraffins	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Peracetic Acid, 1% @ 40°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	E
Perchloric Acid, 67% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Perchloroethylene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Phenol, 5-10% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Phenol, 91% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Phosphoric Acid, <10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Phosphoric Acid, 25% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Phosphoric Acid, 85% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Phosphorous Trichloride Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Photographic Solutions	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Phthalic Acid, 9% in alc	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Phthalic Anhydride, 9% in alc	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Picric Acid, 1% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Plating Solutions	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Carbonate, 55% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Chloride, 20% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Cyanide, 33% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Dichromate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® BCP	Versilon® BCS	Versilon® BCSR	Versilon® BRH	Versilon® CBT	Versilon® CCT	Versilon® CSC	Versilon® CSS	Versilon® CSW	Versilon® CTLCT	Versilon® FGR	Versilon® FPD	Versilon® FPW	Versilon® GCR	Versilon® G-FDA	Versilon® MHH	Versilon® PSD	Versilon® PSTLCT	Versilon® Sight flow indicators	Versilon® SPD
Potassium Hydroxide, <10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Hypochlorite, 70% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Potassium Iodide, 56% in w	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Nitrate, 10% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Potassium Oxide, 50% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Potassium Permanganate, 6% in w	E	E	E	G	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Potassium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Sulfate, 10% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Potassium Sulfide, 20% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Propane Gas	E	E	E	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Propyl Alcohol (Propanol)	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Propylene Glycol	E	E	E	G	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Propylene Oxide	E	E	E	G	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	X
Pyridine	E	E	E	G	X	X	X	X	X	G	X	X	X	X	X	X	X	G	G	X
Salicylic Acid, 1% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Silicone Oils	E	E	E	E	G	G	G	G	G	E	E	X	X	E	E	E	E	E	E	E
Silver Nitrate, 55% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Skydrol 500A	E	E	E	G	F	F	F	F	F	E	X	X	X	X	X	X	X	E	E	X
Soap Solutions	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Acetate, 55% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Sodium Benzoate, 22% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Sodium Bicarbonate, 7% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Bisulfate, 3% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Sodium Carbonate, 7% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Chlorate, 45% in w	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Chloride, 20% in w	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Cyanide, 30% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Dichromate, 70% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Sodium Fluoride, 3% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hydroxide, 10-15% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hydroxide, 30-40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hypochlorite, 5.5% in w	E	E	E	G	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Sodium Hypochlorite, 12.2% in w	E	E	E	G	E	E	E	E	E	E	G	X	X	G	G	G	G	E	E	G
Sodium Nitrate, 3.5% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	G
Sodium Perborate, 25% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Sodium Peroxide, 20% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Sodium Phosphate, 30% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Sodium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Sulfate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Sulfide, 45% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Sulfite, 10% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Stannic Chloride, 50% in w	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Stannous Chloride, 45% in w	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® SSW	Versilon® TB	Versilon® TBOB/TBOBHV	Versilon® TBOK	Versilon® TBOP	Versilon® TBOY	Versilon® TH	Versilon® TLCT/WTLCT	Versilon® TLCTCO	Versilon® TS/SBT	Versilon® TSS	Versilon® TWOB/TWOBHV	Versilon® TWOK	Versilon® TWOP	Versilon® TWOY	Versilon® WCP	Versilon® WCS/SBTC	Versilon® WCSR	Versilon® WCSS	Versilon® WTLCTPFA	Versilon® XFR
Potassium Hydroxide, <10% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Hypochlorite, 70% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Potassium Iodide, 56% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Nitrate, 10% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Potassium Oxide, 50% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Potassium Permanganate, 6% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Potassium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Sulfate, 10% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Potassium Sulfide, 20% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Propane Gas	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Propyl Alcohol (Propanol)	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Propylene Glycol	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Propylene Oxide	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Pyridine	X	E	E	E	E	E	E	G	G	E	E	E	E	E	E	E	E	E	E	G	X
Salicylic Acid, 1% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Silicone Oils	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Silver Nitrate, 55% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Skydrol 500A	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Soap Solutions	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Acetate, 55% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Sodium Benzoate, 22% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Sodium Bicarbonate, 7% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Bisulfate, 3% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Carbonate, 7% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Chlorate, 45% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Chloride, 20% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Cyanide, 30% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Dichromate, 70% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Sodium Fluoride, 3% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hydroxide, 10-15% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hydroxide, 30-40% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hypochlorite, 5.5% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Hypochlorite, 12.2% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Nitrate, 3.5% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Perborate, 25% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Peroxide, 20% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Phosphate, 30% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Sulfate, 5% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Sulfide, 45% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sodium Sulfite, 10% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Stannic Chloride, 50% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Stannous Chloride, 45% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® BCP	Versilon® BCS	Versilon® BCSR	Versilon® BRH	Versilon® CBT	Versilon® CCT	Versilon® CSC	Versilon® CSS	Versilon® CSW	Versilon® CTLCT	Versilon® FGR	Versilon® FPD	Versilon® FPW	Versilon® GCR	Versilon® G-FDA	Versilon® MHH	Versilon® PSD	Versilon® PSTLCT	Versilon® Sight flow indicators	Versilon® SPD
Stearic Acid, 5% in alc	E	E	E	G	X	X	X	X	X	E	F	G	G	F	F	F	F	E	E	G
Styrene Monomer	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Sulfur Chloride	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Sulfur Dioxide, Gas Dry	E	E	E	G	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	E
Sulfur Dioxide, Gas Wet	E	E	E	E	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	E
Sulfur Trioxide, Wet	G	G	G	G	G	G	G	G	G	G	X	G	G	X	X	X	X	G	G	G
Sulfuric Acid, 10% in w	E	E	E	G	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	E
Sulfuric Acid, 30% in w	E	E	E	G	E	E	E	E	E	E	G	G	G	G	G	G	G	E	E	G
Sulfuric Acid, 95-98% in w	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Sulfurous Acid	E	E	E	G	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	E
Tannic Acid, 75% in w	E	E	E	E	G	G	G	G	G	E	E	E	E	E	E	E	E	E	E	E
Tanning Solutions	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Tartaric Acid, 56% in w	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Tetrahydrofuran	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Thionyl Chloride	E	E	E	X	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	E
Tin Salts	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Titanium Salts	E	E	E	-	E	E	E	E	E	E	X	E	E	X	X	X	X	E	E	E
Toluene	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Trichloroacetic Acid, 90% in w	E	E	E	G	E	E	E	E	E	E	F	E	E	F	F	F	F	E	E	E
Trichloroethane	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Triethanolamine	E	E	E	G	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	X
Trichloroethylene	E	E	E	G	X	X	X	X	X	E	G	X	X	G	G	G	G	E	E	X
Trichloropropane	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Tricresyl Phosphate	E	E	E	E	F	F	F	F	F	E	X	E	E	X	X	X	X	E	E	E
Trisodium Phosphate	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Turpentine	E	E	E	G	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Urea, 20% in w	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	E
Uric Acid	E	E	E	-	E	E	E	E	E	E	-	E	E	-	-	-	-	E	E	E
Vinegar	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	G	G	E	E	E
Vinyl Acetate	E	E	E	E	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Water, Brine	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-
Water, De-ionized	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Water, Distilled	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Xylene	E	E	E	X	X	X	X	X	X	E	X	X	X	X	X	X	X	E	E	X
Zinc Chloride, 80% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Zinc Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Zinc Sulfate, 30% in w	E	E	E	-	-	-	-	-	-	E	-	-	-	-	-	-	-	E	E	-

** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Chemical Resistance Ratings (continued)

KEY

E = Excellent
G = Good
F = Fair
X = Not Recommended

Environment, % Conc.*
w = Water alc = Alcohol

	Versilon® SSW	Versilon® TB	Versilon® TBOB/TBOBHV	Versilon® TBOK	Versilon® TBOP	Versilon® TBOY	Versilon® TH	Versilon® TLCT/WTLCT	Versilon® TLCTCO	Versilon® TS/SBT	Versilon® TSS	Versilon® TWOB/TWOBHV	Versilon® TWOK	Versilon® TWOP	Versilon® TWOY	Versilon® WCP	Versilon® WCS/SBTC	Versilon® WCSR	Versilon® WCSS	Versilon® WTLCTPFA	Versilon® XFR
Stearic Acid, 5% in alc	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Styrene Monomer	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Sulfur Chloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Sulfur Dioxide, Gas Dry	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Sulfur Dioxide, Gas Wet	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Sulfur Trioxide, Wet	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X
Sulfuric Acid, 10% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sulfuric Acid, 30% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Sulfuric Acid, 95-98% in w	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Sulfurous Acid	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Tannic Acid, 75% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Tanning Solutions	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Tartaric Acid, 56% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Tetrahydrofuran	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Thionyl Chloride	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Tin Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Titanium Salts	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Toluene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Trichloroacetic Acid, 90% in w	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
Trichloroethane	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Triethanolamine	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Trichloroethylene	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Trichloropropane	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Tricresyl Phosphate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Trisodium Phosphate	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Turpentine	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Urea, 20% in w	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Uric Acid	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Vinegar	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Vinyl Acetate	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Water, Brine	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-
Water, De-ionized	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Water, Distilled	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Xylene	X	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	X
Zinc Chloride, 80% in w	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Zinc Salts	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Zinc Sulfate, 30% in w	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

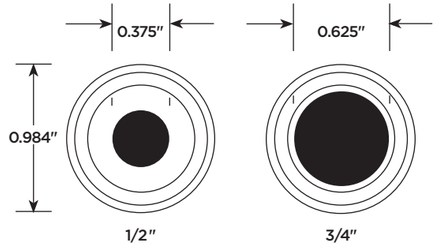
** If concentration is not indicated, assume 100% concentration or the maximum percent solubility in water.*
*** Chemical resistance ratings based on inner liner material.*

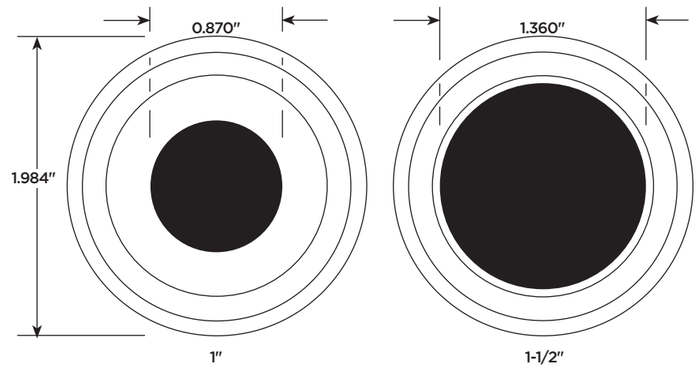
NOTE: Concentrations of room temperature liquids are given in % volume. Concentrations of room temperature solids are given in % weight.

Sanitary Fitting Sizing Guide

Applies to Styles 10/10U, 10L/11L, and 11

These schematics are designed to eliminate sizing errors when specifying sanitary fittings. The fitting outside diameter (0.984") is the same for 1/2" and 3/4" ID mini fittings (Style 11). Likewise, the fitting outside diameter (1.984") is the same for the 1" and 1-1/2" ID sanitary clamp style fittings.



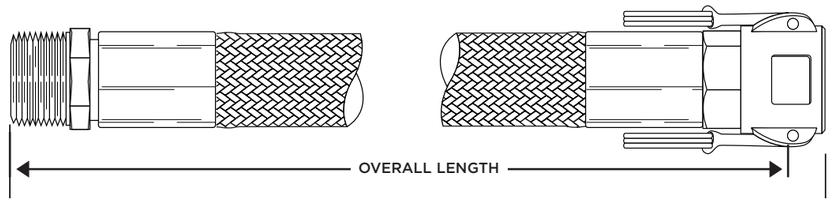


How to Order an Assembly

Versilon® Fluoropolymer Hoses with Crimp Style Fittings

Part Number Example: 16WCS0316S6

Description: 1" Convoluted, SS braided 316 SS male pipe x 316 SS female cam and groove



16	WCS	03	16	S	6	XX	A – Length
ID Size (in 1/16")	Hose Style	Fitting First End	Fitting Second End	Ferrule Material	Fitting Material	Flange Material*	Accessory Code (Optional)

ID Size (in 1/16")

2	(1/8)	TS
4	(1/4)	TSS
6	(3/8)	TB
8	(1/2)	TD
12	(3/4)	TDB
16	(1)	TSS
20	(1-1/4)	TLCT
24	(1-1/2)	TLCTCO
32	(2)	WTLCT
40	(2-1/2)	WTLCTPFA
48	(3)	CTLCT
64	(4)	WCS

Hose Style

WCS
WCSS
BCS
WCP
BCP
TWOB
TWOY
TWOBHV
TBOB
TBOY
TBOBHV
TWOK
TBOK
TWOP
TBOP
ST
PSTLCT
STPG

Fitting First End / Fitting Second End

01 = Butt Weld Adapter, Pipe
02 = J.I.C. Female
03 = Male Pipe, NPT
06 = Female Pipe, FNPT
07 = J.I.C./Female Union
08 = J.I.C./Male Union
10 = Sanitary, Gasket Style
10U = Sanitary, Step-Up
11 = Sanitary, 'Mini' Style
*12 = Flange Retainer, Lap-Joint Style
*16 = Cam and Groove Coupler ('D')
16LK = Cam and Groove Coupler Locking style ('D')
*17 = Cam and Groove Adapter ('E')
20 = Sanitary, Bevel Seat, w/Nut
31 = Compression Connector
31FN = Compression Connector, w/Nut & Ferrules
32 = Compression Adapter
32FN = Compression Adapter w/Nut & Ferrules
33 = O-Ring Female Adapter
38 = J.I.C. Male
40 = Sanitary, Bevel Seat, Exposed Thread
41 = Butt Weld Adapter, Tube
44 = O-Ring Male
50 = I-Line Sanitary Male
51 = I-Line Sanitary Female
61 = NPSH Female Swivel

*PFA encapsulated style also available

Ferrule Material

S = 304 SS
C = Zinc Plated Carbon Steel**

Fitting Material

C = Steel
M = Monel®
6 = 316 SS
T = PFA Encapsulated
P = Polypropylene
K = PVDF (Kynar®)

Flange Material*

SC = Carbon Steel
S6 = 316 SS
S4 = 304 SS
CT = Carbon Steel with PFA Encapsulated
6T = 316 SS with PFA Encapsulated
4T = 304 SS with PFA Encapsulated

Accessory Code (Optional)

A = Armor Casing
C = Casing Strain Cuffs
F = Firesleeve
SG = External SS Spring Guard

⚠ Important:

If using flange, drop Fitting Material code and add Flange Material code. All flange codes above are for Class 150#. For 300#, add 300 as suffix, (e.g., SC300 for carbon steel 300# flange).

****For WCS, BCS 1/2" up to 2" only, zinc plated crimp collar available.***

Overall length tolerances for assemblies are:

+/- 1/4"	on assemblies	6-24"
+/- 1/2"	on assemblies	25-60"
not to exceed +/- 1%	on assemblies	Over 60"

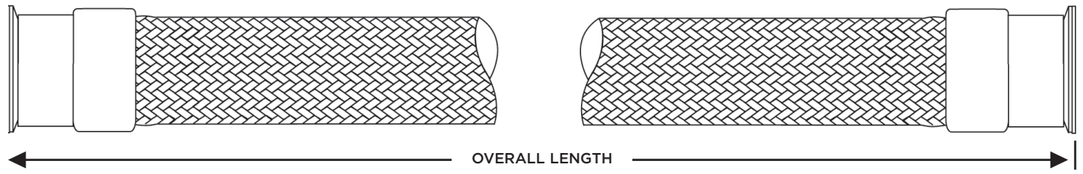
- *For Versilon® Flare-Thru fitting system see section on "How to Order: Flare-Thru Hose Assemblies" pages 33-35..*
- *1/2", 3/4" and 1" sight tubes may be ordered with virtually all fittings shown above. 1-1/2" and larger sight tubes are available with 316L sanitary #10 clamp style fittings. Consult factory for availability of other crimp style fittings. 3/4" through 4" sight tubes are available with Flare-Thru 150# flanged ends.*
- *STPG is P/N for caged sight tube option. 4-foot maximum length. See Versilon® Sight Flow Indicators datasheet for available sizes.*

How to Order an Assembly (continued)

Versilon® PTFE Open Pitch Convoluted Hose (Flare-Thru Fittings)

Part Number Example: 16TWOB10FT10FTS6 – Length

Description: 1" TWOB open pitch SS braided convoluted hose with 1" Flare-Thru PTFE sanitary clamp fittings



Flare-Thru*

16 TWOB 10 FT 10 FT S 6 XX A – Length

ID Size (in 1/16")		Hose Style
12	(3/4)	TWOB
16	(1)	TBOB
20	(1-1/4)	TWOBHV
24	(1-1/2)	TBOBHV
32	(2)	TWOY
40	(2-1/2)	TBOY
48	(3)	TWOK
64	(4)	TBOK
		TWOP
		TBOP

Fitting First End
10 = Sanitary, Clamp Style
12 = Flange Retainer, Lap-Joint Style
16 = Cam and Groove Coupler (D')
50 = I-Line Sanitary Male
51 = I-Line Sanitary Female

Fitting Second End
10 = Sanitary, Clamp Style
12 = Flange Retainer, Lap-Joint Style
16 = Cam and Groove Coupler (D')
50 = I-Line Sanitary Male
51 = I-Line Sanitary Female

Ferrule Material
S = 304 SS

Fitting Material
6 = 316 SS

Flange Material**
SC = Carbon Steel
S6 = 316 SS
S4 = 304 SS

Accessory Code (Optional)

⚠ Important:

**** Not all styles of Versilon® Flare-Thru fittings are available in all series or all sizes of hose. Consult factory for availability.***

***** If using flange, drop Fitting Material code and add Flange Material code. All flange codes above are for Class 150#. For 300#, add 300 as suffix, (e.g., SC300 for carbon steel 300# flange).***

How to Order an Assembly (continued)

Versilon® TLCT Series Rubber Covered Fluoropolymer Lined Hose (Flare-Thru Fittings)

Part Number Example: 24TLCT1616S6

Description: 1-1/2" fluoropolymer lined rubber hose with 1-1/2" Flare-Thru female cam and grooves at each end.

24 TLCT 16 16 S6 FT ( ) – length

ID Size (in 1/16")		Hose Style
8	(1/2)	TLCT
12	(3/4)	WTLCT
16	(1)	CTLCT
20	(1-1/4)	PSTLCT
24	(1-1/2)	
32	(2)	
40	(2-1/2)	
48	(3)	
64	(4)	

Fitting First End
12 = Flange Retainer, Lap-Joint Style
16 = Cam and Groove Coupler ('D')
16L = Cam and Groove Coupler ('D') Locking Style
*50 = I-Line Sanitary Male
*51 = I-Line Sanitary Female

Fitting Second End
12 = Flange Retainer, Lap-Joint Style
16 = Cam and Groove Coupler ('D')
16L = Cam and Groove Coupler ('D') Locking Style
*50 = I-Line Sanitary Male
*51 = I-Line Sanitary Female

Fitting Material
1st Letter: Ferrule Material (SS)
2nd Letter: Fitting Material (SS)
3rd Letter: Flange Material
6 = 316 SS
(4) = Flanges Only – 304 SS
(6) = Flanges Only – 316 SS

Flare-Thru Fitting Style

Accessory Code
A = Armor Casing
B = External Braid
C = Casing Strain Cuff
S = External Spring Guard

⚠ Important:

**** Not all styles of Versilon® Flare-Thru fittings are available in all series or all sizes of hose. Consult factory for availability.***

How to Order an Assembly (continued)

High Pressure (5000 PSI) Versilon® TH Series Hose Assemblies

Part Number Example: 08TH0203S6A

Description: 1/2" high-pressure hose with 316 SS female J.I.C. x 316 SS 1/2" hex male pipe, armor covering with full length armor casing.

8 TH 02 03 S6 (A) – length

ID Size (in 1/16")

4 (1/4)
6 (3/8)
8 (1/2)
10 (5/8)
12 (3/4)
16 (1)

Hose Style

TH

Fitting First End / Fitting Second End

02 = J.I.C. Female
03 = Male Pipe, NPT
06 = Female Pipe, FNPT
08 = J.I.C./Male Union
33 = O-Ring Female Adapter

Fitting Material

316 stainless steel

Accessory Code Optional

A = Armor Casing
C = Casing Strain Cuffs
F = Firesleeve

Versilon® Chlorine Transfer Hose CL Series

Part Number Example: 16CL0303MC3KYA

Description: 1" chlorine transfer hose with 1" Monel® hex male pipe threads at each end.

16 CL 03 03 M ( ) KY ( ) – length

ID Size (in 1/16")

8 (1/2)
16 (1)
24 (1-1/2)

Hose Style

CL

Fitting First End / Fitting Second End

03 = Male Pipe, NPT
*12 = Flange Retainer, Lap-Joint Style

Fitting Material

Ferrule Material
Fitting Material
(Always Monel® M)

Flange Fitting Material

M = Monel®
C3 = Carbon Steel 300# Flanges only
43 = 304 SS 300# Flanges only
63 = 316 SS 300# Flanges only

Kynar® Abrasion Cover

Accessory Code Optional

A = Armor Casing
C = Casing Strain Cuffs

⚠ Important:

**** Must Specify flange material. Carbon, steel, epoxy coated 300# standard. 1" and 1-1/2" sizes only.***

How to Order an Assembly (continued)

Versilon® All Stainless Steel Construction Metal Hose Assemblies

MSS4/CF04 - MSS6/CF16 Series

Part Number Example: 16CF040312CA

Description: 1" 304 SS single braided metal hose with 304 1" hex male NPT one end x 150# epoxy coated carbon steel lap-joint flange with 304 SS stub end, full length armor casing.

16 CF04 03 12 C (A) – length

ID Size (in 1/16")

4 (1/4)+
6 (3/8)
8 (1/2)
12 (3/4)
16 (1)
20 (1-1/4)
24 (1-1/2)
32 (2)
40 (2-1/2)
48 (3)
64 (4)
96 (6)
128 (8)

Hose Style

MDS6+
MSS4
CF04
MSS6
CF16

+ double braided

Fitting First End / Fitting Second End

01 = Butt Weld Adapter, Pipe
02 = J.I.C. Female
03 = Male Pipe, NPT
04 = Plain Male NPT
05 = Female NPT (Round Stock)
06 = Female Pipe, FNPT
07 = J.I.C./Female Union
08 = J.I.C./Male Union
10 = Sanitary, Gasket Style
11 = Sanitary, 'Mini' Style
12 = Flange Retainer, Lap-Joint Style
14 = Flange, Fixed Weld Neck Style
16 = Cam and Groove Coupler ('D')
16L = Cam and Groove Coupler Locking Style ('D')
17 = Cam and Groove Adapter ('E')
21 = 1/2" SAE Female Flare
22 = 5/8" SAE Female Flare
26 = 1/2" SAE Female 90° Elbow
27 = 5/8" SAE Female 90° Elbow
28 = Male NPT Union
29 = Female Union, 150#
30 = Female Union, 300#
31FN = Compression Connector, w/Nut & Ferrules
32 = Compression Adapter
33 = O-Ring Female Adapter
34 = Vacuum Female
35 = Vacuum Male
38 = J.I.C. Male
40 = Sanitary, Bevel Seat, Exposed Thread
41 = Butt Weld Adapter, Tube

Fitting Material

C = Steel
M = Monel®
S4 = Type 304 Stainless Steel Flanges Only
S6 = Type 316L Stainless Steel Flanges Only
SS4 = 304 SS Flange and Stub End
S4C = 304 SS Stub End, Steel Flange
SS6 = 316L SS Flange and Stub End
S6C = 316 SS Stub End Steel Flange

Accessory Code

A = Armor Casing
C = Casing Strain Cuffs
F = Firesleeve

How to Order an Assembly (continued)

Versilon® Rubber, Silicone and PVC Hose Assemblies

Part Number Example: PSD200RE200TC200TC-P-15FT

Description: 2" chlorobutyl lined EPDM hose with 2" ReSeal® sanitary clamp fittings with polymer sleeves.

PSD	200	RE	200	TC	200	TC	P	15/0
Hose*	ID Size	Fitting Style	Size/Style First End		Size/Style Second End		Hose Sleeve Material	Assembly Length

Hose*

PSD
GCR
SSW
G-FDA
FGR
CSC
CSW
CBT
CCT
CSS
SPD
FDP
FPW
MHH
BRH

ID Size

025 = 1/4"
037 = 3/8"
050 = 1/2"
075 = 3/4"
100 = 1"
150 = 1-1/2"
200 = 2"
250 = 2-1/2"
300 = 3"
400 = 4"
600 = 6"

Fitting Style

RE = ReSeal®
PC = Permanent Crimp

Size/Style First End / Size/Style Second End

TC = Sanitary Clamp
BS = Bevel Seat and Hex Nut
BM = Male Threaded Bevel
EF = I-Line Female
EM = I-Line Male
JM = John Perry Male
JF = John Perry Female
MPT = Male Pipe Thread
FPT = Female Pipe Thread
AF = AMSI Stub End & Plate Flange
QM = Q-Line
TE = Tube End Stem (Butt Weld)
CM = Cam & Groove Male
CF = Cam & Groove Female
XTE = Extended Shank
PE = Perlick End

Hose Sleeve Material

S = Stainless
P = Polymer

Assembly Length

Feet/Inches

**Add EH to hose portion of assembly part number for Electrically Heated Hose option; e.g., PSDEH.*

Electrically Heated Hose

Submit the following information with orders.

Ambient Temperature: _____

Fluid Inlet Temperature: _____

Type of Fluid: _____

Hazardous Area Classification: _____

Supply Voltage: _____

Controller Required: ○ Yes ○ No

Type of Sensor: ○ J type ○ RTD

⚠ Important notes on Electrically Heated Hose:

- **Electrically Heated Hose supplied with standard J type thermocouple. RTD is also available; contact factory for details.**
- **Electrically Heated Hose not supplied with controller. Optional controllers are available; contact factory for details.**

Overall length tolerances for assemblies

1/4" on assemblies to 24"
1/2" on assemblies 25" to 60"
1% on assemblies over 60"

Engineering Guide for Hoses

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