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CORESAFE CHEMICAL PERMEATION TESTING GUIDE

ANSI, ASTM F739-12
Average Breakthrough Times
Permeation Rates
Performance Levels
Ratings

Chemical Permeation Testing

Chemical permeation is the process by which chemicals migrate through protective glove material at the molecular level. It is important to note that chemical permeation can occur without any physical or observable changes to glove the material. To be better informed about selecting gloves when working with chemicals, it is important to understand how chemical permeation is tested and measured.

TESTING OVERVIEW

Chemical permeation tests are completed in laboratory conditions where a sample of glove material is placed in a 2-sided chamber. One side of the chamber is filled with the test chemical, the other side with collection medium where measurements are taken to determine the level of chemical permeation over a period of time (480 minutes) and at a fixed temperature (~21°C/69°F).

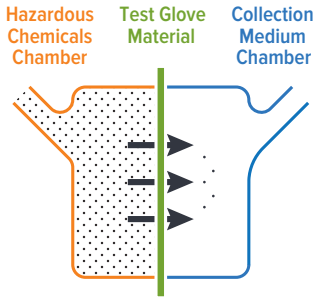

Illustration of chemical testing chamber

Disclaimer: Chemical permeation tests are conducted in controlled laboratory conditions and not in field conditions. Testing cannot replicate specific wear and tear environments under actual application conditions. The information included is provided as a guide only. Using the correct gloves, for specific applications can only by determined by testing in those applications by the purchaser.

TESTING RESULTS KEY

Chemical Permeation (ANSI)	
Model Number	
Previous Name	
Item Number	
Palm Thickness	
Compliance Requirement	
Test Method	
Chemical	CAS Number
ACIDS	
Acetic Acid (Glacial)	64-19-7
Hydrochloric Acid (37%)	7647-01-0
Nitric Acid (70%)	7697-37-2
Sulfuric Acid (96%)	7664-93-9
Phosphoric acid (85%)	7664-38-2

CoreSafe®			
F280			
0.71 mm / 28 mil			
BTT lowest (min)	Rating	Degradation %	Recommendation
7	0	22.9	
>480	6	10.1	
>480	6	14.2	
>480	6	16.9	
>480	6	-10.4	
>480	6	-8.4	
>480	6	-9.4	
>480	6	-2.1	
271	5	22.1	
>480	6	14.2	
>480	6	18.4	
40	2	25.4	
<5	0	-10.2	

Breakthrough Times (BTT): The ***elapsed time*** between initial contact of the test chemical with the outside surface of the glove and the time at which permeation rate reaches 1µg/cm2/min (ASTM F739-12). A higher number is better or longer.

Rating: The ANSI/ISEA 105-2016 numerical classification for chemical permeation.

Degradation %: The percentage change in the puncture resistance of the glove material after a continuous contact with the external surface with the challenge chemical compared to the puncture resistance of the glove material before exposure (ANSI/ISEA 105-2016). A lower number is better.

Recommendation: The destructive change in one or more properties of a material. These are rated on a ***color-coded scale*** (see table below).

Rating is based on Breakthrough Time (BTT)

Average BTT (min)	Rating
7	0
>480	6
>480	6
>480	6
≥ 240	5
≥ 480	6
67	3
256	5

Recommendation Criteria

Color Coding Criteria			
BTT (min)	Degradation %	Physical Changes	Recommendation
>30	0-60%	No	Recommended
>10	61-90%	No	Fair
<10	>90%	Yes	Not Recommended

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SW® CoreSafe® Chemical Permeation Testing Guide - ANSI, ASTM F739-12

CORESAFE®

R Recommended F Fair NR Not Recommended

Chemical Permeation (ANSI)		CoreSafe®				CoreSafe®				CoreSafe®				CoreSafe®				CoreSafe®			
Model Number		F13Y				U17N				F22B				F28O				F28YB			
Item Number		L51300X				L50703X				L51807X				L51901X				T51925X			
Palm Thickness		0.33 mm / 13 mil				0.43 mm / 17 mil				0.55 mm / 22 mil				0.71 mm / 28 mil				0.71 mm / 28 mil			
Compliance Requirement		ANSI-ISEA-105				ANSI-ISEA-105				ANSI-ISEA-105				ANSI-ISEA-105				ANSI-ISEA-105			
Test Method		ASTM F739-12E1				ASTM F739-12E1				ASTM F739-12E1				ASTM F739-12E1				ASTM F739-12E1			
Chemical	CAS Number	BTT lowest (min)	Rating	Degradation %	Recommendation	BTT lowest (min)	Rating	Degradation %	Recommendation	Average BTT (min)	Rating	Degradation %	Recommendation	BTT lowest (min)	Rating	Degradation %	Recommendation	BTT lowest (min)	Rating	Degradation %	Recommendation
ORGANIC ACIDS																					
Acetic Acid - Glacial	64-19-7	<5	0	27.7		<5	0	2.8		<5	0	17.1		7	0	22.9		42	2	22.7	
Acetic Acid, 10%	64-19-7	>480	6	15.0		>480	6	2.3		>480	6	12.9		>480	6	10.1		>480	6	0.7	
Acetic Acid, 20%	64-19-7	>480	6	15.0		>480	6	2.0		>480	6	18.1		>480	6	14.2		>480	6	1.8	
Acetic Acid, 25%	64-19-7	>480	6	20.0		>480	6	1.8		>480	6	21.5		>480	6	16.9		>480	6	2.6	
INORGANIC ACID																					
Hydrochloric Acid, 10%	7647-01-0	>480	6	-4.7		>480	6	-12.2		>480	6	-8.2		>480	6	-10.4		>480	6	-15.5	
Hydrochloric Acid, 37%	7647-01-0	>480	6	-3.9		>480	6	-10.1		>480	6	-6.6		>480	6	-8.4		>480	6	-9	
Hydrofluoric Acid, 40%	7664-39-3	240	5	NT		>480	6	NT		>480	6	NT		>480	6	NT		>480	6	NT	
Nitric Acid, 40%	7697-37-2	>480	6	-3.4		>480	6	-8.9		>480	6	-7.4		>480	6	-9.4		>480	6	14.9	
Nitric Acid, 10%	7697-37-2	>480	6	-3.5		>480	6	-9.2		>480	6	-1.7		>480	6	-2.1		>480	6	2.4	
Nitric Acid, 65%	7697-37-2	75	3	56.3		170	4	19.8		>60	3	NT		271	5	22.1		>120	4	21.9	
Sulphuric Acid, 40%	7664-93-9	>480	6	24.7		>480	6	22.1		>480	6	33.5		>480	6	14.2		>480	6	5.4	
Sulphuric Acid, 50%	7664-93-9	>480	6	40.0		>480	6	24.5		>480	6	23.4		>480	6	18.4		>480	6	8.8	
Sulphuric Acid, 96%	7664-93-9	25	1	62.5		42	2	39.6		>30	2	46.4		40	2	25.4		94	3	26.4	
ALKALIS																					
Ammonium Hydroxide, 25%	1336-21-6	<5	0	-51.8		<5	0	-64.3		<5	0	-29.0		<5	0	-10.2		3	0	-12.3	
Potassium Hydroxide, 50%	1310-58-3	>480	6	30.0		>480	6	-1.2		>480	6	10.0		>480	6	-2.1		>480	6	-12	
Sodium Hydroxide, 40%	1310-73-2	>480	6	36.5		>480	6	-1.5		>480	6	36.3		>480	6	-2.2		>480	6	-13.3	
Sodium Hydroxide, 20%	1310-73-2	>480	6	25.0		>480	6	-1.2		>480	6	15.0		>480	6	-1.6		>480	6	-10.1	
Sodium Hydroxide, 50%	1310-73-2	>480	6	35.0		>480	6	-0.9		>480	6	10.0		>480	6	-1.5		>480	6	-5.5	
ALCOHOLS																					
Butanol	71-36-3	NT		NT		NT		24.2		>480	6	12.6		>480	6	12.6		>480	6	3.6	
Ethanol, 96%	64-17-5	NT		NT		NT		12.3		>480	6	16.2		>480	6	16.2		>480	6	24.9	
Iso Propyl Alcohol (Propan-2-ol)	67-63-0	NT		NT		NT		48.6		>480	6	26.8		>480	6	26.8		>480	6	40.5	
Methanol	67-56-1	<5	0	22.3		7	0	10.4		<10	0	49.7		14	1	12.5		16	1	4.9	
KETONES																					
Acetone	67-64-1	<5	0	90.0		<5	0	89.8		<5	0	NT		<5	0	75.8		<5	0	82.9	
Cyclohexanone	108-94-1	<5	0	98.7		<5	0	98.7		<10	0	NT		<5	0	74.2		<10	0	64.2	
Methyl ethyl ketone	78-93-3	<5	0	90.0		<5	0	89.9		<10	0	NT		<5	0	84.7		<10	0	86.6	
ALDEHYDES																					
Formaldehyde, 37%	50-00-0	>480	6	-13.4		>480	6	-1.2		>480	6	37.3		>480	6	-2.1		>480	6	-1.6	
ESTERS																					
Ethyl Acetate	141-78-6	<5	0	98.7		<5	0	98.7		<5	0	NT		<5	0	89.7		<5	0	88.8	
ALIPHATIC SOLVENTS																					
Cyclohexane	110-82-7	<5	0	89.0		<5	0	87.4		<10	0	NT		NT		65.5		<5	0	79.1	
n - Hexane	110-54-3	<5	0	90.0		<5	0	88.9		<10	0	NT		NT		68.7		<5	0	78.4	
n- Heptane	142-82-5	<5	0	95.0		<5	0	92.1		<5	0	NT		<5	0	62.5		<5	0	73.1	
AROMATIC SOLVENTS																					
Toluene	108-88-3	<5	0	90.0		<5	0	89.7		<5	0	92.0		<5	0	94.5		<5	0	93.6	
Xylene	1330-20-7	<5	0	95.0		<5	0	92.5		<5	0	94.0		<5	0	92.6		<5	0	91.2	
AMINES																					
Diethyl Amine	109-89-7	<5	0	90.0		<5	0	89.9		<5	0	NT		<5	0	84.5		<5	0	81.9	
CHLORINATED SOLVENTS																					
Dichloromethane	75-09-2	<5	0	98.0		<5	0	97.4		<5	0	NT		<5	0	93.6		<5	0	80.4	
PEROXIDES																					
Hydrogen Peroxide, 30%	7722-84-1	30	1	19.8		>240	4	-56.0		>480	6	37.3		>480	6	37.3		>480	6	37.3	

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