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CORES SAFE CHEMICAL PERMEATION TESTING GUIDE

EN 16523-1

Minimum 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 the glove 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).

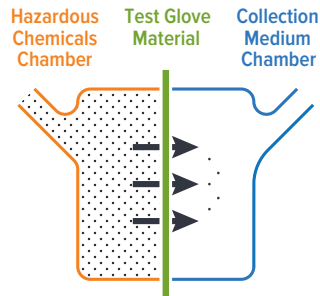


Illustration of chemical testing chamber

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 be determined by testing in those applications by the purchaser.

TESTING RESULTS KEY

Chemical Permeation (EN)		CoreSafe®			
Model Number		U13B			
Palm Thickness		0.28 mm / 11 mill			
Test Method		BS EN 16523-1+A1:2018			
Chemical	CAS Number	Average BTT (min)	CE Rating	Degradation %	Recommendation
ORGANIC ACIDS					
Acetic Acid - Glacial	64-19-7	34	2	95.1	Not Recommended
Acetic Acid, 10%	64-19-7	>480	6	13.3	Recommended
Acetic Acid, 20%	64-19-7	>480	6	15.4	Recommended
Acetic Acid, 25%	64-19-7	>480	6	22.7	Recommended
INORGANIC ACID					
Hydrochloric Acid, 10%	7647-01-0	>480	6	10.8	Recommended
Hydrochloric Acid, 37%	7697-37-2	100	3	21.9	Not Recommended
Nitric Acid, 40%	7697-37-2	270	5	18.2	Recommended
Nitric Acid, 10%	7697-37-2	>480	6	3.8	Recommended
Nitric Acid, 65%	7664-38-2	32	2	98.7	Not Recommended
Sulphuric Acid, 40%	7664-93-9	>480	6	20.5	Recommended
Sulphuric Acid, 50%	7664-93-9	>480	6	22.5	Recommended
Sulphuric Acid, 96%	8007-56-5	31	2	88.1	Not Recommended
ALKALIS					
Ammonium Hydroxide, 25%	1336-21-6	134	4	46.7	Recommended
Potassium Hydroxide, 50%	1310-58-3	>480	6	-21	Recommended
Potassium Hydroxide, 40%	1310-58-3	>480	6	0.6	Recommended

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 (BS EN 16523-1:2015+A1:2018). A higher number is better or longer.

CE Rating: The BS EN 16523-1:2015+A1:2018 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 (EN ISO 374-4:2019). 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).

CE Rating is based on Breakthrough Time (BTT)

BTT Lowest (min)	CE Rating
34	2
>480	6
>480	6
>480	6
>480	6
100	3
270	5
>480	6

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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R Recommended **F** Fair **NR** Not Recommended

Chemical Permeation (EN)		CoreSafe® U13B				CoreSafe® F13Y				CoreSafe® U17N				CoreSafe® F280				CoreSafe® F28YB			
Model Number		0.33 mm / 13 mil				0.33 mm / 13 mil				0.43 mm / 17 mil				0.71 mm / 28 mil				0.71 mm / 28 mil			
Palm Thickness		BS EN 16523-1:2015+A1:2018				BS EN 16523-1:2015+A1:2018				BS EN 16523-1:2015+A1:2018				BS EN 16523-1:2015+A1:2018				BS EN 16523-1:2015+A1:2018			
Test Method		BTT lowest (min)	CE Rating	Degradation %	Recommendation	BTT lowest (min)	CE Rating	Degradation %	Recommendation	BTT lowest (min)	CE Rating	Degradation %	Recommendation	BTT lowest (min)	CE Rating	Degradation %	Recommendation	BTT lowest (min)	CE Rating	Degradation %	Recommendation
Chemical	CAS Number																				
ORGANIC ACIDS																					
Acetic Acid - Glacial	64-19-7	<5	0	25.0	NR	<5	0	27.7	NR	22	1	2.8	F	60	3	22.9	R	55	2	22.7	R
Acetic Acid, 10%	64-19-7	>480	6	10.0	R	>480	6	15.0	R	>480	6	2.3	R	>480	6	10.1	R	>480	6	0.7	R
Acetic Acid, 20%	64-19-7	>480	6	15.0	R	>480	6	15.0	R	>480	6	2.0	R	>480	6	14.2	R	>480	6	1.8	R
Acetic Acid, 25%	64-19-7	>480	6	12.0	R	>480	6	20.0	R	>480	6	1.8	R	>480	6	16.9	R	>480	6	2.6	R
INORGANIC ACID																					
Hydrochloric Acid, 10%	7647-01-0	>480	6	-9.3	R	>480	6	-4.7	R	>480	6	-12.2	R	>480	6	-10.4	R	>480	6	-15.5	R
Hydrochloric Acid, 37%	7697-37-2	>480	6	-7.7	R	>480	6	-3.9	R	>480	6	-10.1	R	>480	6	-8.4	R	>480	6	-9.0	R
Nitric Acid, 10%	7697-37-2	>480	6	-7.0	R	>480	6	-3.5	R	>480	6	-9.2	R	>480	6	-2.1	R	>480	6	2.4	R
Nitric Acid, 40%	7697-37-2	>480	6	-6.8	R	>480	6	-3.4	R	>480	6	-8.9	R	>480	6	-9.4	R	>480	6	14.9	R
Nitric Acid, 65%	7664-38-2	110	3	50.5	F	110	3	56.3	F	201	4	19.8	R	201	5	22.1	R	355	5	22.9	R
Sulphuric Acid, 40%	7664-93-9	>480	6	24.7	R	>480	6	24.7	R	>480	6	22.1	R	>480	6	24.2	R	>480	6	5.4	R
Sulphuric Acid, 50%	7664-93-9	>480	6	32.0	R	>480	6	40.0	R	>480	6	24.5	R	>480	6	18.4	R	>480	6	8.8	R
Sulphuric Acid, 96%	8007-56-5	45	2	60.3	F	45	2	62.5	F	67	3	39.6	R	67	3	25.4	R	88	3	26.4	R
ALKALIS																					
Ammonium Hydroxide, 25%	1336-21-6	15	1	-51.8	F	15	1	-51.8	F	20	1	-64.3	F	20	2	-10.2	R	18	1	-12.3	R
Potassium Hydroxide, 50%	1310-58-3	>480	6	25.0	R	>480	6	30.0	R	>480	6	-1.2	R	>480	6	-2.1	R	>480	6	-12.0	R
Sodium Hydroxide, 20%	1310-73-2	>480	6	15.0	R	>480	6	25.0	R	>480	6	-1.2	R	>480	6	-1.6	R	>480	6	-10.1	R
Sodium Hydroxide, 40%	1310-73-2	>480	6	34.5	R	>480	6	36.5	R	>480	6	-1.5	R	>480	6	-2.2	R	>480	6	8.8	R
Sodium Hydroxide, 50%	1310-73-2	>480	6	35.0	R	>480	6	35.0	R	>480	6	-0.9	R	>480	6	-1.5	R	>480	3	26.4	R
ALCOHOLS																					
Butanol	71-36-3	NT		NT		NT		NT		24.2		24.2	F	NT		12.6		>480	6	3.6	R
Ethanol, 96%	64-17-5	NT		NT		NT		NT		12.3		12.3	F	NT		16.2		>480	6	24.9	R
Iso Propyl Alcohol (Propan-2-ol)	67-63-0	NT		NT		NT		NT		48.6		48.6	F	NT		26.8		>480	6	40.5	R
Methanol	67-56-1	15	1	20.1	F	15	1	22.3	F	20	1	10.4	F	34	2	12.5	F	66	3	4.9	F
KETONES																					
Acetone	67-64-1	<5	0	90.0	NR	<5	0	90.0	NR	<5	0	89.8	NR	<5	0	75.8	NR	<5	0	82.9	NR
Cyclohexanone	108-94-1	<5	0	98.7	NR	<5	0	98.7	NR	<5	0	98.7	NR	<5	0	74.2	NR	NT		64.2	
Methyl ethyl ketone	78-93-3	<5	0	90.0	NR	<5	0	90.0	NR	<5	0	89.9	NR	<5	0	84.7	NR	31	2	86.6	F
ALDEHYDES																					
Formaldehyde, 37%	50-00-0	>480	6	-13.4	R	>480	6	-13.4	R	>480	6	-1.2	R	>480	6	-2.1	R	>480	6	-1.6	R
ESTERS																					
Ethyl Acetate	141-78-6	<5	0	98.7	NR	<5	0	98.7	NR	<5	0	98.7	NR	<5	0	89.7	NR	<5	0	88.8	NR
ALIPHATIC SOLVENTS																					
Cyclohexane	110-82-7	<5	0	89.0	NR	<5	0	89.0	NR	<5	0	87.4	NR	NT		65.5		15	1	79.1	F
n - Hexane	110-54-3	<5	0	90.0	NR	<5	0	90.0	NR	<5	0	88.9	NR	NT		68.7		11	1	78.4	F
n - Heptane	142-82-5	<5	0	95.0	NR	<5	0	95.0	NR	<5	0	92.1	NR	<5	0	62.5	NR	<5	0	73.1	F
AROMATIC SOLVENTS																					
Toluene	108-88-3	<5	0	90.0	NR	<5	0	90.0	NR	<5	0	89.7	NR	<5	0	94.5	NR	<5	0	93.6	NR
Xylene	1330-20-7	<5	0	95.0	NR	<5	0	95.0	NR	<5	0	92.5	NR	<5	0	92.6	NR	7		91.2	NR
AMINES																					
Diethyl Amine	109-89-7	<5	0	90.0	NR	<5	0	90.0	NR	<5	0	89.9	NR	<5	0	84.5	NR	<5	0	81.9	NR
CHLORINATED SOLVENTS																					
Dichloromethane	75-09-2	<5	0	98.0	NR	<5	0	98.0	NR	<5	0	97.4	NR	<5	0	93.6	NR	<5	0	80.4	NR
PEROXIDES																					
Hydrogen Peroxide, 30%	7722-84-1	>480	6	18.0	R	121	4	19.8	R	>480	6	-56.0	NR	>480	6	NT		>480	6	6.5	R



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