Chemical resistant gloves

Symbols and protective effect explained simply

KERBL

Chemical resistant gloves must comply with the requirements of EN ISO 374. For this, testing includes permeation (EN ISO 374-1), penetration (EN ISO 374-2), degradation (EN ISO 374-4), and microbial resistance (EN ISO 374-5). The results for chemical resistance are provided in the product data sheet and the instructions for use.

Permeation

Permeation is defined as the breakthrough time until the chemical comes into contact with the skin. The permeation resistance of the protective gloves is subdivided into Types A, B, and C.

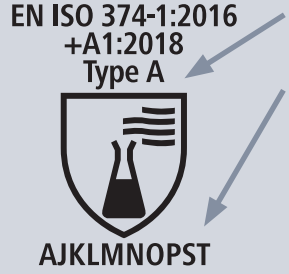
- Type A: Longer than 30 minutes for at least 6 test chemicals
- Type B: Longer than 30 minutes for at least 3 test chemicals
- Type C: Longer than 10 minutes for at least 1 test chemical

Type A gloves therefore have the best resistance.

Penetration

Penetration refers to the entry of a chemical or a micro-organism through porous materials, seams, needle holes, or other damage locations in the glove material. When testing the penetration resistance of chemical protection gloves, neither water nor air may pass through them.
Since the latest update of the standard in 2016 there are 18 test chemicals, each in a specified concentration, in order to depict as broad a spectrum as possible. The user selects a substance class which comes as close as possible to "his" chemical.

Example: "Chemex" chemical protection glove from Kerbl



Type A: The glove is resistant to at least 6 test chemicals for more than 30 minutes each

Test chemicals A, J, K, L, M, N, O, P, S, and T were tested. The breakthrough times for the chemicals are as shown below:

- A and M (performance level 2) > 30 minutes
- L, N, and S (performance level 3) > 60 minutes
- O (performance level 4) > 120 minutes
- J, K, P, and T (performance level 6) > 480 minutes

Code letter	Test chemical	CAS no.	Substance class	Performance level for "Chemex" from Kerbl
A	Methanol	67-56-1	Primary alcohol	2
B	Acetone	67-64-1	Ketone	
C	Acetonitrile	75-05-8	Nitrile	
D	Dichloromethane	75-09-2	Chlorinated hydrocarbon	
E	Carbon disulphide	75-09-2	Sulphureous organic compound	
F	Toluene	75-15-0	Aromatic hydrocarbon	
G	Diethylamine	108-88-3	Amine	
H	Tetrahydrofuran	109-99-9	Heterocyclic and ether compounds	
I	Ethyl acetate	141-78-6	Ester	
J	n-Heptane	142-82-5	Aliphatic hydrocarbon	6
K	Sodium hydroxide 40 %	1310-73-2	Inorganic base	6
L	Sulphuric acid 96 %	7664-93-9	Inorganic acid	3
M	Nitric acid 65 %	7697-37-2	Inorganic acid, oxidising	2
N	Acetic acid 99 %	64-19-7	Organic acid	3
O	Ammonium hydroxide 25 %	1336-21-6	Organic base	4
P	Hydrogen peroxide 30 %	7722-84-1	Peroxide	6
S	Hydrofluoric acid 40 %	7664-39-3	Inorganic acid	3
T	Formaldehyde 37 %	50-00-0	Aldehyde	6

Performance level	1	2	3	4	5	6
Breakthrough time [min]	> 10	> 30	> 60	> 120	> 240	> 480

Performance levels 1 to 6 derive from the breakthrough time [min].
The letters beneath the "Erlenmeyer flask" symbol indicate all chemicals for which a breakthrough time of at least 30 minutes was measured.

Product information

Degradation

Permanent contact with the chemicals modifies the glove's physical characteristics, causing flaking, break-up, hole formation, hardening, and discolouration, for example. This process is known as degradation.

Example: Chemex chemical protection glove
EN ISO 374-4 – Resistance against degradation by chemicals

Chemical	Percent deterioration
Methanol (A)	41.8
n-Heptane (J)	14.0
Sodium hydroxide 40 % (K)	-19.3
Sulphuric acid 96 % (L)	43.5
Nitric acid 65 % (M)	36.4
Acetic acid 99 % (N)	24.5
Ammonium hydroxide 25 % (O)	-10.8
Hydrogen peroxide 30 % (P)	-0.2
Hydrofluoric acid 40 % (S)	X
Formaldehyde 37 % (T)	-7.0

The test result is stated as a percentage deterioration. The values can therefore be positive (material has become weaker after the effect of the chemical) or negative (material has become stronger after the effect of the chemical).

Example: "Chemex" chemical protection glove:
Contact with methanol, n-heptane, and sulphuric, nitric, and acetic acids has weakened the material (nitrile) of the "Chemex" glove. In contrast, contact with sodium hydroxide, ammonium hydroxide, hydrogen peroxide, and formaldehyde has hardened the material. Hydrofluoric acid was not tested (X).

Protection against micro-organisms

Gloves certified according to EN ISO 374-5 protect the user from bacteria and fungi.
If the glove also protects against viruses, then "VIRUS" is displayed next to the pictogram.

EN ISO 374-5:2016

The glove protects against bacteria, fungi, and viruses.

EN ISO 374-5:2016

Example: "Chemex" chemical protection glove from Kerbl

The glove is resistant to bacteria and fungi.

Instructions for correct use

1. Storage: Ideally in a cool (5 - 30°C), dry location free from direct sunlight, in order to prevent premature ageing.
2. Before use: Remove jewellery and trim fingernails if necessary; check gloves for possible damage, and do not use if defective.
3. Putting on: For longer protective gloves, roll back the cuff, so that the chemical does not run into the gloves.
4. Working: The chemical resistance can vary when mixtures of chemicals are present. Temperature, wear, or degradation also affect the actual protection period.
5. Pulling off: When pulling the contaminated gloves off, the user should ensure that they do not come into contact with unprotected skin.

The chemical manufacturers' safety datasheets and the protective glove's instructions for use contain further useful information about use and disposal.