

A close-up photograph of a dentist in a clinical setting. The dentist is wearing black scrubs, a white surgical mask, safety glasses, and light blue nitrile gloves. She is focused on a patient who is reclined in a dental chair. The patient is wearing glasses and has their mouth open. The dentist is using dental instruments, including a mirror and a probe, to examine the patient's teeth. The background is a clean, professional dental office.

**Ansell**

# CHEMICAL SPLASH GUIDE FOR DENTAL GLOVES

# Ansell has developed this guide to help dental professionals better understand how different gloves protect against common chemicals used in dental environments.

When reviewing the following recommendations, remember that tests are conducted under laboratory conditions, and that actual workplace conditions usually dictate a combination of performance capabilities.

Ansell's dental splash guide is presented on the following pages as an aid in determining the general suitability of various products for use with specific chemicals. In view of the fact that the conditions of ultimate use are beyond our control, and because we cannot run permeation tests in all possible work environments and across all combinations of chemicals and solutions, these recommendations are advisory only.

## Definition of Key Terms:

**Permeation** is a process by which a chemical can pass through a protective film without going through pinholes, pores, or other visible openings. Individual molecules of the chemical enter the film, and pass between the molecules of the glove compound or film. In many cases the material that chemicals have permeated through may appear unchanged to the human eye. Chemical permeation can be described in simple terms by comparing it to what happens to the air in a balloon after several hours. Although there are no holes or defects, and the balloon is tightly sealed, the air gradually passes through (permeates) its walls and escapes. This simple example uses gas permeation, but the principle is the same with liquids or chemicals.

Permeation data are presented in two values: **Breakthrough** time and **Rate**. Breakthrough times (min.) are the times observed from the start of the test to first detection of the chemical on the other side of the sample. These times represent how long a glove can be expected to provide effective permeation resistance when totally immersed in the test chemical. Permeation rates are the highest flow rates recorded for the permeating chemicals through the glove samples during a six-hour or eight-hour test. These qualitative ratings are comparisons of permeation rates to each other.

**Degradation** is a reduction in one or more physical properties of a glove material due to contact with a chemical. Certain glove materials may become hard, stiff, or brittle, or they may grow softer, weaker, and swell to several times their original size after exposure to a chemical.

If a chemical has a significant impact on the physical properties of a glove material, its permeation resistance is quickly impaired. Please note, however, that permeation and degradation do not always correlate.

Key points to note about chemical permeation:

1) Gloves made of different polymers will have different chemical resistance properties. Latex, nitrile and Neoprene each have their strengths and weaknesses when exposed to different types of chemicals.

2) Chemical resistance depends on:

- Polymer formulation and manufacturing process
- Thickness of the glove
- Composition of the product or concentration of the chemicals
- Frequency and duration of contact with the chemical(s)
- Nature of contact – total immersion or splash only
- Environmental conditions (temperature, humidity, etc.)

3) Gloves made of the same polymer and with similar thickness may not always have the same chemical resistance as the formulation and manufacturing process of the two gloves may not be similar.

4) The suitability of a glove in protecting against a chemical/ mixture must be determined by testing the specific product against the specific chemical/ mixture in order to accurately determine how well a given glove will protect.

# Methodology

## Permeation Testing



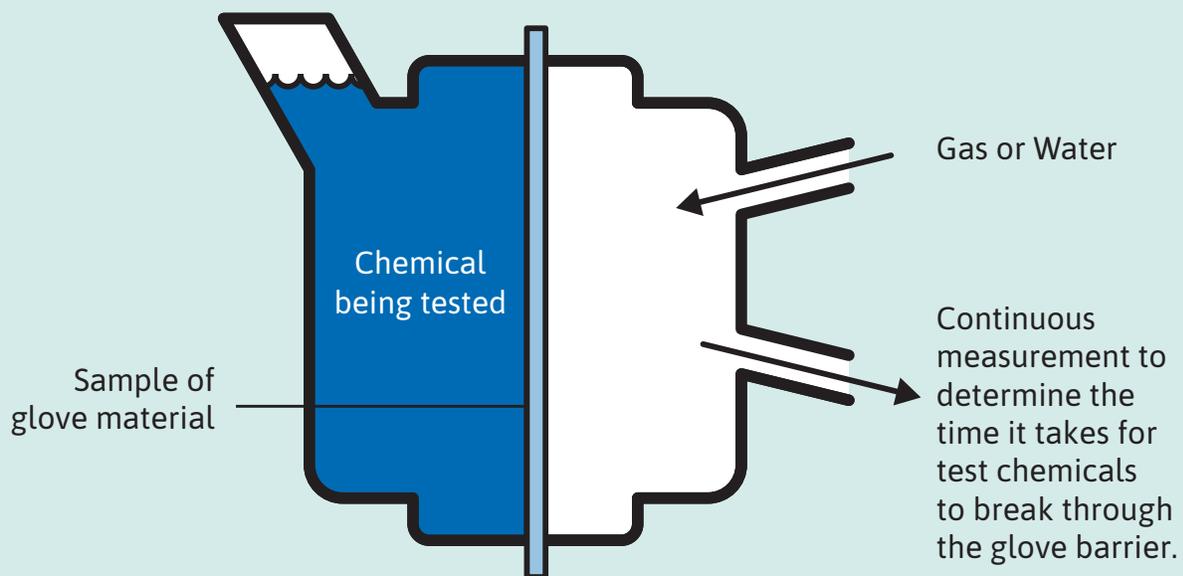
Ansell conducts permeation testing in accordance with both ASTM F739 and EN ISO 16523-1 and can provide test results based on the preference of customers in different regions. Permeation testing is conducted by cutting a specimen from the gloves and clamping it into a test cell as a barrier membrane (see illustration). The “exterior” side of the specimen is exposed to a hazardous chemical. At timed intervals, the unexposed “interior” side of the test cell is checked for the presence of the permeated chemical and the extent to which it may have permeated the glove material.

The EN and ASTM standards allow for variety in analysis and collection media. At Ansell, dry nitrogen is the most common medium and gas chromatography with Flame Ionization Detectors (FID) is the most common analytical technique. Our Research Department also uses liquids such as distilled water and hexane as collecting media, and techniques such as conductivity, colorimetry, and liquid chromatography for analysis of the collecting liquid.

## Degradation Testing

Degradation is performed by cutting patches of material from a glove that become the test material. These patches are weighed and measured, and then completely immersed in the test chemical for 30 minutes. The percentage of change in size is determined, and the patches are then dried to calculate the percentage of weight change. Observed physical changes are also reported. Degradation ratings are based on the combined data.

## HOW CHEMICAL PERMEATION TESTS WORK



# Splash rating was calculated by taking into account the following factors:

**A** Risk Rating (RR) ranging from 1 (greatest risk) to 4 (least risk), based on EU Hazard Ratings in “**Quick Selection Guide to Chemical Protective Clothing/ Krister Forsberg, Ann Van den Borre, Norman Henry III, James P. Ziegler, Hoboken, NJ: Wiley, 7th Edition, 2020**”:

- 1 Highly toxic and/or highly corrosive (Tx, Cx)
- 2 Toxic and/or corrosive (T, C)
- 3 Harmful and/or irritant (X, Xi)
- 4 No risk

*Risk Ratings for compounds not listed in Forsberg and Mansdorf were estimated from toxicity data in other sources.*

**B** Breakthrough time in minutes, EN ISO 374 permeation test.

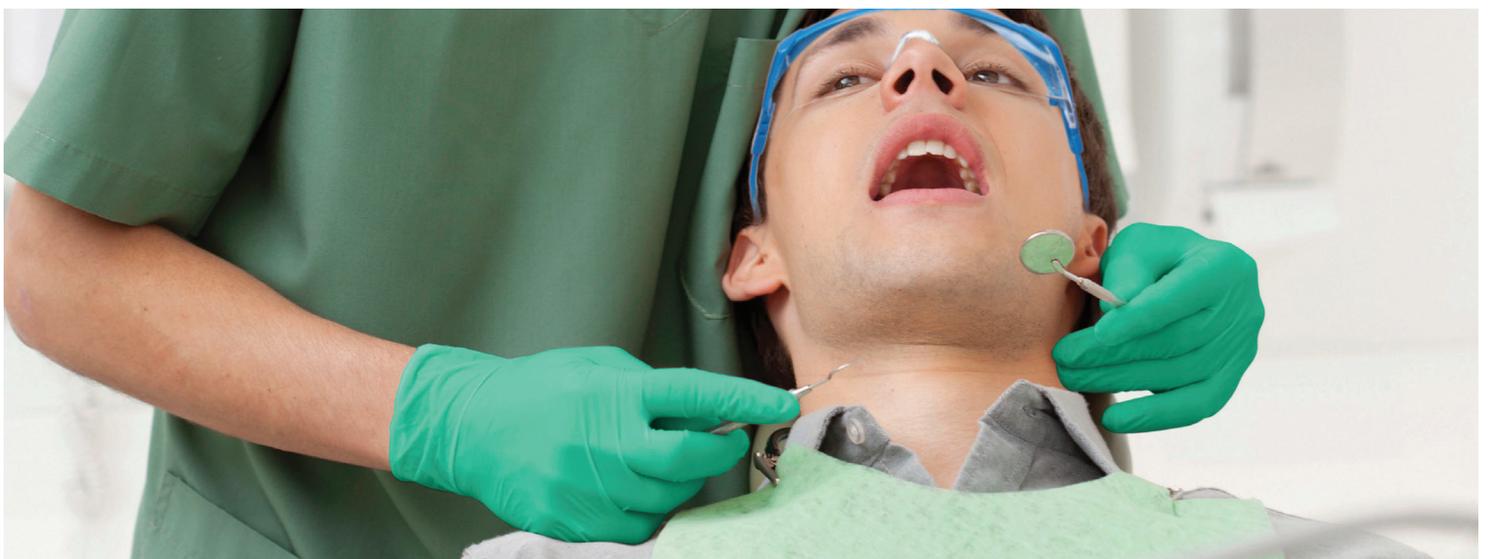
**C** Volatility Rating (VR)

## Rating

1	slightly volatile
2	moderate volatile
3	highly volatile

### Note on the Data and Recommendations

Many of the breakthrough times in the table below have been estimated using data for similar glove/chemical combinations, or are based on EN ISO 374 test data. Recommendations are based on extrapolations from laboratory test results and information regarding the composition of chemicals and may not adequately represent specific conditions of end use. Synergistic effects of mixing chemicals have not been accounted for. Due to these reasons, and because Ansell has no detailed knowledge of or control over the conditions of end use, any recommendation must be advisory only and Ansell fully disclaims any liability including warranties related to any statement contained herein.



# Splash Guide for Dental Gloves

## Splash Guide

- Recommended Splash Rating : The glove is very well-suited for splash protection against that chemical.
- Caution Splash Rating : The glove can be used under carefully controlled conditions, and as a precautionary measure consider replacing the glove if chemical splash/spills occurs.
- Not Recommended Splash Rating : Avoid exposure of the gloves to that chemical.

Chemical Name	CAS Number	Conc. (%)					
			MICROFLEX® Ultraform™ UF-524	MICROFLEX® Soft White Nitrile TQ-601	MICROFLEX® MidKnight™ Touch 93-732	MICROFLEX® XCEED® 93-833.XC-310	MICROFLEX® NEOGARD™ 73-847.C52
1 3-Methacryloxypropyltrimethoxysilane	2530-85-0	100	Green	Green	Green	Green	Green
2 Acetic Acid	64-19-7	100	Red	Red	Red	Red	Red
3 Ammonium Hydroxide	1336-21-6	20	Green	Green	Green	Green	Green
4 Ammonium Hydroxide	1336-21-6	28	Green	Green	Green	Green	Green
5 Ethyl Alcohol	64-17-5	100	Yellow	Yellow	Green	Yellow	Green
6 Ethylene Glycol	107-21-1	100	Green	Green	Green	Green	Yellow
7 Formaldehyde	50-00-0	37	Green	Green	Green	Green	Green
8 Glutaraldehyde, Aqueous Solution	111-30-8	25	Green	Green	Green	Green	Green
9 Glycerine	56-81-5	100	Green	Green	Green	Green	Green
10 Glycolic Acid, Aqueous Saturated Solution	79-14-1	70	Green	Green	Green	Green	Green
11 Heptane	142-82-5	100	Yellow	Yellow	Green	Yellow	Yellow
12 Hydrochloric Acid	7647-01-0	37	Yellow	Yellow	Green	Yellow	Yellow
13 Hydrogen Peroxide	7722-84-1	30	Green	Green	Green	Green	Green
14 Isopropanol	67-63-0	10	Green	Yellow	Green	Yellow	Yellow
15 Isopropanol	67-63-0	100	Green	Yellow	Green	Yellow	Yellow
16 Mercury	7439-97-6	100	Green	Green	Green	Green	Green
17 Methyl Ethyl Ketone	78-93-3	100	Yellow	Yellow	Green	Yellow	Yellow
18 Methyl Methacrylate	80-62-6	100	Yellow	Yellow	Green	Yellow	Yellow
19 Naphtha	8030-30-6	100	Yellow	Green	Green	Yellow	Yellow
20 n-Hexane	110-54-3	100	Yellow	Green	Yellow	Yellow	Yellow
21 Nitric Acid	7697-37-2	70	Red	Red	Red	Red	Yellow
22 Petrolatum	8009-03-8	100	Yellow	Green	Yellow	Yellow	Red
23 Phosphoric Acid	7664-38-2	85	Green	Green	Green	Green	Green
24 Propylene Glycol	57-55-6	100	Green	Green	Green	Green	Green
25 Rosin Modified	65997-06-0	100	Green	Green	Green	Green	Green
26 Sodium Bicarbonate, Aqueous Solutions	144-55-8	99	Green	Green	Green	Green	Green
27 Sodium Fluoride, Aqueous Solutions	7681-49-4	4	Green	Green	Green	Green	Green
28 Sodium Hydroxide	1310-73-2	40	Green	Green	Green	Green	Green
29 Sodium Hypochlorite, Aqueous Solution	7681-52-9	8	Green	Green	Green	Green	Green
30 Sulfamic Acid	5329-14-6	20	Green	Green	Green	Green	Green
31 Sulphuric Acid	7664-93-9	50	Green	Green	Green	Green	Green
32 Sulphuric Acid	7664-93-9	96	Red	Red	Red	Red	Yellow
33 Toluene	108-88-3	100	Yellow	Yellow	Green	Yellow	Yellow
34 White Mineral Oil (Petroleum), Light	92062-35-6	100	Green	Green	Green	Green	Green
35 12149/ 12150/ 12151/ 12154 3M™ ESPE™ VANISH™ 5% NaF WHITE VARNISH WITH TCP			Yellow	Yellow	Green	Yellow	Yellow
36 Biflourid 10			Red	Red	Red	Red	Red
37 Calasept			Green	Green	Green	Green	Green
38 Calcicur			Green	Green	Green	Green	Green
39 Calcimol LC			Green	Green	Green	Green	Green
40 Calmix			Green	Green	Green	Green	Green
41 Calxyl			Green	Green	Green	Green	Green
42 Canal Plus			Green	Green	Yellow	Green	Green
43 Canal Pro EDTA 17%			Green	Green	Green	Green	Green
44 Caries Finder™ Red			Green	Green	Green	Green	Green
45 Cavicide™			Yellow	Yellow	Green	Yellow	Yellow
46 Cavicide™ AF			Green	Green	Green	Green	Green
47 Cavidry (Aka Methyl Ethyl Ketone)	78-93-3	100	Yellow	Yellow	Green	Yellow	Yellow
48 Clorox® Germicidal Bleach			Green	Green	Green	Green	Green
49 Clorox® Regular-Bleach			Green	Green	Green	Green	Green
50 Composite Wetting Resin			Red	Red	Red	Red	Red

# Splash Guide for Dental Gloves

## Splash Guide

- Recommended Splash Rating : The glove is very well-suited for splash protection against that chemical.
- Caution Splash Rating : The glove can be used under carefully controlled conditions, and as a precautionary measure consider replacing the glove if chemical splash/spills occurs.
- Not Recommended Splash Rating : Avoid exposure of the gloves to that chemical.

Chemical Name	CAS Number	Conc. (%)					
			MICROFLEX® Ultraform™ UF-524	MICROFLEX® Soft White Nitrile TQ-601	MICROFLEX® MidKnight™ Touch 93-732	MICROFLEX® XCEED® 93-833.XC-310	MICROFLEX® NEOGARD™ 73-847.C52
51	Consepsis, Consepsis V						
52	Eugenol	97-53-0					
53	FL BOND II "BONDING AGENT"						
54	Fortify Plus / Modeling Resin						
55	Henry Schein Antimicrobial Skin Cleanser						
56	High Spot Moisturizing Spray, Clean and Lube and Clean and Lube Wipes						
57	Hyde-Out Aldehyde Neutralizer						
58	HypoPure						
59	IRM LIQUID - Zinc Oxide Eugenol						
60	IRM Powder Zinc Oxide Eugenol						
61	MaxiCide Plus						
62	MI Varnish						
63	Mikrozyd AF wipes						
64	Monobond Etch & Prime						
65	NOGENOL (Non-Eugenol Temporary Cement; Base)						
66	Opal™ Band™ Cement - Catalyst						
67	Optim 1 Wipes						
68	Optim Blue						
69	Orange Guard						
70	Oraseal™ Caulk, Oraseal™ Putty						
71	Orotol® plus Disinfection of suction system						
72	PermaQuick® Bonding Primer						
73	Porcelain Etch						
74	Preline Base Paste						
75	Premium Dispersed Phase Alloy – Regular Set						
76	Provicol						
77	Pulp Canal Sealer™ Liquid						
78	Purevac Evacuation System Cleaner						
79	QUATTROcare plus Spray AMERICA 2141						
80	SmearClear™ Mix						
81	Sterilex Ultra Disinfectant Cleaner Solution 1						
82	Super Sani-Cloth Germicidal Wipe						
83	Topex® Durashield 5% Sodium Fluoride Varnish						
84	Ultra Blend Plus						
85	UltraCal™ XS						
86	Ultradent™ Citric Acid Solution						
87	Ultradent™ EDTA 18% Solution						
88	Ultra-Etch						
89	Ultra-Etch & Opal Etch						
90	Woolite Carpet & Upholstery Cleaner (8352)						
91	Woolite Carpet & Upholstery Cleaner, or Fabric & Upholstery Cleaner						

### Abbreviation

Conc.

### Note on the Data and Recommendations

The Splash Rating was calculated based on chemical permeation breakthrough time, its volatility and health hazard. The breakthrough time is based on EN ISO 374 test data. Recommendations are based on extrapolations from laboratory test results and information regarding the composition of chemicals and may not adequately represent specific conditions of end use. Synergistic effects of mixing chemicals have not been accounted for. For these reasons, and because Ansell has no detailed knowledge of or control over the conditions of end use, any recommendation must be advisory only and Ansell fully disclaims any liability including warranties related to any statement contained herein.

® are registered trademarks owned by Ansell Ltd. or one of its affiliates. © 2021 Ansell Ltd. All Rights Reserved.

➔ For more information, visit [www.ansell.com](http://www.ansell.com)

Ansell, ® and ™ are trademarks owned by Ansell Limited or one of its affiliates. © 2021 Ansell Limited. All Rights Reserved.

