



**Home Innovation**  
RESEARCH LABS™

Stain and Chemical Resistance  
Testing in Accordance with  
CSA B45.5-17 /  
IAPMO Z124-2017

*Prepared For*

**Relang**

7030 Quad Ave  
Rosedale, MD 21237

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## BACKGROUND

Relang International, LLC requested stain and chemical resistance testing of their Durasein brand solid surface sheet material in accordance with CSA B45.5-17/IAPMO Z124-2017 *Plastic Plumbing Fixtures*. At the request of the client, the scope of testing was expanded beyond the list of reagents in the standard to include those listed. An agreement was entered January 14, 2020, between Relang International, LLC and Home Innovation Research Labs, Inc.

## SAMPLES

Six (6) 15" by 15" panels of solid surface material were submitted directly to Home Innovation by the client. The samples were not independently or randomly selected for testing. The samples were not damaged during shipping and were not tampered with prior to arrival. No special conditions or preparations were observed by Home Innovation staff. Specimens were received at Home Innovation on April 8, 2020, and testing concluded May 7, 2020. Each panel was subdivided into 25 sections by Home Innovation to provide adequate space for each individual test.

## TESTING METHOD

Home Innovation staff prepared and tested the panels in accordance with CSA B45.5-17/IAPMO Z124-2017 *Plastic Plumbing Fixtures*, Section 5.11 Stain resistance test. There was no deviation from this standard test procedure. All testing was conducted in the test lab of Home Innovation in the same location and lab ambient environment. Test lab ambient conditions were controlled around 72.6°F and 40% RH during testing. The panels were prepared in accordance with section 5.11.1(b) by wet rubbing with cheesecloth using an abrasive powder mixture for 20 cycles. Following preparation of the panels and evaluation for pre-existing defects, two drops of each reagent were placed on the surface. One drop was covered with a watch glass while the other was left exposed to ambient laboratory conditions for 16 hours. At the end of the exposure, samples were first cleaned in accordance with section 5.4.1 as follows:

1. Specimen was washed with standard liquid detergent and water, then dried.
2. The surface was rubbed with a 1:1 mixture of water and washable ink.
3. The ink was rinsed from the surface and the panels were dried.

Panels were then evaluated for defects and were rated 1 - 5 in accordance with section 5.11.2, as follows:

- Rating 1: Removeable by washing with water and a cheesecloth for 20 cycles.
- Rating 2: Removeable by washing with naphtha and a cheesecloth for 20 cycles.
- Rating 3: Removeable with 20 cycles of wet rubbing with abrasive powder.
- Rating 4: Removeable with 40 additional cycles of wet rubbing with abrasive powder.
- Rating 5: Not removable using previous methods.

Those stains and texture changes with ratings of 5 were sanded with 400-grit sandpaper to determine the depth of staining.

## RESULTS

The results are presented in Table 1, below. Some of the more aggressive reagents caused notable surface swelling in addition to the rated stain and surface texture changes. In those cases, the damage is described in the notes column. Two requested reagents were unavailable due to their controlled sales status and were not included.

**Table 1. Stain and Chemical Resistance Results**

Reagent	Covered		Uncovered		Notes
	Rating	Material Removed (in)	Rating	Material Removed (in)	
Acetic Acid 10%	3	-	3	-	
Acetic Acid 90%	3	-	3	-	
Acetic Acid 98%	3	-	3	-	
Acetone	3	-	3	-	
Acid Drain Cleaner	5	0.000	5	0.000	
Acrodine Orange	3	-	3	-	
AG Eosin Blue 5%	1	-	1	-	
AG Gentian Violet	4	-	4	-	
Ammonia 10%	1	-	1	-	
Ammonium Hydroxide 28%	1	-	1	-	
Ammonium Hydroxide 5%	1	-	1	-	
Amyl Acetate	3	-	3	-	
Amyl Alcohol	1	-	1	-	
Aqua Regia Cleaner	5	0.000	5	0.000	
Aromatic Ammonia	1	-	1	-	
Ball Point Pen	5	0.000	5	0.000	
Benzene	3	-	3	-	
Betadine Solution	1	-	1	-	
Bite Registration Base	2	-	2	-	
Bleach (Household Type)	1	-	1	-	
Blood	1	-	1	-	
Butyl Alcohol	1	-	1	-	
Calcium Thiocyanate 78%	1	-	1	-	
Carbon Disulfide	1	-	1	-	
Carbon Tetrachloride	1	-	1	-	
Caulk IRM	5	0.001	5	0.000	
Chlorobenzene	4	-	4	-	
Chloroform 100%	4	-	4	-	
Chromic Trioxide Acid	5	0.001	5	0.001	
Cigarette (Nicotene)	1	-	1	-	
Citric Acid 10 %	1	-	1	-	

Reagent	Covered		Uncovered		Notes
	Rating	Material Removed (in)	Rating	Material Removed (in)	
Coffee	1	-	1	-	
Cooking Oils	1	-	1	-	
Copalite Varnish	2	-	2	-	
Cottonseed Oil	1	-	1	-	
Cresol	5	0.002	5	0.001	Swelling
Crystal Violet	5	0.001	5	0.001	
Dimethyl methylene Blue	3	-	2	-	
Dimethyl Formamide	3	-	4	-	
Dioxane	3	-	3	-	
Dishwashing Liquids/ Powders	1	-	1	-	
Dry Bond Dental Adhesive	1	-	1	-	
Ethyl Acetate	3	-	3	-	
Ethyl Alcohol (Ethanol)	1	-	1	-	
Ethyl Ether	1	-	1	-	
Eucalyptol	1	-	1	-	
Eugenol	5	0.000	5	0.000	
Ferric Chloride	3	-	3	-	
Fisher Formaldehyde 40%	1	-	1	-	
Food Coloring	1	-	1	-	
Formaldehyde	1	-	1	-	
Formic Acid 50%	3	-	3	-	
Formic Acid 90%	4	-	4	-	
Furfural	5	0.000	5	0.000	
Gasoline	1	-	1	-	
Gentian Violet	4	-	4	-	
Giemsa	5	0.002	5	0.001	
Glacial Acetic Acid	3	-	3	-	
Hair Dyes	3	-	3	-	
Household Soaps	1	-	1	-	
Hydrochloric Acid 20%	1	-	1	-	
Hydrochloric Acid 30%	1	-	1	-	
Hydrochloric Acid 37%	1	-	1	-	
Hydrofluoric Acid 48%	5	0.001	5	0.001	
Hydrogen Peroxide	1	-	2	-	
Iodine 1%	3	-	1	-	
Kerosene	1	-	1	-	
Ketchup	1	-	1	-	
Lemon Juice	1	-	1	-	

Reagent	Covered		Uncovered		Notes
	Rating	Material Removed (in)	Rating	Material Removed (in)	
Lipstick	2	-	2	-	
Lye 1%	1	-	1	-	
Lysol Brand Cleaner	1	-	1	-	
Mercurochrome 2%	1	-	1	-	
Methanol	1	-	1	-	
Methyl Ethyl Ketone	3	-	3	-	
Methyl Orange 1%	3	-	3	-	
Methyl Red 1%	4	-	4	-	
Methylene Chloride Based Products – Paint Removers – Brush Cleaners – Some Metal Cleaners	4	-	4	-	
Mineral Oil	1	-	1	-	
Monseil's Solution	1	-	1	-	
Mustard	1	-	1	-	
Nail Polish	5	0.005	5	0.005	
Nail Polish Remover	3	-	3	-	
Napthalene (Naptha)	1	-	1	-	
N-Hexane	1	-	1	-	
Nitric Acid 25%	5	0.009	5	0.001	Swelling
Nitric Acid 30%	5	0.011	5	0.006	Swelling
Nitric Acid 70%	5	0.007	5	0.003	Swelling
Olive Oil	1	-	1	-	
Pencil Lead	3	-	3	-	
Perchloric Acid	5	0.001	5	0.001	
Phenol 40%	5	0.000	5	0.000	
Phenol 85%	5	0.001	5	0.001	Swelling
Phenophthalein 1%	3	-	2	-	
Phosphoric Acid 75%	5	0.003	5	0.002	
Phosphoric Acid 90%	5	0.002	5	0.001	
Phosphorus Pentoxide	1	-	1	-	
Photographic Film Developer (used)	1	-	1	-	
Picric Acid	1	-	1	-	
Potassium Permanganate 2%	3	-	3	-	
Procaine	1	-	1	-	
Safranin	1	-	1	-	
Salt (Sodium Chloride)	1	-	1	-	
Shoe Polish	5	0.003	5	0.004	
Silica Dental Cement (liquid)	1	-	1	-	
Silver Nitrate 10%	3	-	3	-	



Reagent	Covered		Uncovered		Notes
	Rating	Material Removed (in)	Rating	Material Removed (in)	
Soapless Detergents	1	-	1	-	
Sodium Bisulphate	1	-	1	-	
Sodium Hydroxide Flake	5	0.001	5	0.001	
Sodium Hydroxide Solution 10%	5	0.001	5	0.001	
Sodium Hydroxide Solution 25%	5	0.000	5	0.001	
Sodium Hydroxide Solution 40%	5	0.001	5	0.001	
Sodium Hydroxide Solution 5%	4	-	4	-	
Sodium Hypochlorite 5%	1	-	1	-	
Sodium Sulphate	1	-	1	-	
Soy Sauce	1	-	1	-	
Sugar (Sucrose)	1	-	1	-	
Sulphuric Acid 25%	5	0.000	5	0.000	
Sulphuric Acid 33%	5	0.000	5	0.000	
Sulphuric Acid 60%	5	0.001	5	0.001	
Sulphuric Acid 77%	5	0.001	5	0.002	
Sulphuric Acid 96%	5	0.000	5	0.000	
Tannic Acid	1	-	1	-	
Tea	3	-	3	-	
Tetrahydrofuran	3	-	3	-	
Tetramethyl Rhodamine Isothiocyanate	5	0.003	5	0.001	
Thymol in Alcohol	1	-	1	-	
Tincture of Iodine	3	-	1	-	
Tincture of Mercurochrome	1	-	1	-	
Tincture of Merthiolate	3	-	3	-	
Toluene	3	-	3	-	
Tomato Sauce	1	-	1	-	
Trichloroacetic Acid 10%	5	0.001	5	0.000	Swelling
Trichloroacetic Acid 50%	5	0.001	5	0.001	Swelling
Trichloroethane	1	-	1	-	
Trisodium Phosphate 30%	1	-	1	-	
Trypan Blue	5	0.002	5	0.001	
Urea 6%	1	-	1	-	
Uric Acid	1	-	1	-	
Urine	1	-	1	-	
Vinegar	1	-	1	-	
Washable inks	2	-	2	-	
Wine (all varieties)	2	-	2	-	
Wright's Stain	5	0.002	5	0.001	

Reagent	Covered		Uncovered		Notes
	Rating	Material Removed (in)	Rating	Material Removed (in)	
Xylene	1	-	2	-	
Zephiran Chloride	1	-	1	-	
Zinc Chloride	1	-	1	-	
Zinc Oxide Ointment	1	-	1	-	
Debacterol	No longer sold over the counter.				
"Cavity" in Phenol	Mortuary chemical. Unavailable for purchase.				

## SUMMARY

In accordance with section 5.11.3, the thickness of material removed to eliminate a stain must not exceed 0.005 in. The only reagents failing that criteria were Nitric Acid 70%, Nitric Acid 30%, and Nitric Acid 25%. All other reagents passed the stain requirements of the standard. Furthermore, all reagents met the criteria of 5.4.2 and no cracks, chipped areas, or blisters were observed. The documented swelling was not a fault described in the standard. As it was removeable using the 400-grit sandpaper, it was considered to be equivalent to a texture change for the purposes of evaluation.



## EQUIPMENT UTILIZED

The following table is a list of equipment used in this testing.

Equipment	Serial Number	Calibration due
Indicator	ATD17423071	10/31/20
Digital Scale	USS-DB52-50-180705	5/31/2020

## REFERENCED STANDARDS

CSA B45.5-17 / IAPMO Z124-2017 *Plastic Plumbing Fixtures*

 <hr/> Prepared by John Winebarger Laboratory Programs Supervisor	<hr/> 05/08/2020 Date
 <hr/> Signed for and on behalf of Home Innovation Research Labs Deanna Seale, P.E. Assistant Lab Director	<hr/> 05/15/2020 Date

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