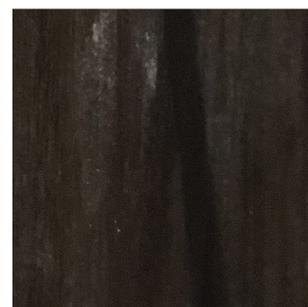


Vinyl based
Flooring
—
Product
guide



We bring it all together.



Vinyl Based Flooring

Product guide resin



ENERGY CURING RAW MATERIAL AND TECHNICAL SOLUTION PROVIDER

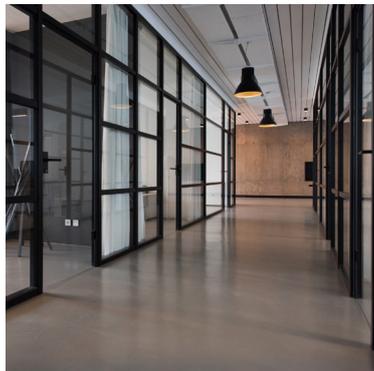
IGM Resins is the leading global provider of energy curable raw material solutions to a wide variety of industries such as graphic arts, industrial coatings, adhesives and 3D printing. The combination of our global presence, unique market driven and customer focused approach, technical and regulatory support, and our comprehensive portfolio of products covering photoinitiators, monomers, oligomers and additives, is the cornerstone of our success.

Our dedication to energy curing technology and the markets we serve is emphasized by the

development of next generation products for innovative integrated solutions, and ongoing investment into state-of-the-art manufacturing capabilities.

HOW TO GET MORE FROM US

The flooring market can be segmented in soft cover flooring (carpets and rugs), non-resilient flooring (ceramic tiles, wood and laminate) and resilient flooring (linoleum, cork, rubber and vinyl). Development in re-modelling and new construction in residential and non-residential buildings is boosting the demand in flooring. The superior performance properties of vinyl flooring (vinyl sheet, vinyl composite tiles and luxury vinyl tiles) are



driving the high demand of this type of flooring. As a result of the versatility of its graphic layer, luxury vinyl tiles provide superior design capabilities resembling the look of natural wood, marble, granite, concrete or other types of flooring. The performance properties are

for a significant part determined by the UV coating applied on top providing chemical, water, stain and mechanical resistance properties such as scratch and scuff/markings resistance.

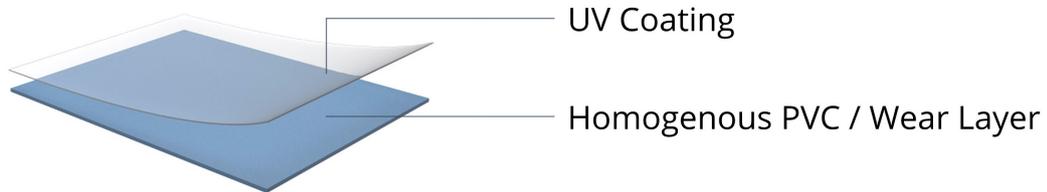
To meet these challenging requirements, IGM Resins offers different solutions. In this leaflet you will find information about our product portfolio.

For more details, contact your local sales representative or send us an email to sales@igmresins.com for Europe and Asia and ussales@igmresins.com for America.

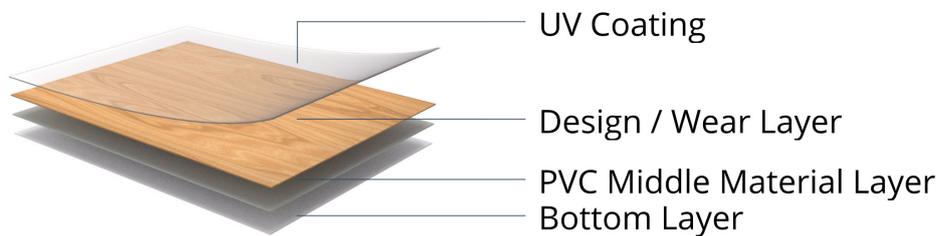


RESILIENT FLOORING - VINYL BASED FLEXIBLE AND RIGID FLOORING

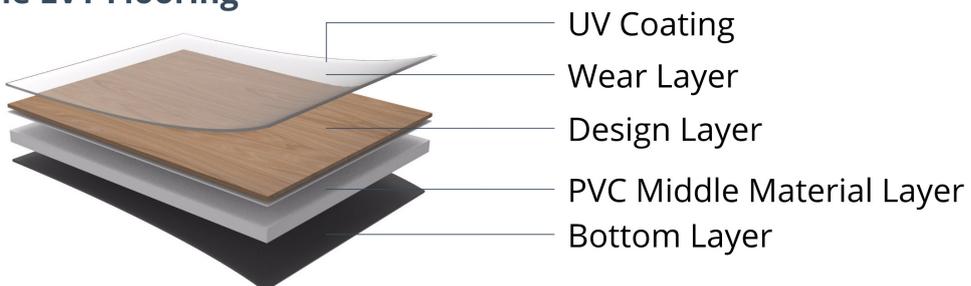
Flexible Roll Flooring Homogenous



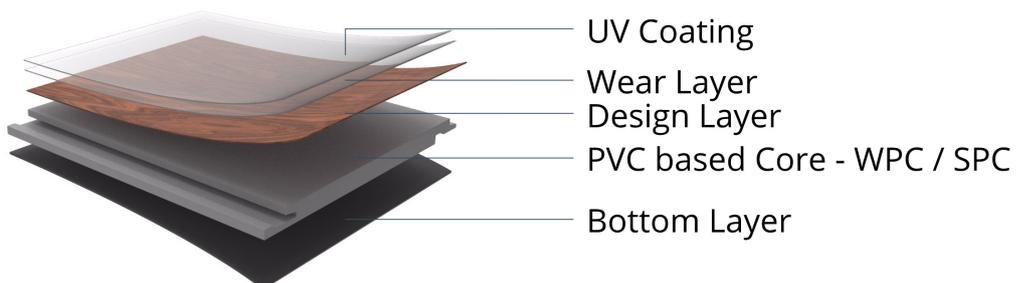
Flexible Roll Flooring Heterogeneous



Flexible LVT Flooring



Inflexible / Rigid LVT Flooring

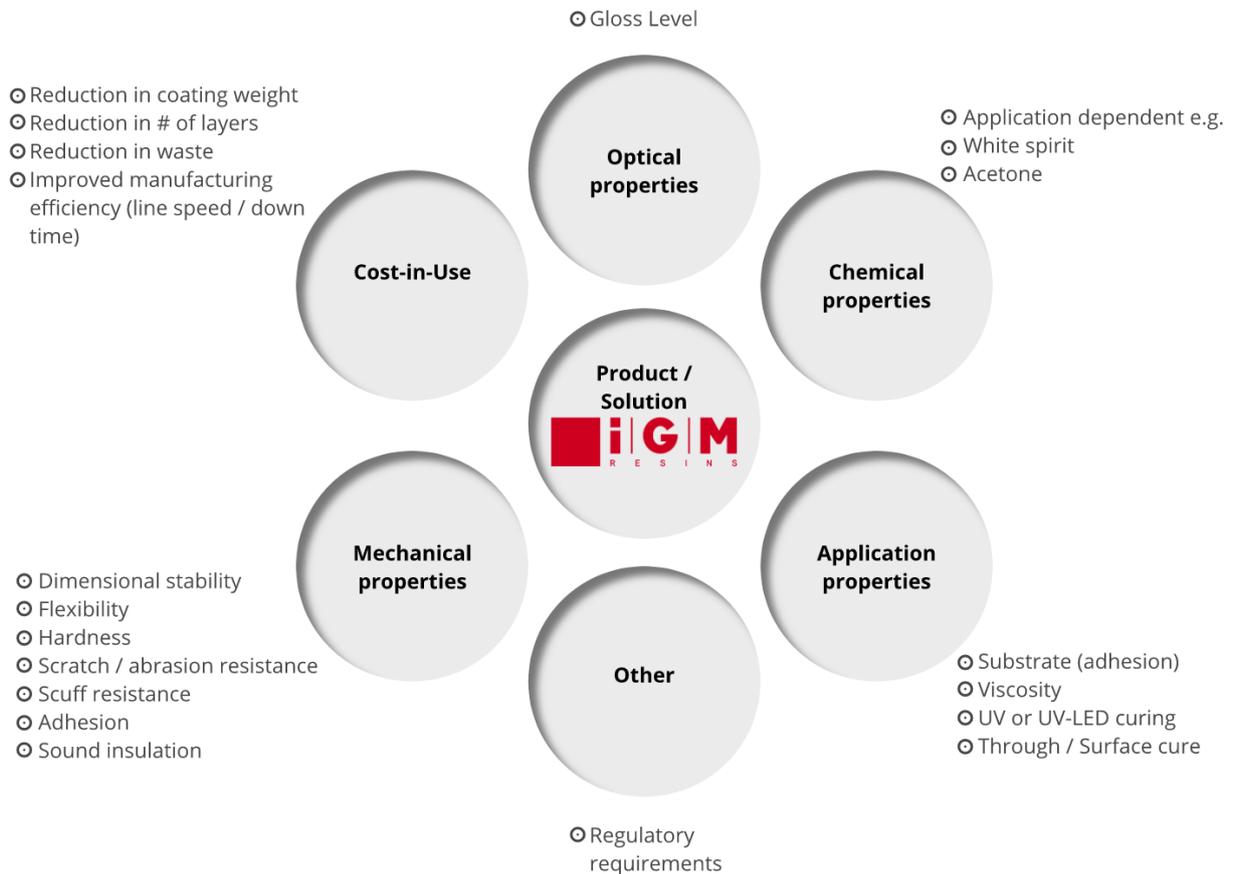




Layer Functionality

- UV Coating – chemical, water, stain, scratch and scuff / marking resistance.
- Wear Layer – will gradually get worn away with time from the passage of feet and the movement of furniture.
- Design Layer – wood, stone, tile or other designs. Typically inkjet printed PVC film or paper.
- PVC Middle Material Layer – glass fiber reinforced for dimensional stability.
- PVC based Core – wood polymer core (WPC) or stone polymer core (SPC) for dimensional stability.
- Bottom Layer – sound insulation and comfort improvement.

UNDERSTANDING ALL DIMENSIONS FOR AN INTEGRATED TOTAL SOLUTION WITH IGM'S CORE PORTFOLIO OF PHOTOINITIATORS AND ENERGY CURABLE RESINS



Chemical Identity	Functionality	Viscosity mPa.s at 25°C	Product attributes	EU REACH *	USA TSCA *	China IECSC *	
Photomer 4967	Acrylated Amine Synergist	1	20	High reactivity / Chemical resistance / Oxygen inhibitor	•	•	•
Photomer 5050	Polyether Acrylate	4	2500	Fast curing, high functionality, good mechanical resistance	•	•	
Photomer 5436	Polyester Acrylate	6	20000	Abrasion and scratch resistance / hardness / Solvent resistance	•	•	
Photomer 5662	Amine modified Polyether Acrylate	4	3000	Good abrasion resistance, coating hardness , good reactivity	•	•	•
Photomer 6008	aliphatic PUA	3	16000**	Coating hardness, tensile strength, chemical resistance, non-yellowing	•	•	•
Photomer 6010	aliphatic PUA	3	5800**	Good flexibility , non yellowing, abrasion resistance	•	•	•
Photomer 6019	aliphatic PUA	3	3250**	Coating hardness, tensile strength, adhesion, non-yellowing		•	•
Photomer 6063	aliphatic PUA	2	3000**	Adhesion, flexibiliton and non-yellowing	•	•	•
Photomer 6064	aliphatic PUA	2.5	1400**	Coating hardness, abrasion & scratch resistance, stain resistance		•	•
Photomer 6184	Aliphatic PUA	3	58000	Ease of handling / Hardness / Tensile strength / Temperature Resistance / Low yellowing	•	•	•
Photomer 6210	Aliphatic PUA	2	12000	Scratch resistance, flexibility, impact resistance, adhesion, non yellowing, High refractive Index	•	•	•
Photomer 6215	Aliphatic PUA	2	20000**	Mechanical resistance / Flexibility / Low yellowing	•	•	•
Photomer 6643	aliphatic PUA	2	50000**	High elongation,excellent flexibility adhesion , abrasion resistance	•	•	•
Photomer 6646	aliphatic PUA	4	32500**	Good reactivity , good scratch resistance and good weatherability	•	•	•
Photomer 6892	aliphatic PUA	3	29500	Adhesion, chemical resistance, flexibility, scratch resistance, non-yellowing		•	•
Photomer 9145	Polyester Acrylate	-	11000	Adhesion / Pigment and matting agent wetting	•		
Photomer 5010	Polyester Acrylate	2	Gel	Self matting / Low gloss		•	•

* Disclaimer:

The information in this overview is presented in good faith and believed to be correct, but is provided on the condition that persons receiving it will make their own assessment on its correctness referring to the latest version of official documentation (e.g. safety data sheet).

** @ 60°C

Chemical Identity		Functionality	Viscosity mPa.s at 25°C	Product attributes	EU RECH *	USA TSCA *	China IECSC *
Photomer 4017	HDDA	2	8	Adhesion, chemical resistance, high solvency & cutting power, High refractive Index	•	•	•
Photomer 4039	P4EOA	1	30	Flexible, low odour, adhesion		•	•
Photomer 4061	TPGDA	2	13	Versatile, good flexibility and high reactivity	•	•	•
Photomer 4071	MPDDA	2	8.5	Low odour, adhesion, high solvency & cutting power	•	S	•
Photomer 4149	TMPEOTA	3	63	High reactivity / Flexibility / Low shrinkage	•	•	•
Photomer 4666	DPHA	6	5500	High reactivity, hardness and scratch resistant	•		
Photomer 4703	-	1	4000	Acid functional acrylate for adhesion	•	•	•
Photomer 4810	IDA	1	6	Flexibility, hydrophobic, pigment wetting, substrate wetting, High refractive Index	•	•	•

Chemistry		CAS Number	Melting point °C	LED	Pigmented system	Clear system	Water-based system	EU REACH *	USA TSCA *	China IECSC *
Esacure KIP 100F	Type I	163702-01-0 + 7473- 98-5	Liquid **		•			•	•	•
Omnirad 184	Type I	947-19-3	44-50			•	•	•	•	•
Omnirad BP	Type II	119-61-9	45-49		•	•	•	•	•	•
Omnirad BDK	Type I	24650-42-8	64-67		•			•	•	•
Omnirad TPO	Type I	75980-60-8	91-94	•	•	•		•	•	•
Omnirad 127	Type I	474510-57-1	45-50		•	•		•	•	•
Esacure 1001 M	Type II	272460-97-6	>100	•		•		•	•	
Omnirad 754	Type I	-	Liquid **		•	•		•	•	•
Omnirad 819	Type I	162881-26-7	127-133	•	•	•		•	•	•
Omnirad TPO-L	Type I	84434-11-7	Liquid **	•	•	•		•	•	•

** : At room temperature

ALIPHATIC URETHANE ACRYLATE SELECTION FOR LVT

Following our first product guide on Vinyl flooring (available on our website), our laboratory has designed this specific study on LVT for our best aliphatic urethane acrylates. These products are tested in a matte coating formulation for yellowing resistance evaluation, and more broadly in a matte coating formulation.

	Functionality	Typical Viscosity mPa.s at T °C	T °C	Product Attributes	EU Reach *	USA TSCA *	China IECSC *
Photomer 6008	3	16000	60	Coating hardness, tensile strength, chemical resistance, non-yellowing	•	•	•
Photomer 6019	3	3250	60	Coating hardness, tensile strength, adhesion, non-yellowing		•	•
Photomer 6210	2	12000	25	Ease of handling, scratch resistance, flexibility, impact resistance, adhesion, non-yellowing	•	•	•
Photomer 6892	3	29500	25	Adhesion, chemical resistance, flexibility, scratch resistance, non-yellowing		•	•
Photomer 6063	2	3000	60	Adhesion, flexibility and non-yellowing	•	•	•
Photomer 6064	2.5	1400	60	Coating hardness, abrasion & scratch resistance, stain resistance		•	•

* Regulation status can be processed where needed.

MATTE COATING

Formulation

Urethane Acrylate	Oligomer	40
Photomer 4017	HDDA	23
Photomer 4810	IDA	12
Photomer 4149	TMPEOTA	4
Efka 3372	Slip and levelling agent	0.4
Byk 2155	Wetting and dispersing additive	2.0
Syloid ED50	Matting product	14.0
Camflour 1000	Wax	1.0
Byk1792	Dispersing Agent	0.2
Omnirad 184	Photoinitiator	2.6
Omnirad TPO-L	Photoinitiator	0.8

Technical properties of formulation

Gloss conditions: use BYK gloss meter to measure the gloss and record the average of three measures at 60°.

Hardness conditions: Cured recipes on clear glass substrates. König Pendulum cycles: count and record the sway cycles for each sample.

Matte formulation with:	Viscosity at 25°C mPa.s	Gloss at 60°	Hardness Pendulum
Photomer 6008	3660	22	80
Photomer 6019	1600	15	100
Photomer 6210	1800	11	25
Photomer 6892	2500	19	30
Photomer 6063	2300	13	50
Photomer 6064	1400	12	70

- For each Photomer, we were able to achieve gloss below 25 unit.
- Formulated Photomer 6210, Photomer 6063 and Photomer 6064 show exceptional matte finish.
- Photomer 6019, Photomer 6008 and Photomer 6064 have high hardness.

Matte coating – Stain & Chemical resistance

Formula samples were drawn down on white Leneta Charts with wire rod #3 (a film thickness of 13-16 microns) and two drawdowns (7x11 in) for each of the formula and cured in UV Fusion System at 25-30 ftm (945 mJ/cm²).

Test Conditions: 2 hours contact time, wipe off with dry paper towels or IPA wet paper towels and check the film appearance and color difference before and after with WR-10QC Colorimeter.

Iodine (2%), 1% KMnO₄, BHMR (black), BHMR (brown), Mustard, Wright Blood, Asphalt.

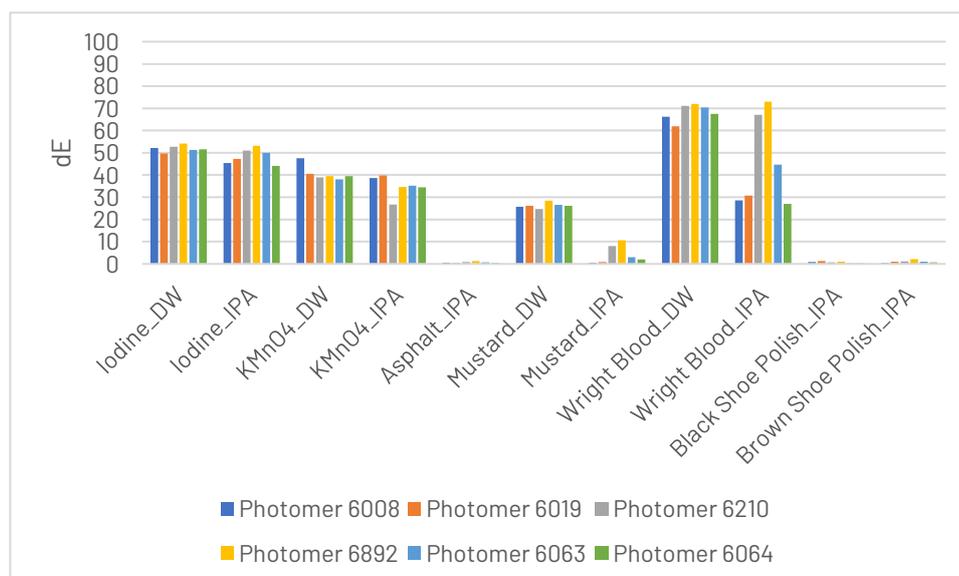


Chart. 1: Stain resistance in matte formulation

- Good resistance to aggressive chemicals.
- Photomer 6063 Photomer 6008 and Photomer 6019 show interesting wright blood stain resistance

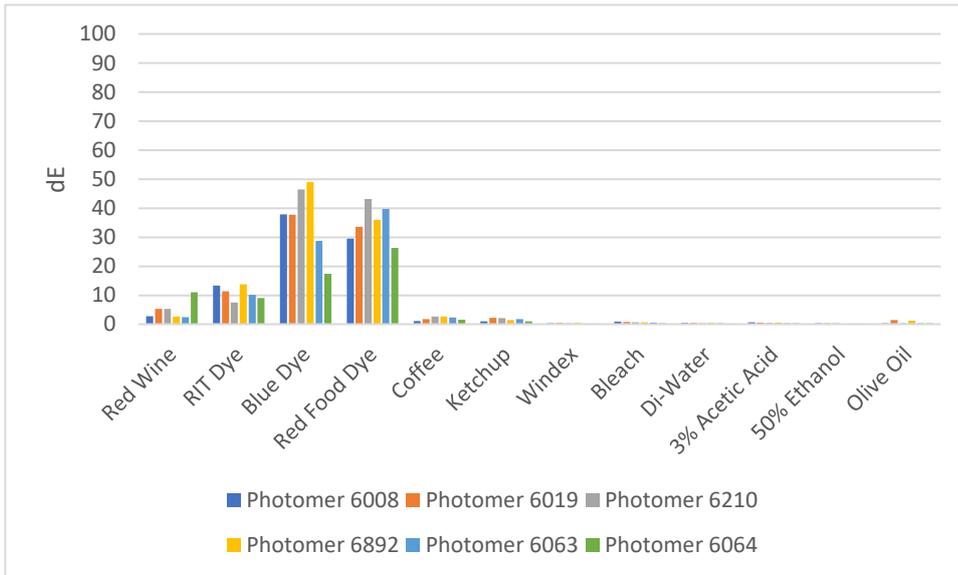


Chart.2: Stain resistance Dry wiping in matte formulation

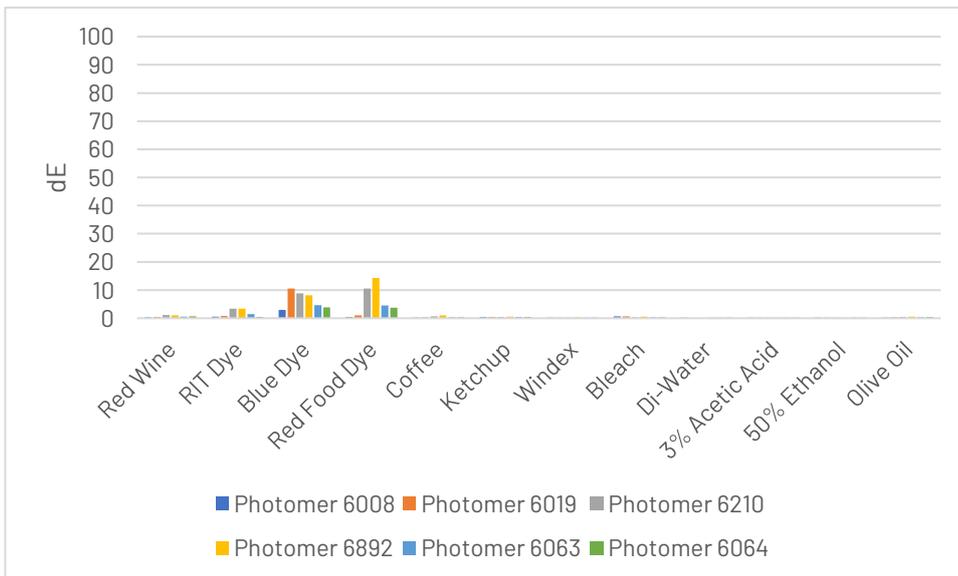


Chart.3: Stain resistance IPA wiping in matte formulation

- No visible stain after both Dry and PA wipe for coffee, ketchup, windex, bleach, di-water, acetic acid, olive oil.

Taber Abrasion resistance

Taber Abrasion Tests: formula samples were drawn down on customer provided LVT panels (pre-cleaned with IPA) with wire rod #4 (a film thickness of 23-26 microns) and cured in UV Fusion System at 25-30 ftm (945 mJ/cm²).

Test Conditions: Samples cured recipes on LVT substrates. Wheels: H18, Weight 500g and Cycles 300 and record the weight loss for each 100 cycles.

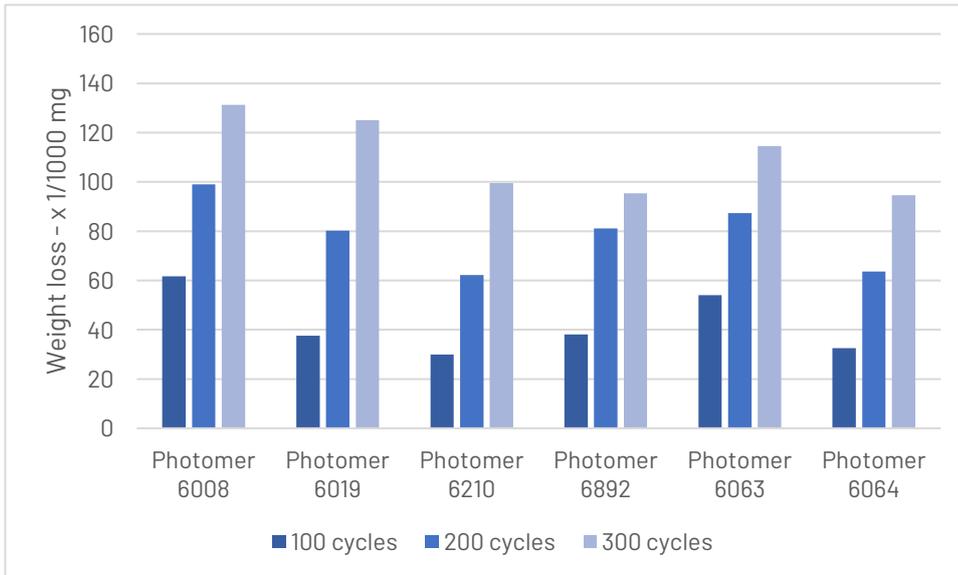


Chart. 4: Abrasion after 100, 200, 300 cycles with Taber in matte formulation

- Under strong Taber Abraser conditions, all our products succeed.
- Photomer 6210, Photomer 6063 and Photomer 6064 show excellent abrasion resistance.

UV Curing exposure test

Samples: cured recipes on white Leneta Charts.

Test Conditions: Fusion UV System Setting at 28-30 ftn (945 mJ/cm²). Pass the samples with 10 and 20 cycles and measure the color changes before and after.

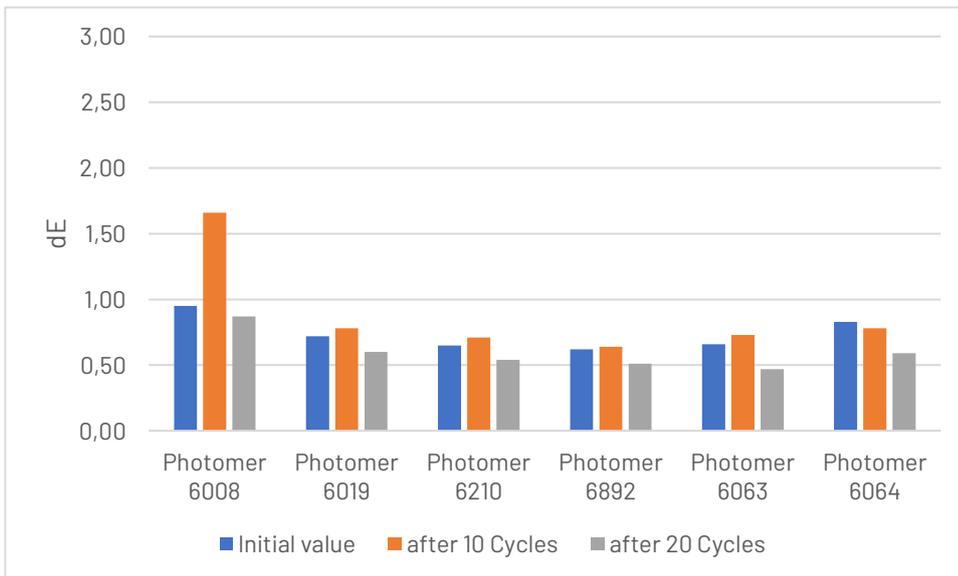


Chart. 5: UV Curing exposure in matte formulation

- UV exposure have no impact on final color.
- Photomer 6063, Photomer 6210 and Photomer 6892 exhibit very low color value.

Flexibility

Formula samples were drawn down on PVC sheets (purchased from home depot and pre-cleaned with acetone) with wire rod #3 and cured in UV Fusion System at 25-30 fpm (945 mJ/cm²).

Test conditions: Cured samples on steel panels and PVC sheets. Conduct Conical Mandrel test at 25 °C as much as possible, observe any occurrence of cracks due to bending, measure and record the distance of the cracks in millimeters.

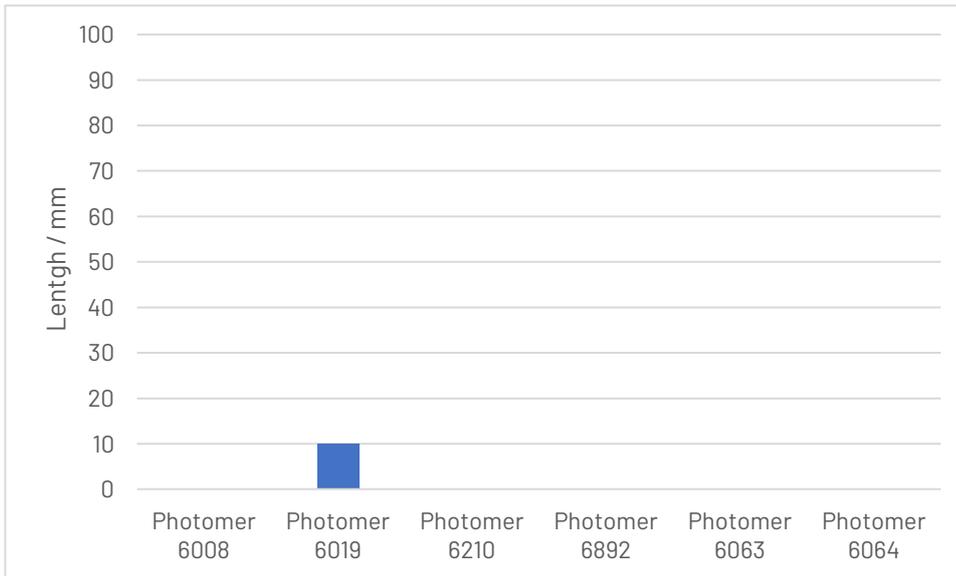
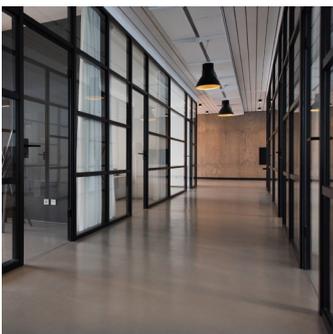


Chart. 6: Flexibility in matte formulation with conical mandrel

- All products have excellent flexibility.
- Photomer 6008, photomer 6210, Photomer 6892, Photomer 6063 and Photomer 6064 didn't show any cracks.



SOLUTIONS FOR LVT FLOORING

Used in our matte formulation (page 8), we can conclude:

Stain & Chemical resistance: All our Photomer selected for this study have excellent stain and chemical resistance.

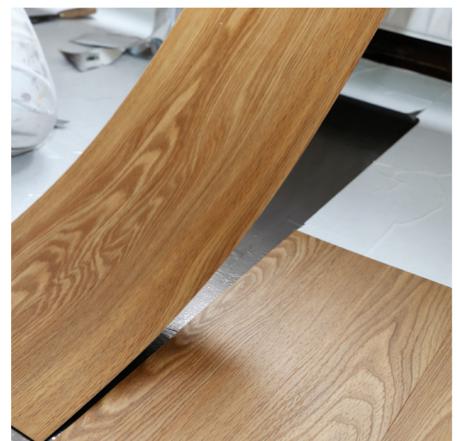
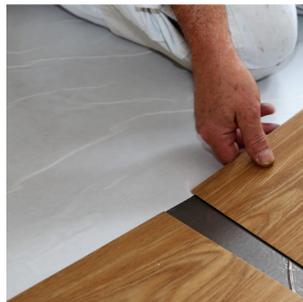
Taber Abrasion resistance: Photomer 6210, Photomer 6063 and Photomer 6064 show excellent abrasion resistance.

UV Curing exposure test: Photomer 6063, Photomer 6210 and Photomer 6892 exhibit very low color value.

Flexibility: Photomer 6008, photomer 6210, Photomer 6892, Photomer 6063 and Photomer 6064 didn't show any cracks.

« With this study, our technical capabilities , our knowledge and our wide product range (Monomers, oligomers, photoinitiators and additives)we are deeply involved in bringing customers adapted solutions for specific market and products.»

For more information, please request information to our sales team.



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