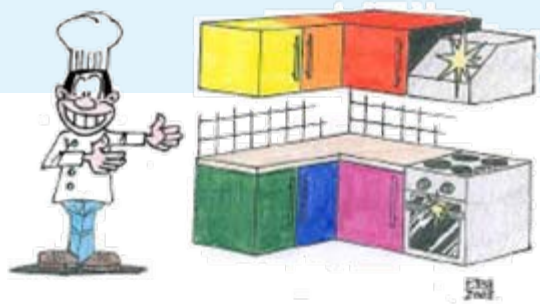
CYTEC

UCECOAT® 7699

A novel aliphatic UV curable Polyurethane Dispersion for pigmented spray coatings on wooden furniture

UCECOAT® 7699 TARGET APPLICATIONS



® Cytec – Ph. De Groote

- ***UCECOAT®* 7699 has been developed for high end wooden furniture top-coats (kitchen cabinets, bathrooms, office furniture), especially pigmented, but can also be used for clear coatings and for other applications/substrates such as hard coatings on melamine paper foils, plastic substrates and clear coating on PVC floorings.**

- **This UV curable polyurethane dispersion is very reactive and the cured coating exhibits outstanding scratch and stain resistance also in thick pigmented layers.**

- **Due to the low viscosity, it can be easily applied by spray or curtain coater. For roller coater applications, the product needs to be thickened.**

GIVE WINGS TO YOUR IDEAS WITH UCECOAT 7699

From

TO

UCECOAT® 7699 PRODUCT FEATURES

UCECOAT® 7699 is characterized by:

- translucent to white appearance
- low viscosity
- tack-free behaviour after water evaporation and before UV curing
- very high reactivity in both clear and pigmented systems
- excellent stability
- easy to formulate

UV/EB cured formulations based on *UCECOAT® 7699*
are characterized by :

- outstanding hardness and scratch resistance (nail, pencil, coin)
- excellent stain resistance

UCECOAT® 7699

- Brookfield viscosity at 25°C, (mPa.s): max. 200
- Appearance: translucent to white liquid
- Density, g/cm³ : approx. 1.0
- pH : 7-8.5
- Particle size, nm : < 150
- Polymer solids, by weight : approx. 35%
- MFFT : 6°C
- Persoz pendulum hardness before UV curing : 135 seconds
- Persoz pendulum hardness after UV curing : 360 seconds

EVALUATION AND RESULTS

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UCECOAT® 7699

Technical evaluation in orange colored systems – Benchmarking with other UV-PUDs and non UV-curable systems (Water-based 1K & Solvent-based 2K PU)

UCECOAT® 7699 has been benchmarked against following systems :

- *UCECOAT®* 7571
- *UCECOAT®* 7655
- Competitive UV-PUD 1
- Competitive UV-PUD 2
- Industry standard formulated Water based 1K System
- Industry standard formulated Solvent based 2K PU System

UCECOAT® 7699 STARTING POINT FORMULATION

Suggested starting point formulation for pigmented top-coat :

- 85 parts

100	UCECOAT® 7699
1.5	ACEMATT® TS 100
3	AQUAMAT® 208
1	ADDITOL® BCPK
0.5	IRGACURE® 819 DW
0.05	BYK® 028
1	UCECOAT® 8460 (50% in water)

- 15 parts Pigment paste

Suggested additives:

- Defoamers : BYK® 028 (Altana)
- Flow and levelling : ADDITOL® VXW 6396 (Cytec) silicone free
- Rheology and flow modifier : UCECOAT® 8460 and/or UCECOAT® 8488 (Cytec)
- Matting agents: SYLOID® 7000, SYLOID® C 807(Grace) – ACEMATT® TS 100 or 3300 (Evonik)
- Wax dispersion or water repellent agents : AQUACER® 535, AQUAMAT® 208 (Altana)
- Photoinitiators : IGACURE® 819 DW (Ciba) – ADDITOL® BCPK (Cytec)

TYPE OF SUBSTRATE & CURING CONDITIONS

Substrate

panels covered with a melamine paper of 70 g/m² from Unilin.

Sanding (important step)

The grain type is important because it influences the final aspect of the coating and the adhesion on the substrate :

- 120 – 150 type
- 150 – 180 type

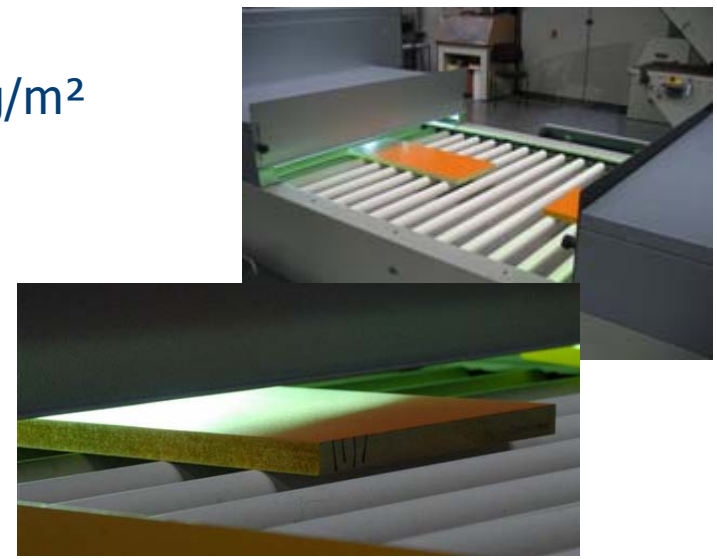
} Generate defects

- The 180 – 240 aluminum oxide type gives very good results in adhesion and aspect
- The sanding step with 280 – 320 silicium carbide type is too "light" and the adhesion is less good.

Drying and curing conditions

- Thickness applied is between 120 and 130 g/m²

- The coatings are :
  - dried at 40°C during 20 minutes
  - UV cured with one Ga lamp 120 W/cm
    + one Hg lamp 120 W/cm at 5m/minute



UCECOAT® 7699 TECHNICAL EVALUATIONS

- **Reactivity :**
  - Application of 36 micron wet on white paper.
  - Water evaporation : 2 minutes at 80°C.
  - UV curing with a 80 W Hg lamp.
  - Reactivity given is at 50 acetone double rubs.

- **Persooz hardness :** before and after UV curing.
  - 120 micron wet on glass plate.
  - Water evaporation : 20 minutes at 40°C.
  - UV curing : 1 Ga UV lamp 120 W + 1 Hg UV lamp at 120 W at 5 m/min.

- **Nail resistance**
  - Immediately after UV curing
  - After 10 minutes
  - After 60 min

- **Pencil hardness**
  - After 2 -3 hrs
  - After 24 hrs
  - After 7 days

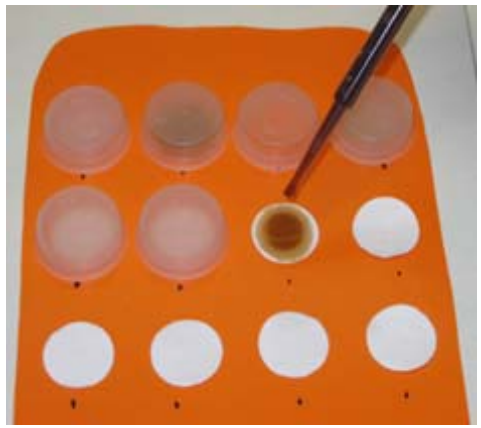
- **Stain resistance**

Stain resistance on orange coated panels is measured after 24 hrs for UV cured coatings and after 15 days for water and solvent based coatings (formulated products).

Measurements done following Norm EN 12720

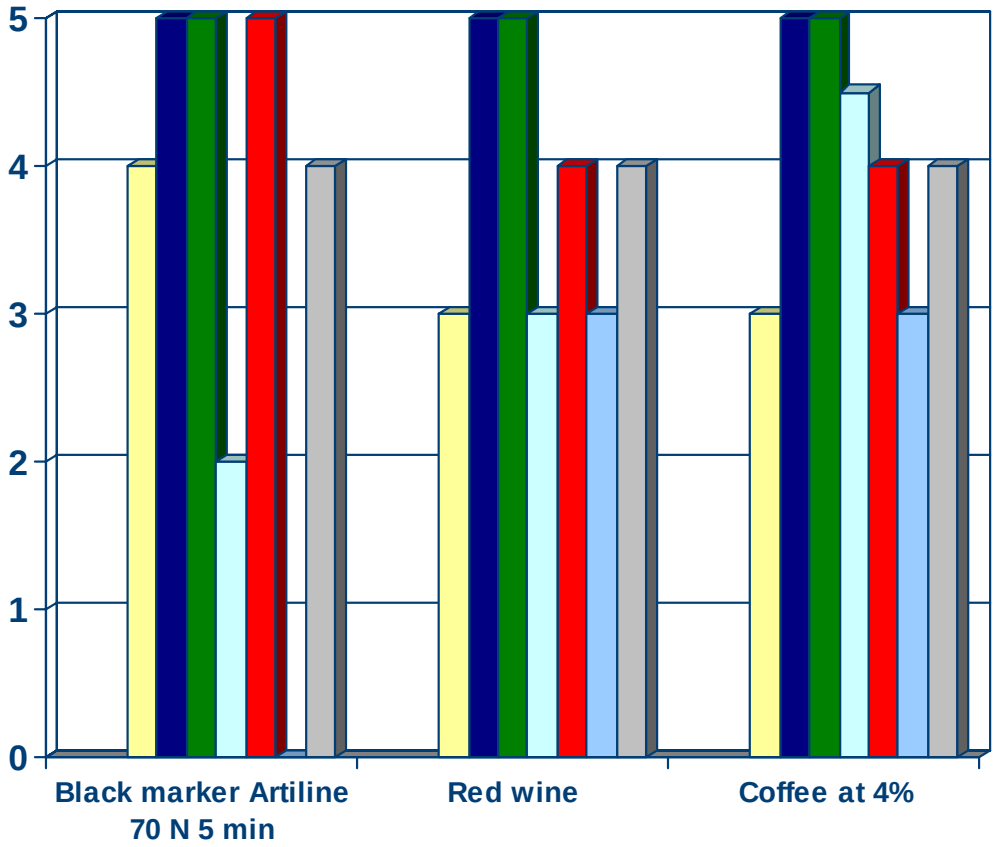
Stain resistance

- Black marker Artiline 70N during 5 minutes, cleaning with IPA
- Eosine 2% in water during 2 and 16 hours, cleaning with water
- Ammonia 10% during 1, 10, 30 minutes, cleaning with water
- Red wine during 5 and 16 hours, cleaning with water
- Ethanol during 1, 5, 16 hours, cleaning with water
- Ketchup during 1, 5, 16 hours, cleaning with water
- Olive oil during 1, 5, 16 hours, cleaning with water
- Water demi during 16 hours, cleaning with water
- Cola during 16 hours, cleaning with water
- Coffee at 4% during 16 hours, cleaning with water
- Mustard during 16 hours, cleaning with water
- Hand cream during 16 hours, cleaning with water
- Sparkling water during 16 hours, cleaning with water
- Wine vinegar during 16 hours, cleaning with water
- Balsamic vinegar during 16 hours, cleaning with water
- Sunlight soap during 16 hours, cleaning with water

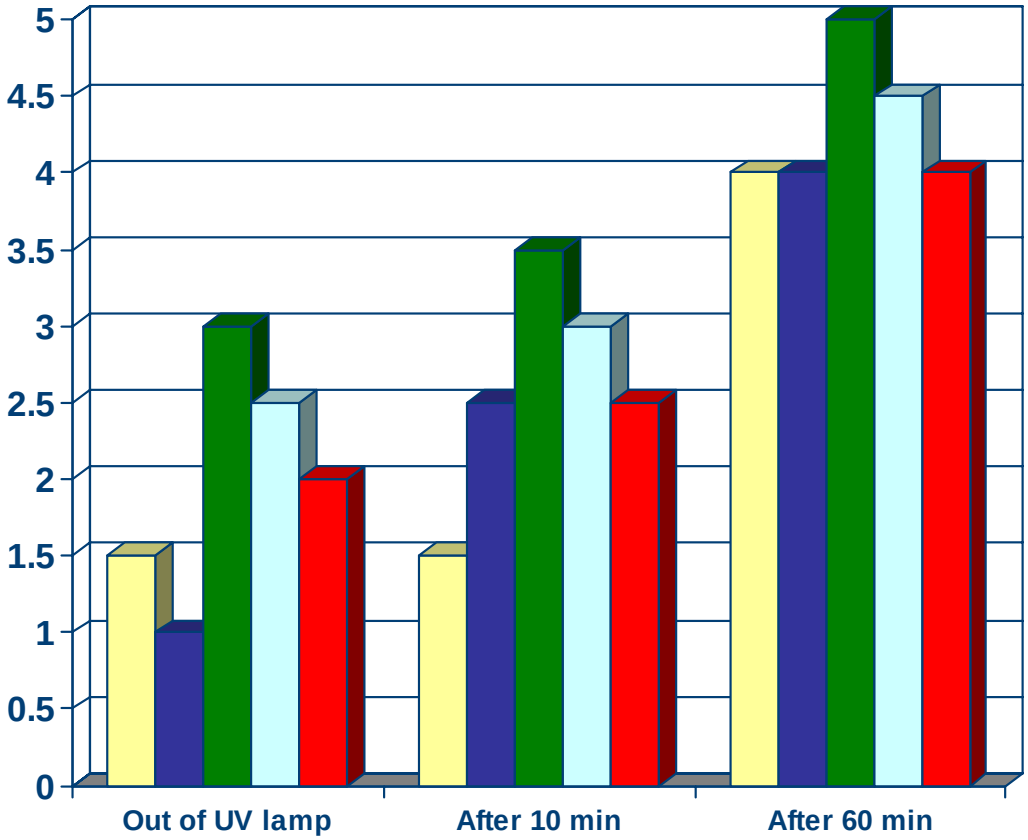


STAIN RESISTANCE COMPARISON

Stain resistance on orange after 24 hrs for UV cured / dried coatings after 15 days for water and solvent based coatings (formulated)

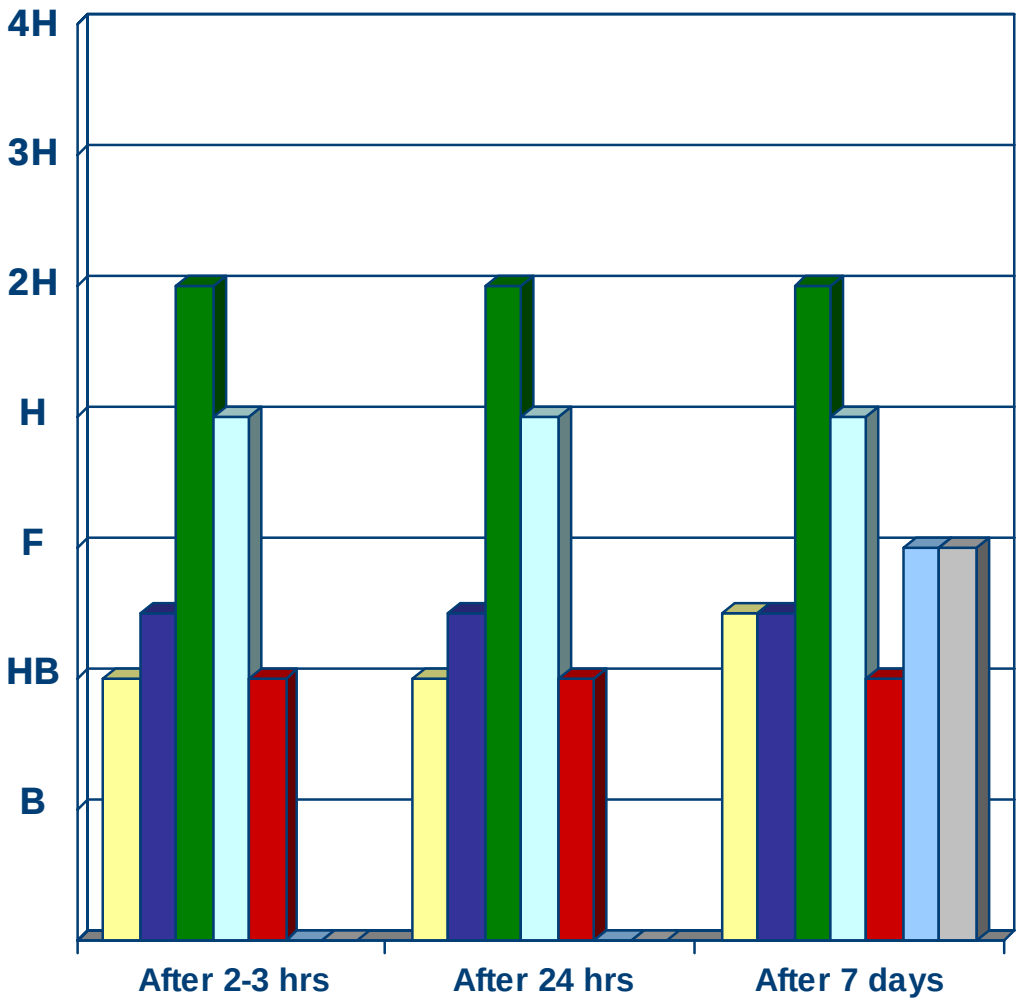


Nail resistance on UV cured/dried orange pigmented systems



PENCIL HARDNESS COMPARISON

Pencil Hardness on orange UV cured / dried pigmented systems



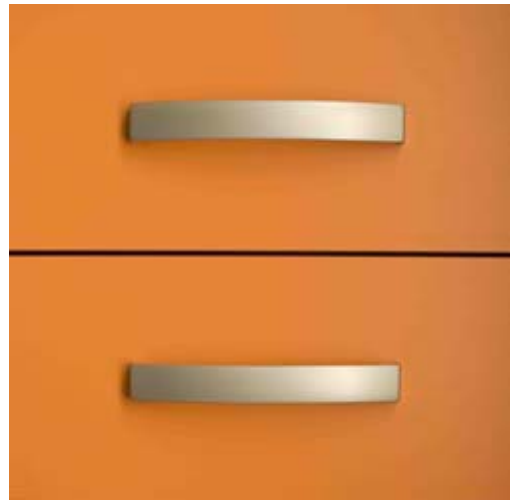
® Cytec – Ph. De Groote

- UCECOAT® 7571
- UCECOAT® 7655
- UCECOAT® 7699
- Competitor 1
- Competitor 2
- Water-based 1K after 7 days only
- Solvent-based 2K after 7 days only

Comparison with competitive products in orange

Competitor 1

- Less good Nail resistance just after UV curing
- Less good Pencil hardness
- Very poor Stain resistance



Competitor 2

- Less good Nail resistance just after UV curing
- Less good Pencil hardness
- Less good Stain resistance

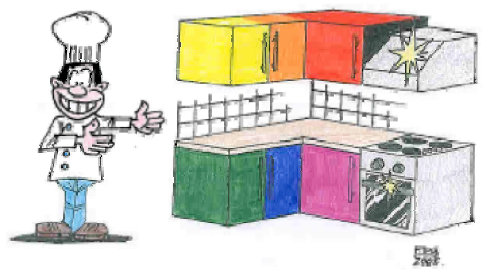
Comparison with alternative technologies in orange

Water based 1K

- Impossible to measure scratch resistance directly but still much weaker performance after 1 Week
- Very poor Stain resistance compared to other evaluated systems – not possible to evaluate stain resistance with Black marker Artiline due to poor solvent resistance.

Solvent based 2K PU

- Same comments as for waterbased 1K for the scratch resistance
- Poor performance compared to ***UCECOAT® 7699***

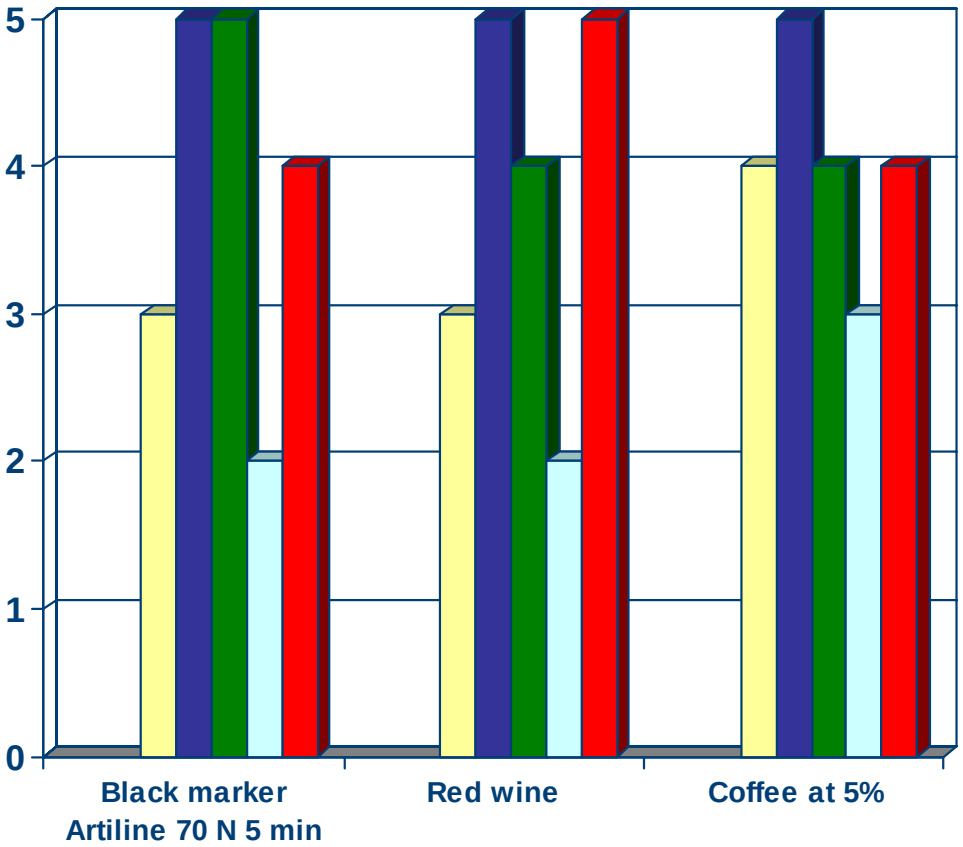


UCECOAT® 7699

Technical evaluation in white pigmented systems – Benchmarking with other UV-PUDs

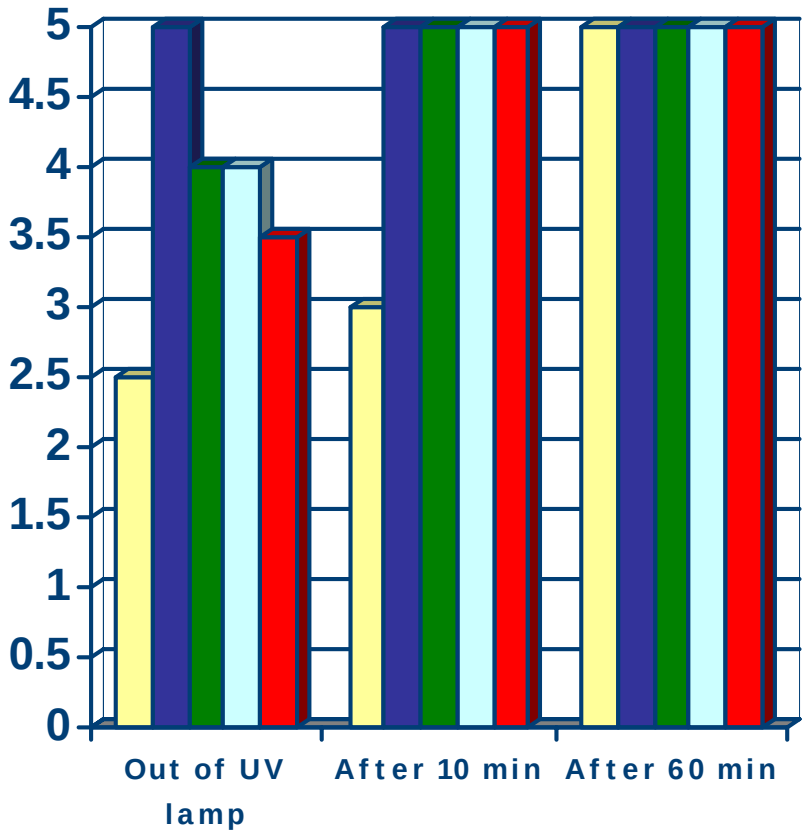
STAIN RESISTANCE COMPARISON

Stain resistance **on white after 24 hrs** for UV cured coatings



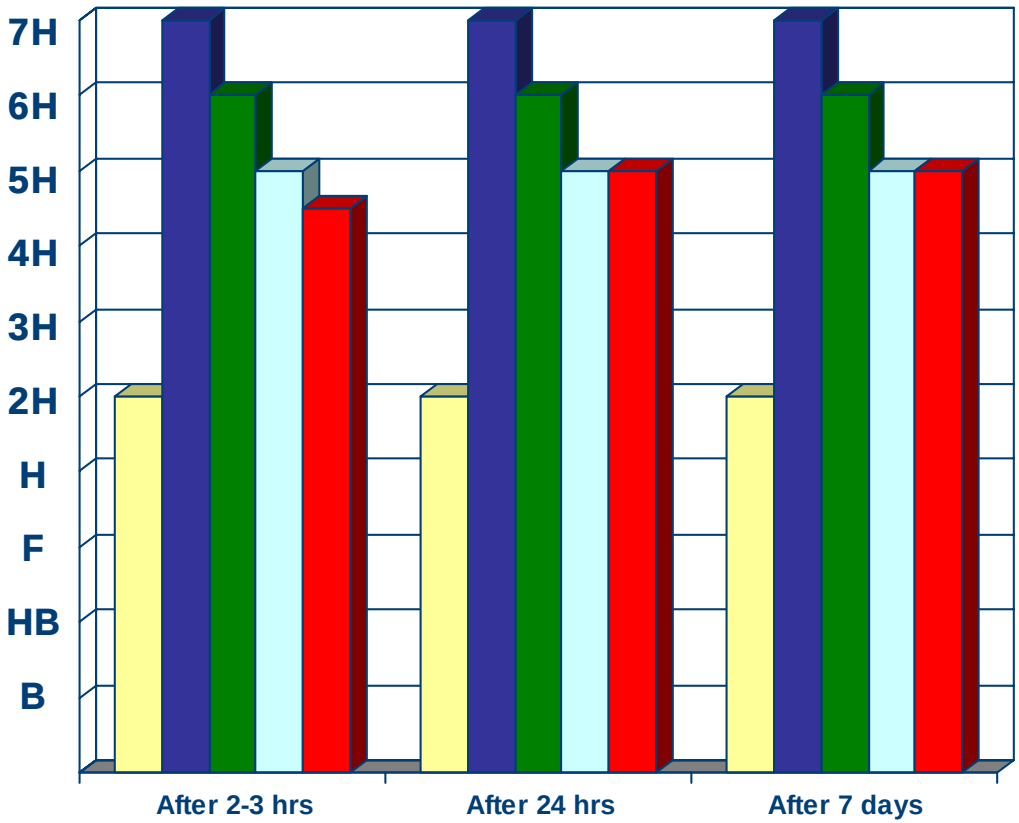
NAIL RESISTANCE COMPARISON

Nail resistance **on UV cured white** pigmented systems



PENCIL HARDNESS COMPARISON

Pencil Hardness **on UV cured white** pigmented systems



- UCECOAT® 7571
- UCECOAT® 7655
- UCECOAT® 7699
- Competitor 1
- Competitor 2

COMPARISON WITH COMPETITIVE UV-PUDs

Comparison with competitive products in white

Competitor 1

- UCECOAT® 7699 shows better stain resistance than Competitor 1

Competitor 2

- UCECOAT® 7699 shows
  - Better nail resistance just after UV curing
  - Better pencil hardness
  - Similar stain resistance

- UCECOAT® 7655 shows
  - Better nail resistance just after UV curing
  - Better pencil hardness
  - Better stain resistance