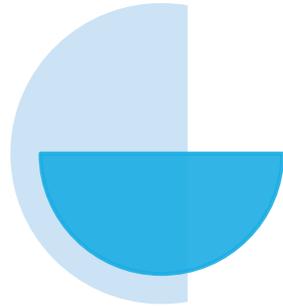
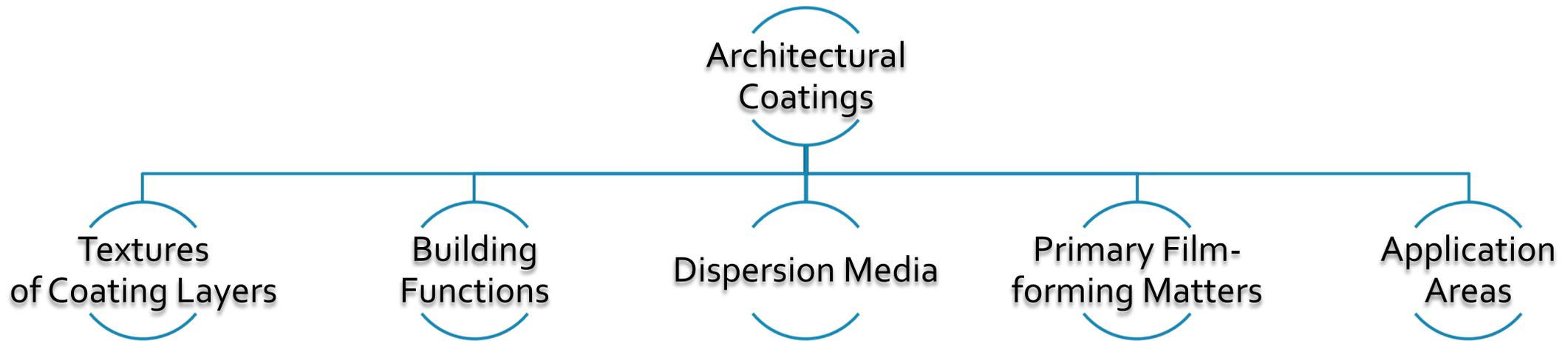


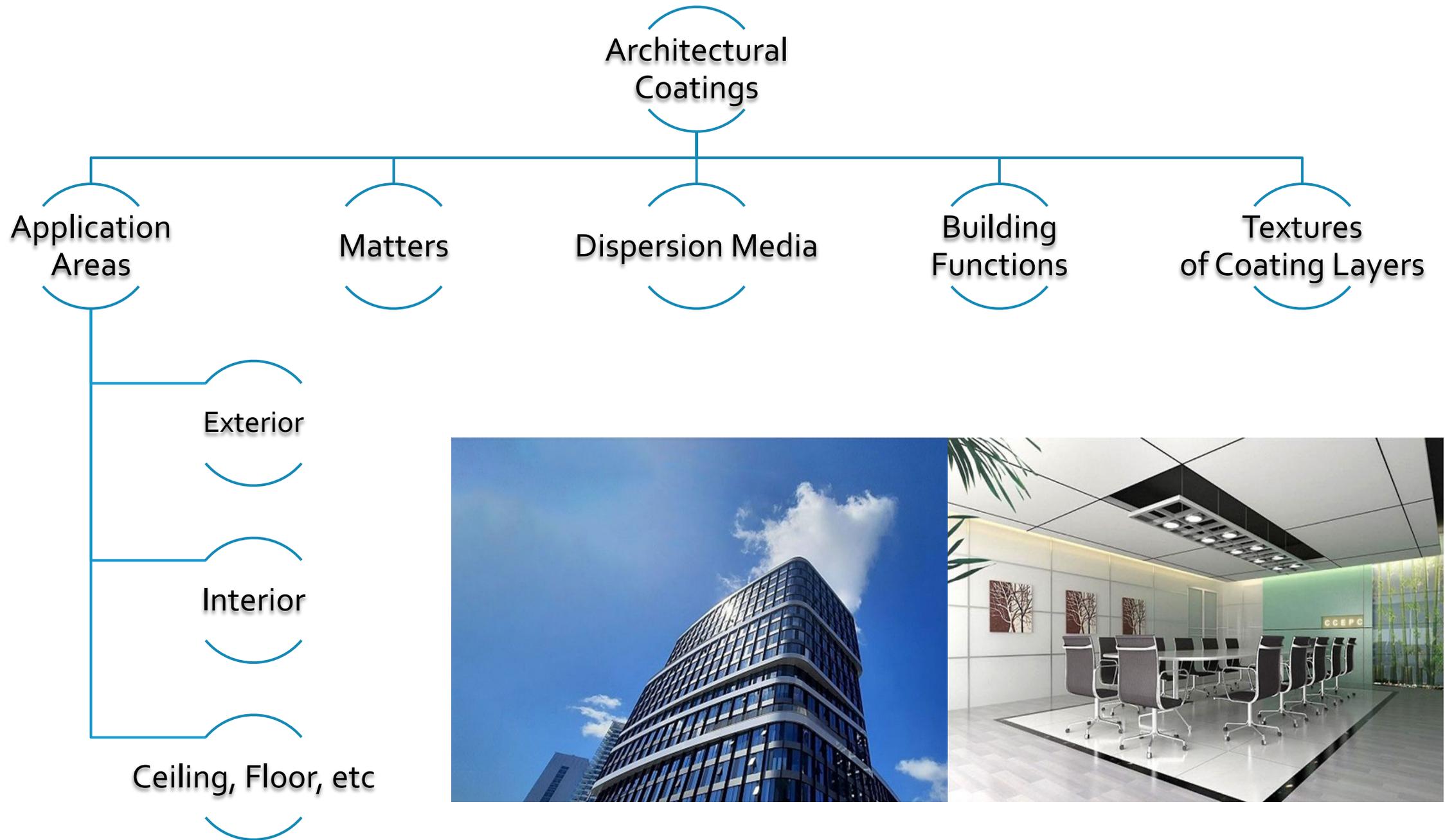
The background features several overlapping, semi-transparent geometric shapes in various shades of blue and grey, creating a layered, architectural effect. The shapes are primarily rectangular and trapezoidal, with some appearing as if they are floating or overlapping each other.

# Durability of Architectural coatings on building facades



# Architectural Coatings Possible Categorization





# Architectural Coatings

Application Areas

Primary Film-forming Matters

Dispersion Media

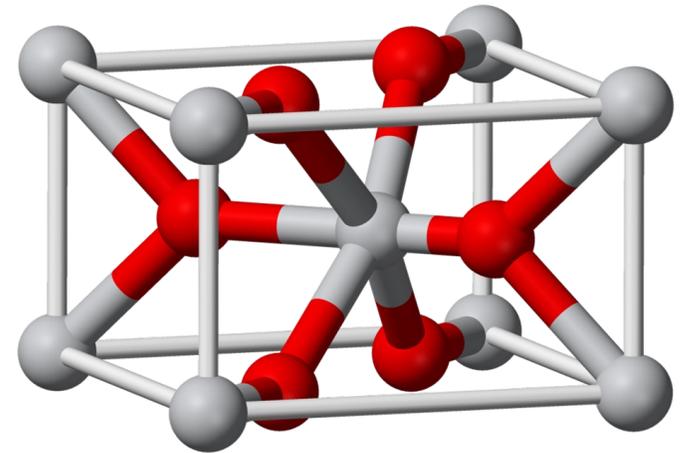
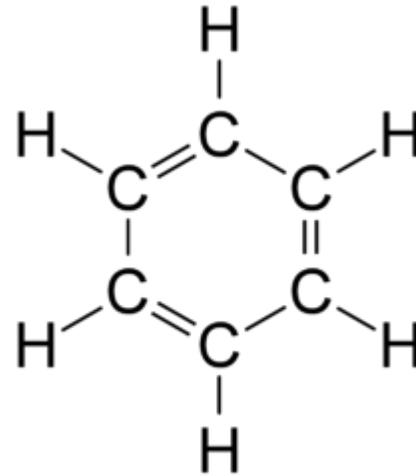
Building Functions

Textures of Coating Layers

Organic

Inorganic

Organic-Inorganic



# Architectural Coatings

Application Areas

Primary Film-forming Matters

Dispersion Media

Building Functions

Textures of Coating Layers

Solvent-based

Water-based coatings



# Architectural Coatings

Application Areas

Primary Film-forming Matters

Dispersion Media

Building Functions

Textures of Coating Layers



Decorative

Waterproof

Anti Corrosive

Fireproof etc

# Architectural Coatings

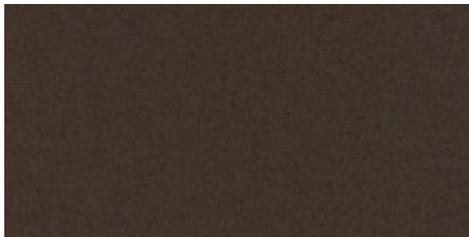
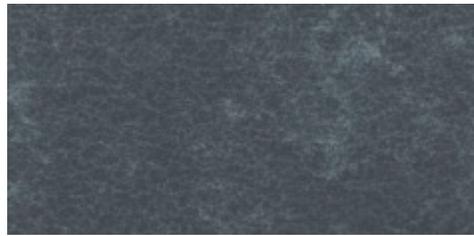
Application Areas

Primary Film-forming Matters

Dispersion Media

Building Functions

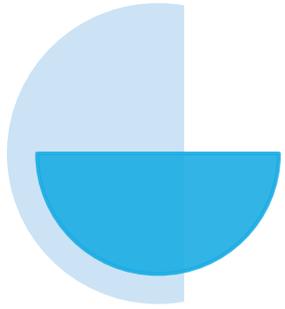
Textures of Coating Layers



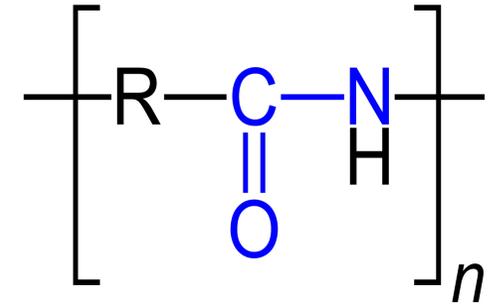
Thin

Thick

Stratified

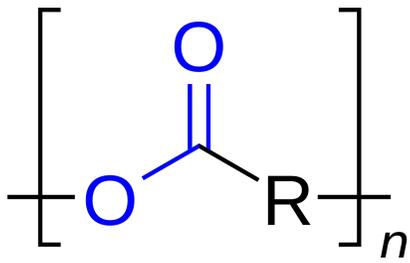


# Coating Systems



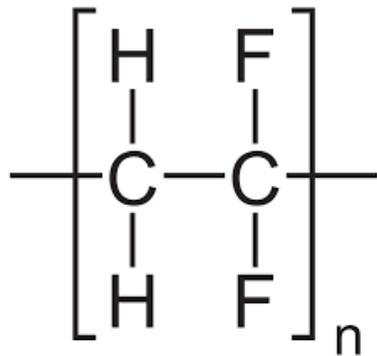
## Layers

- 1 layer
- 2 layers
- 3 layers



## Chemistry

- PE
- VHDPE
- PVDF
- PU/PA

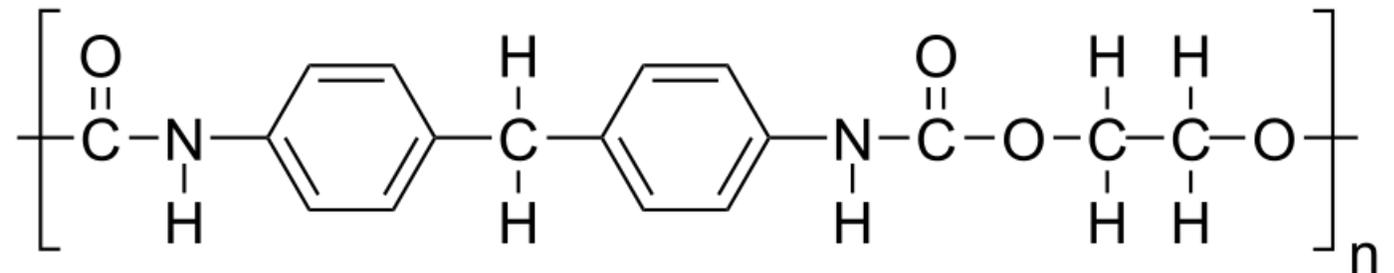


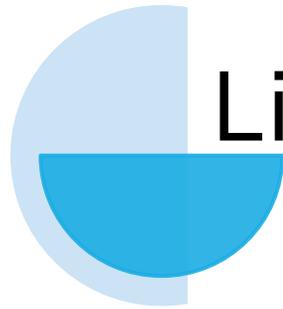
## Thickness

- Coil Coating: 25-60  $\mu\text{m}$
- Powder Coating: 90-150  $\mu\text{m}$

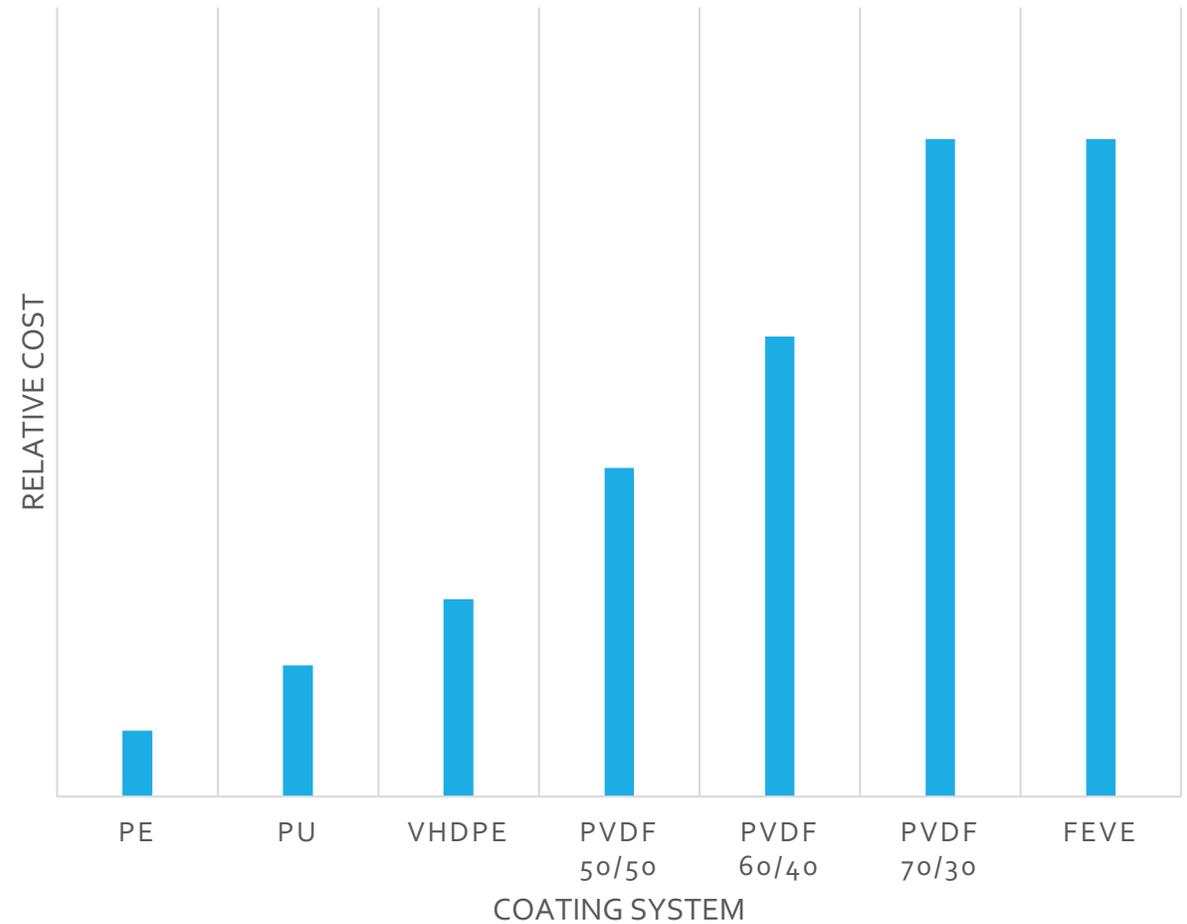
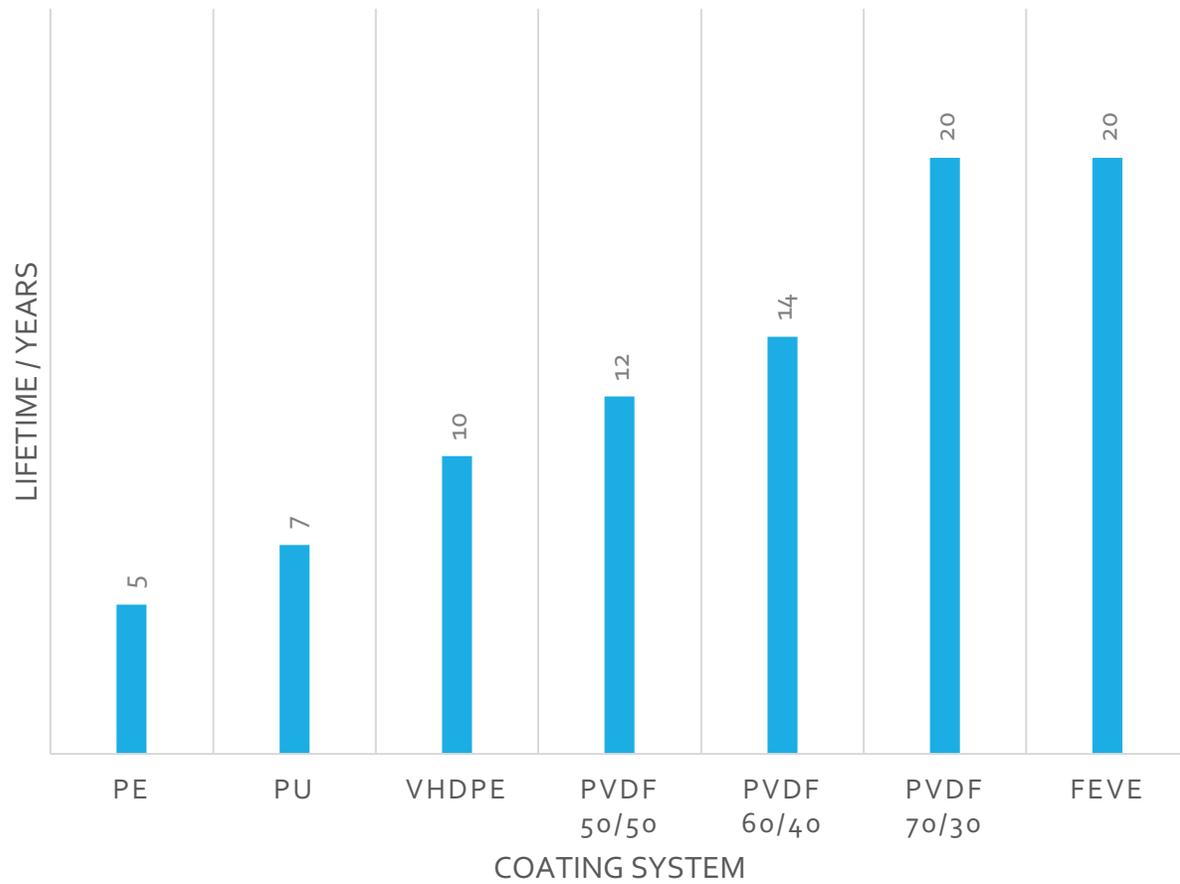
## Cost

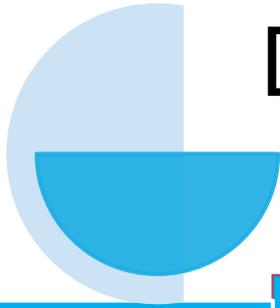
## Application



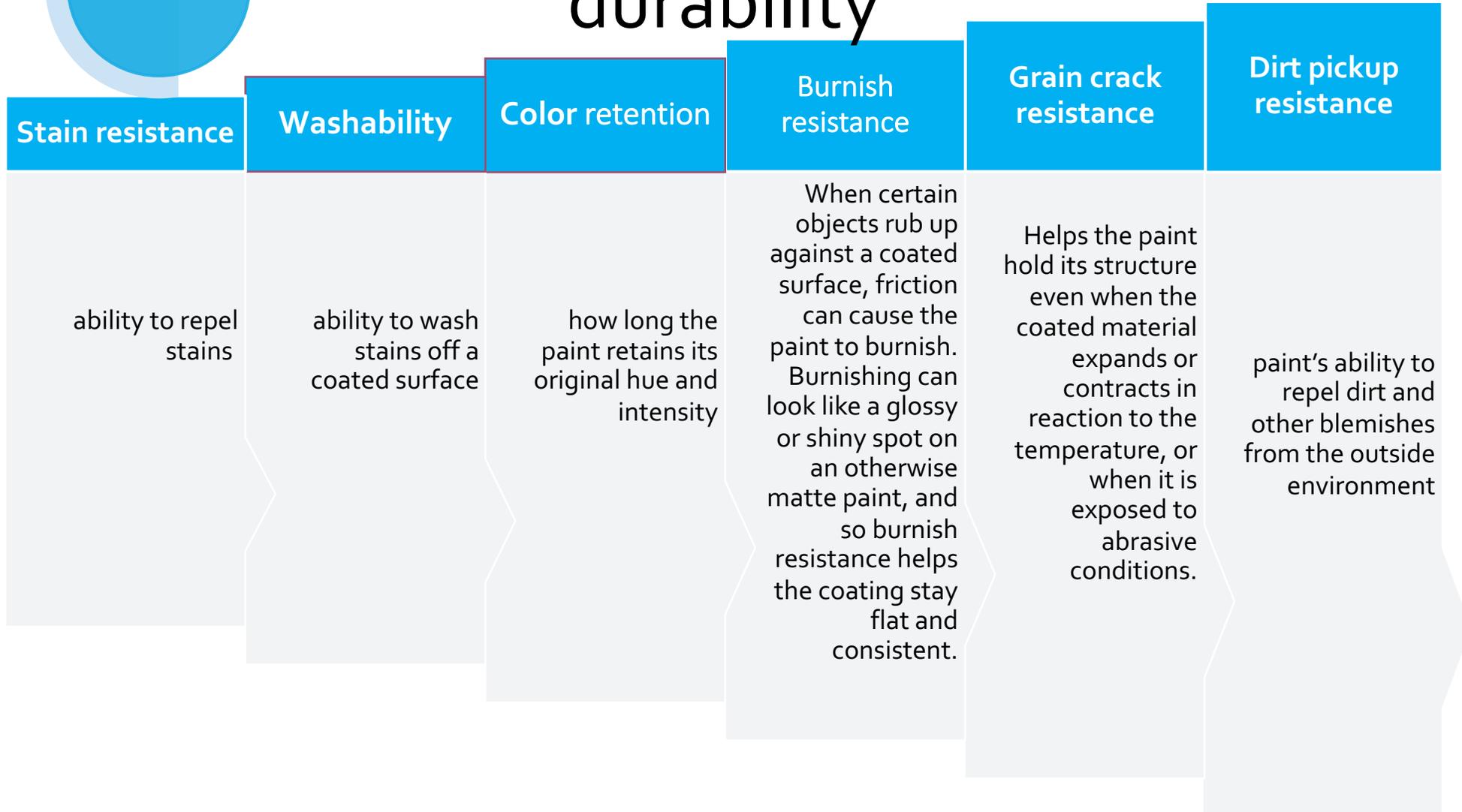


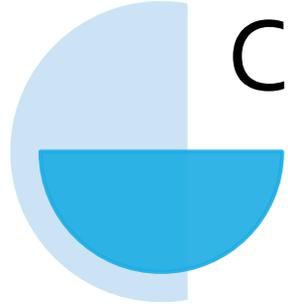
# Lifetime vs Cost





# Defining architectural coating durability





# Challenges for the performance of coatings

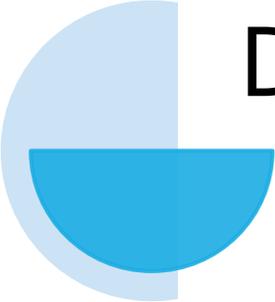
Exposure to

- Solar Radiation
- Temperature Fluctuations
- Rain
- Snow

Resistance to

- Degradation by UV
- Hydrolysis
- Erosion by rain and snow

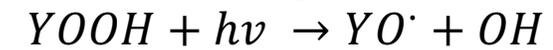
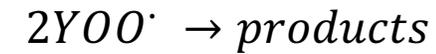
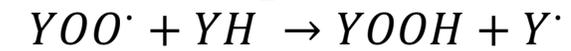
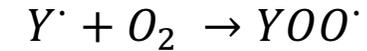
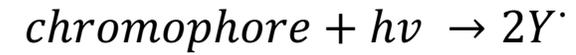
# Degradation of coatings



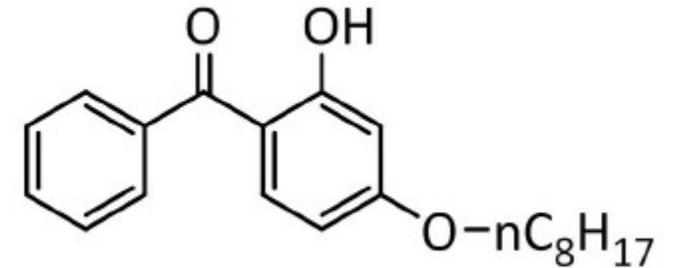
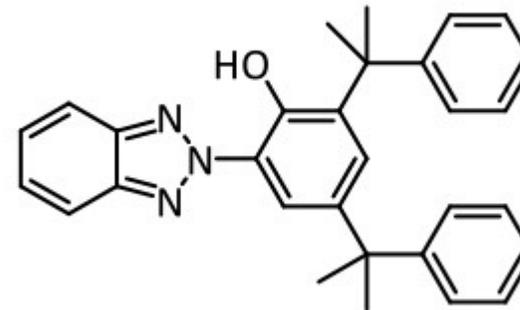
Moisture

Heat

UV radiation



.....

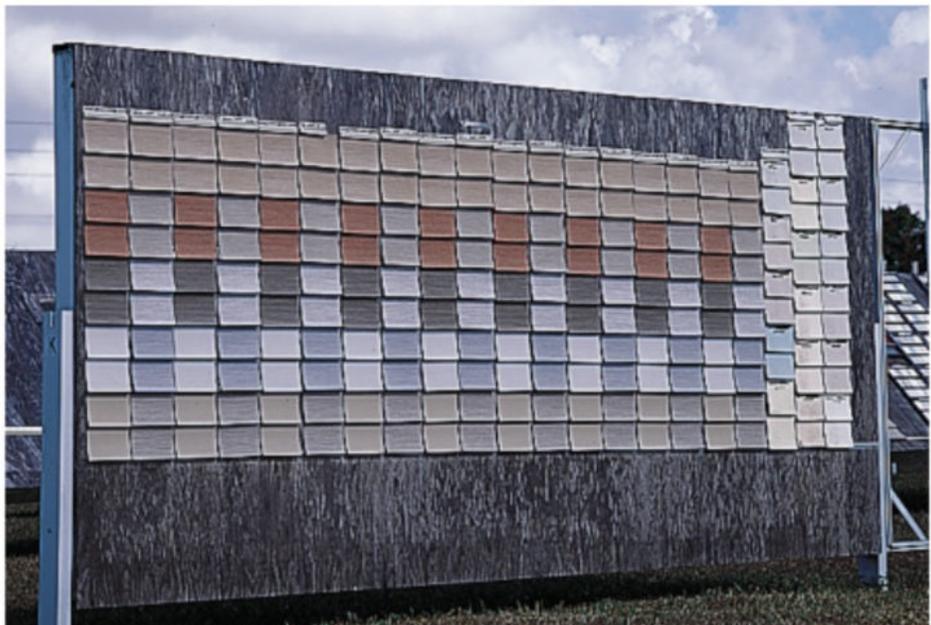




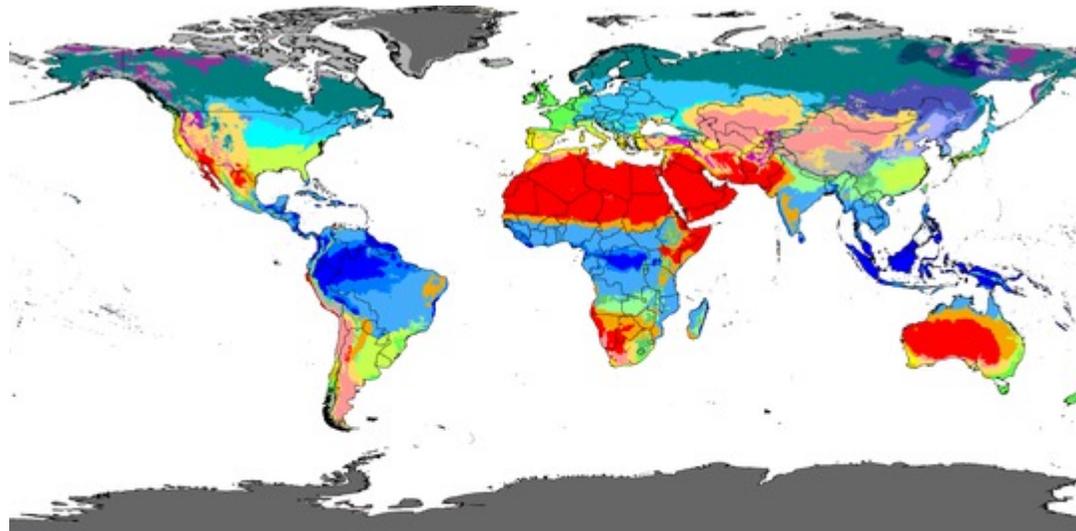
# Natural weathering of coatings

- Standard South Florida
- Arizona: less humidity
- North Australia: Tropical
- North USA: Cold

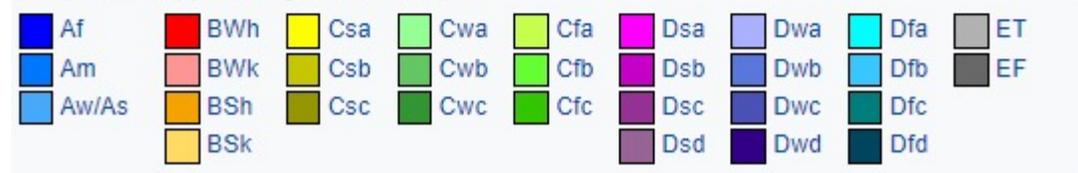
Different inclinations depending the purpose



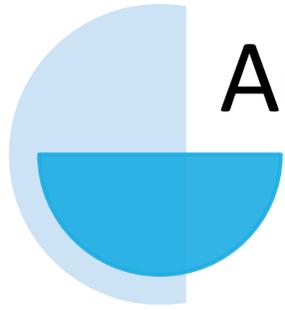
# Köppen climate classification



An updated Köppen–Geiger climate map<sup>[1]</sup>



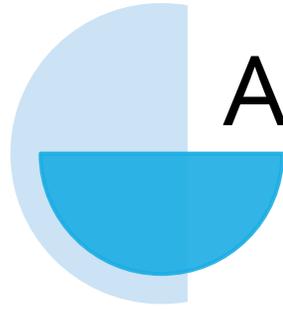
1 <sup>st</sup> letter	2 <sup>nd</sup> letter	3 <sup>rd</sup> letter
<b>A (Tropical)</b>	f (Rainforest)	
	m (Monsoon)	
	w (Savanna, Dry winter)	
	s (Savanna, Dry summer)	
<b>B (Arid)</b>	W (Desert)	h (Hot)
	S (Steppe)	K (cold)
<b>C (Temperate)</b>	w (Dry winter)	a (Hot summer)
	f (No dry season)	b (Warm summer)
	s (Dry summer)	c (Cold summer)
<b>D (Continental)</b>	w (Dry winter)	a (Hot summer)
	f (No dry season)	b (Warm summer)
	s (Dry summer)	c (Cold summer)
		d (Very cold winter)
<b>E (Polar)</b>	T (Tundra)	
	F (Eternal frost (ice cap))	



# Accelerated weathering of coatings

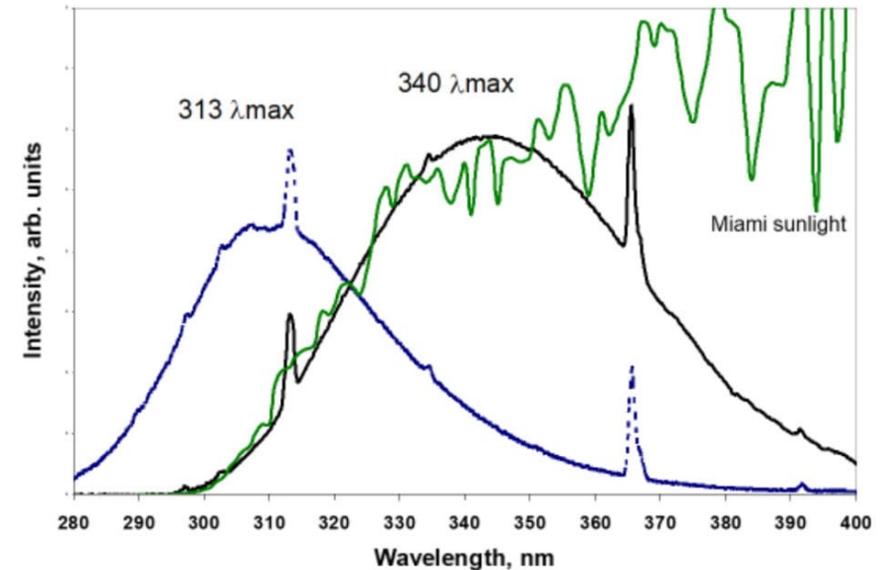


- Controlled UV-Vis radiation
- Controlled T cycles
- Humidity and liquid water application
- Reliable long term operation

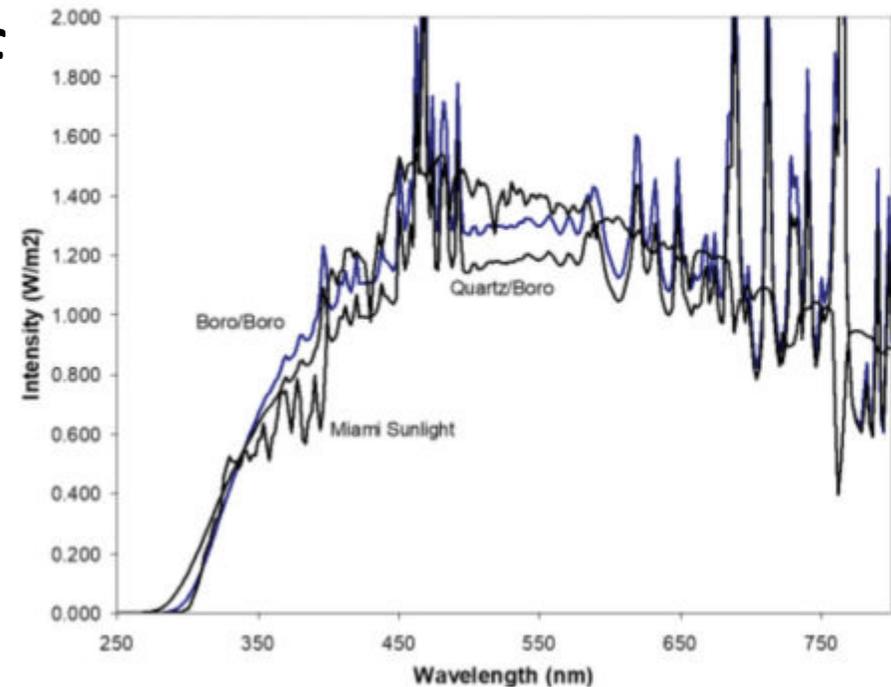


# Accelerated weathering of coatings - QUV

- Low-cost operation and consumables
- Easy to operate
- Harsher light than natural



# Accelerated weathering of coatings – XENON arc



- Closer to imitating natural light
- Cut off <295 nm
- Vaporization of water to control humidity



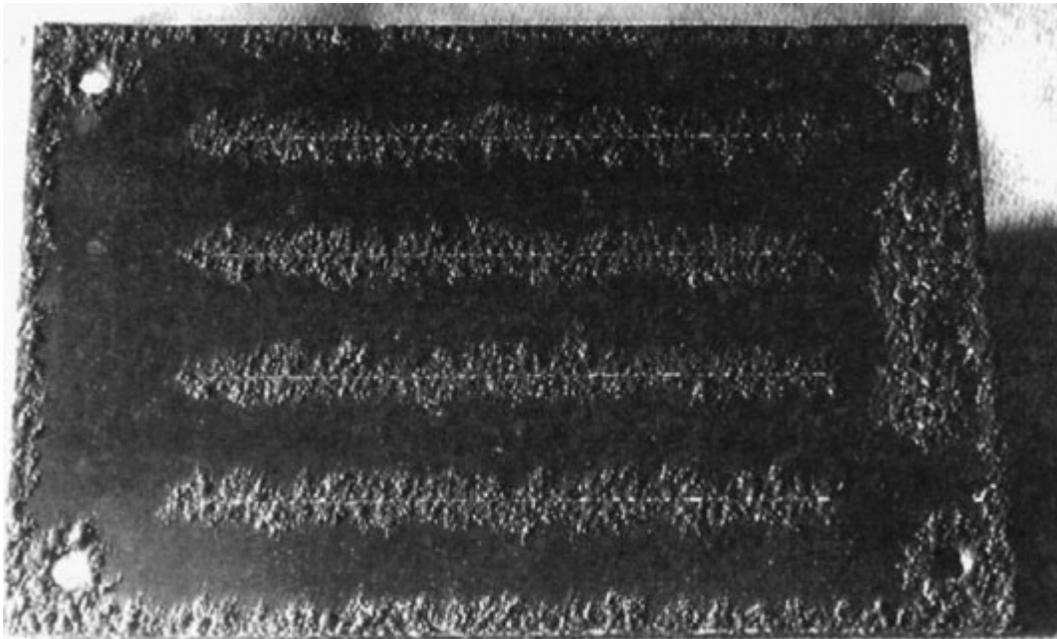
# Classification based on QUV test

Requirements (duration: 2000h for artificial UV radiation)	UV resistance category*			
	R <sub>UV2</sub>	R <sub>UV3</sub>		R <sub>UV4</sub>
Maximum colour change $\Delta E^*_{aba}$ before and after the test (CIELab units)	5	3		3 <sup>a</sup> 2 <sup>b</sup>
Minimum retained gloss after the test (RGb), %	30	50 <sup>a</sup>	60 <sup>b</sup>	80

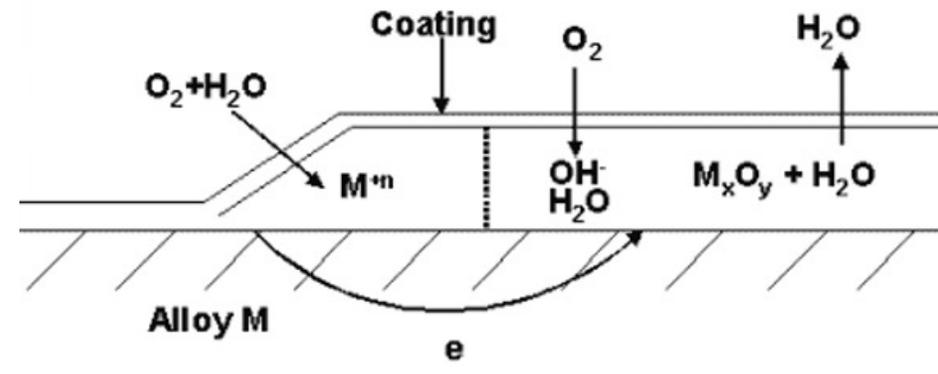
<sup>a</sup> Natural UV radiation.  
<sup>b</sup> Artificial UV radiation  
\*acc. to EN1396

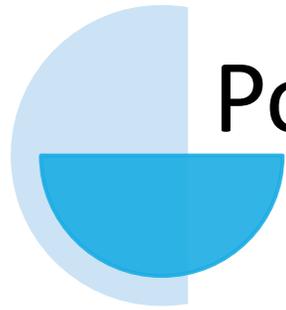


# Filliform corrosion



- Metal coated surfaces
- Threads like filaments
- Defects exposed to warm and humid atmospheric environments
- Corrosion rate index: CRI<sub>1</sub>, CRI<sub>2</sub>, CRI<sub>3</sub>





# Post exposure tests

- Colour
- Gloss
- Flaking
- Adhesion
- IR
- XPS
- UV



Thank you for your  
attention

