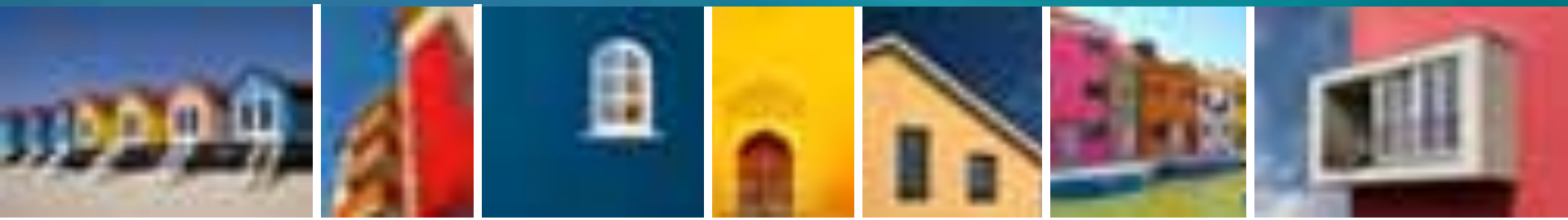
MOMENTIVE™

VeoVa™10 vinyl ester based binders for exterior architectural paints

基于叔碳酸乙烯酯单体的乳液在外墙涂料中的应用

Dr. Claude Nootens; Wee Wang
Momentive Specialty Chemical



May. 2014

VeoVa VINYL ESTER

Table of content 目录

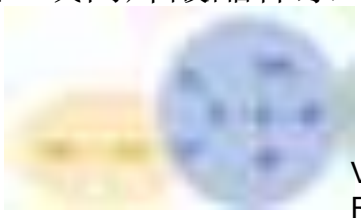
VeoVa 10 monomer key features
叔碳酸乙烯酯单体特性

VeoVa monomers for decorative paints
叔碳酸乙烯酯单体用于建筑涂料

VeoVa monomers application areas 应用领域

- Waterborne decorative and protective coatings
  水性建筑涂料及保护涂料
- Can be used in Vinyl and/or Acrylic systems
  可用于乙烯酯和/或丙烯酸酯体系

Vinyl reactivity
Radical polymerization



Bulky alkyl group

VeoVa 10 monomer:
$R^1 + R^2 = C_7H_{16}$

VeoVa 9 monomer:
$R^1 + R^2 = C_6H_{14}$

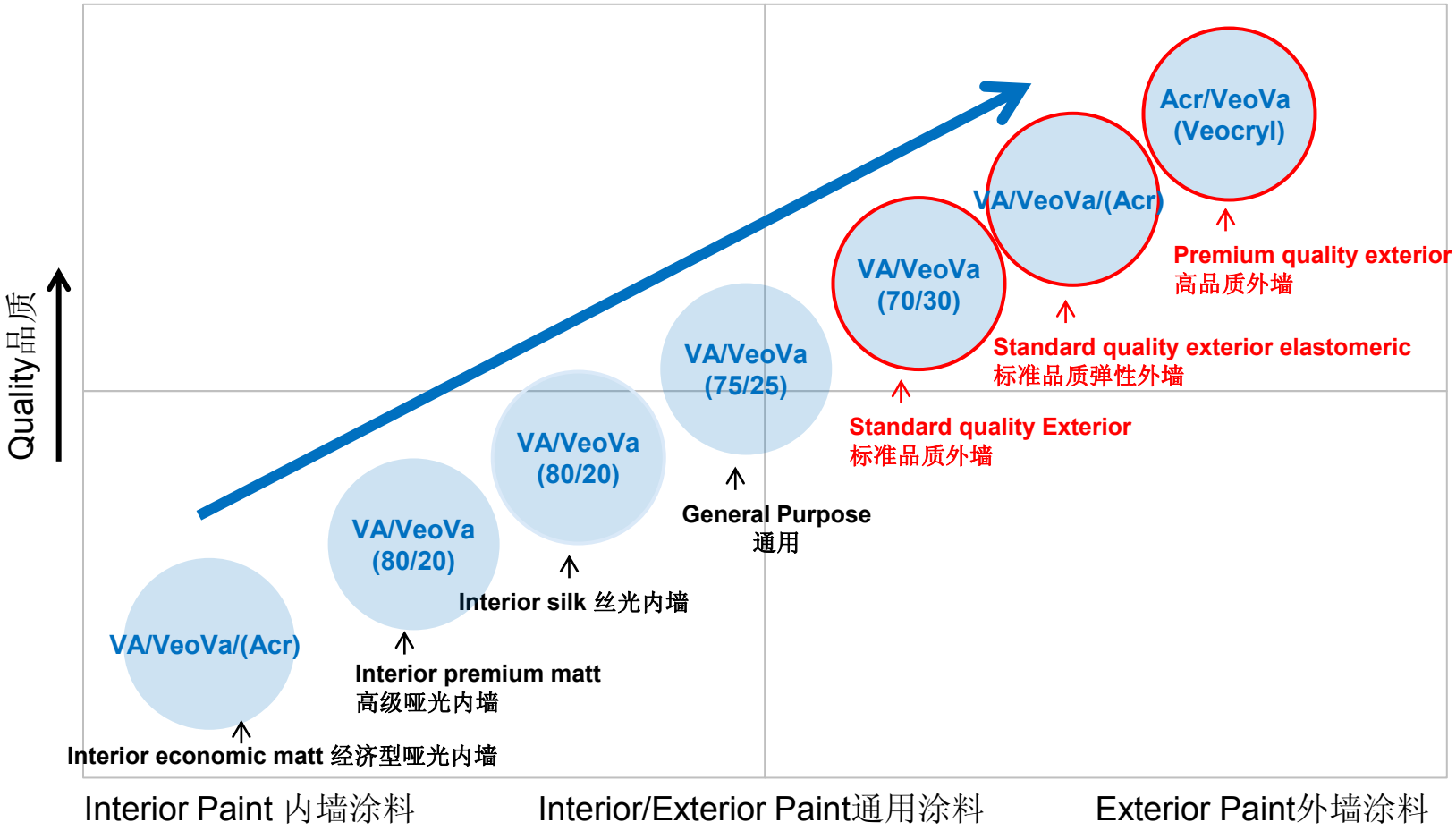
Key features 主要性能

- Alkali resistance 耐碱性
- Water repellency 憎水性
- Reduced water absorption 减少吸水
- Outdoor durability 户外耐久性
- Improved adhesion on substrates 提高对基材的粘结力

VeoVa monomers are used as a modifying monomer and have a great fit in waterborne emulsions for paints and coatings.
叔碳酸乙烯酯非常适合用作水性涂料用乳液的改性单体

Exterior architectural paints
外墙乳胶漆

VeoVa monomer enables improved cost/performance latices for a wide range of paint applications
VeoVa单体可以提高建筑涂料乳液的性价比



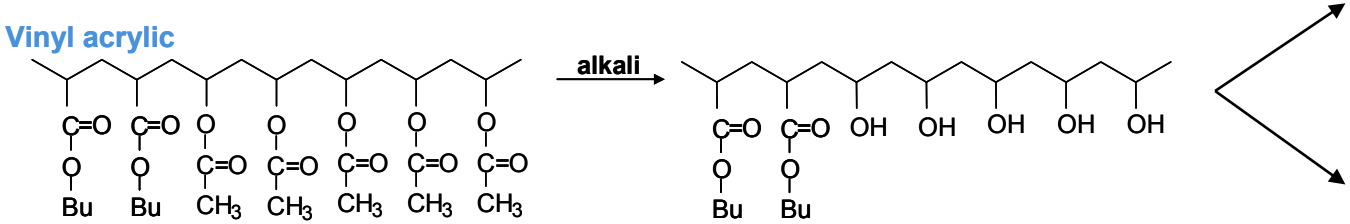
VeoVa monomers enable performing VA based latices for multiple paint applications.
VeoVa单体 可以使醋酸乙烯乳液用于各种建筑涂料

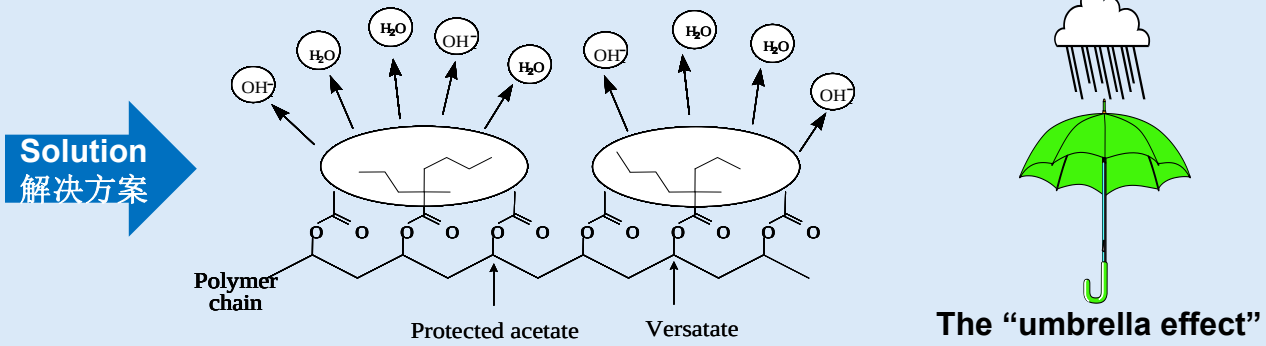
Main requirements for exterior paints
外墙涂料的主要要求

Requirement需求	Property 性能
Alkali resistance 耐碱	Early applicability on fresh concrete 新混凝土上的早期施工性
	Alkali extractable 碱溶出
	Efflorescence resistance 抗泛碱性
Hydrophobicity疏水	Early rain resistance 早期耐雨水
	Color retention 保色
	Rain mark resistance 耐雨痕
	Scrub resistance 耐擦洗
UV resistance 耐紫外线	Yellowing resistance 耐黄变
Appearance 外观	Dirt pick-up resistance 耐沾污
	Algae and fungi resistance耐霉菌
	Hiding power遮盖力
Flexibility 柔韧性	Mud cracking resistance 抗龟裂性
	Elongation 伸长率

Most of these properties can be controlled by monomers and/or latex composition.
大部分性能可以通过乳液和/或单体组成来调控

Alkali resistance: the umbrella effect
耐碱性：雨伞效果



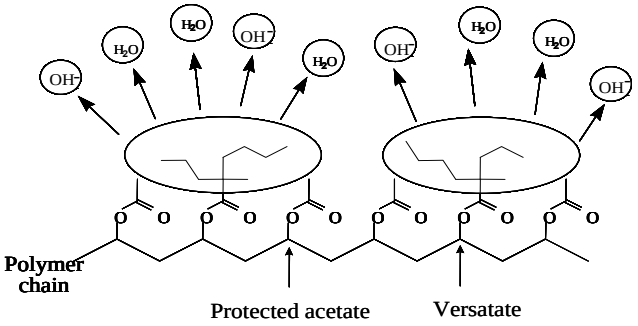


Very efficient protection because vinyl acetate and VeoVa monomers have similar reactivity ratio, thus random co-polymers are made.

由于醋酸乙烯同叔碳酸乙烯具有相似的竞聚率因此发生无归共聚，使保护的效率非常高

The Versatate groups protect their neighboring acetate groups from alkali hydrolysis.
叔碳酸基团保护相邻乙烯酯基团在碱性条件下不被水解

Alkali resistance: the umbrella effect
耐碱性：雨伞效果



Monomer hydrophobicity
单体的疏水性

Monomer	Water solubility 20 °C (g/100 ml)	Carbon/Oxygen Ratio
Vinyl Neodecanoate (VV 10)	<0.001	6
Butyl acrylate (BA)	0.16	3.5
Vinyl acetate (VA)	2.5	2

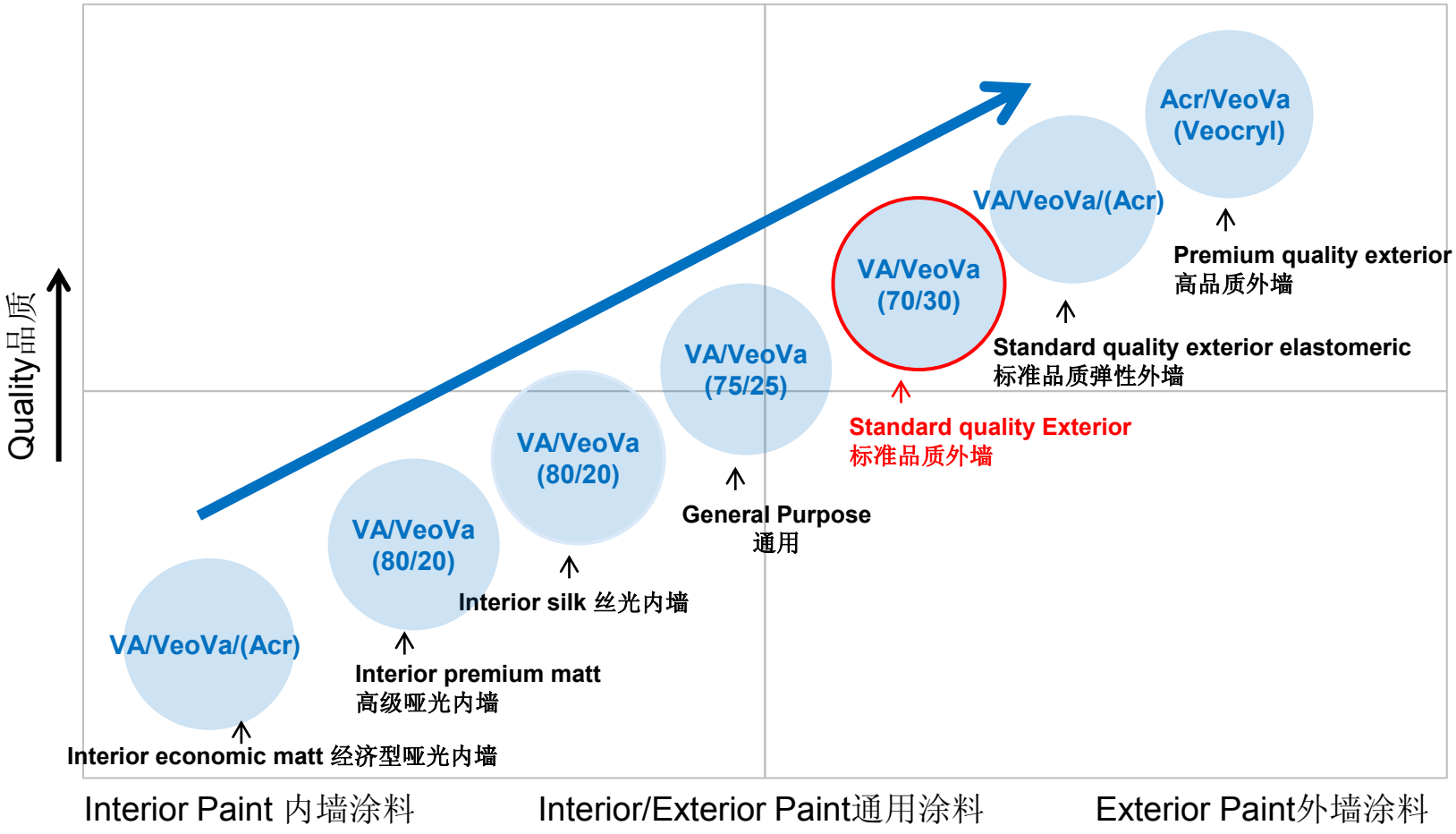
Alkali extractable of clear latex film
清漆膜的碱溶出率
After 2 weeks at 23°C

VA/VeoVa 10 (70/30) CS*	Comm. All-Acr A	Comm. VA/ACR G	Comm. All-Acr K	Comm. Sty/Acr D
<3%	<3%	5.6%	<3%	3%

CS*: colloid-stabilized

The Versatate groups protect its neighboring acetate groups from alkali hydrolysis.
叔碳酸基团保护相邻的醋酸酯基团不被碱水解

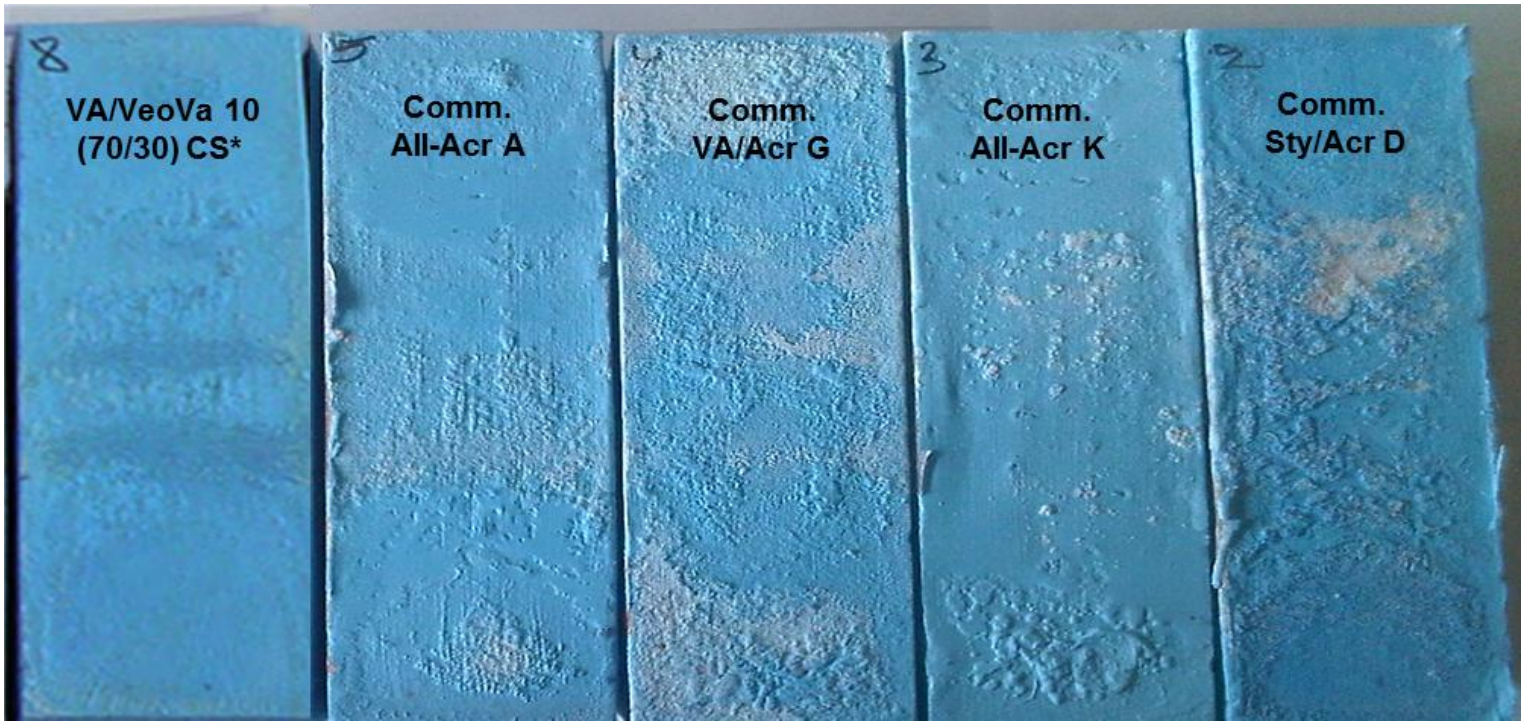
VeoVa monomer enables improved cost/performance latices for a wide range of paint applications
VeoVa单体可以提高建筑涂料乳液的性价比



VeoVa monomers enable performing VA based latices for multiple paint applications.
VeoVa单体 可以使醋酸乙烯乳液用于各种建筑涂料

Exterior paint alkali resistance - effloresence resistance
外墙涂料的耐碱性-抗泛碱性

Accelerated efflorescence lab test (internal Momentive test method)加速抗泛碱性测试



CS* : colloid-stabilized

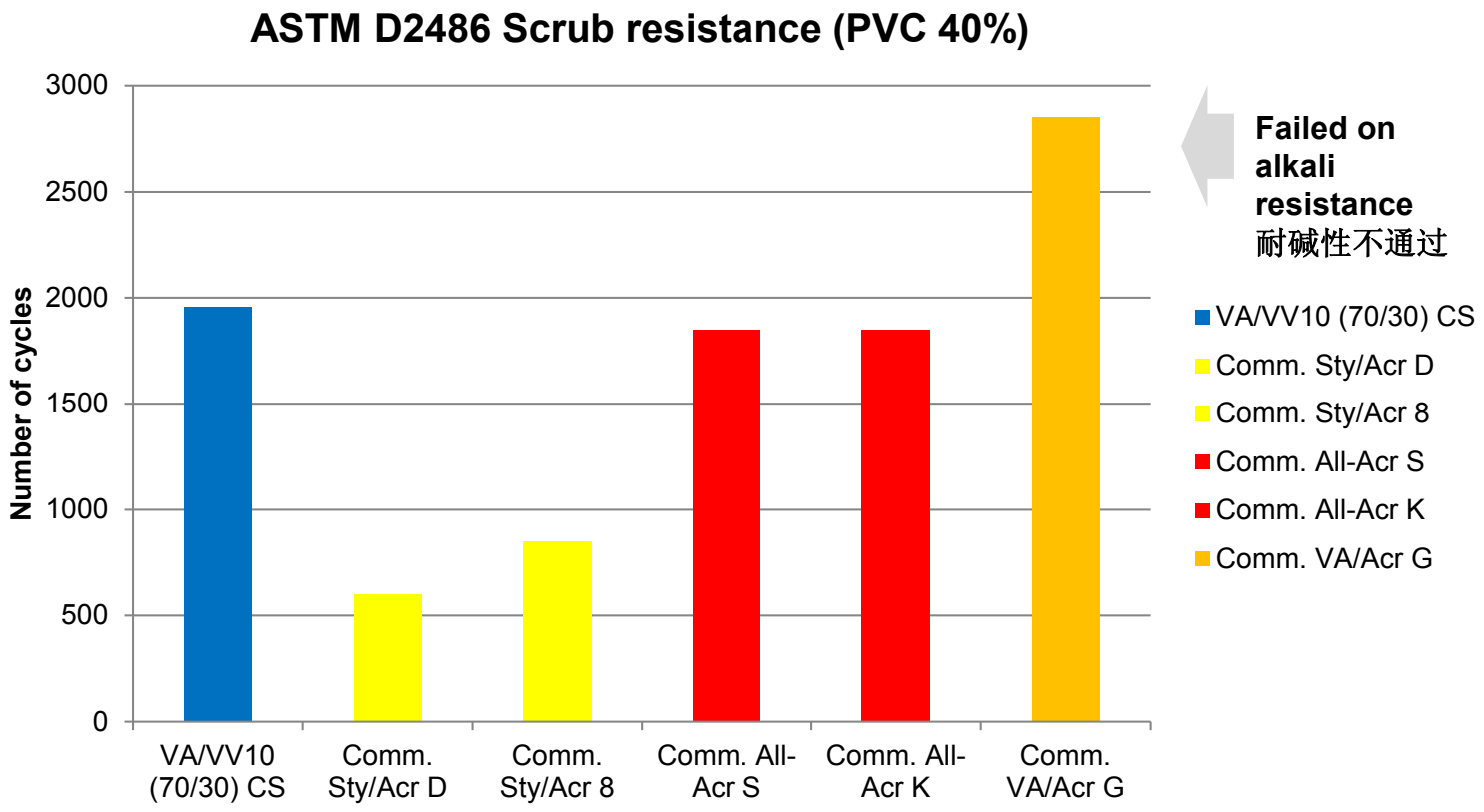
The presence of VeoVa 10 monomer in vinyl acetate binder brings the required alkali resistance of vinyl acetate based polymers.
叔碳酸乙烯酯单体与醋酸乙烯酯合用可提供醋酸乙烯酯乳液所必须的耐碱性

Exterior paint hydrophobicity – water repellent property
外墙乳胶漆的疏水性-憎水效应

Sty/Acr paint 苯丙乳胶漆	VA/VV paint 醋叔乳胶漆
	

The VeoVa 10 monomer based binder is demonstrating its outstanding water repellent property.
基于叔碳酸乙烯酯单体的乳液疏水性能极强

Exterior paint hydrophobicity- scrub resistance
外墙乳胶漆耐擦洗性能



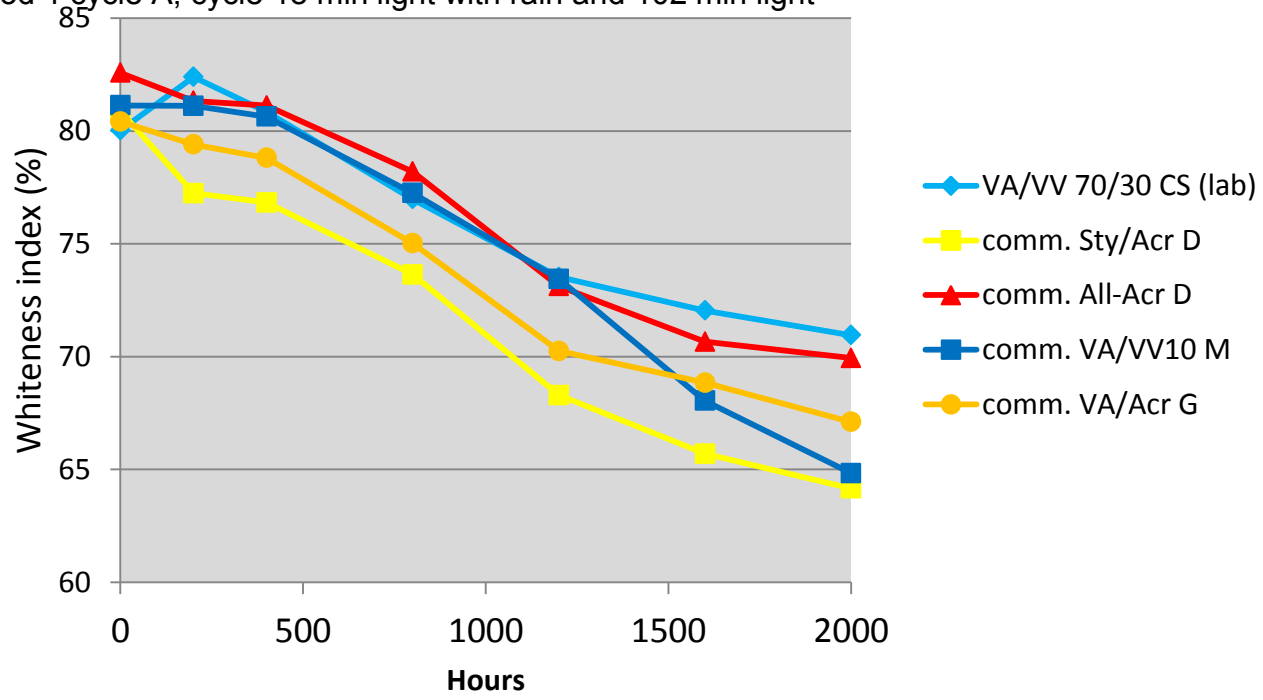
The VeoVa 10 monomer based lattices are scoring high in terms of scrub resistance in architectural exterior paints.

基于叔碳酸乙烯酯单体的乳液在外墙乳胶漆应用中耐擦洗性能优异

Exterior paint UV resistance - accelerated lab testing
外墙涂料 耐紫外性能- 实验室加速测试

Artificial accelerated weathering 人工加速老化

QUV lab test using a Weather-O-Meter and white paint
ISO 11341 method 1 cycle A, cycle 18 min light with rain and 102 min light



The VA/VeoVa 10 monomer (70/30) emulsion is demonstrating good UV resistance.
醋叔（70/30）乳液耐紫外性能优异

Exterior paint UV resistance: outdoor Florida exposure - Benchmark latices and paints study - Test description

参照品乳液和涂料性能研究/7年弗罗里达自然暴晒 - 方法描述

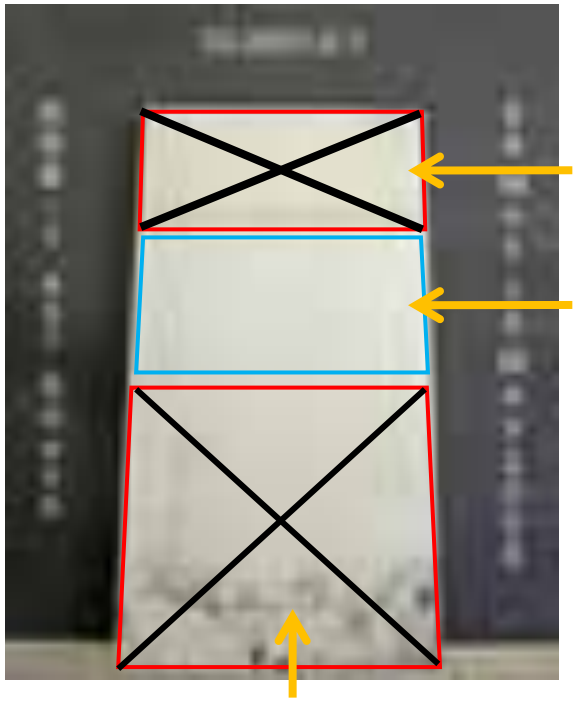
Test performed by 3rd party expert company:
Q-Lab Test Service Division
Homestead Fl 33034, Florida

Substrate:
Cement based panels: Eternit Elflex NT
(asbestos-free panels)

White paints:
Primer (paint diluted with 1/3 water), Number of coats: 2, One side covered, duplo panels

Testing:
Annually during 7 years, panels at 45° facing South

Analyses:
WI & YI, Tape chalk rating, Visual rating of Color, Mildew, Dirt pick-up resistance, Cracking



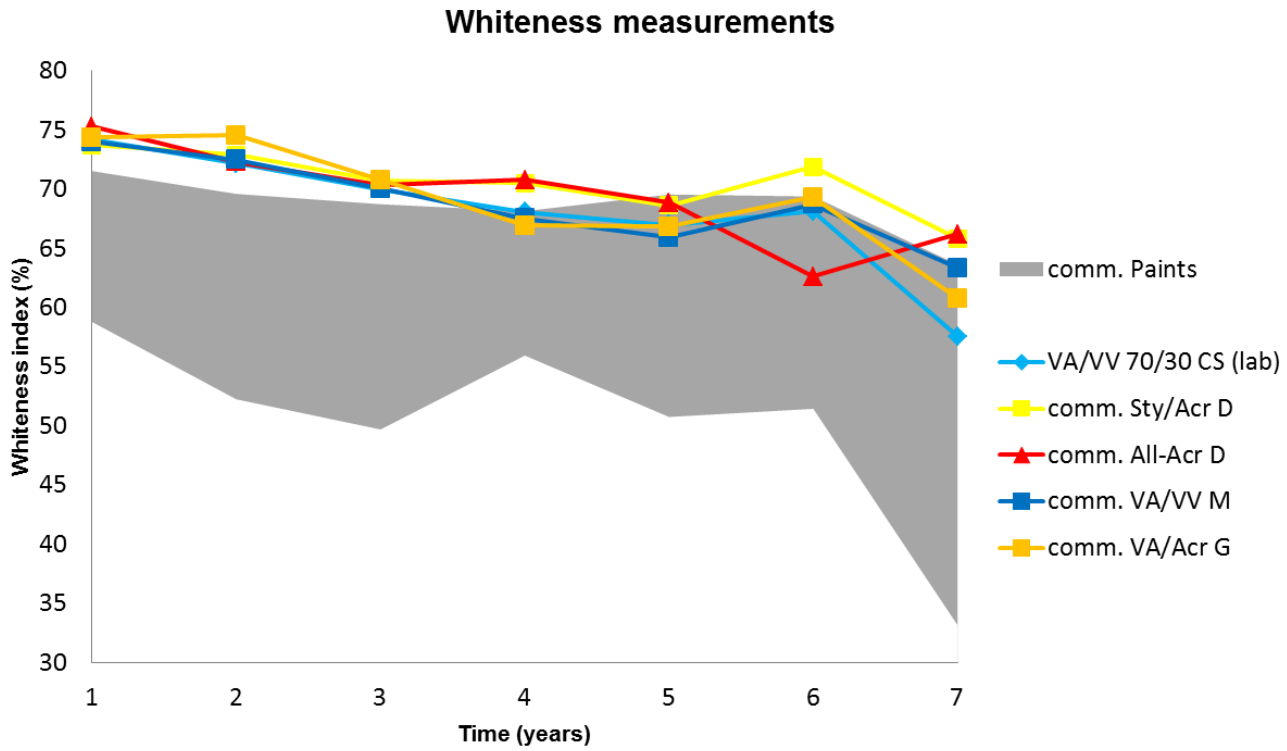
The top 2.5 inch is covered by clamp. This part is excluded from inspection by the test methods Q-Lab uses.

The top half of each specimen was washed with de-ionized water prior to inspection.
This is the area for inspection.

The panel is positioned in a tray where water can stand for some period after rain. This leads to extra dirt pick-up and deterioration of the paint.
This part is excluded from inspection by the test methods Q-Lab uses.

Exterior paint UV resistance: outdoor Florida exposure - Benchmark latices and paints study results
参照品性能研究/7年弗罗里达自然暴晒 - 结果

Lab made VeoVa latex versus commercial latices and paints



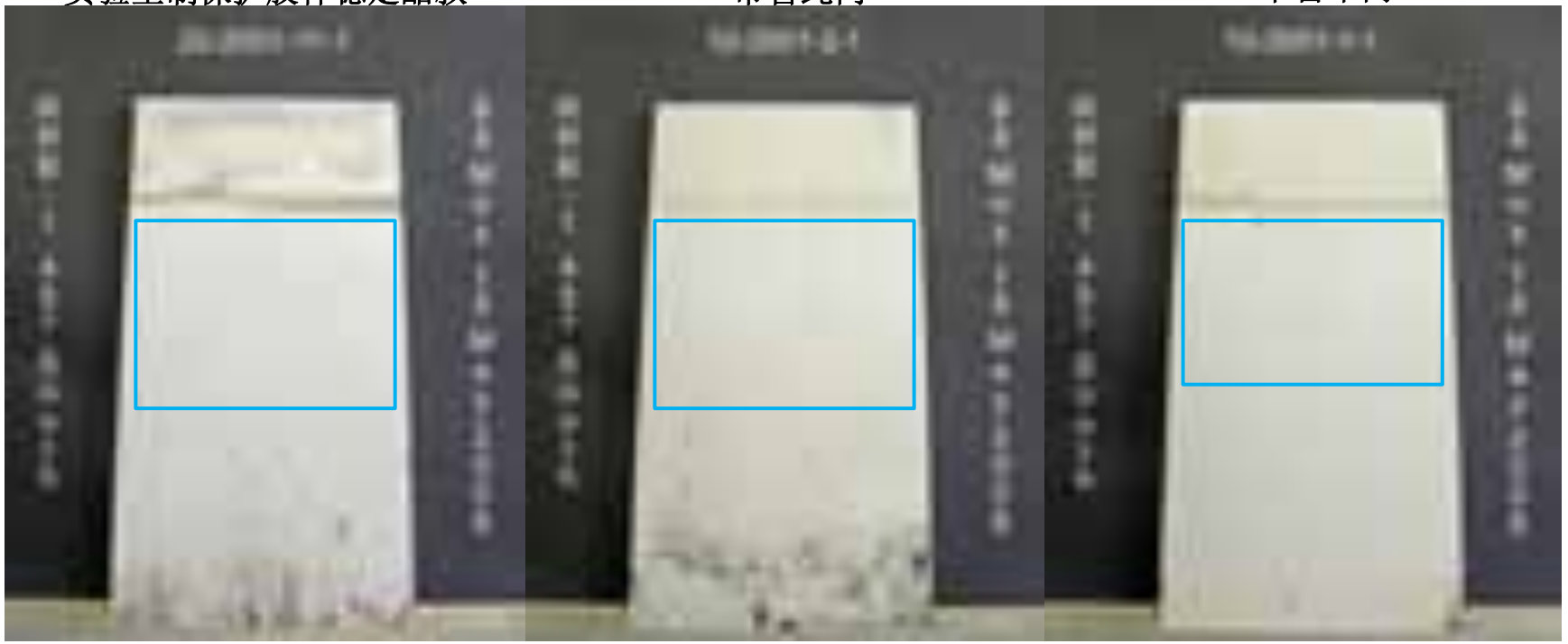
The VA/VeoVa 10 (70/30) emulsion is demonstrating similar performance to high quality all-acrylic international latex benchmarks and to high performing commercial paints.
醋叔（70/30）乳液与市售知名高性能纯丙标样及乳胶漆标样相比具有相似耐紫外性能

Exterior paint UV resistance: outdoor Florida exposure - Benchmark latices study results
参照品性能研究/7年弗罗里达自然暴晒 – 与市售乳液比较

VA/VV 70/30 CS lab
实验室制保护胶体稳定醋叔

Comm. All-Acr D
市售纯丙

Comm. Sty/Acr D
市售苯丙



The VeoVa monomer based paint formulation is demonstrating better performance than most of the commercial international latex used in this benchmark study.
醋叔（70/30）乳液制备的涂料表现出比大部分市售的国际品牌乳液更好的性能

Exterior paint UV resistance: outdoor Florida exposure - Benchmark paints study results
参照品性能研究/7年弗罗里达自然暴晒 – 与市售乳胶漆比较

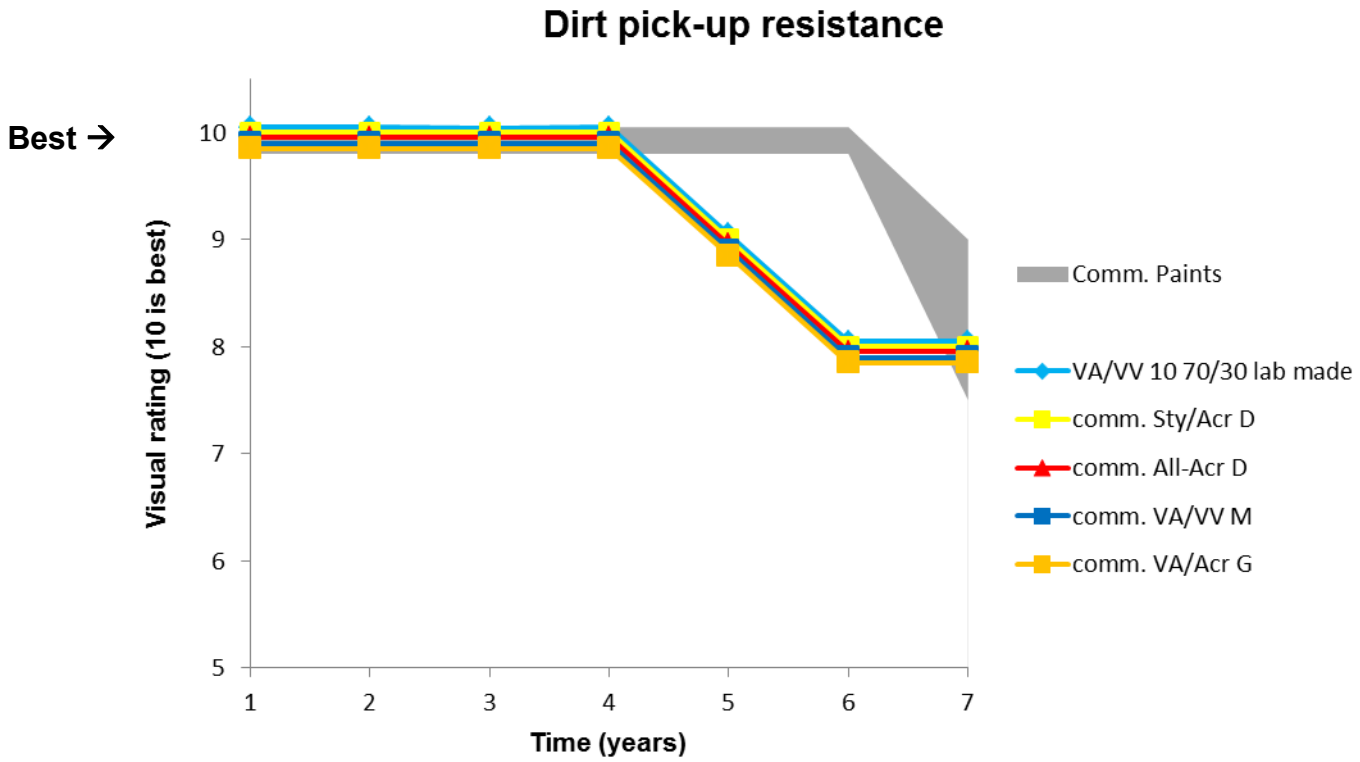
VA/VV 70/30 CS lab 实验室制保护胶体稳定醋叔	Comm. Paint L 市售乳胶漆L	Comm. Paint SWWP 市售乳胶漆SWWP

The VeoVa monomer based paint formulation is demonstrating better performance than most of the commercial paints used in this benchmark study.
醋叔（70/30）乳液制备的涂料表现出比大部分市售的乳胶漆更好的性能

Dirt pick-up benchmark study in natural outdoor exposure - Florida - Benchmark latices and paints study results
弗罗里达自然曝晒-参照品乳液和涂料耐沾污研究结果

Lab made VeoVa latex versus commercial latices and paints

实验室制备乳液同市售乳液和涂料对比

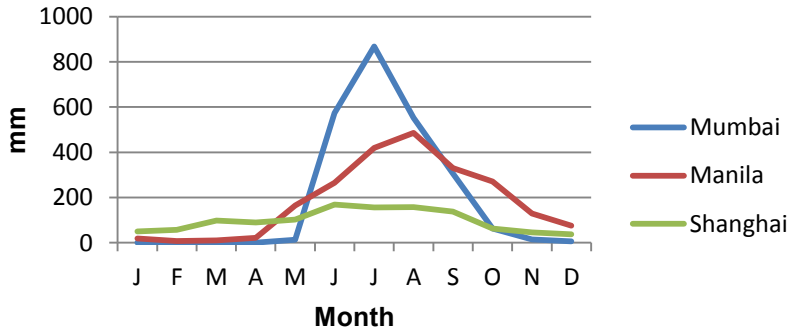


All the latices show the same dirt pick-up resistance in our exterior paint formulation.
所有的乳液使用我们的涂料配方都表现出相同的耐沾污性

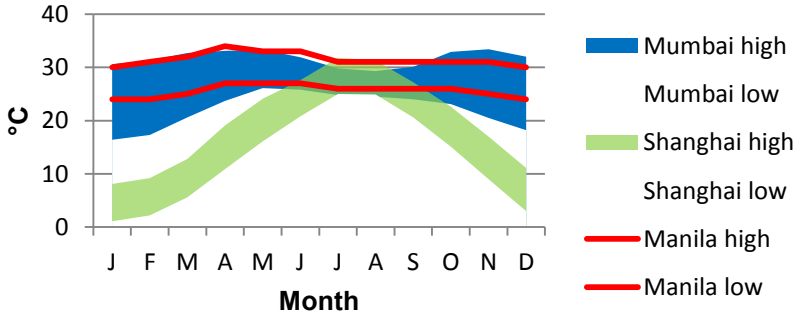
Exterior paint - natural outdoor exposure locations
外墙涂料 - 户外自然暴晒地点

City (Country)	Mumbai (India)	Manila (Philippines)	Shanghai (China)
Latitude	18°59'N	14°35'N	31°12'N
Climate	Tropical wet and dry (moderately hot with high level of humidity)	Tropical savanna which borders moonsoon climate (dry and cooler wet)	Humid subtropical
Annual mean particles* PM10 (μg/m^3)	132	47	81

Rainfall**



Average high and low temperature**



* source: World health organization (2011)
** sources: wikipedia and World Weather Information Service

The results of the exterior paint weatherability studies are strongly linked to the regional specific climate and dirt particle types.
外墙涂料耐候性研究结果与不同地域的特定气候和污染物颗粒种类密切相关

Dirt pick-up benchmark study in natural outdoor exposure Mumbai, India

户外自然暴晒耐沾污性-孟买，印度

Test performed by 3rd party:

Institute of Chemicals Technology (University) Mumbai, India

(12 October 2012 exposure start)

Substrate:

Cement based panels: Eternit Elflex NT (asbestos-free panels)

White paints:

Primer (paint diluted with 1/3 water), Number of coats: 2, One side covered

Testing:

Monthly during 2 years, ongoing exposure, panels at 45° facing South

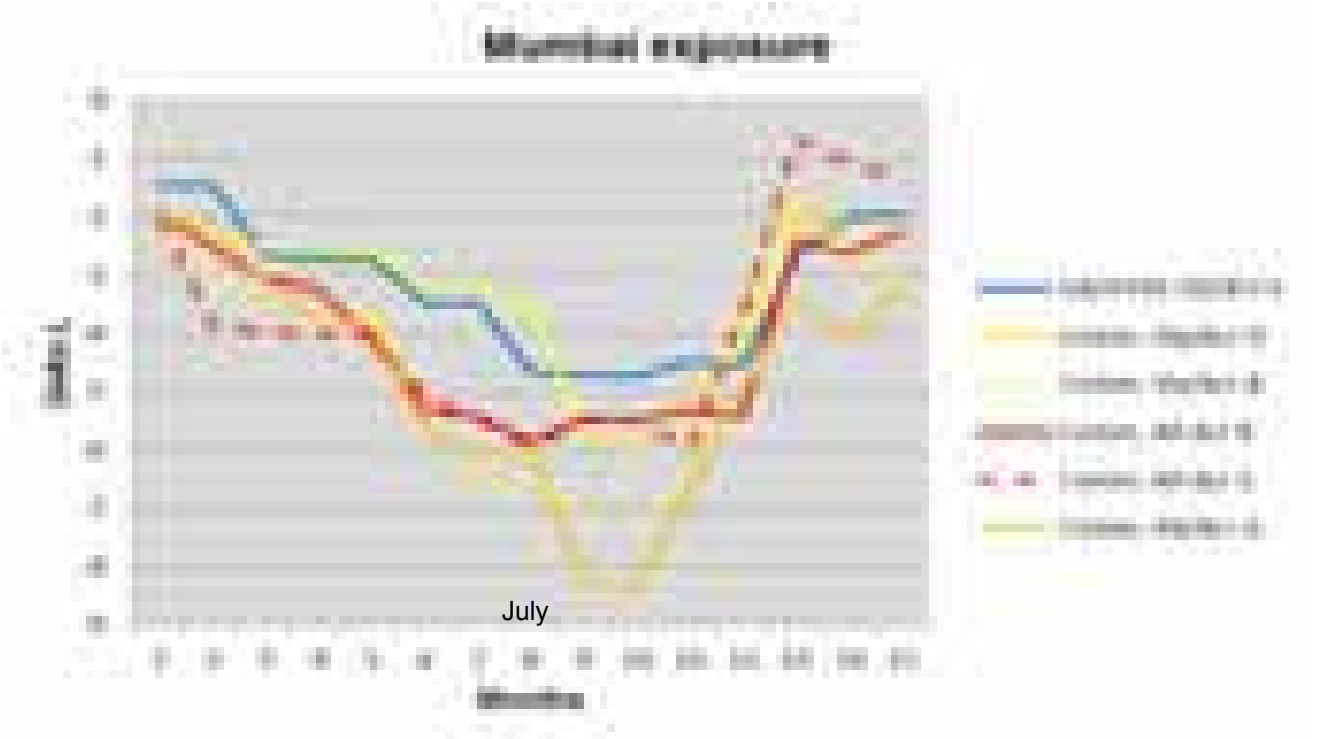
Analyses:

WI & YI, L, a, b

APAC Locations

Exterior paint dirt pick-up resistance: 外墙耐沾污性
Outdoor Mumbai exposure - Results after 15 months
孟买户外曝晒 – 15个月的结果

VA/VeoVa 10 monomer (70/30) latex versus commercial latex benchmarks

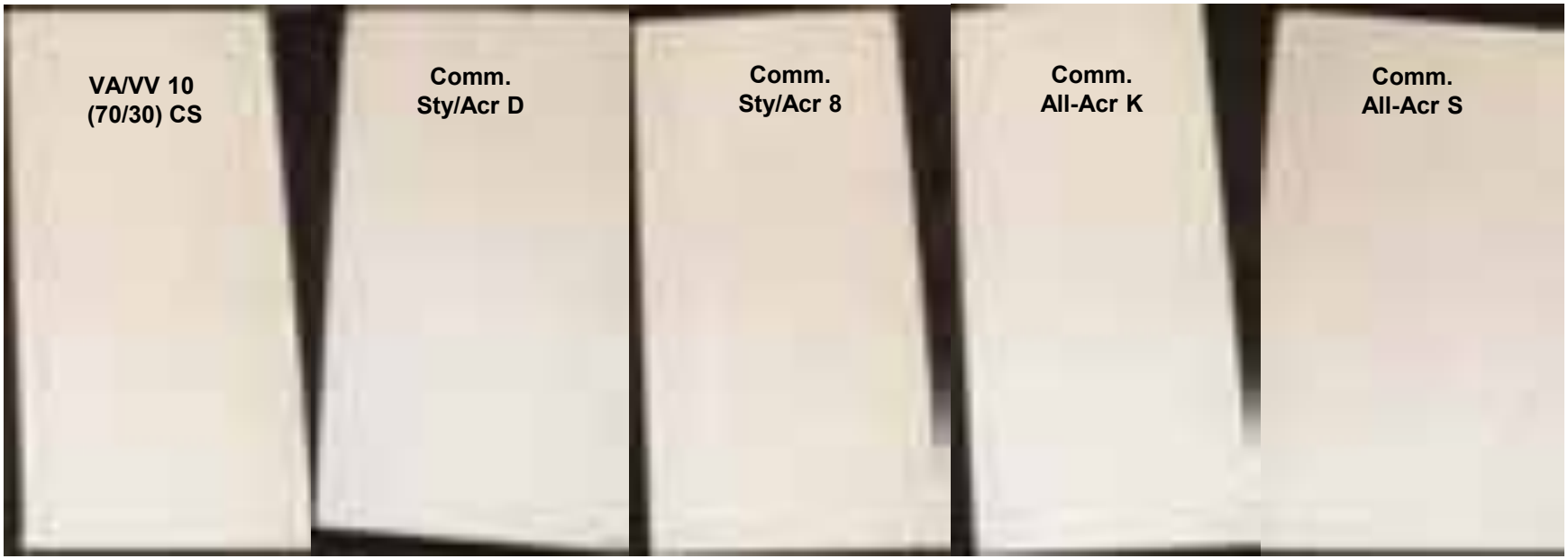


Visual difference is observed for values difference of more than 2 units

After 15 months: the VA/VeoVa 10 monomer (70/30) latex is demonstrating at least similar performance than all-acrylic international high quality latex benchmarks.
15个月曝晒：醋酸乙烯/叔碳酸乙烯（70/30）乳液 表现出同国际品牌高性能纯丙乳液最起码相近的性能

Exterior paint dirt pick-up resistance: 外墙耐沾污性
Outdoor Mumbai exposure - Results after 15 months
孟买户外曝晒 – 15个月的结果

VA/VeoVa 10 monomer (70/30) latex versus commercial latex benchmarks



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Exterior paints colour retention study in natural outdoor exposure Shanghai China

外墙涂料保色性研究- 自然曝晒 上海，中国

Test performed by Momentive staff:

Momentive
Shanghai, China
(12 October 2012 exposure start)

Substrate:

Cement based panels: Eternit Elflex NT
(asbestos-free panels)

White paints and blue paints:

Primer (paint diluted with 1/3 water), Number of coats: 2, One side covered , duplo panels

Testing:

Every 3 months during 2 years, ongoing exposure, panels at 45° facing South

Analyses:

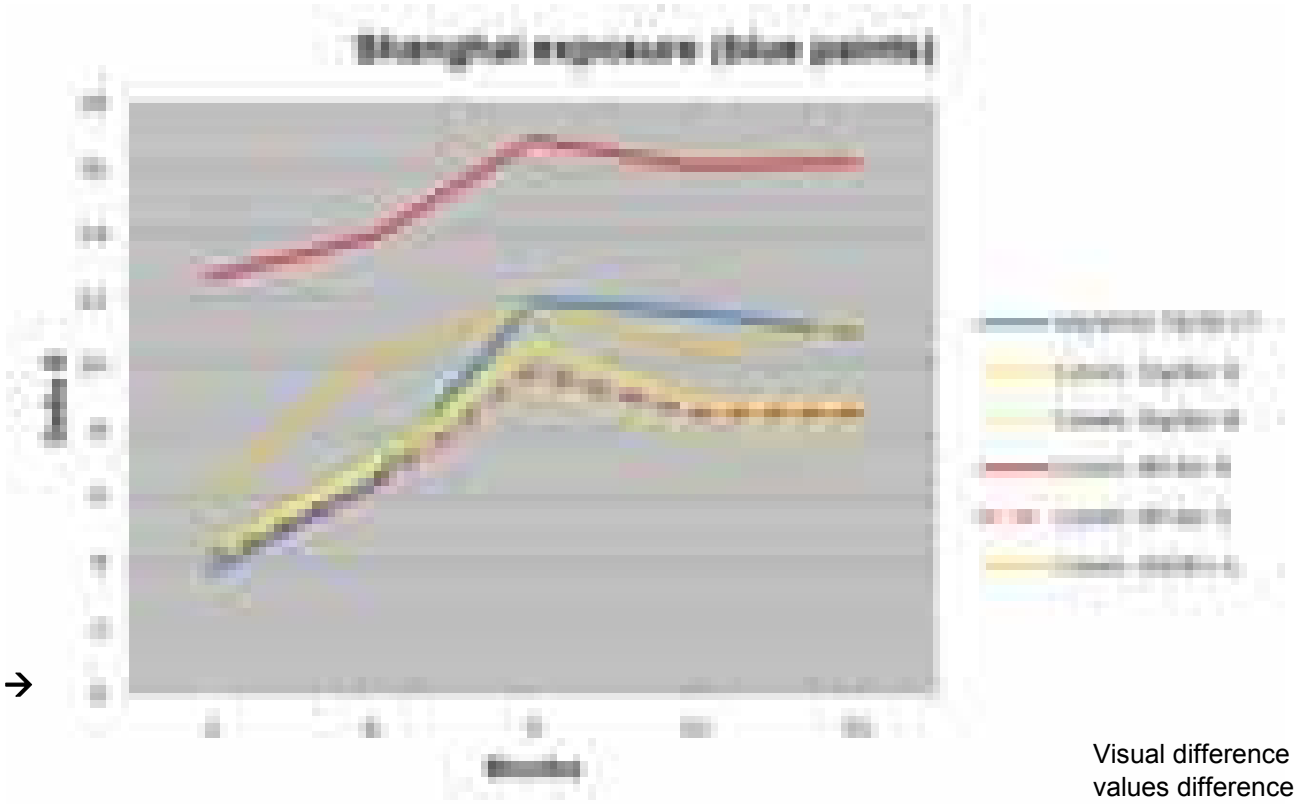
- WI & YI, L, a, b

APAC Locations

Exterior paints colour retention study in natural outdoor exposure Shanghai China

外墙涂料保色性研究- 自然曝晒 上海，中国- 15个月

VA/VeoVa 10 monomer (70/30) latex versus commercial latex benchmarks



Best →

Visual difference is observed for values difference of more than 2-3 units

After 15 months: the VA/VeoVa 10 monomer (70/30) latex is demonstrating at least similar performance than all-acrylic international high quality latex benchmarks.

15个月曝晒：醋酸乙烯/叔碳酸乙烯（70/30）乳液 表现出同国际品牌高性能纯丙乳液最起码相近的性能

Exterior paints colour retention study in natural outdoor exposure Shanghai China

外墙涂料保色性研究- 自然曝晒 上海，中国- 15个月

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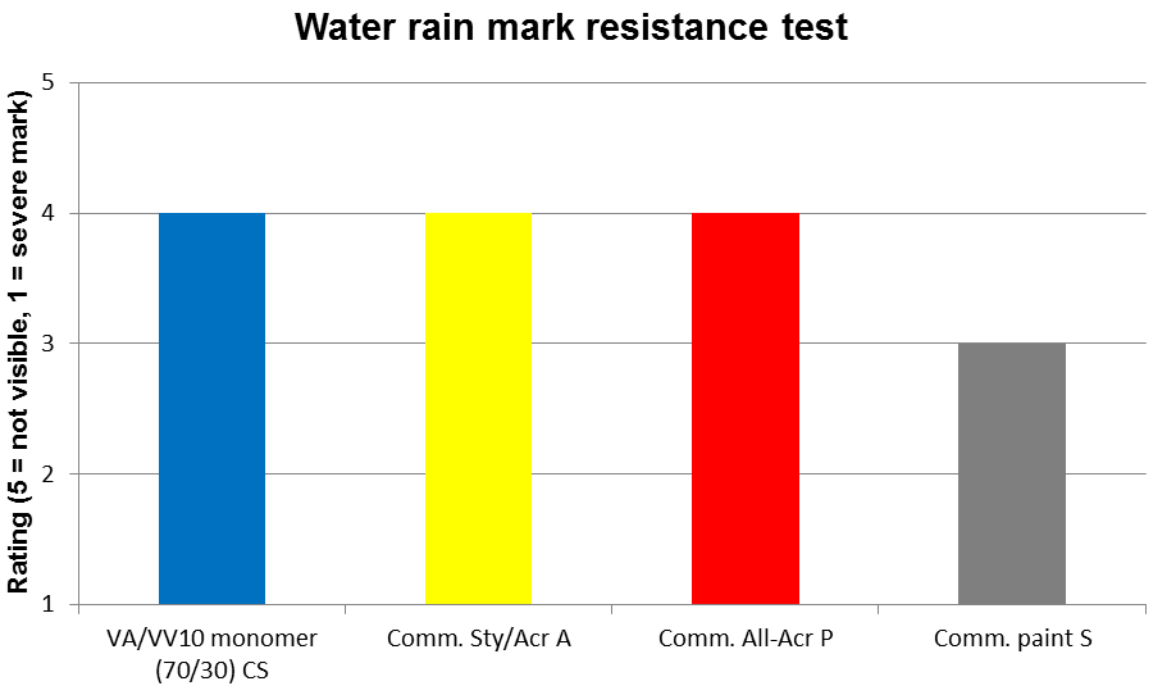
Exterior paints rain mark resistance
外墙涂料耐雨痕

VA/VeoVa 10 monomer (70/30) latex versus commercial latex and paint benchmarks



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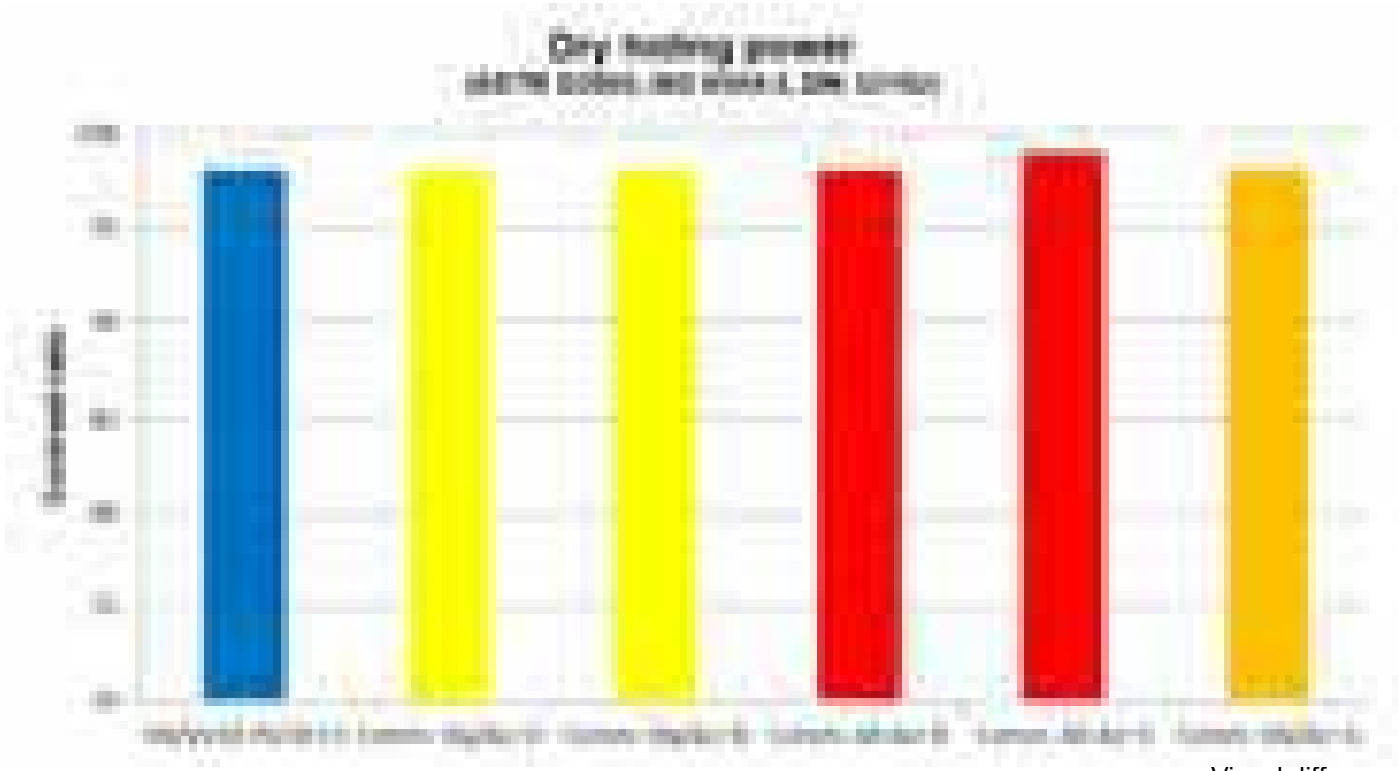
Exterior paints hiding power
外墙涂料遮盖力

VA/VeoVa 10 monomer (70/30) latex versus commercial latex benchmarks



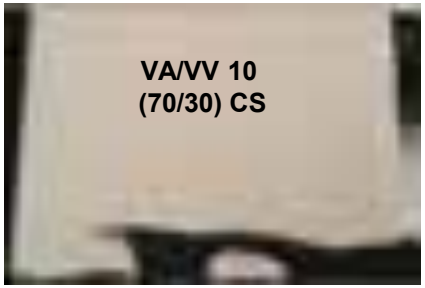
Visual difference is observed for values difference of 3-5 units

The VA/VeoVa 10 monomer (70/30) is performing similarly than international commercial high quality latex benchmarks.
醋酸乙烯/叔碳酸乙烯（70/30）乳液 表现出同国际品牌高性能乳液相近的性能

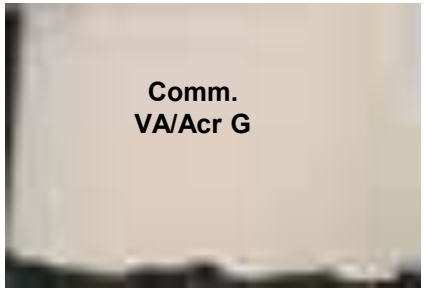
Exterior paints mud cracking resistance
外墙涂料抗龟裂性

VA/VeoVa 10 monomer (70/30) latex versus commercial latex benchmarks

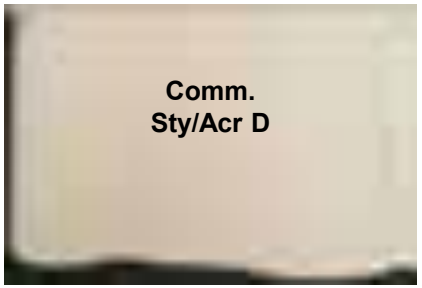
25 µm 1000 µm dry



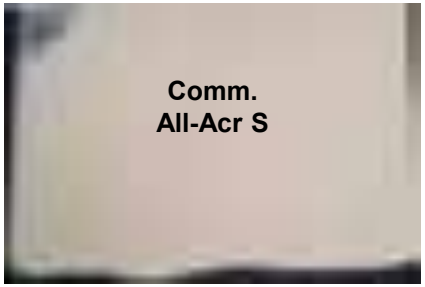
25 µm 1000 µm dry



25 µm 1000 µm dry



25 µm 1000 µm dry



No cracking has been observed on these panels

Minimum requirement is 900 µm dry

All the binders formulated in the our paint recipe have an excellent mud cracking resistance.
所有的乳液在我们的涂料配方中都具有优异的抗龟裂性

Exterior paints – standard quality exterior
外墙涂料 – 标准品质

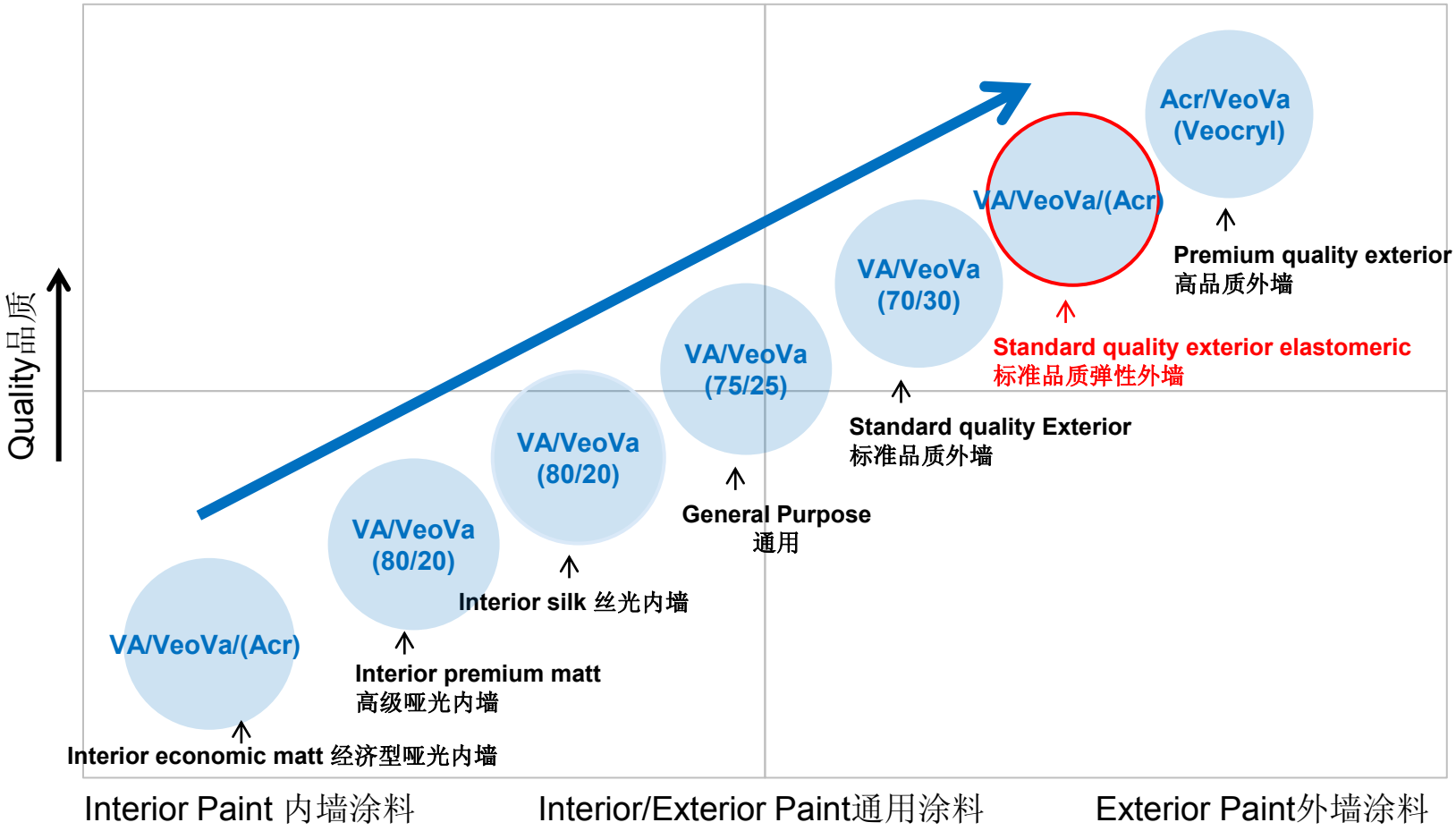
Conclusions 结论

- VeoVa 10 monomer enables vinyl acetate based latex to be used in exterior architectural paints. 叔碳酸乙烯单体使醋酸乙烯乳液可以用于外墙建筑涂料

- VA/VeoVa 10 monomer (70/30) based latex demonstrates a good alkali resistance, UV resistance, water resistance and color retention which are important factors for the weatherability resistance of the coating. 醋酸乙烯/叔碳酸乙烯 （70/30）乳液表现出良好的耐碱性，耐UV性，耐水性和保色性，这些都是涂料耐候性的重要因素

- VA/VeoVa 10 monomer (70/30) based latex can be a lower cost alternative to all-acrylic latices. 醋酸乙烯/叔碳酸乙烯 （70/30）乳液可以是纯丙乳液的低成本替代产品

VeoVa monomer enables improved cost/performance latices for a wide range of paint applications
VeoVa单体可以提高用于多种建筑涂料乳液的性价比



VeoVa monomers enable performing VA based latices for multiple paint applications.
VeoVa单体 可以使醋酸乙烯乳液用于各种建筑涂料

Main requirements for elastomeric exterior paints
弹性外墙涂料的主要性能要求

Requirement需求	**Property 性能**
Alkali resistance 耐碱	Early applicability on fresh concrete 新混凝土上的早期施工性 Alkali extractable 碱溶出 Efflorescence resistance 抗泛碱性
Hydrophobicity疏水	Early rain resistance 早期耐雨水 Color retention 保色 Rain mark resistance 耐雨痕 Scrub resistance 耐擦洗
UV resistance 耐紫外线	Yellowing resistance 耐黄变
Appearance 外观	Dirt pick-up resistance 耐沾污 Algae and fungi resistance耐霉菌 Hiding power遮盖力
Flexibility 柔韧性	Mud cracking resistance 抗龟裂性
	Elongation before and after accelerated weathering test, tensile strength, water absorption, … following regional norm 加速老化前和后的伸长率，抗张强度，吸水率， … 地区标准

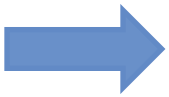
Most of these properties can be controlled by monomers and/or latex composition.
大部分性能可以通过乳液和/或单体组成来调控.

Exterior paint flexibility: elastomeric paints
外墙涂料的柔韧性：弹性涂料

- **Current commercial system used 现有市售体系**
  - Blend of soft and hard Sty/Acr to achieve water resistance, tensile strength and low dirt pick-up
    混合硬苯丙和软苯丙，达到耐水性，抗张强度及耐沾污要求
  - Drawbacks 缺点:
    - Elongation is reduced after blending 混合后断裂伸长率下降
    - UV degradation = Yellowing 紫外降解=黄变
- **New option: Soft VeoVa monomer based binder (which could optionally be blended with hard VeoVa monomer based binder)**

  新方向：基于软叔碳酸乙烯酯单体的乳液（可选择性与基于硬叔碳酸乙烯酯单体的乳液混合）

Vinyl Acetate based systems 醋酸乙烯酯体系
Vinyl Acetate/Acrylate/VeoVa monomer 醋酸乙烯酯/丙烯酸酯/叔碳酸乙烯酯单体



Performance 性能
Increased water resistance 提高耐水性
Better exterior durability 更好户外耐久性
Better flexibility 更好柔韧性
Excellent alkaline resistance 杰出耐碱性
High elongation 高断裂伸长率
Good tensile strength 优异拉伸强度
Excellent resistance after UV exposure 耐紫外暴晒
High recovery after elongation 拉伸后回弹性好

* All the VeoVa 10 monomer based binders (soft and hard) are colloid-free for the elastomeric coatings project

Elastomeric paints
弹性涂料

Concept 1 Soft latex alone 单用软乳液	Concept 2 Blend soft/hard same type of latex 混用同类型软/硬乳液	Concept 3 Blend soft/hard different type of latex 混用不同类型软/硬乳液
Soft Sty/Acr	**Soft Sty/Acr** + **Hard Sty/Acr**	**Soft Sty/Acr** + **Hard VV 10**
Soft VV 10	**Soft VV 10** + **Hard VV 10**	

Comm. Sty/Acr

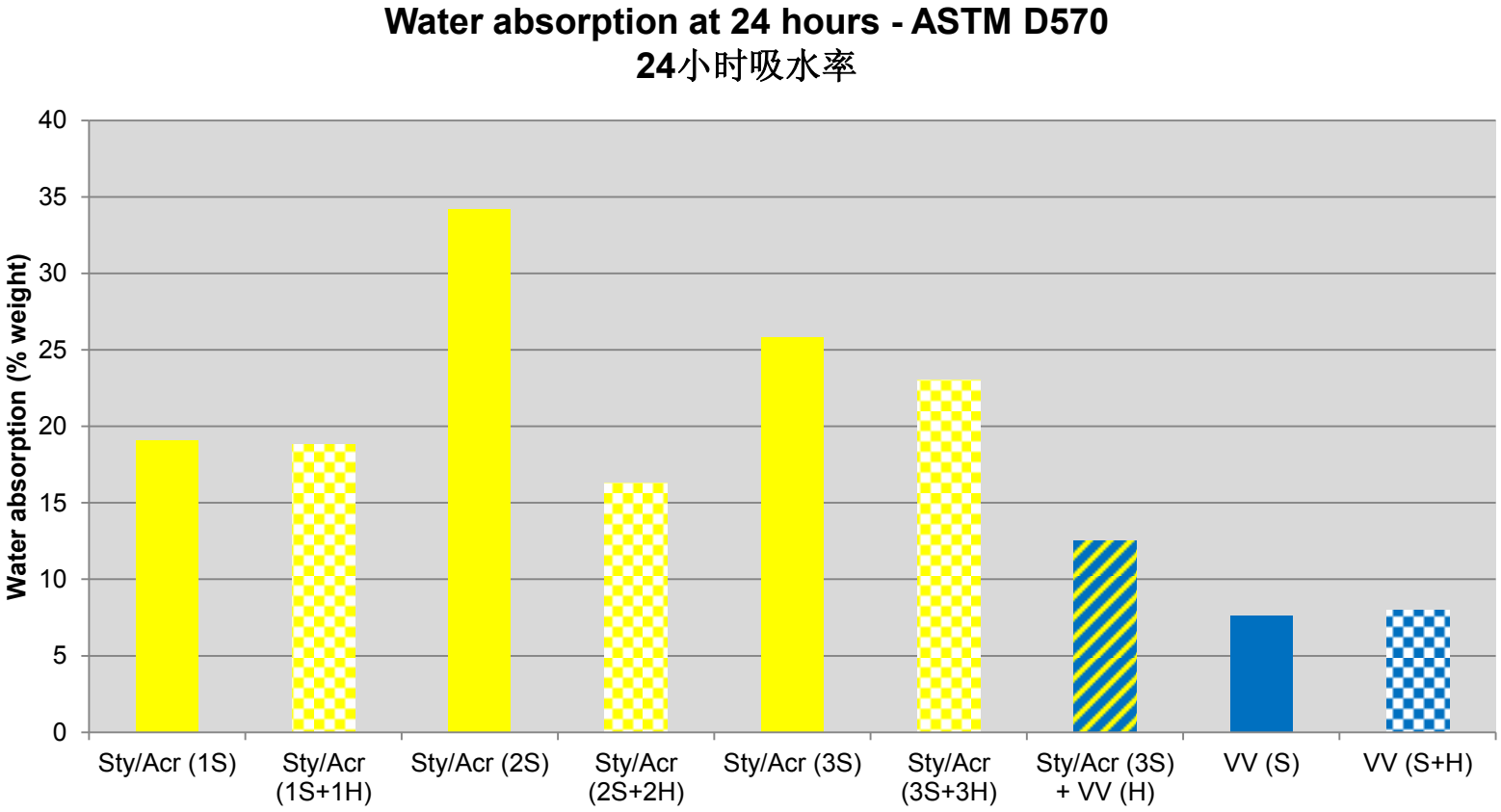
- Benchmark soft (1S) and hard (1H) ex producer 1
- Benchmark soft (2S) and hard (2H) ex producer 2
- Benchmark soft (3S) and hard (3H) ex producer 3

VeoVa vinyl ester binder*

- Soft VA/VV 10/BA 42/30/28 (Tg -3°C), VV (S)
- Hard VA/VV 10/BA 58/41/1 (Tg +16°C), VV (H)

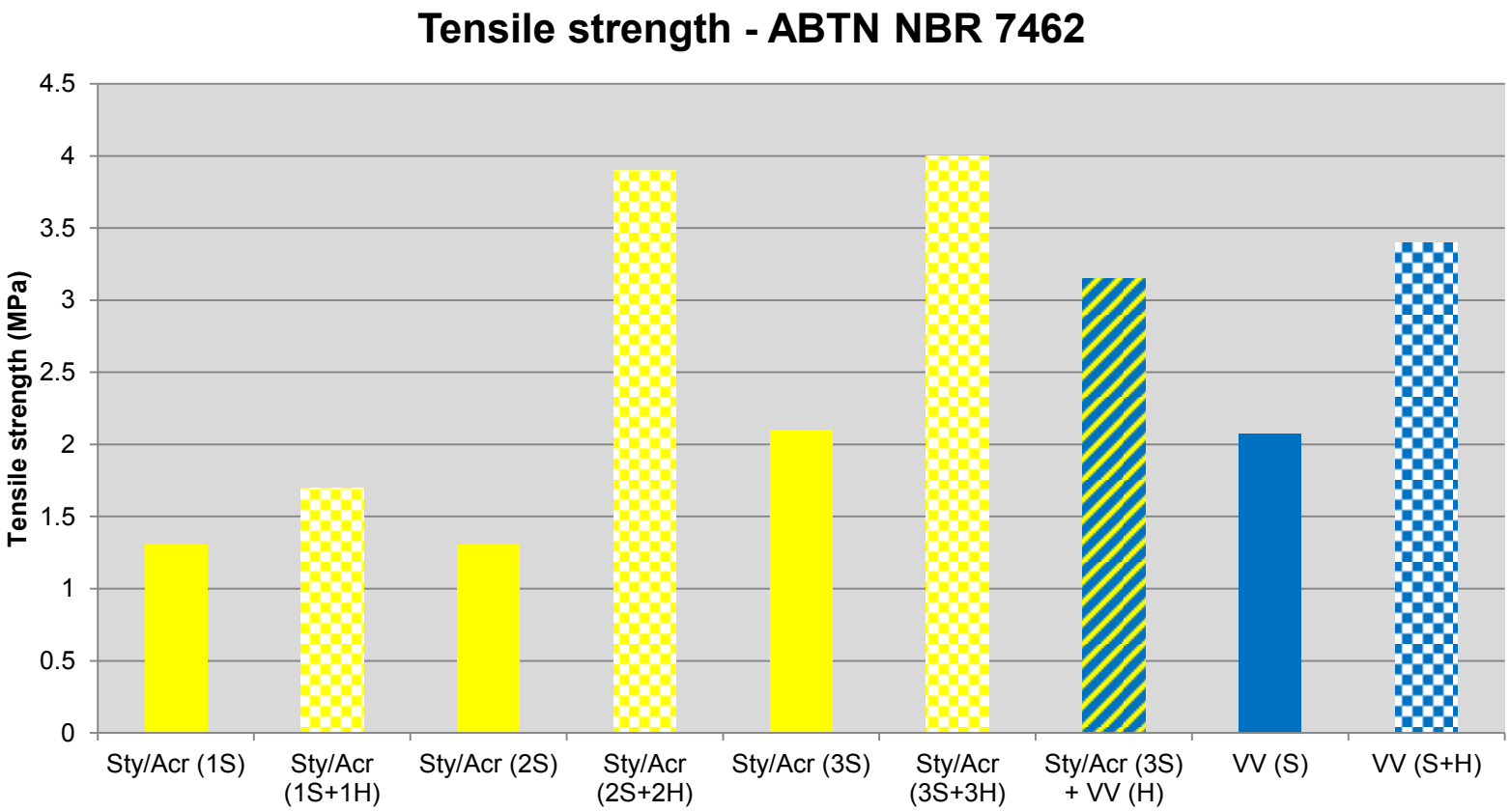
VV = VV 10 = VeoVa 10 monomer
*All the VeoVa 10 monomer based binders are colloid-free

Elastomeric paints
弹性涂料



Elastomeric coatings prepared with the soft VeoVa monomer based polymer shows an excellent water absorption resistance.
基于叔碳酸乙烯酯单体的软乳液吸水性最小

Elastomeric paints
弹性涂料

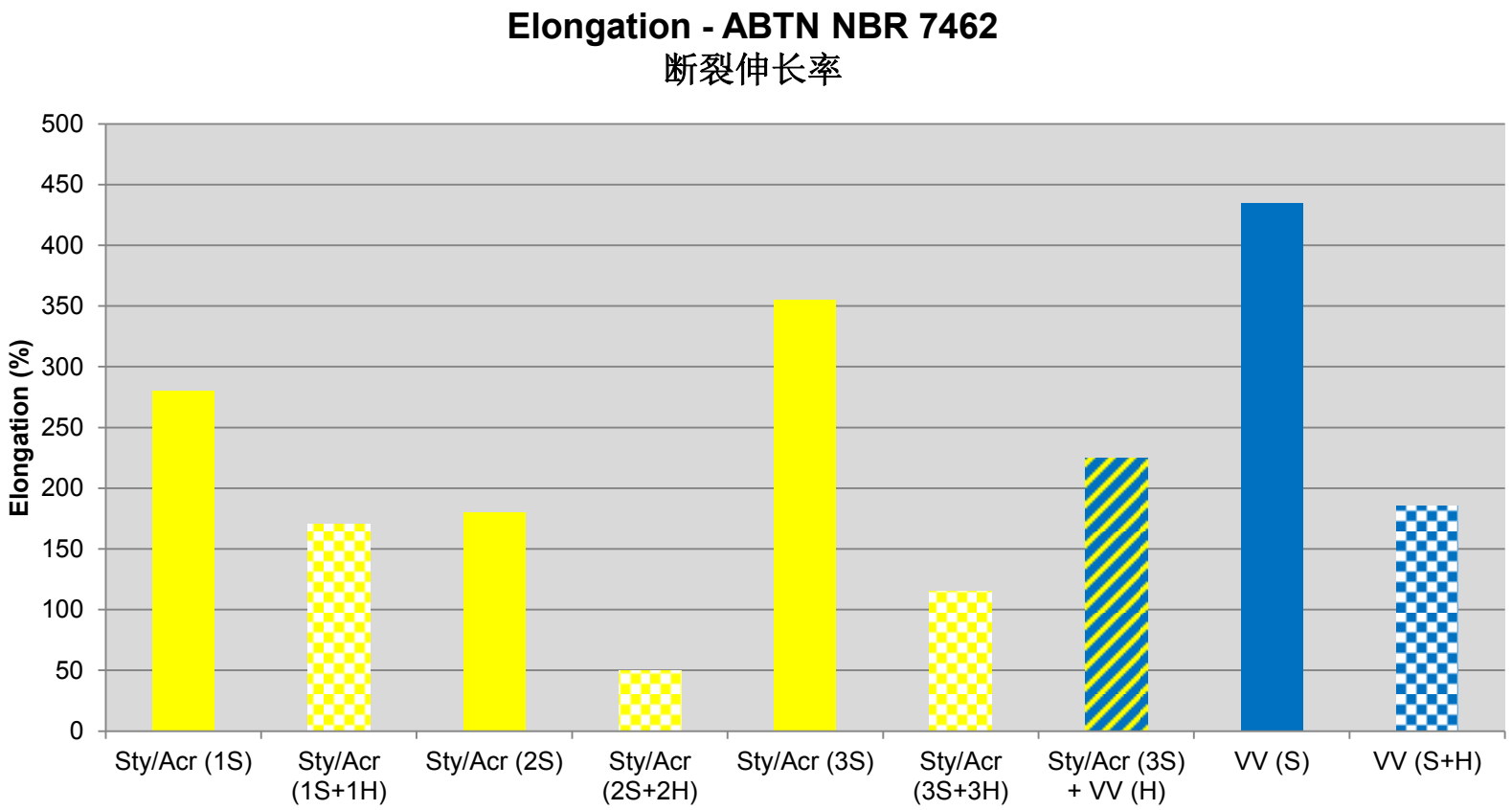


Dry paint thickness: 1 to 1.2 mm

Elastomeric coatings prepared with the soft VeoVa 10 monomer based latex show an excellent tensile strength.

基于叔碳酸乙烯酯单体的软乳液表现出优异的抗张强度

Elastomeric paints
弹性涂料



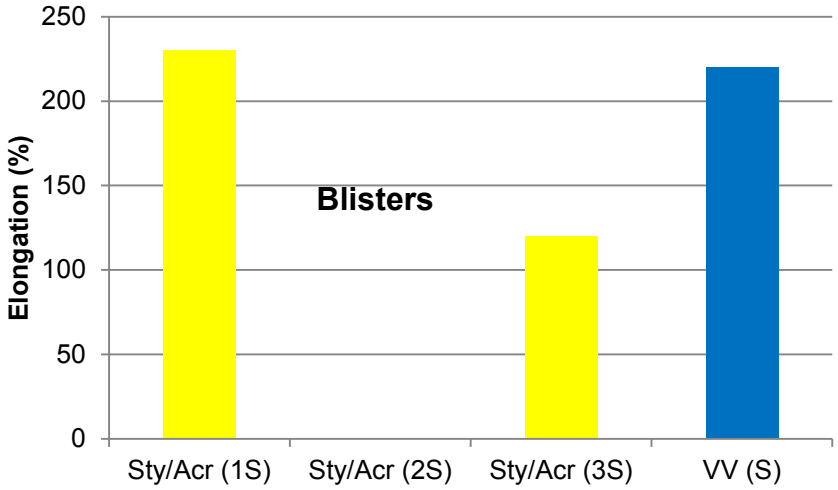
Elastomeric coatings prepared with soft VeoVa 10 monomer based latex shows an excellent elongation.

基于叔碳酸乙烯酯单体的软乳液表现出优异的断裂伸长率

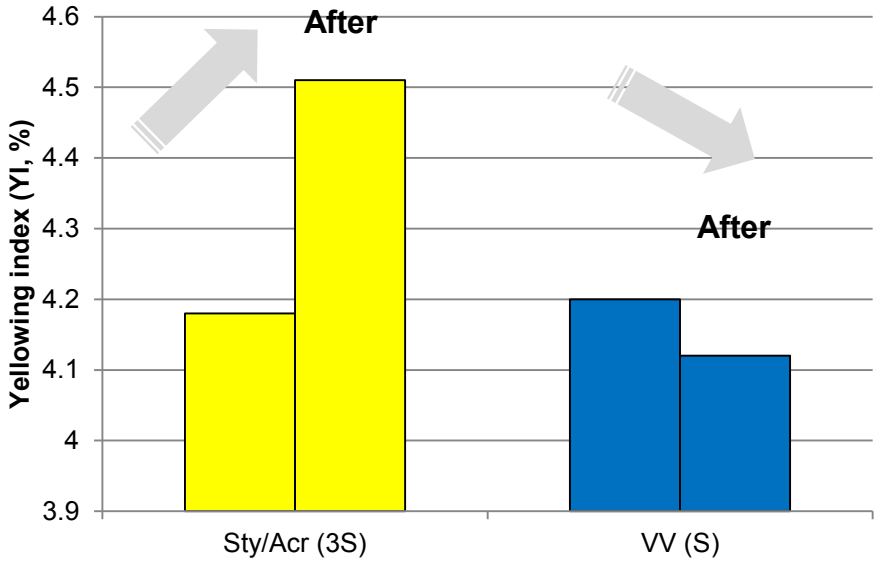
Elastomeric paints
弹性涂料

Test conditions for accelerated weathering test: cycles: 4 hours QUVA at 70°C and 4 hours at 60°C
加速老化测试条件：循环：4 hours QUVA at 70°C and 4 hours at 60°C

Elongation after 300 hours weathering (QUVA/Water) - ABTN NBR 7462
300小时老化后断裂伸长率



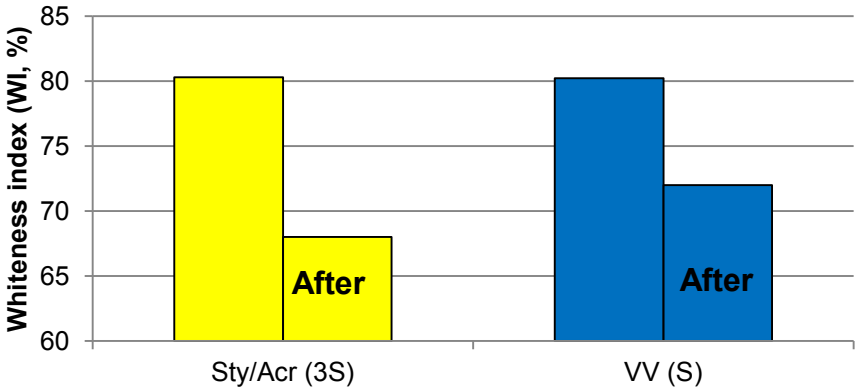
Color change after 300 hours weathering (QUVA/Water) Yellowing index
300小时后黄变指数



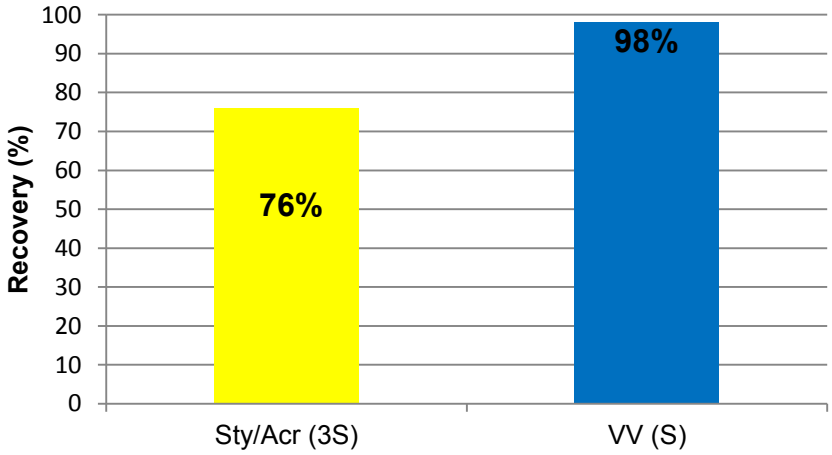
Elastomeric coatings prepared with the soft VeoVa 10 monomer based latex show excellent elongation and yellowing resistance after accelerated weathering test.
基于叔碳酸乙烯酯单体的软乳液在加速老化试验后表现出优异的断裂伸长率及耐黄变性

Elastomeric paints
弹性涂料

Color change after accelerated dirt pick-up (coal ash) Whiteness index
加速耐沾污（粉煤灰）后白度指数



Length recovery after 100% elongation
100%拉伸后回弹率



Dirt pick-up resistance test after exposure for 3 days in sunlight

Elastomeric coatings prepared with soft VeoVa monomer based polymers also show excellent dirt pick-up resistance and recovery after elongation.
基于叔碳酸乙烯酯单体软乳液的弹性涂料表现出优异的耐沾污性及回弹率

Exterior paints - elastomeric paints
外墙涂料 – 弹性涂料

Conclusions 结论

- VeoVa 10 monomer based latex gives an excellent overall performance.

基于叔碳酸乙烯酯单体的乳液总体性能优异

- Soft VeoVa 10 monomer based polymers has a good water resistance without the need to be mixed with hard resins.

基于叔碳酸乙烯酯单体的软乳液不需要同硬乳液混合即具有良好的耐水性

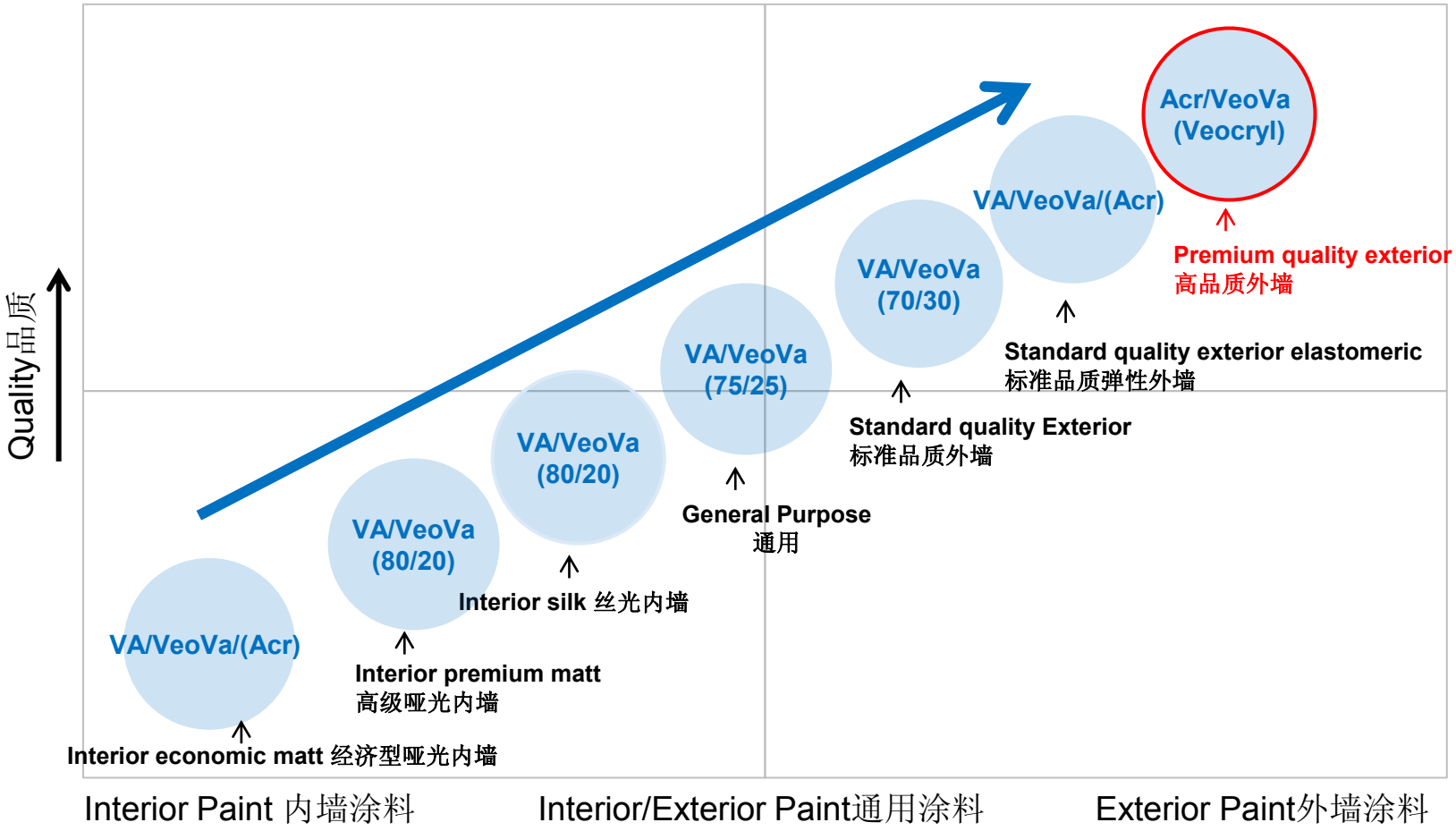
- Soft VeoVa 10 monomer based polymers has a good elastomeric performance.

基于叔碳酸乙烯酯单体的软乳液具有优异的弹性

- Hard VeoVa 10 monomer based polymers can be used to upgrade the performance of soft Sty/Acr systems.

基于叔碳酸乙烯酯单体的硬乳液可用于提高软苯丙乳液的性能

VeoVa monomer enables improved cost/performance latices for a wide range of paint applications
VeoVa单体可以提高用于多种建筑涂料乳液的性价比



VeoVa monomers enable performing VA based latices for multiple paint applications.
VeoVa单体 可以使醋酸乙烯乳液用于各种建筑涂料

Main requirements for premium exterior paints
高品质外墙涂料的主要要求

Requirement需求	**Property 性能**
Alkali resistance 耐碱	Early applicability on fresh concrete 新混凝土上的早期施工性 Alkali extractable 碱溶出 Efflorescence resistance 抗泛碱性
Hydrophobicity疏水	Early rain resistance 早期耐雨水 Color retention 保色 Rain mark resistance 耐雨痕 Scrub resistance 耐擦洗
UV resistance 耐紫外线	Yellowing resistance 耐黄变
Appearance 外观	Dirt pick-up resistance 耐沾污 Algae and fungi resistance耐霉菌 Hiding power遮盖力
Flexibility 柔韧性	Mud cracking resistance 抗龟裂性 Elongation 伸长率

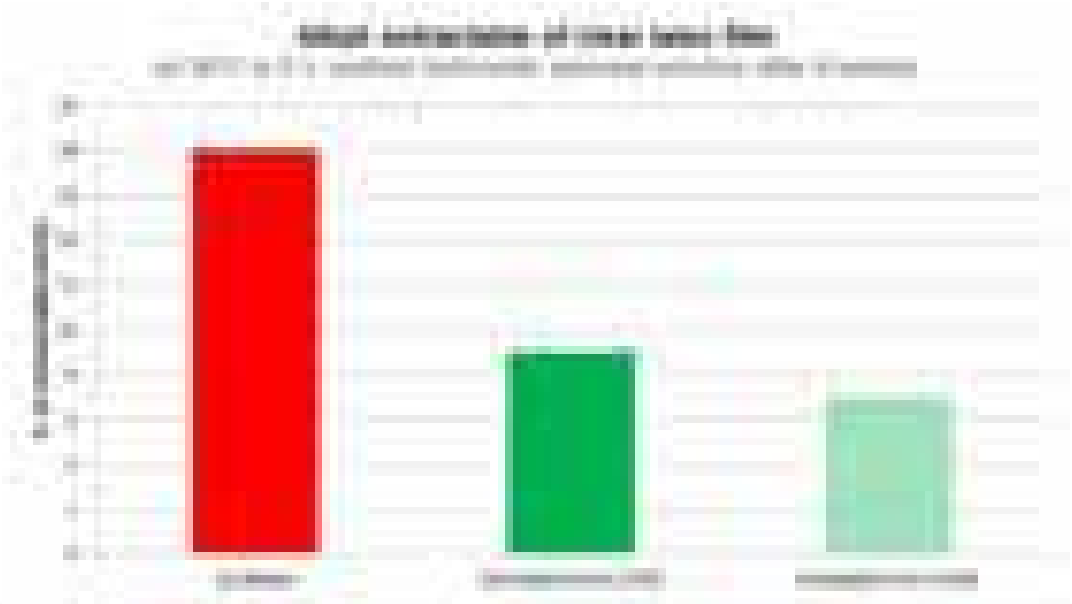
Most of these properties can be controlled by monomers and/or latex composition.
大部分性能可以通过乳液和/或单体组成来调控

Alkali resistance: the umbrella effect
耐碱性：雨伞效果

Monomer hydrophobicity
单体的疏水性

Monomer	Water solubility 20 ºC (g/100 ml)	Carbon/Oxygen (C/O) Ratio
Vinyl Neodecanoate (VV 10)	<0.001	6
Butyl acrylate (BA)	0.16	3.5
Methyl methacrylate	1.5	2.5

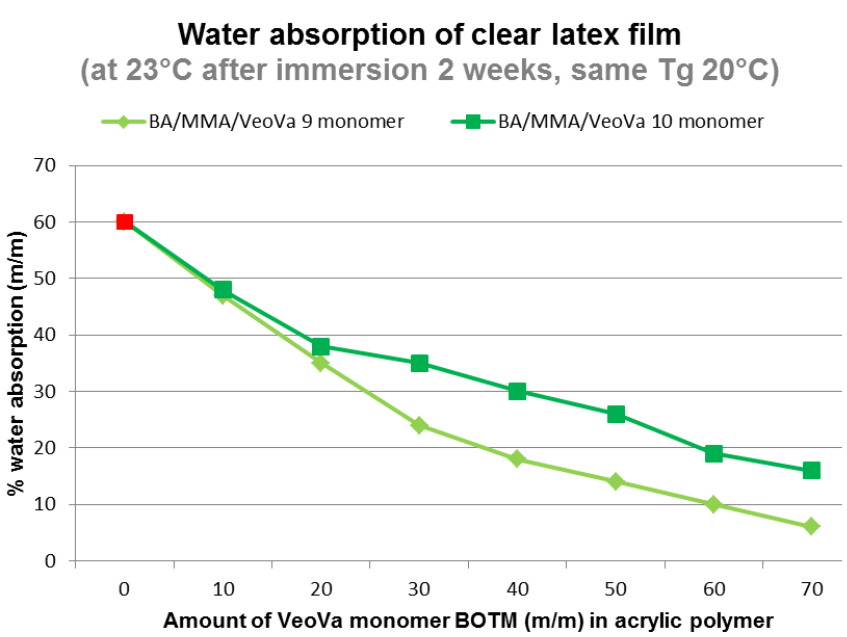
Alkali extractable of clear latex film
清漆膜的碱溶出率

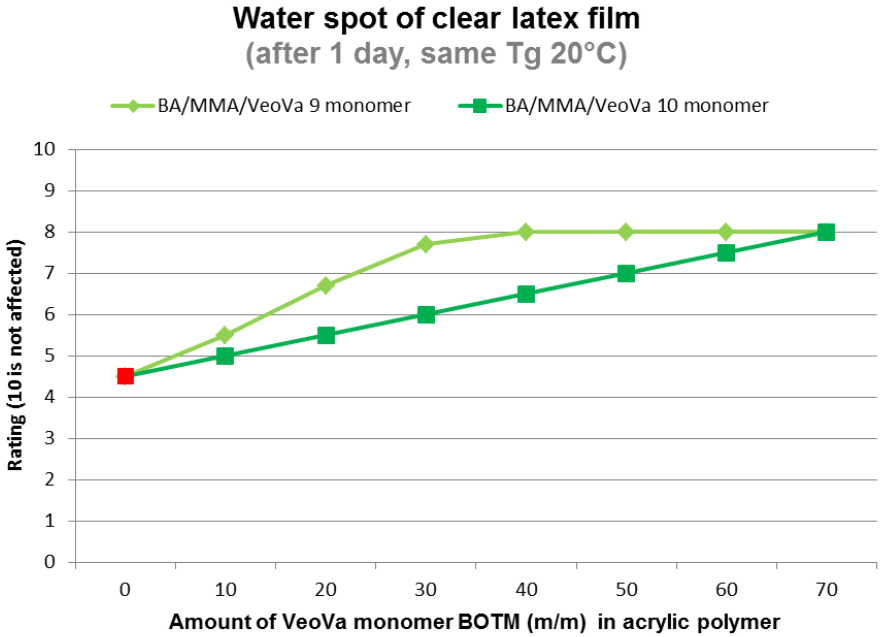


The Versatate groups protect its neighboring butyl acrylate groups from alkali hydrolysis.
叔碳酸基团保护相邻的丙烯酸丁酯基团不被碱水解

Water resistance of clear latex film
清漆膜的耐水性

Coating hydrophobicity 涂料的疏水性



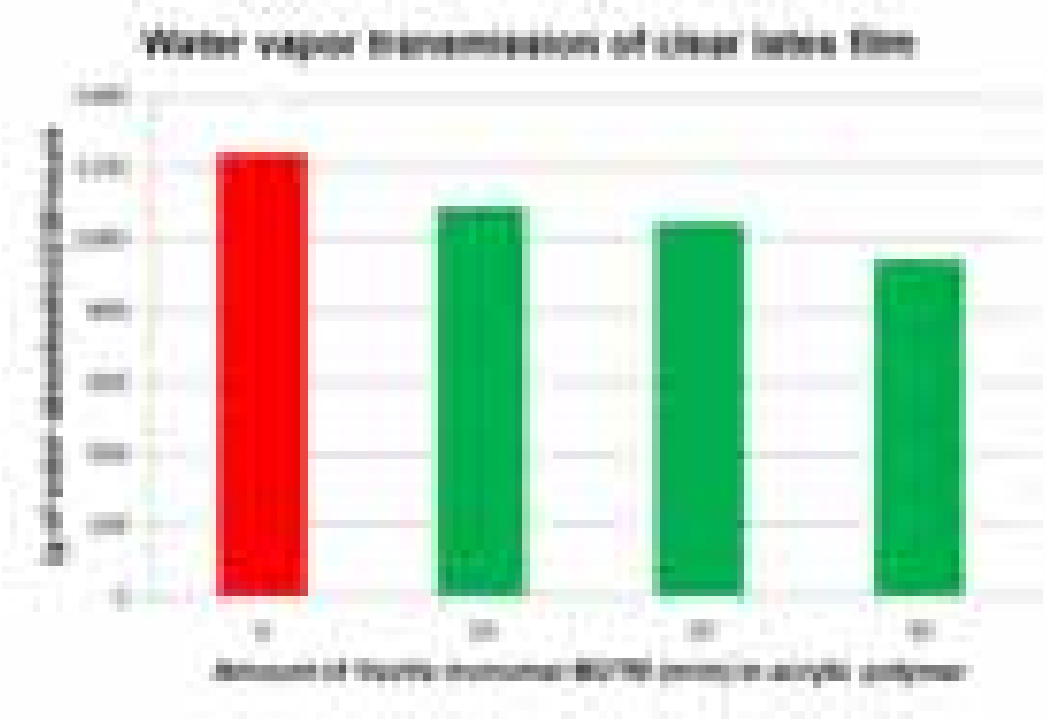


VeoVa 9 monomer based Veocryl is more water resistant than a VeoVa 10 based Veocryl as it contains less MMA at same polymer Tg

The VeoVa monomers improve water resistance of all-acrylic latices.
叔碳酸乙烯酯提高纯丙乳液的耐水性

Water vapor barrier of clear latex film
清漆膜的水汽阻隔性

Coating hydrophobicity 涂料的疏水性



The Veocryl has a higher water vapor barrier than an all-acrylic latex but still allows the substrate to breathe.
叔丙乳液比纯丙乳液更好的阻隔水汽但还是允许底材呼吸

Water whitening resistance of clear latex film
清漆膜的耐水白性

- Water whitening of the clear latex film after 7 days immersion*
  清漆膜浸水7天的水白程度

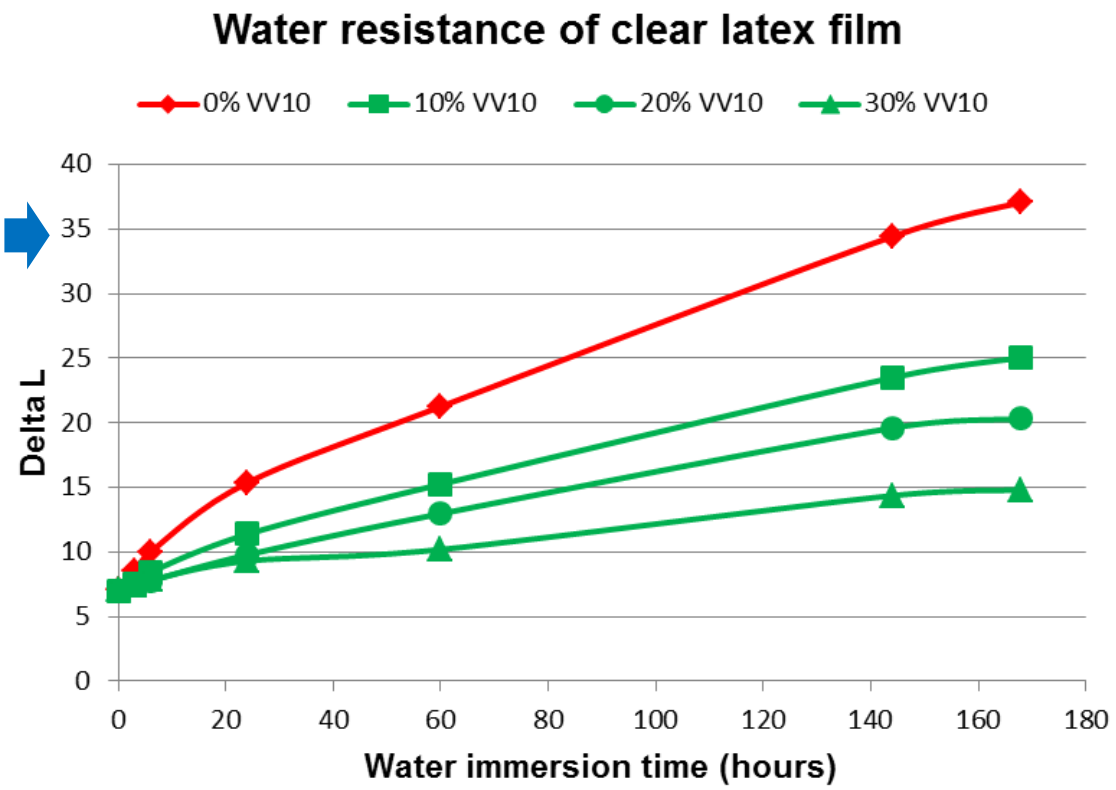
* The latex film has been dried 7 days at room temperature before immersion

The Veocryl based coating has an outstanding water whitening resistance compared to styrene/acrylic and all-acrylic coatings.
叔丙乳液制备的涂料同纯丙和苯丙乳液相比具有更出色的耐水白性

Water whitening resistance of clear latex film
清漆膜的耐水白性

Factors influencing the water whitening resistance of a clear latex film:
影响清漆膜耐水白性的因素：

- Monomers composition (Tg)
- Monomers type
  - **Hydrophobicity** 疏水单体
  - Specialty monomers
- Surfactant type
- Drying conditions (T° & time)

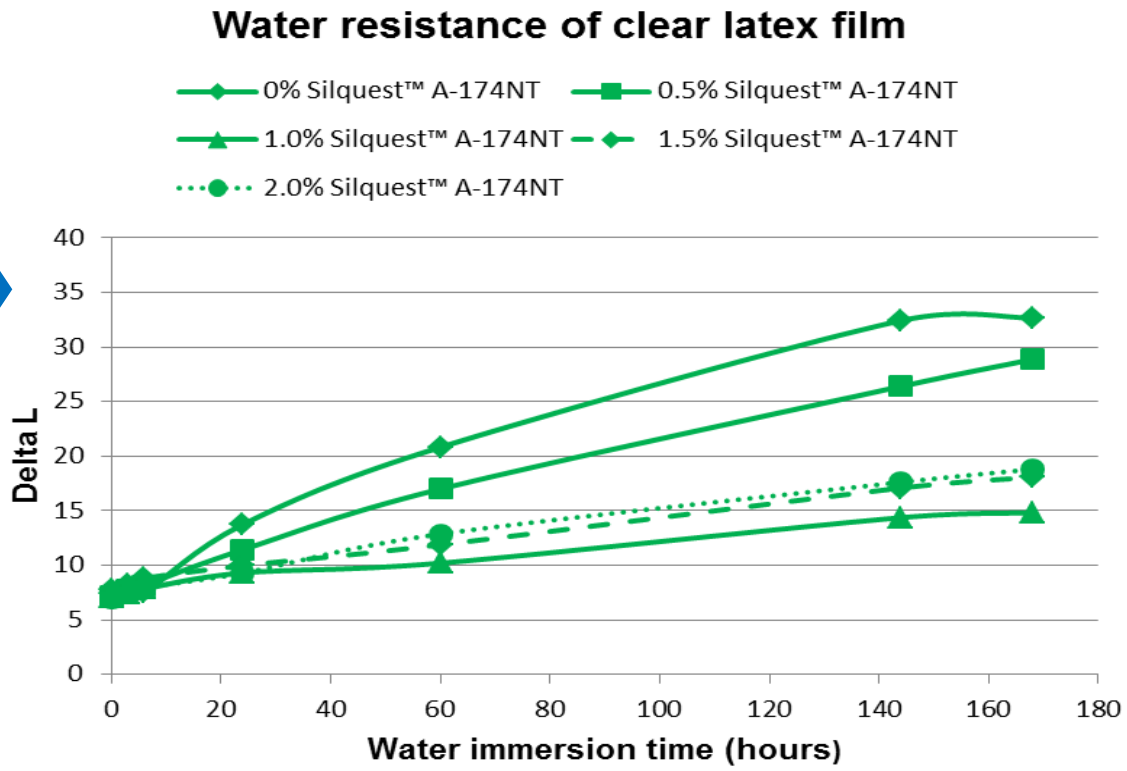


VeoVa monomer based binder can be designed to formulate high water whitening resistant coatings.
基于叔碳酸乙烯酯单体的乳液可以被设计成用于耐水白的涂料

Water whitening resistance of clear latex film
清漆膜的耐水白性

Factors influencing the water whitening resistance of a clear latex film:
影响清漆膜耐水白性的因素：

- Monomers composition (Tg)
- Monomers type
  - Hydrophobicity
  - **Specialty monomers**
- Surfactant type
- Drying conditions (T° & time)

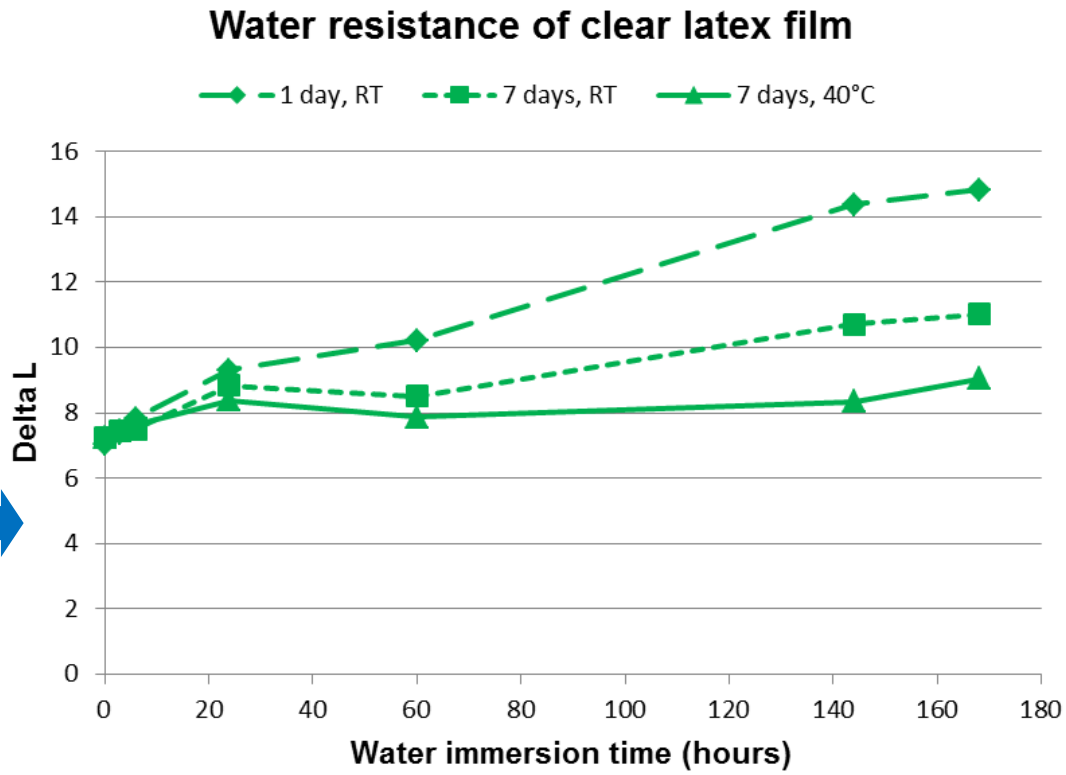


Veocryl binder can be designed to formulate high water whitening resistant coatings.
叔丙乳液可以被设计成用于耐水白的涂料

Water whitening resistance of clear latex film
清漆膜的耐水白性

Factors influencing the water whitening resistance of a clear latex film:
影响清漆膜耐水白性的因素：

- Monomers composition (Tg)
- Monomers type
  - Hydrophobicity
  - Specialty monomers
- Surfactant type
- **Drying conditions (T° & time)**



Veocryl binder can be designed to formulate high water whitening resistant coatings.
叔丙乳液可以被设计成用于耐水白的涂料

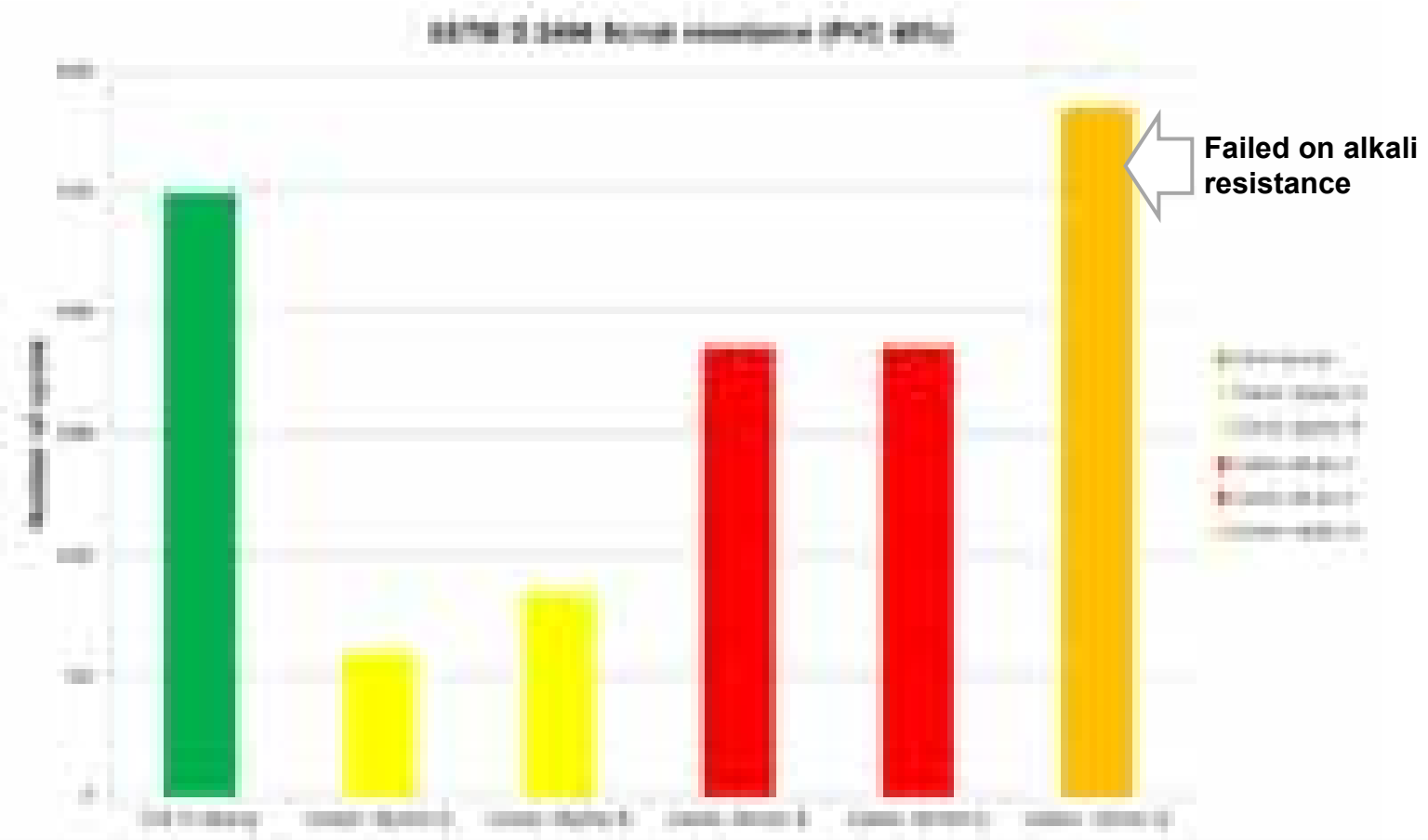
Exterior paint hydrophobicity – water repellent property
外墙涂料的疏水性 – 憎水效果

All-acrylic paint 纯丙涂料

Veocryl paint 叔丙涂料

The VeoVa 10 monomer based binder is demonstrating its outstanding water repellent property.
基于叔碳酸乙烯酯单体的乳液表现出优异的憎水性

Exterior paint hydrophobicity - scrub resistance
外墙涂料疏水性 – 耐擦洗



The VeoVa monomer based latices are scoring high in terms of scrub resistance in architectural exterior paints.
基于叔碳酸乙烯酯单体的乳液在外墙涂料中具有很高的耐擦洗性能

Dirt pick-up benchmark study in natural outdoor exposure Mumbai, India 户外自然暴晒耐沾污性-孟买，印度

Test performed by 3rd party:

Institute of Chemicals Technology (University) Mumbai, India

(12 October 2012 exposure start)

Substrate:

Cement based panels: Eternit Elflex NT (asbestos-free panels)

White paints:

Primer (paint diluted with 1/3 water), Number of coats: 2, One side covered

Testing:

Monthly during 2 years, ongoing exposure, panels at 45° facing South

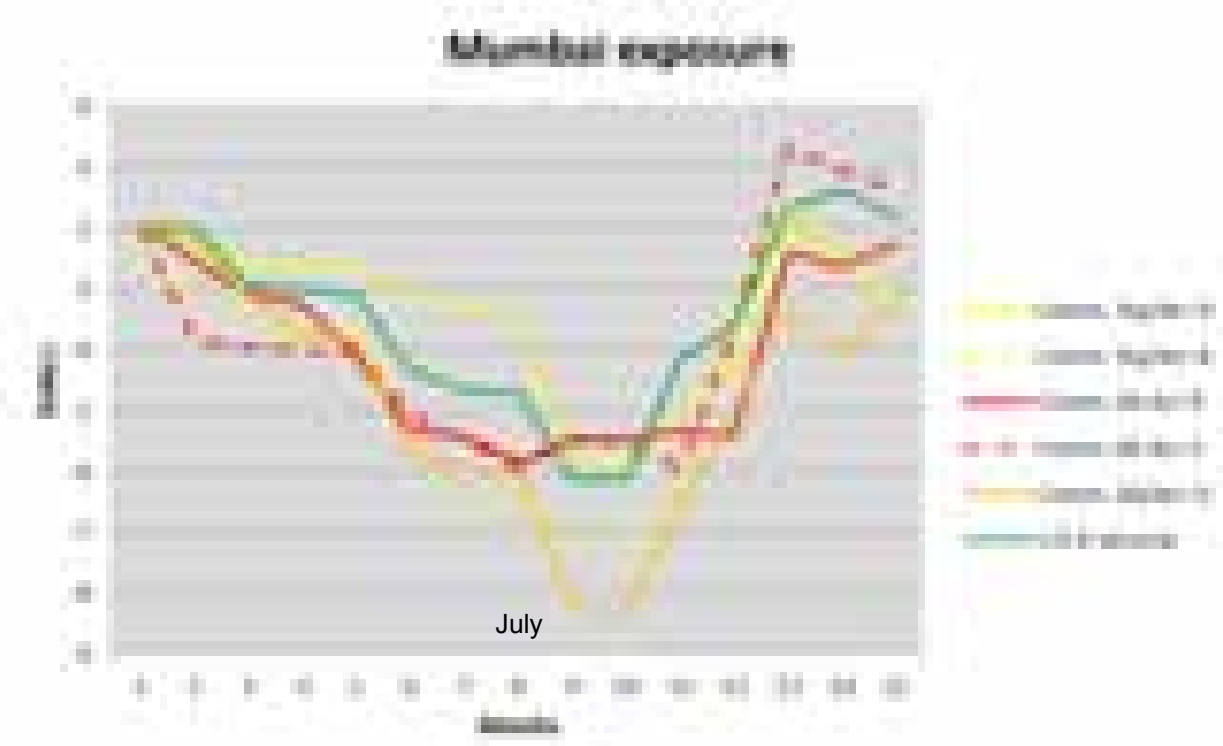
Analyses:

WI & YI, L, a, b

APAC Locations

Exterior paint dirt pick-up resistance: Outdoor Mumbai exposure - Results after 15 months
户外自然暴晒耐沾污性-孟买，印度- 15个月

Veocryl latex versus commercial latex benchmarks

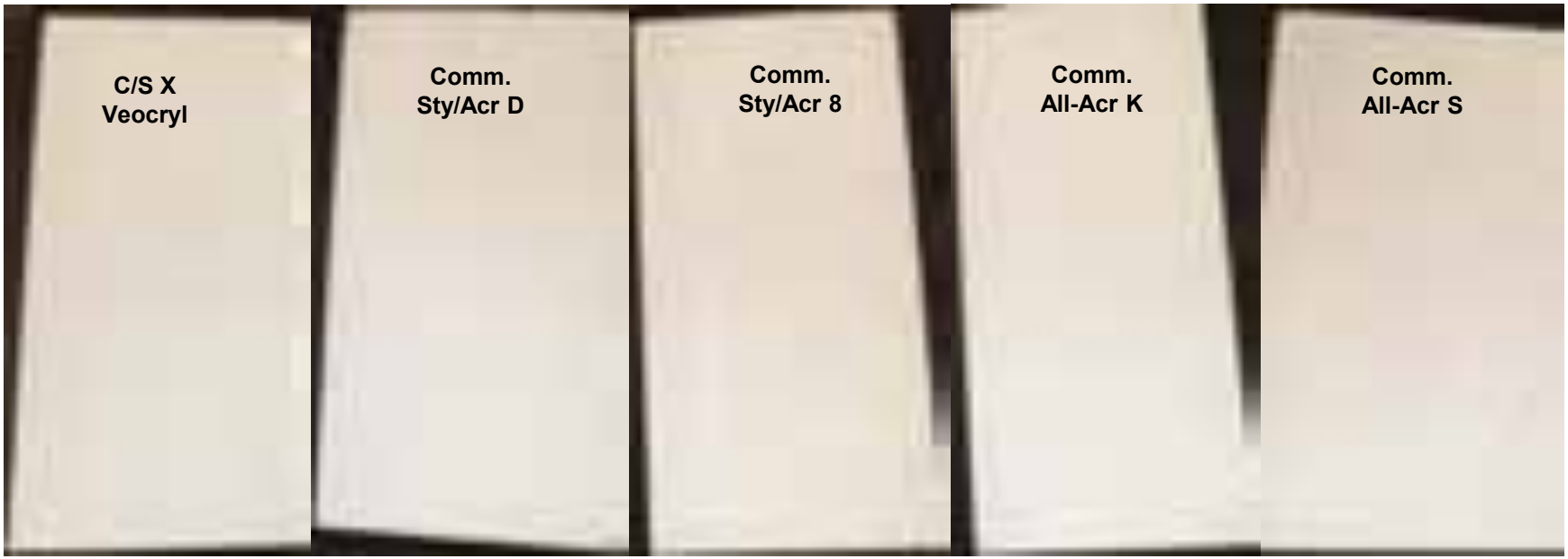


Visual difference is observed for values difference of more than 2 units

After 15 months: the Veocryl latex is demonstrating at least similar performance than all-acrylic international high quality latex benchmarks.
15个月的曝晒结果表明叔丙乳液同国际化的高品质纯丙乳液具有相近的性能

Exterior paint dirt pick-up resistance: Outdoor Mumbai exposure - Results after 15 months
户外自然暴晒耐沾污性-孟买，印度- 15个月

Veocryl latex versus commercial latex benchmarks



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Dirt pick-up benchmark study in natural outdoor exposure Manila, Philippines户外自然暴晒耐沾污性- 马尼拉，菲律宾

Test performed by 3rd party :
Paint company
Manila, Philippines
(14 September 2012 exposure start)

Substrate:
Cement based panels: Eternit Elflex NT
(asbestos-free panels)

White paints:
Primer (paint diluted with 1/3 water), Number of coats: 2, One side covered , duplo panels

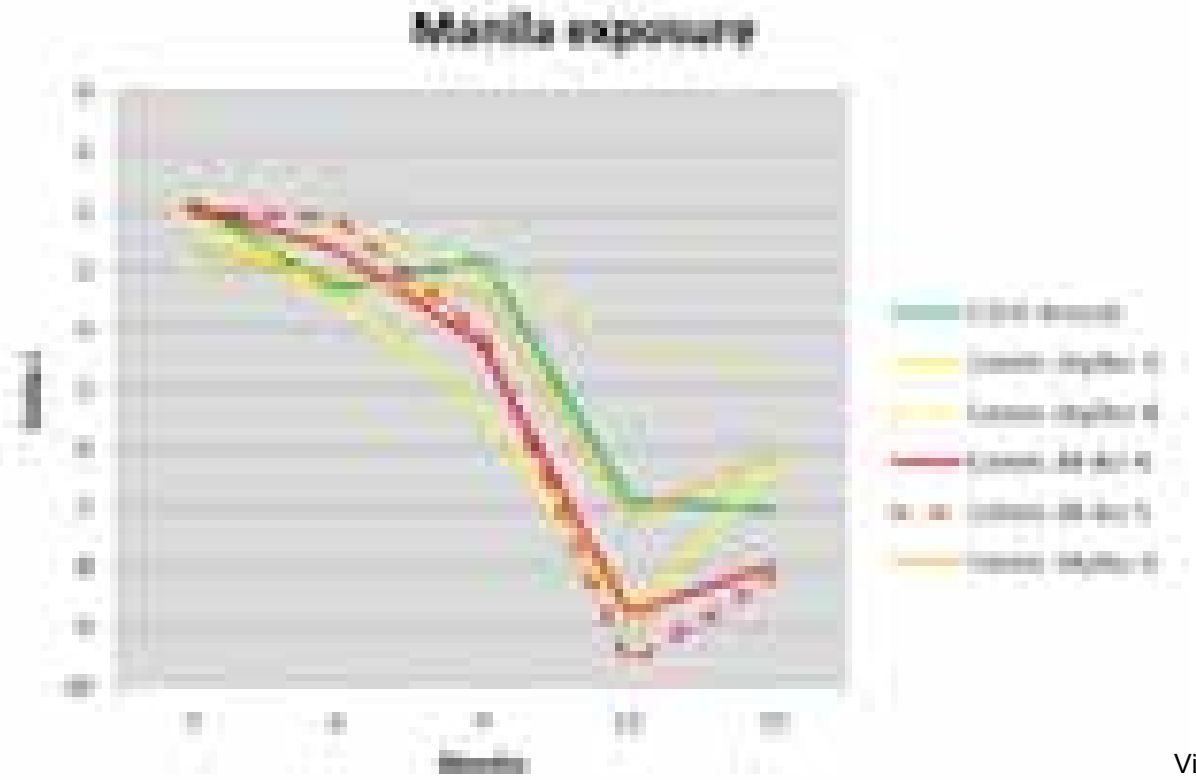
Testing:
Every 3 months during 2 years, ongoing exposure, panels at 45° facing South

Analyses:
WI & YI, L, a, b

APAC Locations

Exterior paint dirt pick-up resistance: Outdoor Manila exposure - Results after 15 months
户外自然暴晒耐沾污性马尼拉- 15个月

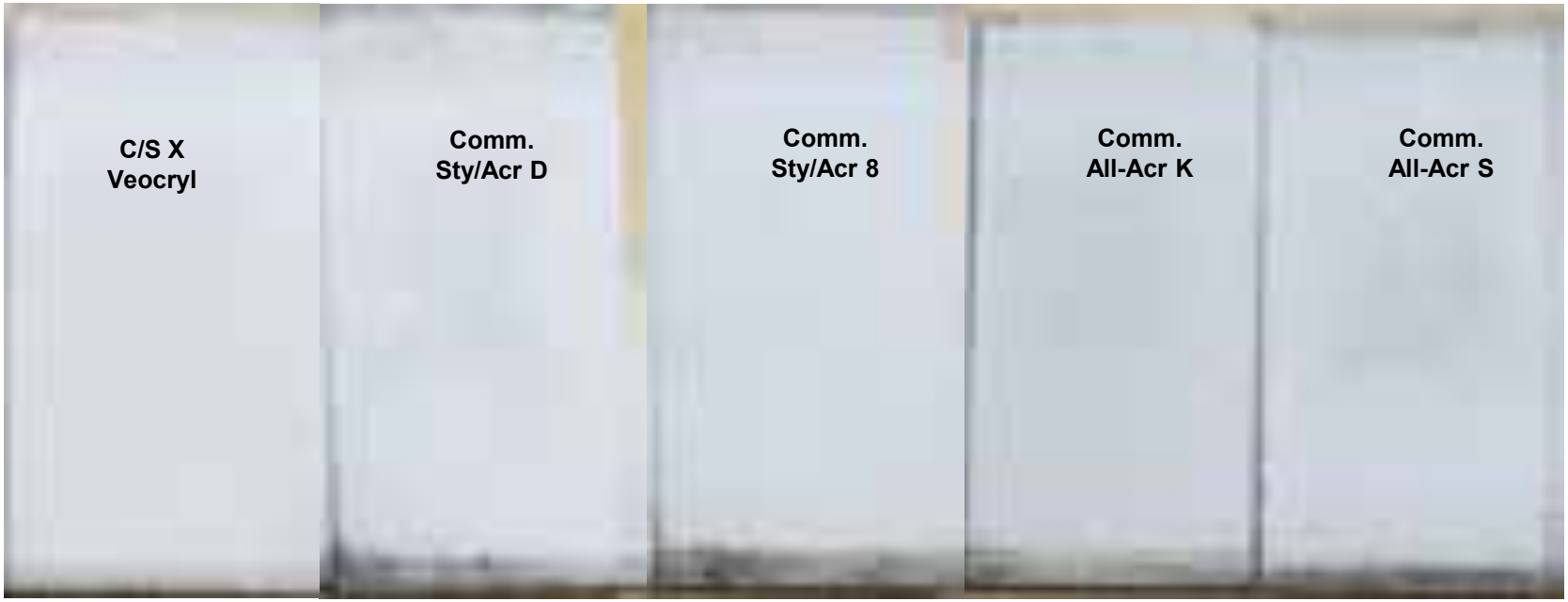
Veocryl latex versus commercial latex benchmarks



Visual difference is observed for values difference of more than 2 units

After 15 months: the Veocryl latex is demonstrating at least similar performance than international high quality latex benchmarks.
15个月的曝晒结果表明叔丙乳液同国际化的高品质乳液具有相近的性能

Exterior paint dirt pick-up resistance:
Outdoor Manila exposure - Results after 15 months
户外自然暴晒耐沾污性马尼拉- 15个月

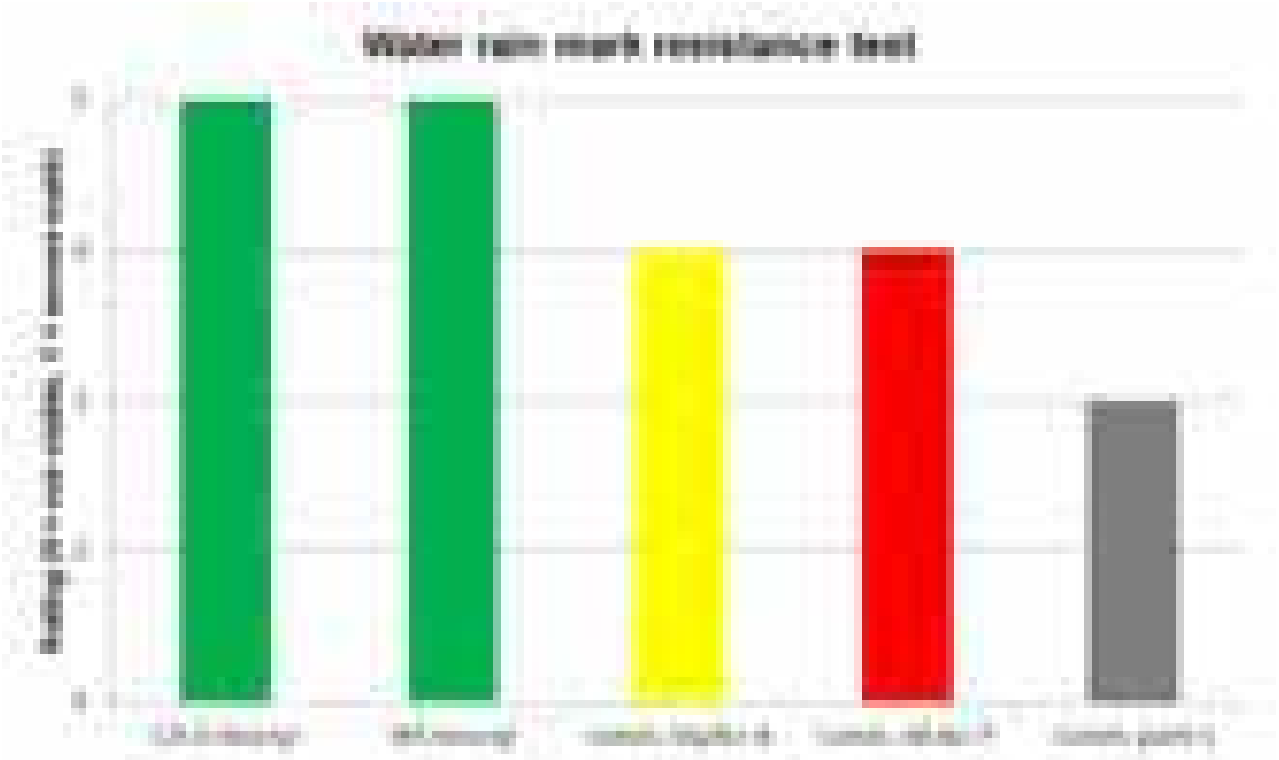


Visual difference is observed for values difference of more than 2 units

After 15 months: the Veocryl latex is demonstrating at least similar performance than international high quality latex benchmarks.
15个月的曝晒结果表明叔丙乳液同国际化的高品质乳液具有相近的性能

Exterior paints rain mark resistance
外墙涂料耐雨痕

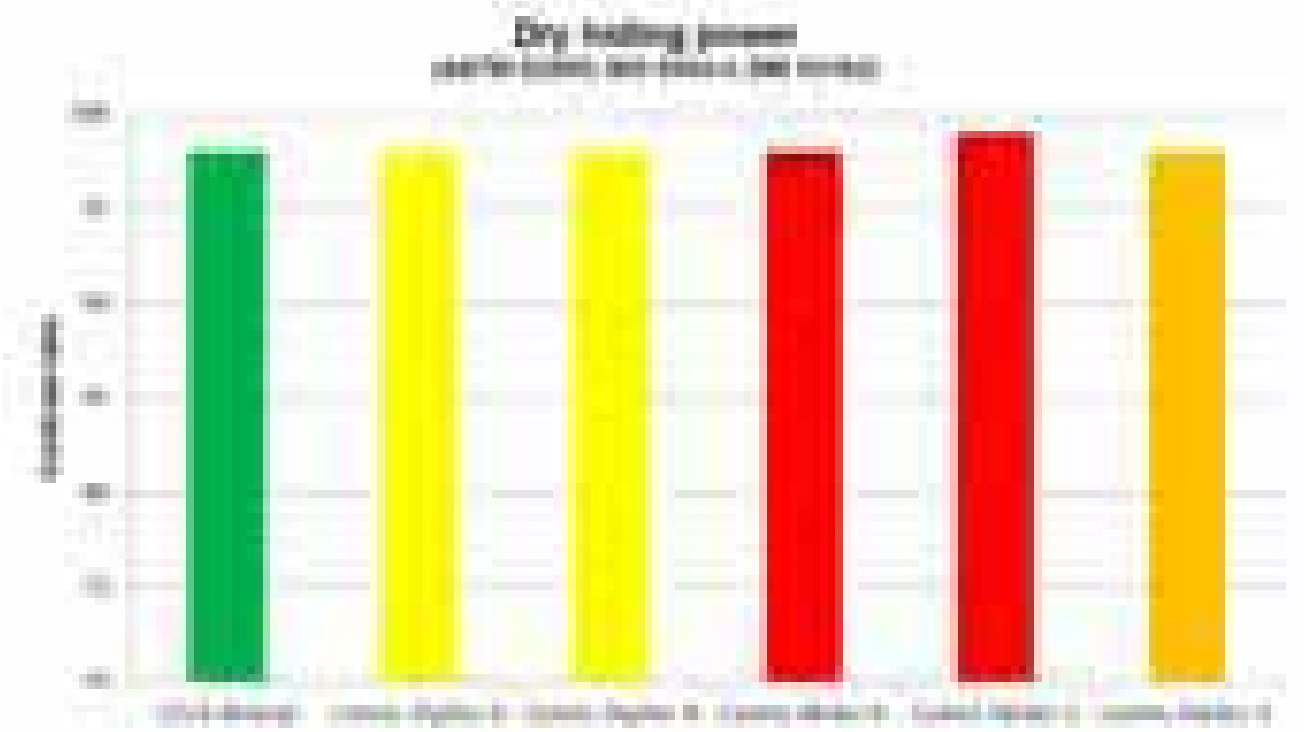
Veocryl latex versus commercial latex and paint benchmarks



The Veocryl latex is performing better than commercial international all-acrylic latices and paint benchmarks.
叔丙乳液优于市售的国际品质的纯丙乳液和涂料

Exterior paints hiding power
外墙涂料的遮盖力

VA/VeoVa 10 monomer (70/30) latex versus commercial latex benchmarks



Visual difference is observed for values difference of 3-5 units

The Veocryl is performing similarly than international commercial high quality latex benchmarks.
叔丙乳液同其他高品质国际性的市售乳液相似

Exterior paints – premium quality
外墙涂料 – 高品质

Conclusions 结论

- VeoVa 10 monomer enables acrylic binders to reach improved performance.
  叔碳酸乙烯酯单体可以提高纯丙乳液的性能

- The Veocryl latex demonstrates an excellent alkali resistance, UV resistance, water resistance and color retention which are important factors for the weatherability resistance of the coating.

叔丙乳液表现出优异的耐碱性，耐紫外光性，耐水性和保色性，这些性能是涂料耐候的重要因素

Conclusions
结论

Overall Conclusions
综述

The VeoVa 10 monomer based binders can be used in exterior architectural paint formulations to meet the specific regional requirements at competitive cost levels.
基于叔碳酸乙烯酯单体的乳液可以用于外墙建筑涂料配方以满足特定区域的需求并具有成本竞争力

Our regional Technical Service Teams are committed to help you to develop a VeoVa binder which will meet your requirements.
我们的技术服务团队致力于帮助您开发基于叔碳酸乙烯酯单体的乳液以满足您的需求

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