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NEXT GEN MULTI-FUNCTIONAL ADDITIVES FOR DURABLE COATING APPLICATIONS

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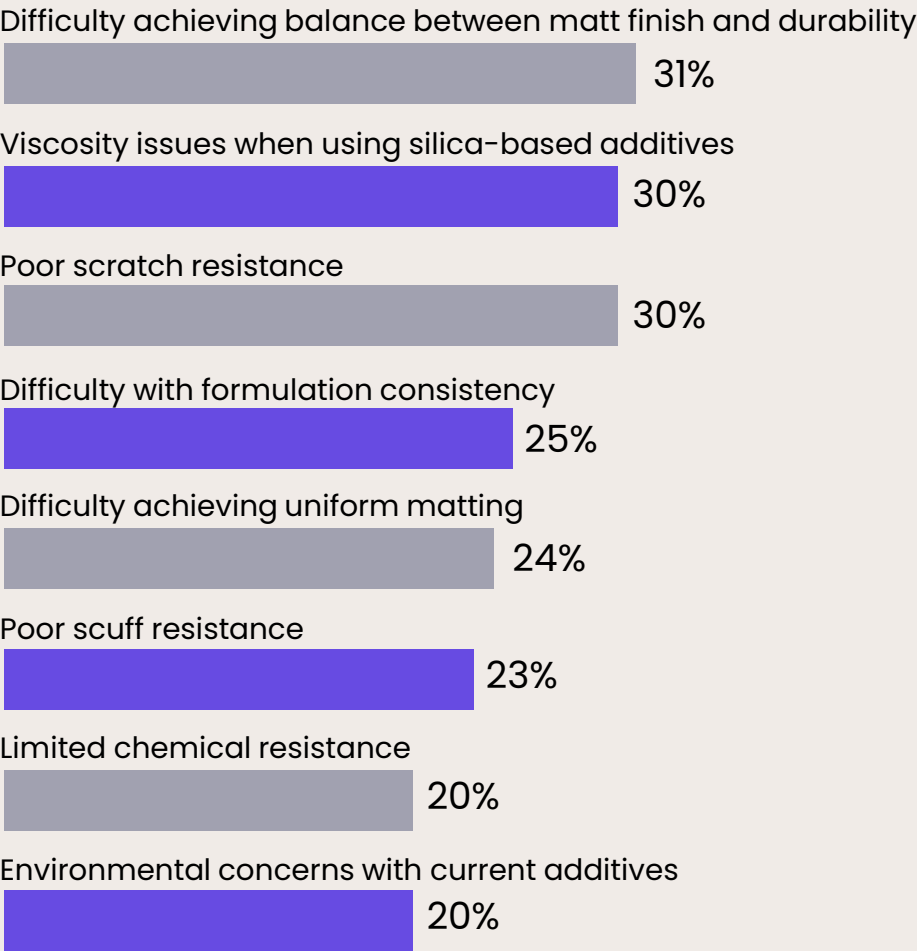
WHAT ARE THE TOP THREE CHALLENGES YOU FACE WITH YOUR CURRENT ADDITIVES?

- Difficulty achieving uniform matting
- Viscosity issues when using silica-based additives
- Poor scratch resistance
- Poor scuff resistance
- Difficulty achieving balance between matte finish and durability
- Limited chemical resistance
- Difficulty with formulation consistency
- Environmental concerns with current additives

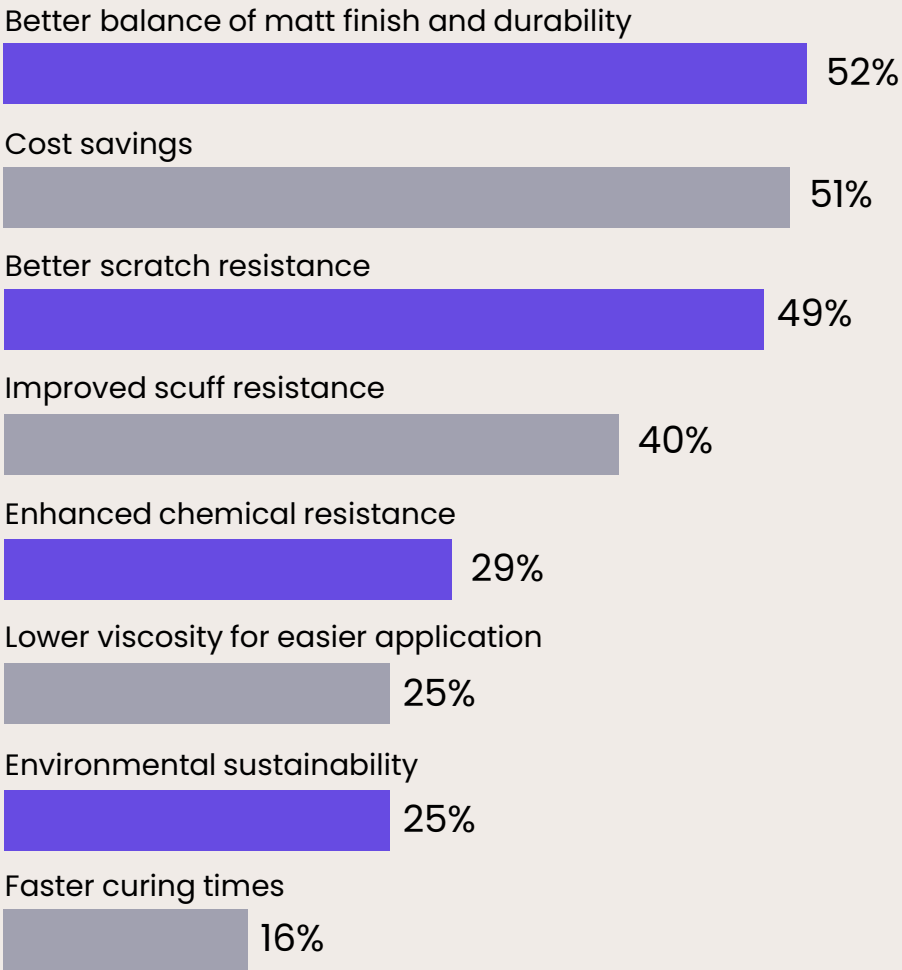


FINDINGS FROM A RECENT SURVEY

Challenges Faced With Current Additives



Expected Benefits From the New Additive



NEW MULTI-FUNCTIONAL ADDITIVES (MFAS) PROVIDE SIGNIFICANT IMPROVEMENT OVER SILICA BASED MATTING AGENTS

- A novel polyethylene-based micronized multifunctional matting agent additive
- Preference for matte finish in the furniture and decorative segments is growing at accelerated pace globally
- Consumers also require longevity and durability
- Silica based matting agents make paints susceptible to mar, rub, burnish and scratch, negatively impacting longevity and durability
- MFAs provide 2-3 times better surface property performance and better matting efficiency at same dosage levels
 - 3 different products covering wide range of functional attributes in fine white Micronized Powder form



MFAS PROVIDE SIGNIFICANT IMPROVEMENT OVER SILICA-BASED MATTING AGENTS



In Paint
Manufacturing

- Ease of dispersion, even the ability to post add
- Less dust generation
- Less viscosity build



In Use

- Efficient and more durable Gloss Reduction
- Improved surface properties: Mar, Abrasion, Rub, Color Transfer, Scratch & Burnish
- Improved Stain Resistance



In Storage

- Better anti-settling & shelf stability

Performance Benefits Throughout the Paint Life Cycle

APPEARANCE AND GLOSS



The coating film has initial gloss – Matting Agents will reduce that gloss to desired level

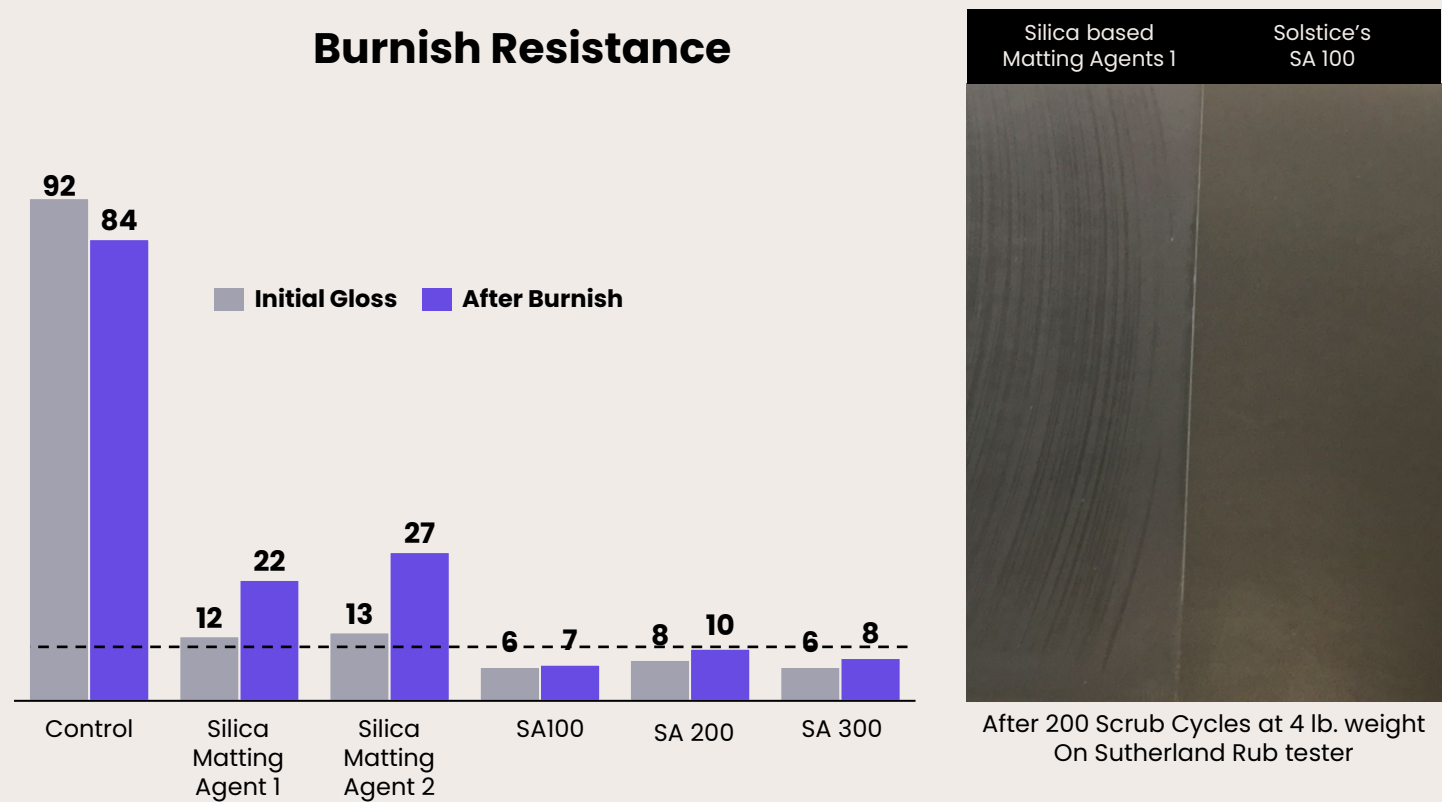
3 NEW MATTING AGENT PRODUCTS COVER A WIDE RANGE OF FUNCTIONAL ATTRIBUTES

	Incorporation Flexibility	Dispersion Ease		Dust Generation	Foaming	Friability	Maintain Viscosity	Matting Efficiency	Burnish Resistance	Scrub Resistance	Rub/Mar Resistance	Storage Stability
		Water-borne	Solvent-borne									
SA100	++	+	++	+	+	++	++	=	+	+	+	+
SA200	++	+	++	+	+	++	++	=	++	++	++	+
SA300	++	++	+	+	+	++	++	=	++	++	++	+

- = is equal to silica
- + slightly better than silica
- ++ significantly better than silica
- *All data based on Solstice and partner’s internal analysis

ADVANTAGES OF MFA OVER SILICA

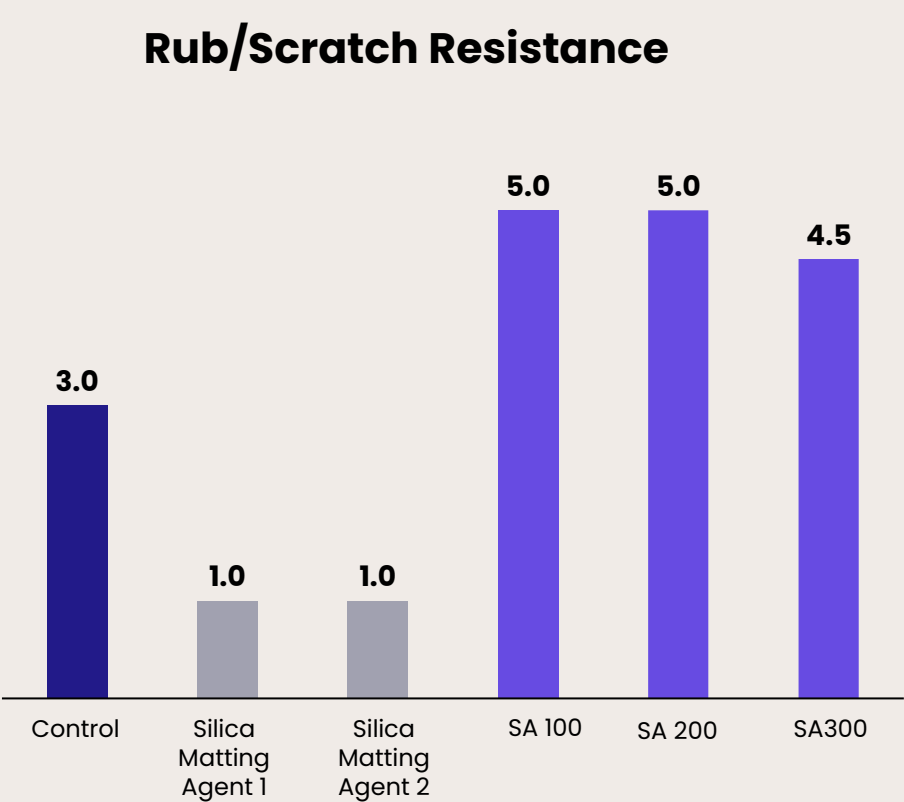
Burnish Resistance



- 1. Gloss readings are at 85° Gloss Angle
- 2. --- 85° Gloss reading of fully matted coating

*Results shown here are for water-based clear acrylics with all Matting Agents post added at 5% w/w

Rub/Scratch Resistance



- 1. Rating on the scale of 1 to 5 where 5 represents no visible damage and 1 represents high level of surface damage after Sutherland Rub test.

HOW DOES MFA HELP SURFACE PROPERTIES?



Low Oil Absorption:

Less binder demand to wet out particles, frees up binder to form a more superior paint film



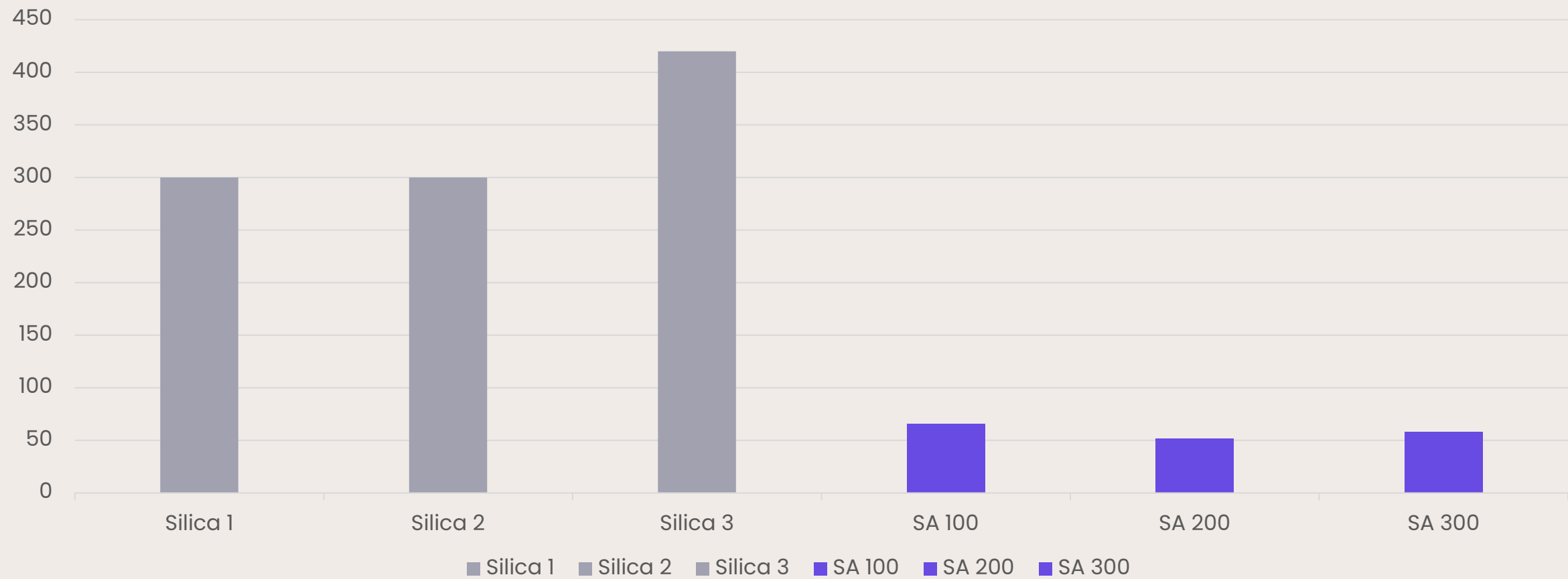
MFA particles are **not fracturable and friable**, maintaining surface performance and gloss



Polyethylene based particles lower the COF of the substrate, **lowering surface damage**

Three major advantages over silica!

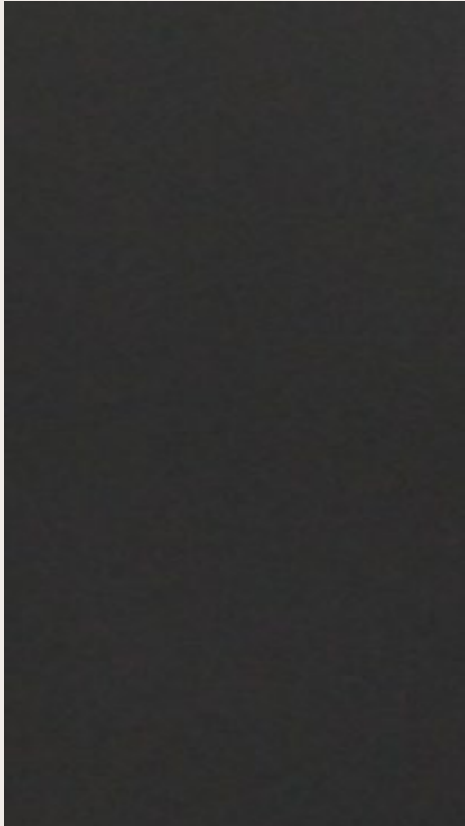
OIL ABSORPTION



MFA absorbs less oil and hence improves coating efficiency

CLARITY (GRAY SCALE)

**Matted using
MFSA**



L* Gray Scale Measurement = 28.4

**Matted using
Synthetic Silicas**



L* Gray Scale Measurement = 42.3

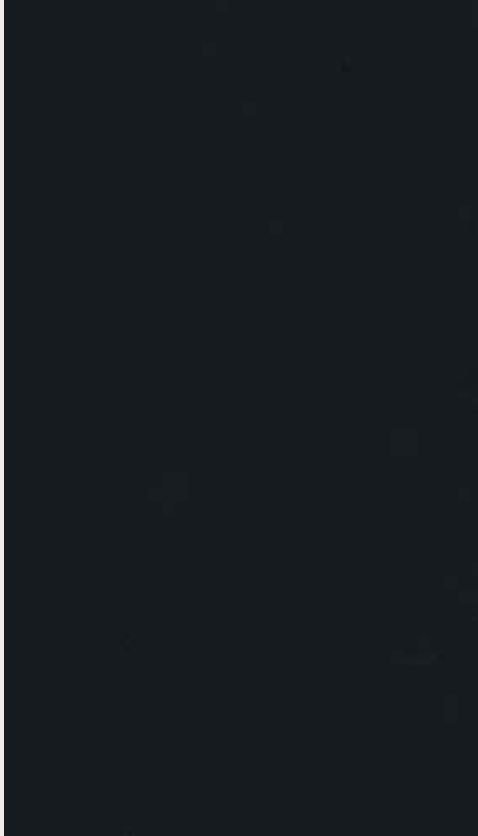
Test Conditions: Clear coating is drawdown on a black background and then the Gray Scale is measured on a Spectrophotometer

Test Coating: Clear Aqueous Acrylic Coating

MFSA has higher clarity in clear coatings than silicas

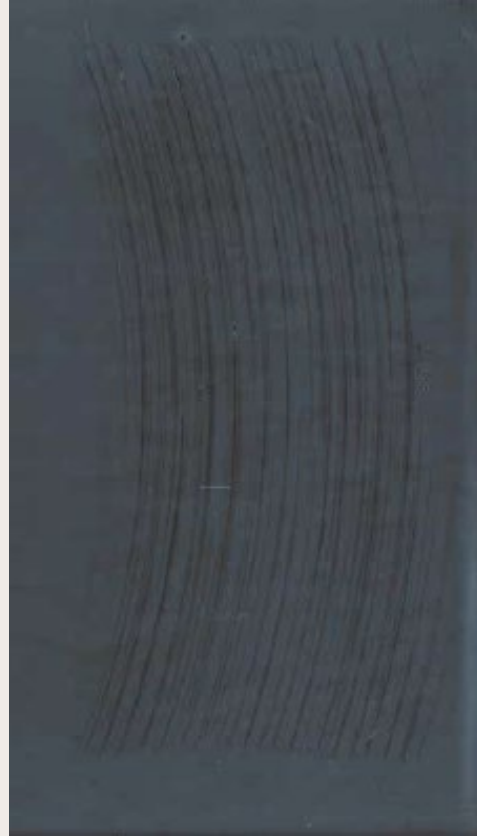
RUB/MAR RESISTANCE

**Matted using
MFSA**



Visual Rub Rating = 5

**Matted using
Synthetic Silicas**



Visual Rub Rating = 1

Test Conditions: Sutherland Rub Tester, 200
Cycles with an additional 4lb weight
Note: Rub Resistance Scale: Visual Rating 1 – 5
(1 = Worst, 5 = Best)

Test Coating: Clear Aqueous Acrylic Coating

More Mar & Abrasion Resistance in Clear, Aqueous Acrylic Coatings

BURNISH RESISTANCE

**Matted using
MFSA**



85° Gloss Increase: ~ 1 unit (10% Inc)

**Matted using
Synthetic Silicas**



85° Gloss Increase: ~ 14 units (100% Inc)

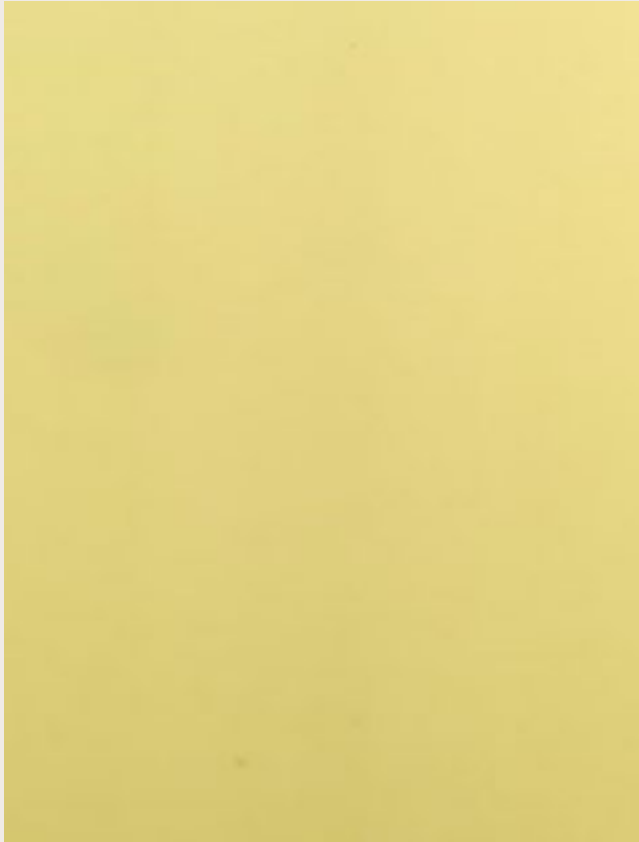
Test Conditions: BYK Gardner Abrasion/Scrub Tester,
Cheese Cloth Pad, 500 Cycles

Test Coating: Clear Aqueous Acrylic Coating

More Burnish Resistance in Clear, Aqueous Acrylic Coatings

BURNISH RESISTANCE

**Matted using
MFSA**



85° Gloss Increase: < 3 units

**Matted using
Synthetic Silicas**



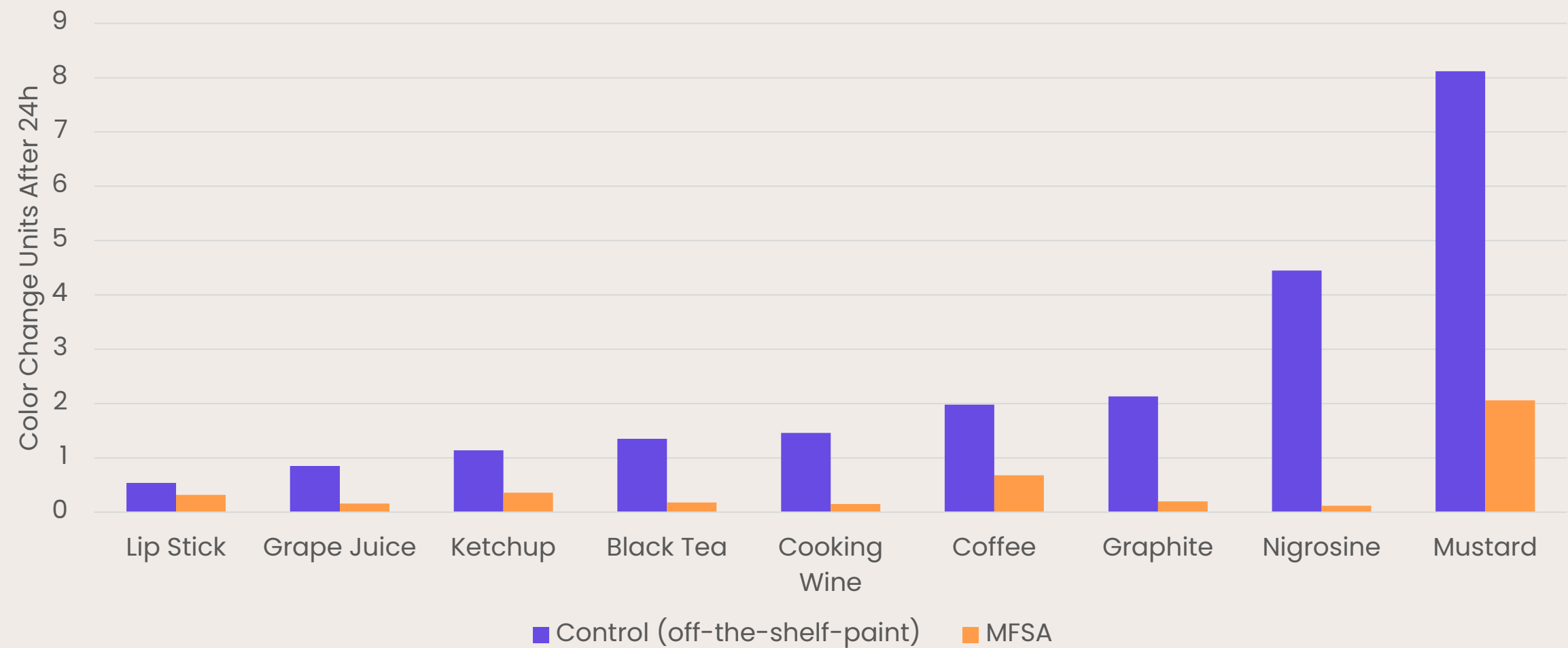
85° Gloss Increase: ~ 15 units

MPI Test Conditions: BYK Gardner
Abrasion/Scrub Tester,
Rayon Cloth Pad, 250 Cycles w an additional
500 grams of weight added to the sled

Test Coating: Aqueous, Pigmented
Architectural Coating

More Burnish Resistance in Pigmented Architectural Coatings

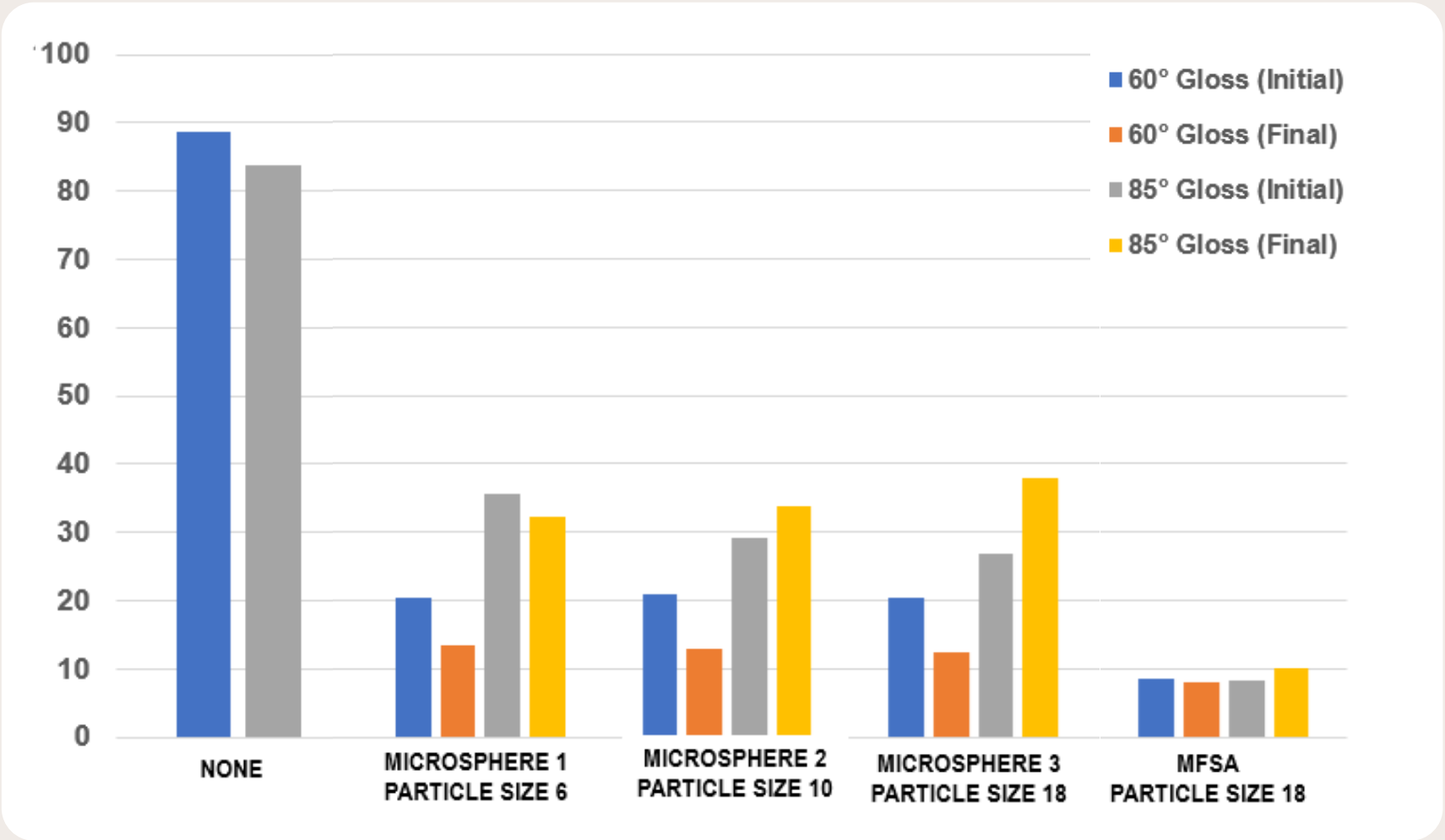
MFSA – STAIN RESISTANCE



MFSA resists the staining of even off-the-shelf paints

MFSA – STAIN RESISTANCE

Gloss Reduction Efficiency – Architectural Coating



MFSA – OTHER R&D ACTIVITIES

- Exterior Weathering Panels
- uV Coatings Evaluations
- Other competitive Matting Agent Evaluations

BENEFITS OF MFSA OVER SILICAS

Silica Based Matting Agents

- Efficient matting

- Burnishing (defined as the undesirable increase in gloss after rubbing)
- Poor Mar and Scratch Resistance
- Poor surface slip and feel
- Loss of efficiency with “aging in can”
- Tendency to precipitate in storage (Settling)
- High Binder Demand leads to weaker paint film

+

Pros

Multi-Functional Specialty Additives

- Efficient matting
- Increase Surface slip (CoF reduction)
- Increase Mar & Abrasion resistance
- Increase Scrub resistance
- Protect from burnishing
- Excellent surface feel
- Low Binder Demand, maintain paint film strength

Cons

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THANK YOU!

LEARN MORE:

