Gloxil matt SL

Functional matting agent slurry

for water-based clear coats, i. e. for wood

Author: Bodo Essen

HOFFMANN MINERAL®
We supply material for good ideas

Contents

- Introduction
- Experimental
- Results
  - Processing properties
  - Optical properties
  - Water, alcohol and ink resistance
  - Combining performance effects
- Summary

Status Quo

INTRODUCTION

EXPERIMENTAL

RESULTS

SUMMARY

Rising environmental awareness and legal conditions lead to an increased demand for water-based clear coats for wood

- ✓ Low VOC emissions
- ✓ Efficiency
- ✓ Versatility

Need for optimization?

Challenge of matting:

- Maintaining excellent optical properties combined with very good resistance characteristics. Particularly in binder emulsions with higher film formation and glass transition temperature
- Insufficient handling properties of matting agents

Objective

INTRODUCTION

EXPERIMENTAL

RESULTS

SUMMARY

Assessment of the performance of Gloxil matt SL versus established powdery silica matting agents in a standard water-based clear coat for wood.

Key criteria:

- Matting effect and optical appearance
- Resistance against water, alcohol and ink
- Optimized handling / processing properties

Base formulation:

- 1K Acrylic emulsion, based on low viscosity, self-crosslinking binder Alberdingk AC 2514, MFFT 43°C, Tg 52°C, relatively hard

Base Formulation

INTRODUCTION

EXPERIMENTAL

RESULTS

SUMMARY

Derived from guide formulation FP 2514-5 from Alberdingk Boley

	Description	pbw *
Alberdingk AC 2514	Binder, acrylic emulsion	79.5
Byk 024	Defoamer	0.8
Butyl diglycol	Cosolvent	6.0
Butyl glycol	Cosolvent	2.0
Water demineralized		7.5
Matting agent	Silica or Gloxil matt SL	varied X
Aquamat 272	Wax dispersion	3.3
Byk 346	Wetting agent	0.4
Rheovis PU 1214	Thickener	0.5
Total		100.0 + X

* Parts by weight

Matting Agents

INTRODUCTION

EXPERIMENTAL

RESULTS

SUMMARY

Characteristic

	Fumed Silica	Precipitated Silica	Gloxil matt SL
Appearance	Powder	Powder	Liquid slurry, 15 %
Density [g/cm³]	2.2	2.0	1.1
Particle size d_{50} [µm]	9 *	9	9
Oil Absorption [g/100g]	360	320	-
Specific Surface Area BET [m²/g]	250	400	-

* Agglomerated

Formulation Variants

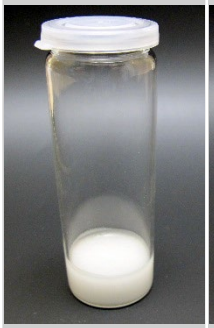
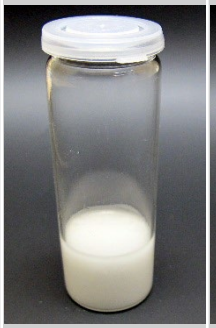
INTRODUCTION

EXPERIMENTAL

RESULTS

SUMMARY

pbw

	Fumed Silica	Prec. Silica	Gloxil matt SL		
Matting Agent	2.5	2.5	7.7	15.4	23.1
Bulk / Liquid Volume					
Water demin.	7.5	7.5	---	---	---
All other ingredients remain unchanged					
Total	102.5	102.5	100.2	107.9	115.6

%

Solids Content	38.7	38.7	39.2	38.4	37.7

Paint Preparation / Storage

INTRODUCTION

EXPERIMENTAL

RESULTS

• Processing properties and storage stability

SUMMARY

Source: VMA Getzmann

Mixing and dispersing with dissolver,
in sequence of mentioning in the formulation

- 5.2 m/s peripheral speed
- toothed disc (cowles blade)
- 15 min dispersing time

Typical total time: 40 min

	Fumed Silica	Prec. Silica	Gloxil matt SL
Dust prevention	👎	👎	👍
Incorporation	👎	👍	👍
Foam prevention	👎	👎	👍 - 👍
Deaeration 12 h	👍	👍	👍
Storage stability	Slight settling of matting agent, easy to re-stir and to homogenize		

Drying-time after Application

INTRODUCTION

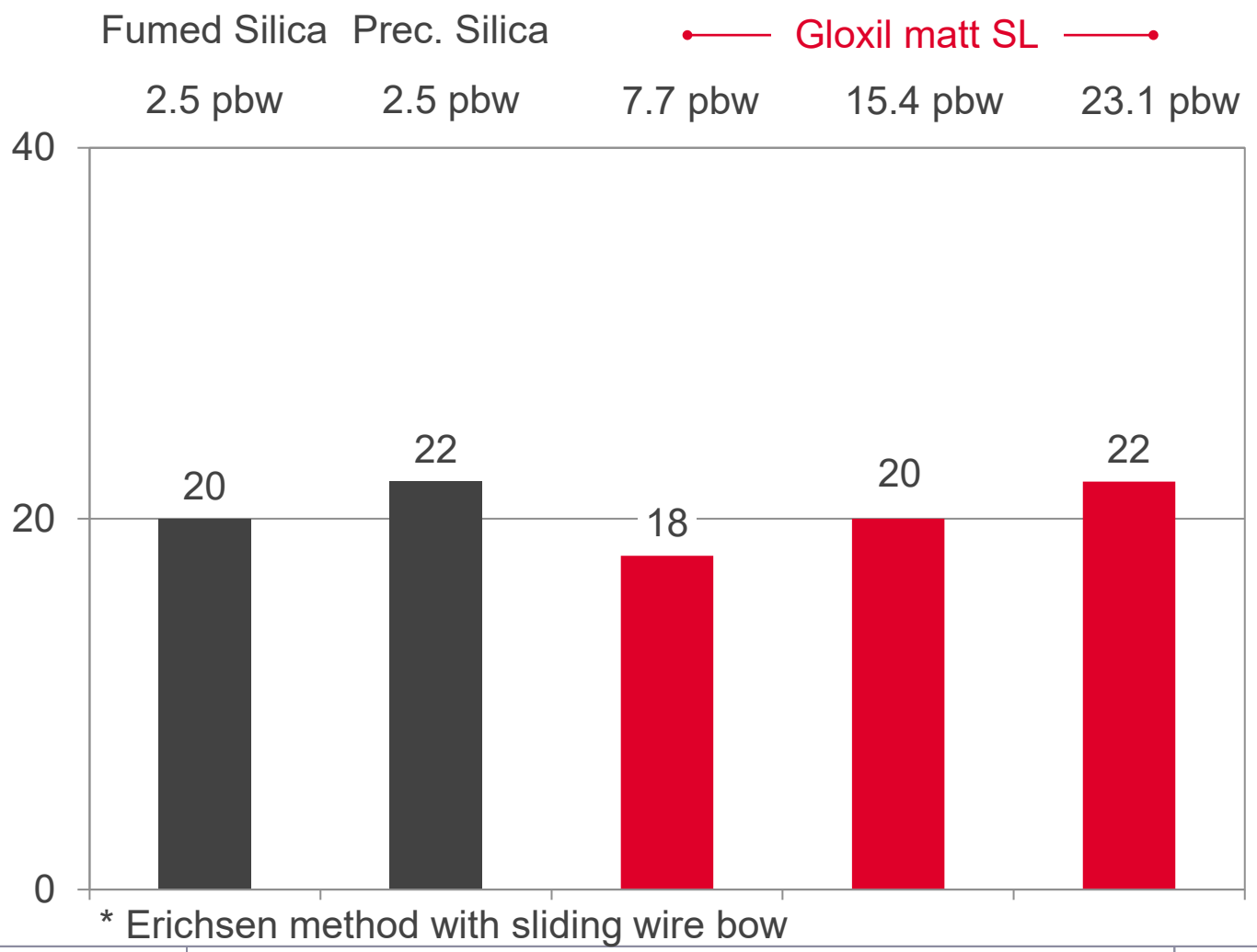
EXPERIMENTAL

RESULTS

- Processing properties and storage stability

SUMMARY

[min] to absence of surface damage*, DFT 35 µm



Early
Blocking Resistance, Drying 24 h

HOFFMANN MINERAL

Evaluation acc. ASTM D 4946, 0 = worst, 10 = best, DFT 35 µm

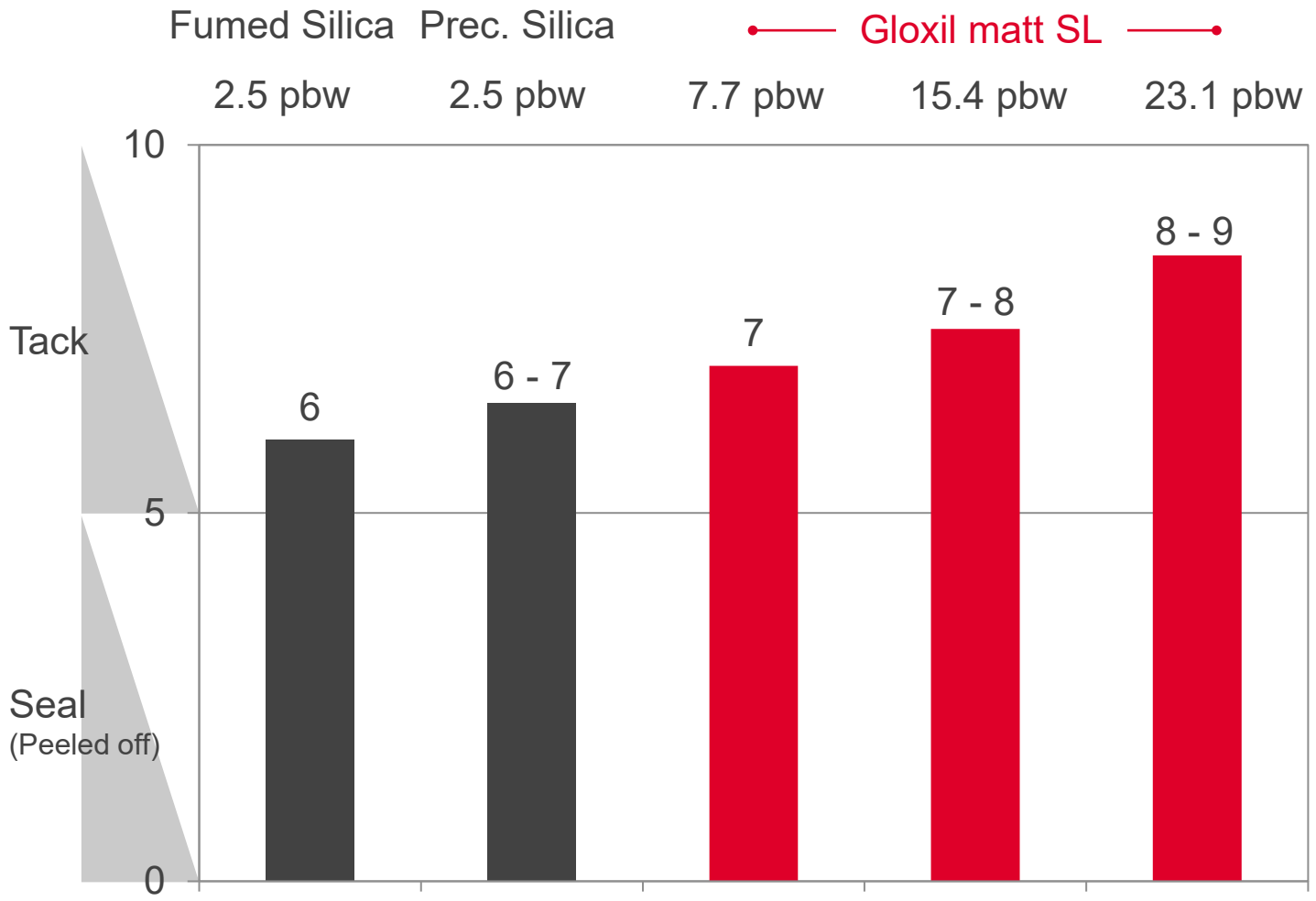
INTRODUCTION

EXPERIMENTAL

RESULTS

- Processing properties and storage stability

SUMMARY



Transparency

HOFFMANN MINERAL

INTRODUCTION

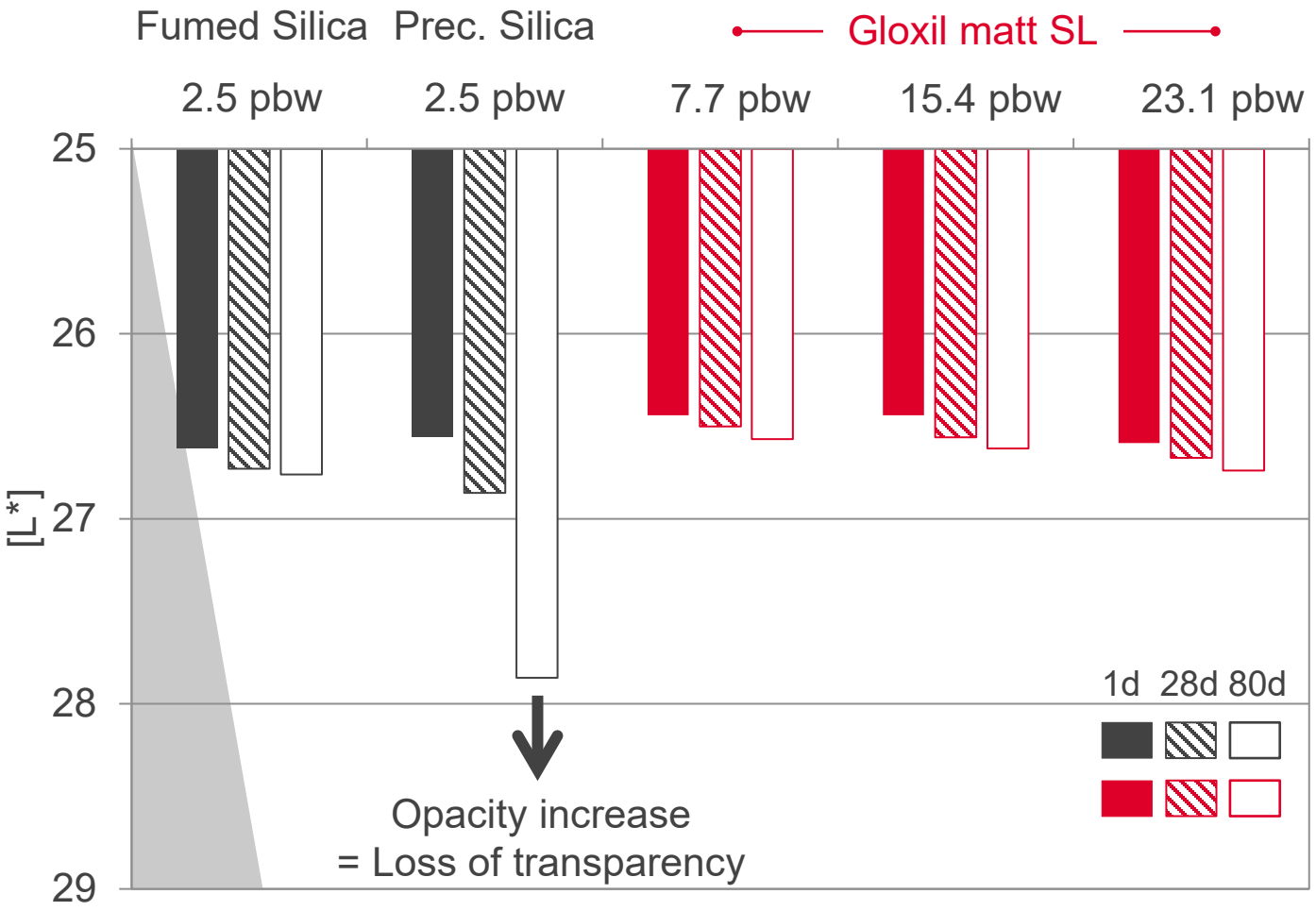
EXPERIMENTAL

RESULTS

• Optical properties

SUMMARY

Brightness on black contrast cardboard, DFT 35 µm



Matting

INTRODUCTION

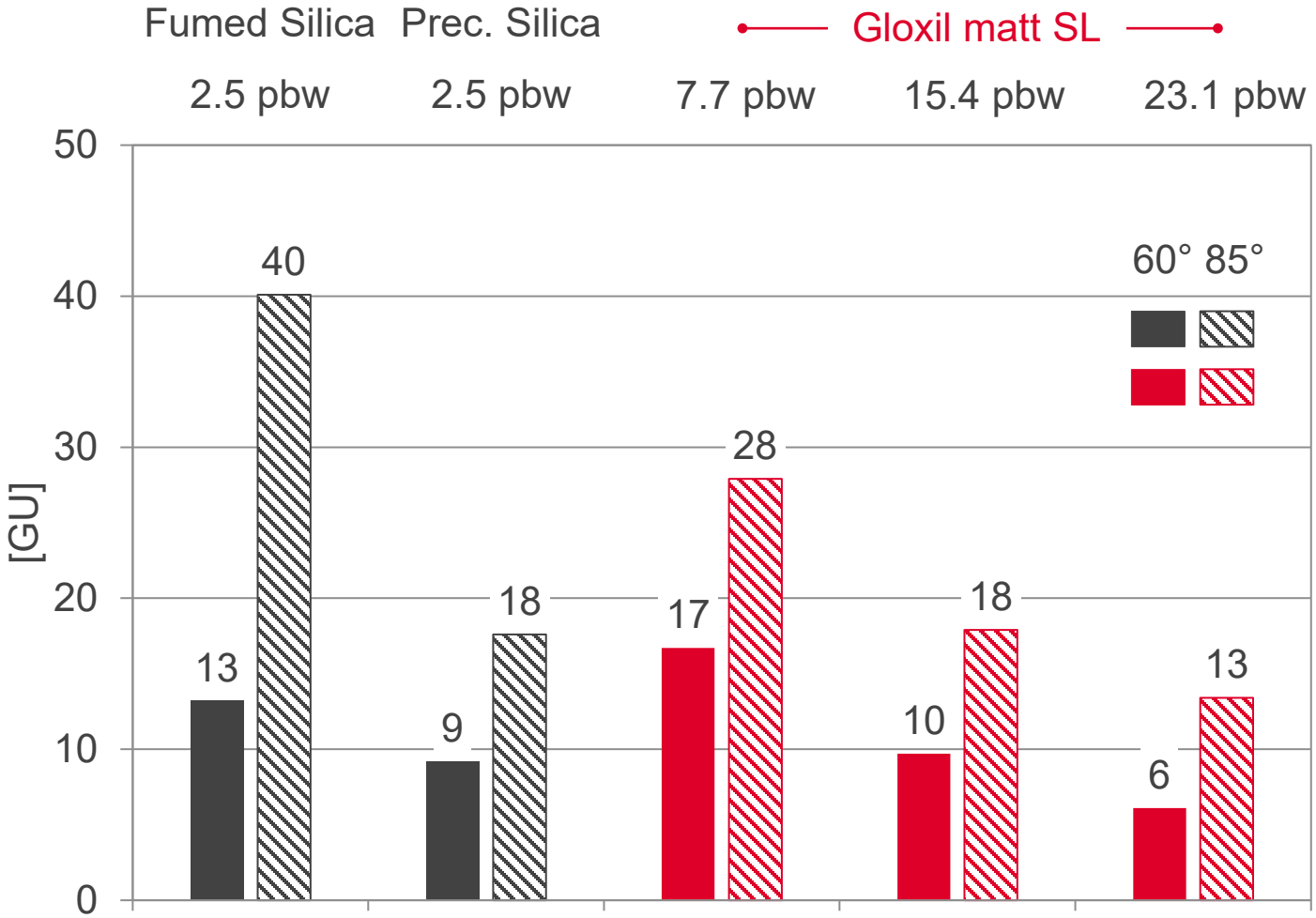
EXPERIMENTAL

RESULTS

• Optical properties

SUMMARY

Gloss level, DFT 3 x 35 µm on contrast cardboard



Appearance on Wood

INTRODUCTION

EXPERIMENTAL

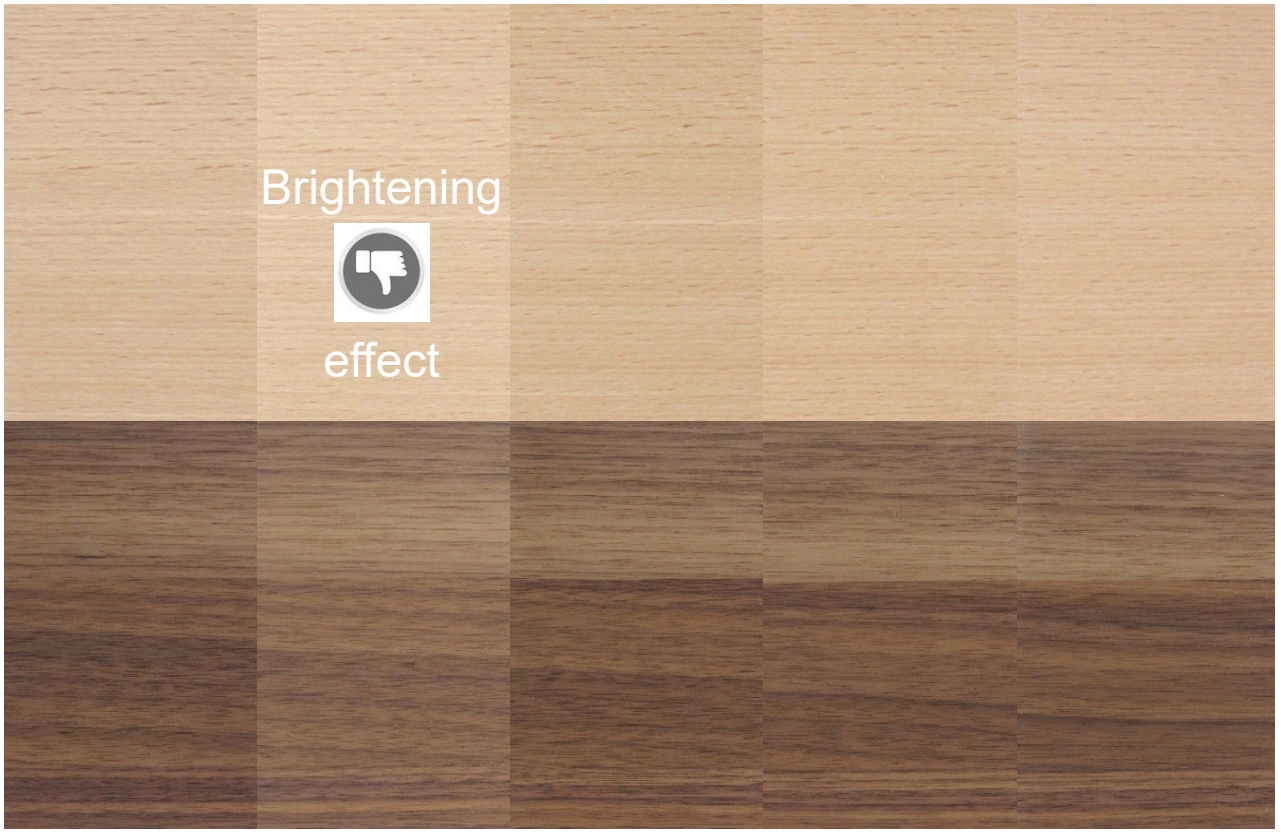
RESULTS

• Optical properties

SUMMARY

Drying 28 d, DFT 105 µm (3 x 35)

	Fumed Silica	Prec. Silica	Gloxil matt SL		
	2.5 pbw	2.5 pbw	7.7 pbw	15.4 pbw	23.1 pbw
Beech					
American Walnut					



Water Resistance

INTRODUCTION

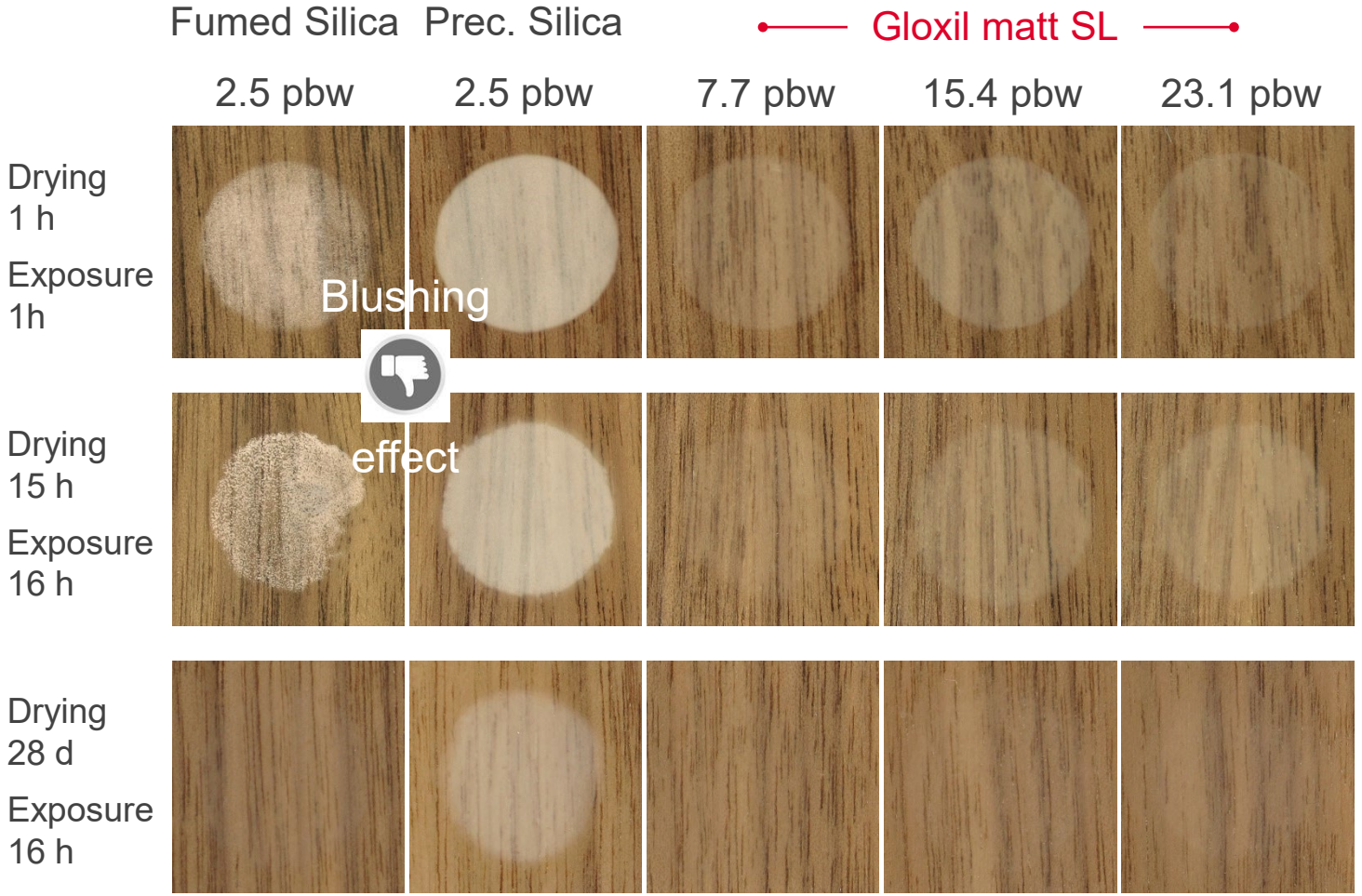
EXPERIMENTAL

RESULTS

- Water, alcohol and ink resistance

SUMMARY

Early stage and acc. to DIN 68861-1, 1A DFT 105 µm (3 x 35)



Alcohol Resistance

28 d after application, exposure time 16 h DFT 105 µm (3 x 35)

INTRODUCTION

EXPERIMENTAL

RESULTS

- Water, alcohol and ink resistance

SUMMARY

	Fumed Silica	Prec. Silica	Gloxil matt SL		
	2.5 pbw	2.5 pbw	7.7 pbw	15.4 pbw	23.1 pbw
Ethanol 48 %					
Water (comparative)					

Ink Resistance

INTRODUCTION

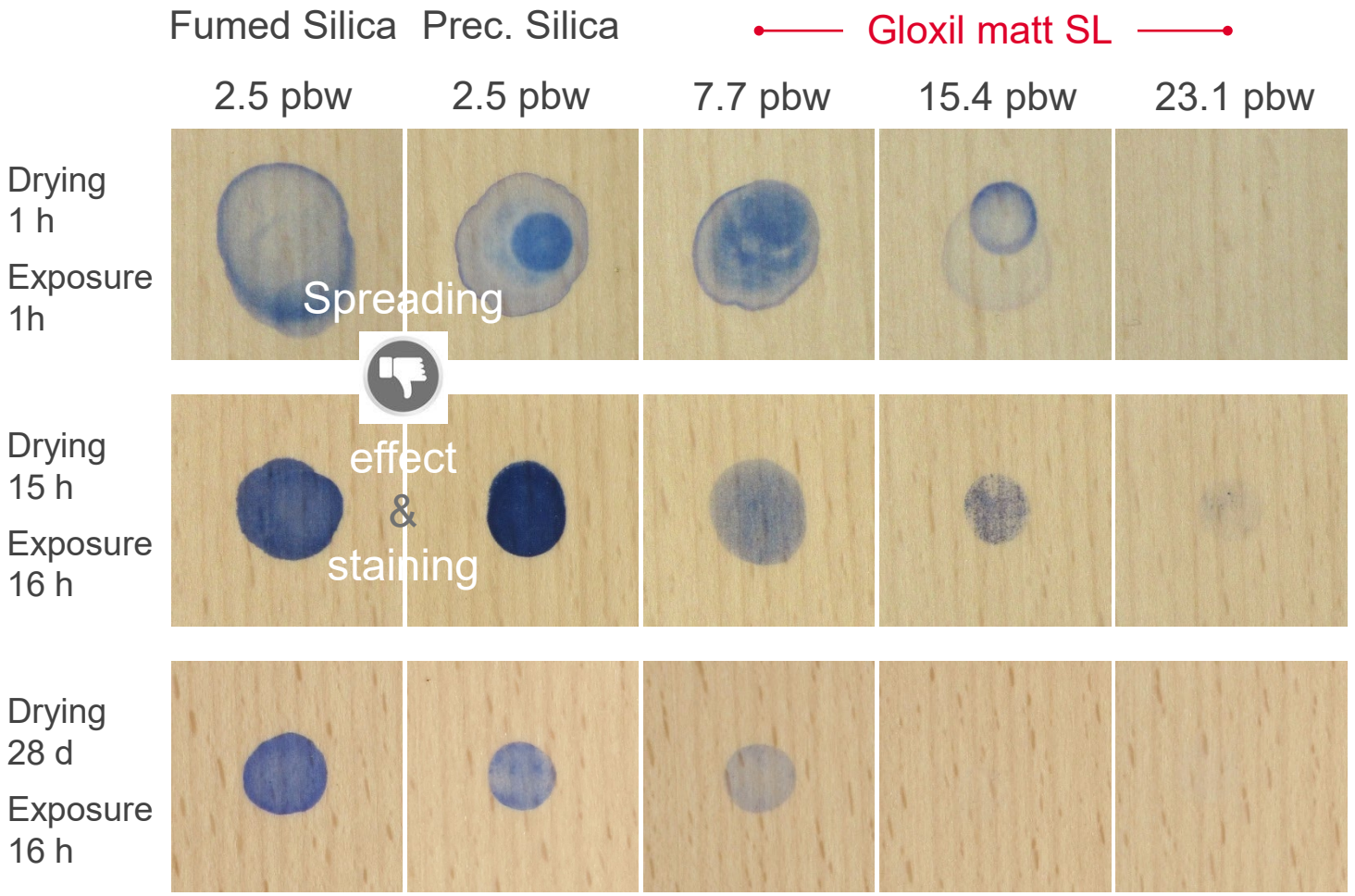
EXPERIMENTAL

RESULTS

- Water, alcohol and ink resistance

SUMMARY

Early stage and acc. to DIN 68861-1, 1A DFT 105 µm (3 x 35)



Performance Comparison

INTRODUCTION

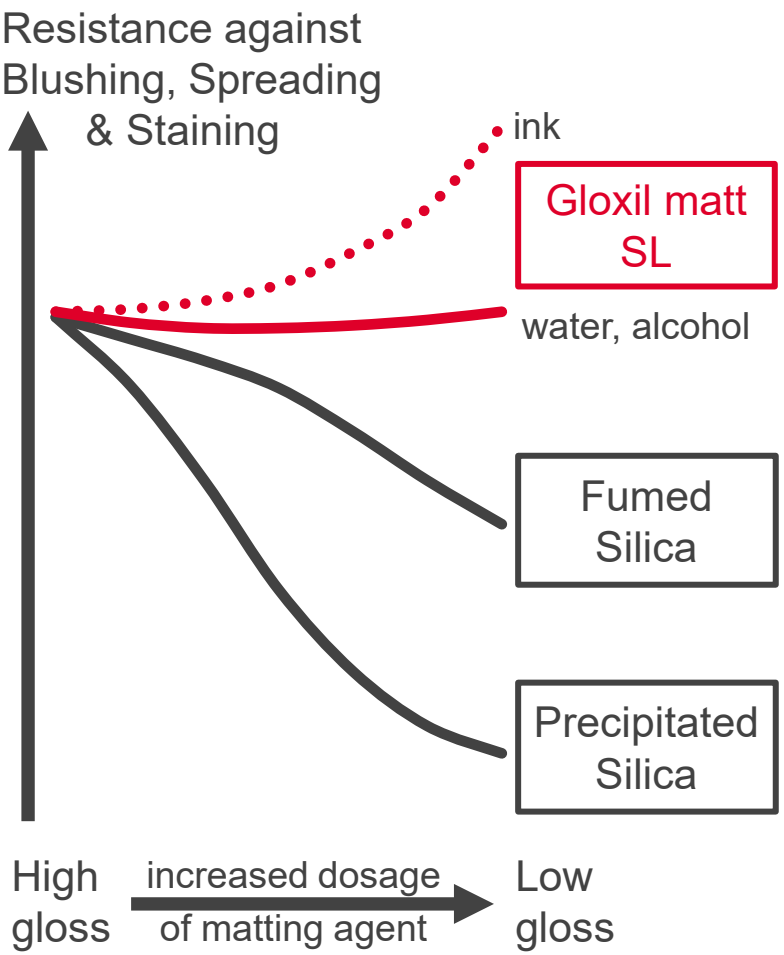
EXPERIMENTAL

RESULTS

• Water, alcohol and ink resistance

SUMMARY

Gloxil matt SL vs. powdery Silicas



- Water and alcohol resistance

  Largely independent from loading likewise matting level, whereas silicas deteriorate at higher loadings

- Ink resistance

  Significantly improved with higher loading / matting level, whereas silicas remain at a weak performance

- Higher dosage particularly beneficial for early stage resistance

Combining Performance Effects

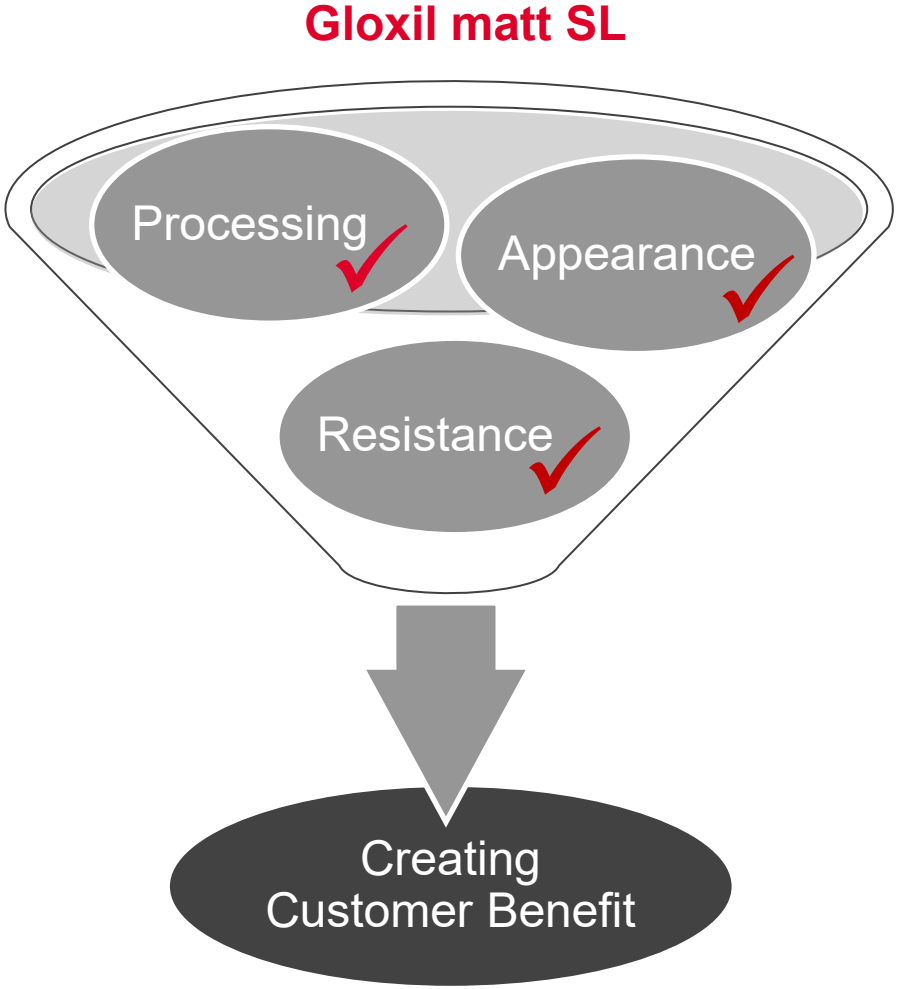
INTRODUCTION

EXPERIMENTAL

RESULTS

• Combining performance effects

SUMMARY



Customer Benefit

Simplifying / Shortening Dispersing Process

HOFFMANN MINERAL

INTRODUCTION

EXPERIMENTAL

RESULTS

- Combining performance effects

SUMMARY

Mixing Equipment	Dissolver		Overhead stirrer
	 Source: VMA Getzmann		
	Fumed Silica	**Prec. Silica**	**Gloxil matt SL**
Handling / Metering	dust raising / laborious		non-dusting / easy
Dosing / Wetting	1-2 min	1 min	10 sec ✓
Mixing / Dispersing	10-15 min	10-15 min	1-2 min ✓ Video

Customer Benefit

Avoiding Deaeration Process

HOFFMANN MINERAL

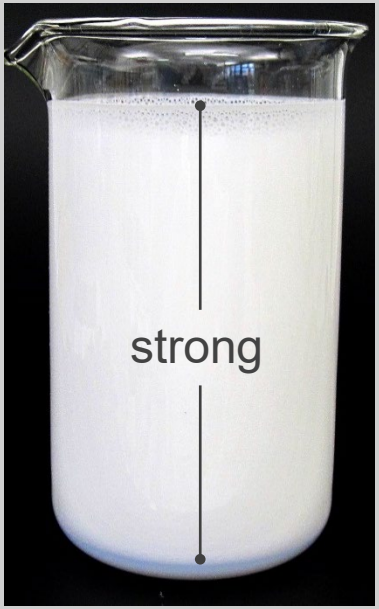
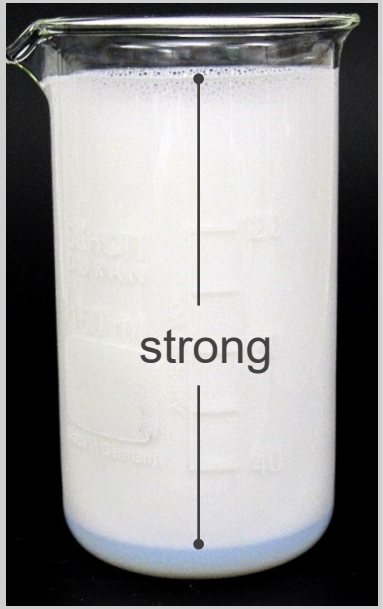
INTRODUCTION

EXPERIMENTAL

RESULTS

- Combining performance effects

SUMMARY

	Dissolver		Overhead stirrer
	Fumed Silica	**Prec. Silica**	**Gloxil matt SL**
Foaming			
Deaeration	several hours		immediately

Customer Benefit

Dispersibility Without High Shear Force

HOFFMANN MINERAL

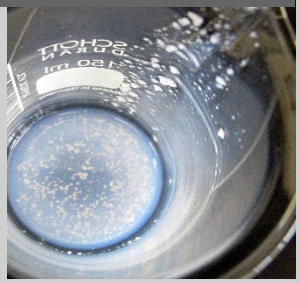
INTRODUCTION

EXPERIMENTAL

RESULTS

• Combining performance effects

SUMMARY

	Overhead stirrer		
	Fumed Silica	**Prec. Silica**	**Gloxil matt SL**
Dispersion problems			
Adhesion	 lump nests	 sticking	no ✓
Insufficient particle breakdown	agglomerates 		no ✓

Customer Benefit

Easy Dosing – Easy Cleaning

HOFFMANN MINERAL

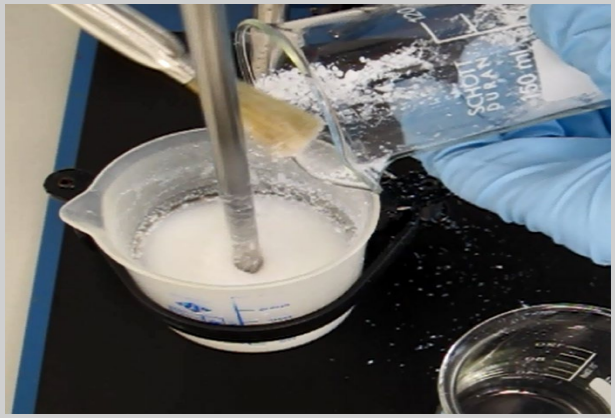
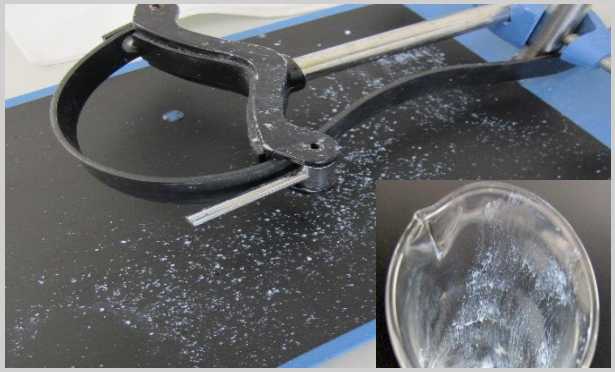
INTRODUCTION

EXPERIMENTAL

RESULTS

• Combining performance effects

SUMMARY

	Overhead stirrer		
	Fumed Silica	**Prec. Silica**	**Gloxil matt SL**
Cleaning effort			
During dosing			no ✓
Subsequently			low ✓

Customer Benefit

Maintaining Enhanced Tech. Performance

INTRODUCTION

EXPERIMENTAL

RESULTS

• Combining performance effects

SUMMARY

Compared to Dissolver	Overhead stirrer	
	Gloxil matt SL Addition	
	regular within matt paint preparation	post-addition to finished glossy paint
Optical Appearance	✓	✓
Matting Effect	✓	✓
Matting Flexibility		✓
Resistances	✓	✓

Overall generating savings

- ➢ Time, Energy & Effort
- ➢ Cost

Summary

Gloxil matt SL shows already known effects of powdery silica matting agents, but offers the following additional benefits in water-based clear coats:

+ No dust formation
+ Highly improved metering and incorporation
+ Easier and time-reduced mixing without high shear dispersion process
+ Foam-supressing effect
+ Better early blocking resistance
+ Very high transparency with good long term stability
+ Strong matting effect
+ Good wood grain enhancement, particularly on dark wood
+ Superior early water and stain resistance
+ Easy matting level adjustment via post-addition

✓ Efficient easy and ready to use liquid matting additive for low VOC coatings:
Cost and time saving, highly versatile and with enhanced performance.

We supply material for good ideas!

HOFFMANN MINERAL GmbH
Muenchener Straße 75
DE-86633 Neuburg (Donau)

Phone: +49 8431 53-0
Internet: www.hoffmann-mineral.de
E-mail: info@hoffmann-mineral.com

Measuring
Early Blocking Resistance

HOFFMANN MINERAL

INTRODUCTION

EXPERIMENTAL

RESULTS

• Processing properties

SUMMARY

Evaluation acc. ASTM D 4946, 0 = worst, 10 = best, DFT 35 µm