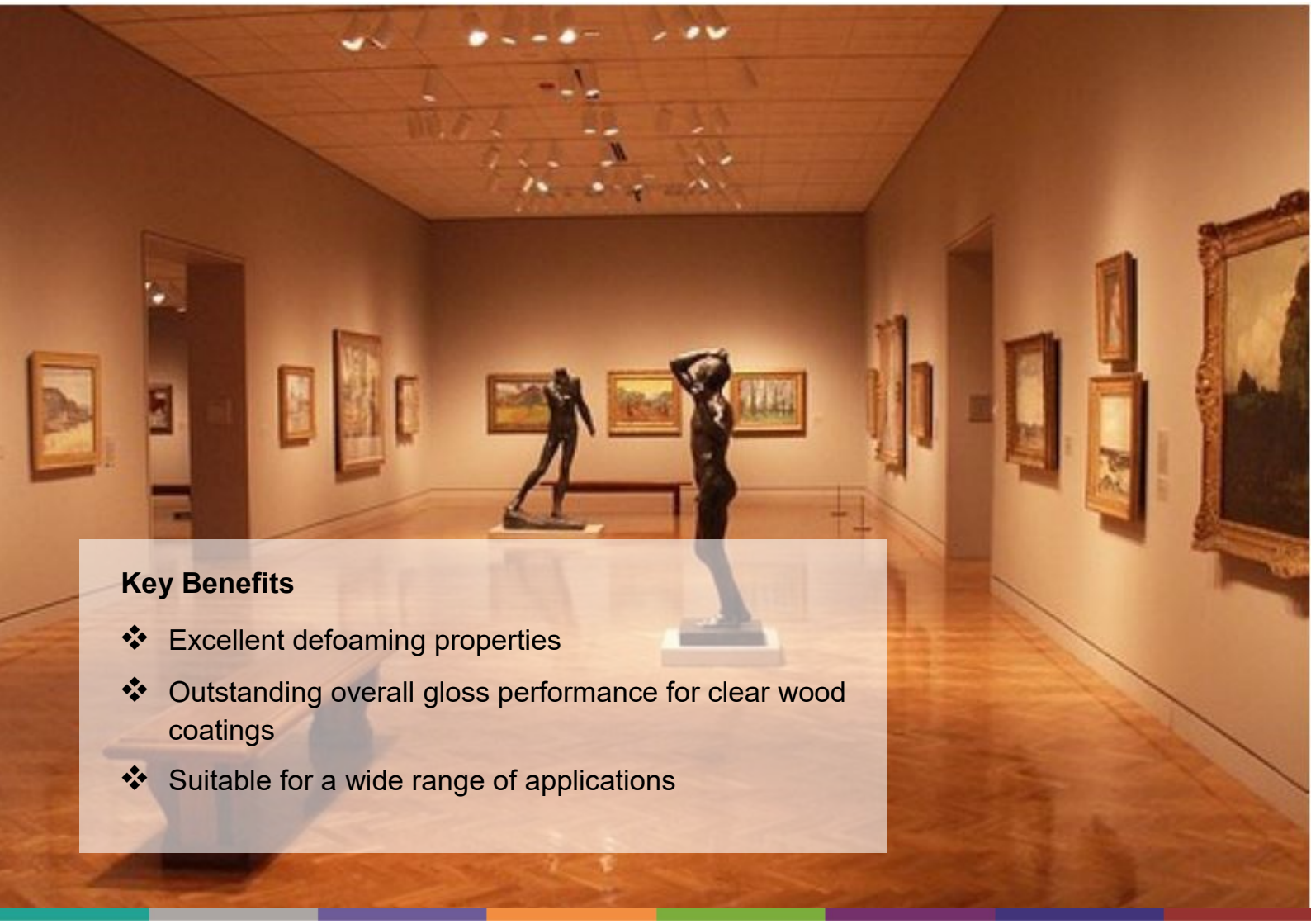
ELEMENTIS

A global specialty chemicals company

Application Leaflet

DAPRO® DF 21 and DAPRO® DF 52

Highly efficient defoamer for aqueous wood coating formulations



Key Benefits

- Excellent defoaming properties
- Outstanding overall gloss performance for clear wood coatings
- Suitable for a wide range of applications

Introduction

DAPRO® DF 21 is a mineral oil based hydrophobic silica containing emulsifier. This water dispersible defoamer is suitable in high quality waterborne inks, adhesives and industrial coatings. DAPRO® DF 21 is in particular very useful for glossy wood paints and clear acrylic coatings.

DAPRO® DF 52 is a mineral oil– free, hydrophobic silica defoamer and is suitable for wood coatings, flexo -inks and paper coatings. DAPRO® DF 52 has excellent defoaming properties and is particularly suitable for systems where mineral oils are unacceptable in chemical waste water.

Key properties

- Excellent defoaming properties
- Outstanding gloss performance
- Effective in a wide range of applications
- Particularly useful for glossy paints based on acrylic and PU chemistries

Chemical and physical data

	DAPRO® DF 21	DAPRO® DF 52
Composition	Blend of hydrophobic silica and mineral oil	Blend of esters, hydrophobic silica and emulsifiers
Appearance	Opaque off-white liquid	Cloudy, light-amber liquid

Levels of use

Typically 0.1 - 1.0% on total weight, but should be optimized by testing a concentration ladder.

Handling

Products must be mixed prior to use!

Under adequate storage conditions, DAPRO® DF 21 and DAPRO® DF 52 can be stored for at least 24 months in a non-opened container. Store between 10° C - 35 °C. If frozen thaw at room temperature and mix well. Detailed information on handling and safety can be found in the material safety data sheet. Handle in accordance with good industrial hygiene and safety practices.

Incorporation

DAPRO® DF 21 and DAPRO® DF 52 show excellent compatibility and are suitable to use in the let down stage of sensitive coatings systems where optical properties are very important (e.g. gloss, transparency). A ladder study should be carried out to optimize the loading level.

Test results

In the following practical examples, DAPRO® DF 21 and 52 were tested in different formulations on its effectiveness in defoaming: Acrylic clear coat of high viscosity, high performance wood clear coat of low viscosity) and a 2C high performance PU-parquet lacquer. In these formulations DAPRO® DF 21 and DF 52 were tested against a market benchmark.

System 1: Acrylic clear coat - Defoaming

	Conc.	Head of foam	Density	
	[%]	[%]	[g/l]	after 24h
DAPRO® DF 21	0.25	28.6	0.77	1.04
	0.50	28.6	0.81	1.04
	0.75	25.7	0.83	1.04
DAPRO® DF 52	0.25	25.7	0.86	1.04
	0.50	14.3	0.92	1.04
	0.75	11.3	0.83	1.04
Market reference	0.25	31.4	0.70	1.04
	0.50	37.1	0.76	1.04
	0.75	20.0	0.88	1.04
Blank	--	134.3	0.43	1.05

Table 1 - Defoaming performance

The highest density which correlates with the best defoaming performance was obtained with a medium dosing level of 0.5 % DAPRO® DF 52.

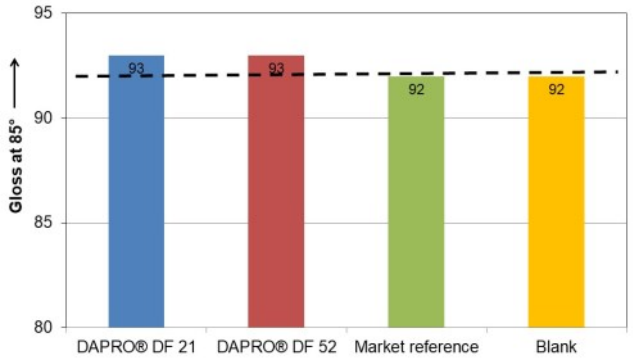


Figure 1 - Defoamer influence on gloss

All samples displayed almost equally high gloss levels.

System 2: High performance 1c acrylic clear coat

	Conc.	Head of foam	Density	
	[%]	[%]	[g/l]	after 24h
DAPRO® DF 21	0.25	17.1	0.87	1.05
	0.50	14.3	0.90	1.05
	0.75	17.1	0.91	1.05
DAPRO® DF 52	0.25	37.1	0.73	1.05
	0.50	37.1	0.76	1.05
	0.75	37.1	0.81	1.05
Market reference	0.25	114.3	0.49	1.04
	0.50	65.7	0.64	1.04
	0.75	77.1	0.47	1.05
Blank	--	148.6	0.40	1.40

Table 2 - Defoaming performance

The best defoaming performance was obtained with DAPRO® DF 21 and DAPRO® DF 52.

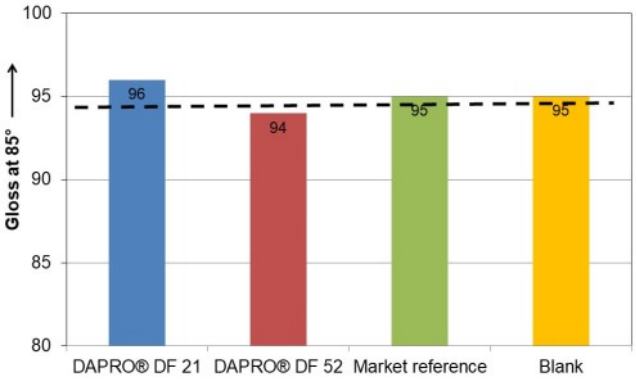


Figure 2 - Defoamer influence on gloss

All samples displayed almost equally high gloss levels.

System 3: 2c PU parquet lacquer

	Conc.	Head of foam	Density	
	[%]	[%]	[g/l]	after 24h
DAPRO® DF 21	0.25	44.9	9.93	1.03
	0.50	11.4	0.95	1.03
	0.75	14.3	0.94	1.03
DAPRO® DF 52	0.25	20.0	0.87	1.03
	0.50	22.9	0.89	1.03
	0.75	14.3	0.92	1.03
Market reference	0.25	37.1	0.77	1.03
	0.50	37.1	0.83	1.03
	0.75	20.0	0.89	1.03
Blank	--	142.9	0.43	1.03

Table 3 - Defoaming performance

The head of foam results were overall best for DAPRO® DF 21.

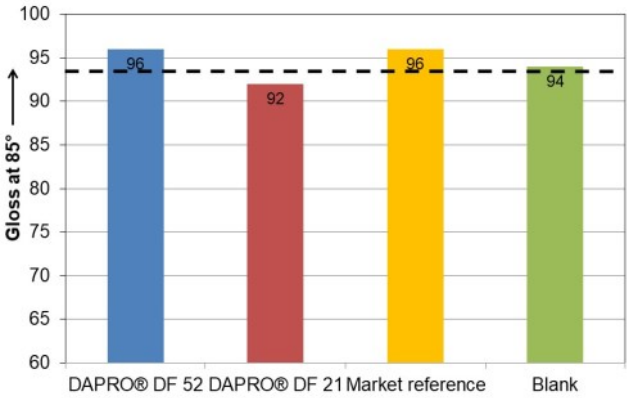


Figure 3 - Defoamer influence on gloss

All samples displayed similar gloss results within an acceptable range.

Formulations

The following formulations were used to test DAPRO® DF 21 and DF 52 regarding their defoaming behaviour and gloss and film appearance.

- Acrylic clear coat
- 1C High Performance wood clear coat, glossy
- 2C High Performance PU-parquet lacquer, satin

In each test series a blank sample was used without a defoamer which represents the negative reference.

System 1: Acrylic clear coat

Raw material	Conc. [%]	Function	Supplier
Acrylic binder emulsion	92.00	Binder	
Defoamer	X	Defoamer	Elementis
Ethyl diglycole	4.50	Coalescent	
DAPRO® W-77	0.50	Surface additive	Elementis
RHEOLATE® 299	0.35	Rheology modifier	Elementis
Demin. water	2.65 - X	Diluent	
	100.00		

System 2: High performance 1c acrylic clear coat

Raw material	Conc. [%]	Function	Supplier
Acrylic binder emulsion	83.0	Binder	
Defoamer	X	Defoamer	Elementis
Substrate wetting agent	0.5		
Dowanol DPM	4.0	Coalescent	Elementis
Dowanol DPnB	5.0	Coalescent	
Demin. water	6.7 - X	Diluent	
RHEOLATE® 350D	0.8	Rheology modifier	Elementis
	100.00		

System 3: 2c PU parquet lacquer

Raw material	Conc. [%]	Function	Supplier
Component A			
OH functional acrylic emulsion	78.0	Binder	
Defoamer	X	Defoamer	Elementis
Wetting agent	0.4	Wetting agent	
Silica	1.0	Matting agent	
Butylcarbitol	4.0	Coalescent	
RHEOLATE® 350D	0.8	Rheology modifier	Elementis
Demin. water	15.8 - X	Diluent	
	100.00		
Aliphatic isocyanate emulsion	10.0	Hardener	

Test methods

Defoaming performance

To test the defoamers performance in the three different formulations the following procedure was conducted: first, 100 ml paint was put into a 250 ml glass jar. This dispersion was stirred for 5 minutes at 5,000 rpm using a 3 cm toothed Cowles blade. After this process step, the height of head of foam as well as the density was ascertained with a paint pycnometer Model 290/ IV (Volume + 50 ml) from Erichsen.

Influence on the gloss

A film was applied with a 250 µm blade on Leneta charts. The gloss of the film cured for 24 h was measured using a haze-gloss meter from BykGardner. Measuring angle 85°)

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