



ELEMENTIS

Application Leaflet

DAPRO[®] FX 514

Sustainable plasticizer
for adhesive systems

Unique chemistry, sustainable solutions

Key Benefits

- Enhanced tackiness and flexibility of adhesive films
- Outstanding plasticizing properties
- Based on renewable raw materials

Product

Composition	Renewable organic ester
Appearance	Clear liquid
Boiling point [°C]	>290°C
VOC (EPA method 24)	0*
Density, [g/cm ³]	0.92
Odor	Nearly odorless

* results based on testing in finished paint

Introduction

Regulations are driving adhesive formulations to very low VOC levels and encourage the use of sustainable raw materials. The industry is challenged to find ingredients that meet these demands.

DAPRO® FX 514 is a high-boiling point, nearly odorless plasticizer for adhesive systems like floor and wood applications, that provides high film flexibility and tackiness to enhance adhesive strength and durability of the bond.

DAPRO® FX 514 is a clear liquid and is predominately based on renewable resources.

Key Benefits

- Outstanding plasticizing properties
- Improvement of film flexibility and tackiness
- Prepared from predominantly renewable raw materials
- Efficient reduction of MFFT (minimum film formation temperature)
- Very low odor

Incorporation & Use levels

Typical use levels of DAPRO® FX 514 are 1% to 5% by weight on total formulation, depending on system requirements. A ladder study should be done to optimize the optimum concentration.

DAPRO® FX 514 is handled as a standard plasticizer and incorporated as appropriately.

Test system

VAE/rosin based floor adhesive

Part 1: Resin compound

Component	Concentration [%]
High purity rosin gum	45
Rosin ester	35
Plasticizer	20

Part 2: Base adhesive composition

Component	Concentration [%]
VAE emulsion	33.1
Emulsifier	0.6
Water	8.8
Defoamer	0.1
Extender	33.1
Resin compound (Part 1)	24.3
RHEOLATE® 125	various

Incorporation plasticizer

- Tooth bladed dissolver (Ø 4 cm)
- 30 min at 1000 rpm into the resin compound
- Total concentration 4.9%

FIGURE 1: Influence of DAPRO® FX 514 on the adhesive film softness and flexibility

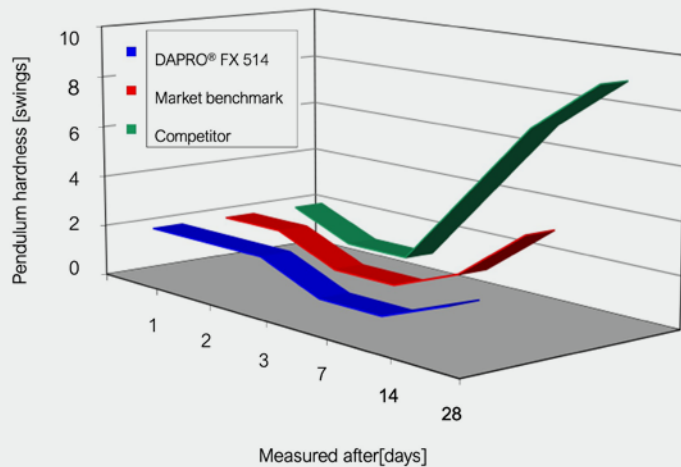
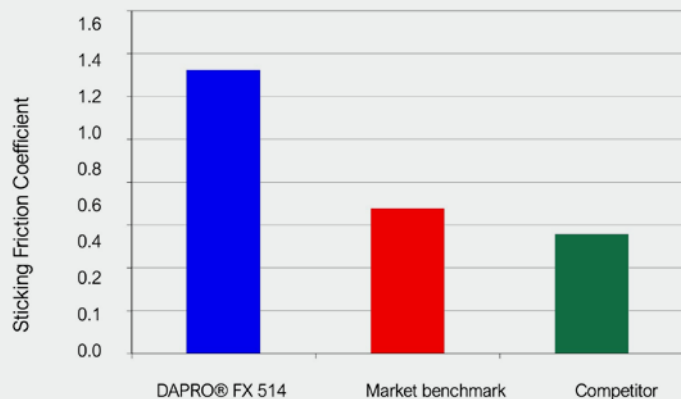


FIGURE 2: Stickiness of the dried film



Test results

The use of DAPRO® FX 514 is illustrated in comparison to a leading market reference plasticizer based on benzoate ester, as well as to another plasticizer based on ester alcohol.

In all cases the plasticizer concentration was 4.9% related to the total formulation.

The film softness was determined as pendulum hardness over 28 days according to König (DIN EN ISO 1522). The applied wet layer thickness in all cases was 200 µm on glass panels (**FIGURE 1**).

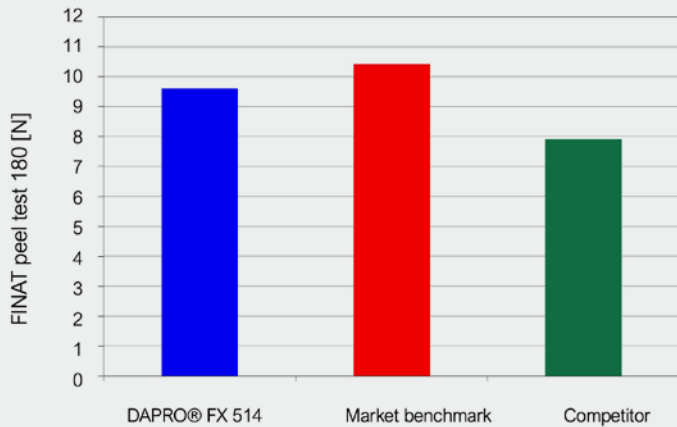
In this test series the DAPRO® FX 514 retained the softness of the adhesive film longest and clearly outperformed both, the competitor and the market reference products.

The dry adhesive film stickiness was tested as Sticking Friction Coefficient of the surface using the friction-peel tester, Twingh-Albert (model 225-1). The applied wet layer thickness of each sample was 250 µm on black leneta charts. The higher the value the stickier is the materials surface (**FIGURE 2**).

DAPRO® FX 514 gave higher dry film stickiness than the market reference or the competitive product.

Below 0, thixotropy is significantly ramping up.

FIGURE 3: Wet film tackiness



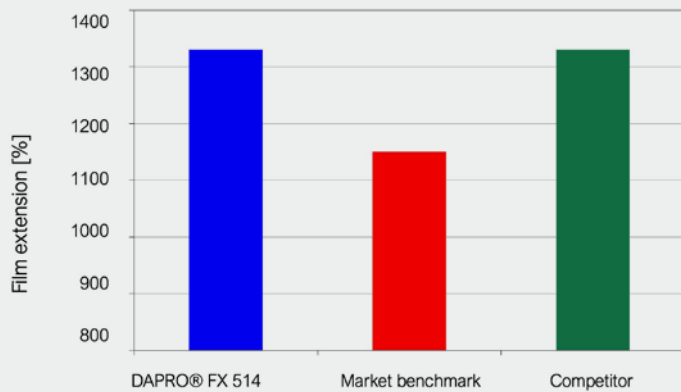
The wet film tackiness was determined in a peel test using FINAT test method no. 1 at an angle of 180° and a jaw separation rate of 300 mm per minute.

The DAPRO® FX 514 performed similarly to the market benchmark and better than the competitive material.

The dry film flexibility was measured using a pull test with dry film strips of defined dimensions using the TAXT texture analyzer. The clamping length in all cases was 10 mm.

DAPRO® FX 514 provided excellent film flexibility especially compared to the market reference.

FIGURE 4: Flexibility of the dried film





Conclusion

DAPRO® FX 514 performed outstandingly as a plasticizer. Large improvements in film flexibility and tackiness were found even compared to the market reference product. All these benefits were achieved without influencing the ease of application

Based on these results DAPRO® FX 514 is highly recommended as a sustainable plasticizer providing excellent performance for various aqueous adhesive systems.

NOTE:

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May 2024

For more details
please contact:

North America

Elementis
469 Old Trenton Road
East Windsor,
NJ 08512, USA
Tel: +1 609 443 2500


Europe

Elementis UK Ltd c/o
Porto Business Plaza
Santos Pousada Street, 290
4300-189, Porto, Portugal

Asia

Deuchem (Shanghai) Chemical
Co., Ltd.
99, Lianyang Road
Songjiang Industrial Zone
Shanghai, China 201613
Tel: +86 21 577 40348

elementis.com



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sustainable solutions