

Bringing paper to life

ELVANOL™ IN THE PAPER INDUSTRY

THE PERFORMANCE ADVANTAGES OF KURARAY ELVANOL™ PVOH

**BARRIER PROPERTIES
FILM STRENGTH**

Resistant to oil, grease and water
Tensile = 9,000 psi (vs 600 psi
for starch)

BINDING CAPACITY

3 times the capacity of starch
2.5 times the capacity of
synthetic latex

**ENVIRONMENTAL
EASE OF PREPARATION**

Lower BOD than starch
Can be batch or jet cooked;
or co-cooked with hot-water-
soluble polymers

Because of its outstanding film strength, barrier properties and binding capacity, ELVANOL™ polyvinyl alcohol enjoys wide use in the manufacture of paper and paperboard. Kuraray manufacture ELVANOL™ PVOH in a number of specialized grades offering a range of useful performance features and convenient processing characteristics. Reviewed inside are some of the most common uses for ELVANOL™ in this industry, as well as frequently used product grades and typical application methods.

SURFACE PROPERTIES IMPROVED BY ELVANOL™

The use of ELVANOL™ in size press and calender stack enhances drastically the strength and barrier properties of paper.

Surface Barrier

ELVANOL™ polyvinyl alcohol is one of the strongest water-borne film formers commercially available for the paper industry. It is chemically resistant to oil, grease, wax, organic solvents, and shows high water resistance. The grade of ELVANOL™ selected is governed by the end-use properties needed, application equipment, and post-dryer capabilities of the paper machine or off-machine coater. ELVANOL™ is for example an excellent carrier for fluorochemicals in oil and grease barrier applications.

ELVANOL™ 70-06, 90-50 and 71-30 are fully hydrolyzed grades that give superior water resistance. The water resistance of ELVANOL™ grades can be further improved using conventional crosslinking agents like salts of multivalent ions, aminoplast resins and aldehyde derivatives.

Surface Strength

Films made of ELVANOL™ are much stronger than those made of starch alone. ELVANOL™ based surface sizes with concentrations as low as 10 percent provide a surface that resists surface abrasion and cracking and improves folding and bursting strength.

Surfaces sized with starch that need scuff resistance or surface pick resistance will benefit from incorporating ELVANOL™. The strong film with excellent binding properties ties the fibers and the surface debris to the paper or paperboard surface to reduce linting and dusting. This helps to keep offset printing blankets cleaner and reduces press downtime. The strength and moisture resistance of ELVANOL™ surface treatment can also improve curl control.

The binding strength of ELVANOL™ allows costly fibre to be economically replaced with filler and still maintain the strength of the paper. Similarly, the hardwood or recycled fraction of paper can be increased, while maintaining strength and printability properties with ELVANOL™ applied as a surface treatment.

Surface Printing

ELVANOL™ gives paper and paperboard excellent printability, smoothness and print gloss. The oil and solvent resistant properties keep ink from penetrating into the paper and allow clear, glossy printing with outstanding print clarity.

APPLICATIONS WITH PIGMENTS OR OPTICAL BRIGHTENERS

Pigmented Size Press

ELVANOL™ is an effective binder in coating formulations at the size press. Because of its binding power, ELVANOL™ can be used to replace starch on a 1-to-3 basis.

With the incorporation of ELVANOL™ and reduced level of binder in the pigmented size, the optical and surface properties are improved over a clearsize, uncoated sheet.

The following advantages have been demonstrated using ELVANOL™ in pigmented size applications:

- Excellent way to optimize costs for fillers or fibres
- Improved opacity and brightness
- Improved drying and uniformity of moisture profile
- Reduced calendar loading to achieve surface smoothness
- Uniform ink receptivity, reduces two-sidedness
- Reduced binder reduces mottle
- Economical method to reduce sheet porosity
- Holdout and smoothness to the topcoat
- Coatings

ELVANOL™ has stronger binding power than acrylic latex, styrene butadiene, soy protein, casein, and starches. It can therefore be used in paper coating formulations to partially replace the binder or to increase the pigment to binder ratio.

Optical Brighteners

Fluorescent whitening agents (FWAs) are commonly used in coated offset papers to increase the brightness of Paper. The use of 0.5 to 2.5 parts by weight of ELVANOL™ polyvinyl alcohol based on 100 parts of pigment, results in a whitening effect that is significantly better than that with FWA alone. Using ELVANOL™ PVOH as carrier for optical brightening agent, the dosage of the conventional carrier like starch and casein can be reduced significantly.

COMPATABILITY

Solutions of ELVANOL™ PVOH are compatible with most of the common materials used in paper-making and with size additives such as modified starches, alginates, sodium CMC, wax emulsions and defoamers.

Sizes made from ELVANOL™ and modified starch are generally stable at room temperature with no agitation up to 24 hours before phase separation takes place.



ELVANOL™ in the Paper Industry



TYPICAL PRODUCT GRADES USED IN THE PAPER INDUSTRY

The most common grades of Kuraray ELVANOL™ polyvinyl alcohol used in the paper industry are:

ELVANOL™ 71-30

Medium viscosity, fully hydrolyzed PVOH

Uses include:

- FWA and optical brightener carrier
- Surface sizing. Controls back-side lint and surface debris
- Controls dusting and picking on high filler content papers
- Grease proofing reprographic papers
- High gloss ink printing surfaces
- Compatible with starch and CMC
- excellent film formation

ELVANOL™ 75-15

Medium to low viscosity, fully hydrolysed copolymer

Uses include:

- Higher whiteness than with FWA alone
- Excellent binding properties to reduce linting
- Superior creping aids
- High solid coatings and sizings
- Reinforcement of starch performance in paper and paper-board

ELVANOL™ 80-18

Medium viscosity, fully hydrolysed copolymer

Uses include:

- FWA and optical brightener carrier
- Superior barrier for grease-proof packaging
- High solid coatings and sizings
- Compatible with starch

ELVANOL™ 85-82

Medium viscosity, fully hydrolysed copolymer

Uses include:

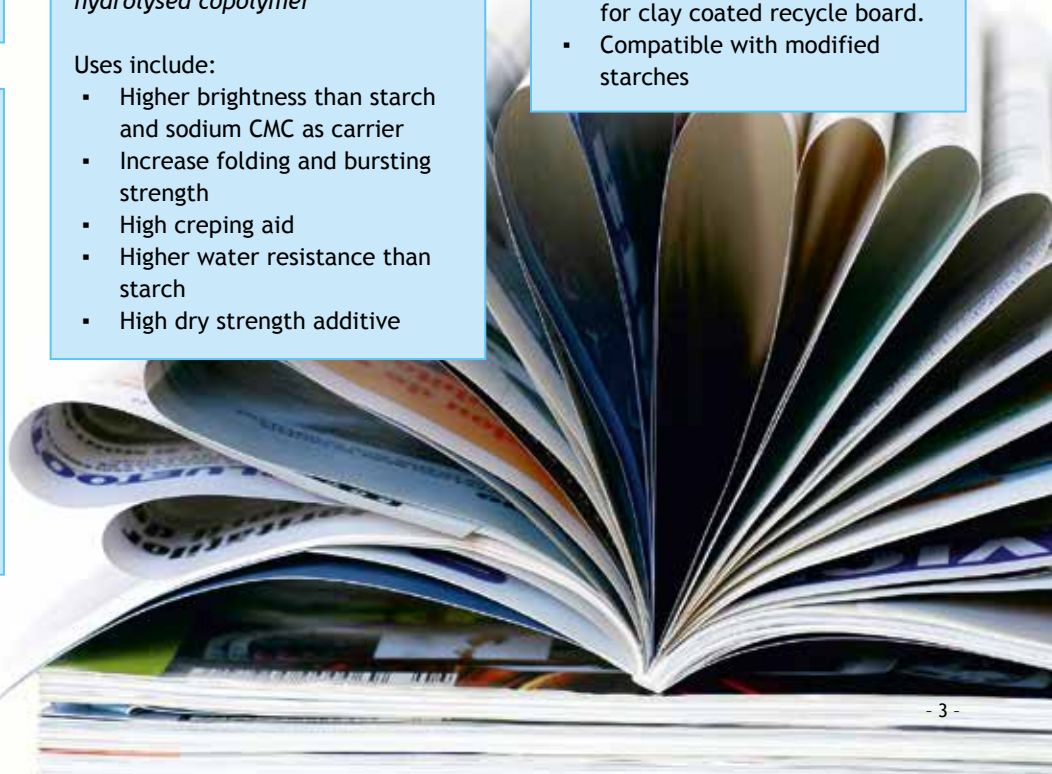
- Higher brightness than starch and sodium CMC as carrier
- Increase folding and bursting strength
- High creping aid
- Higher water resistance than starch
- High dry strength additive

ELVANOL™ 90-50

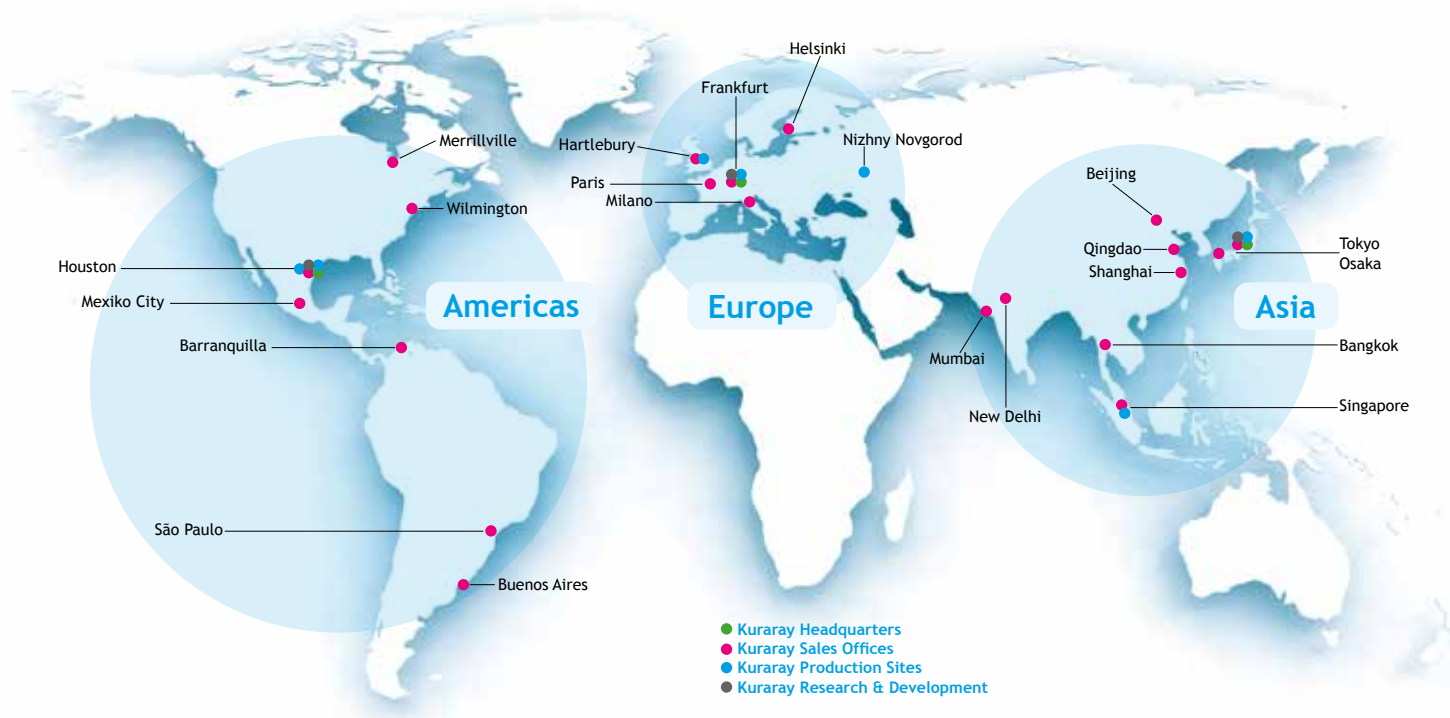
Medium-to-low viscosity, fully hydrolyzed PVOH

Uses include:

- FWA and optical brightener carrier.
- Grease and water resistance.
- Excellent coating binder.
- Combines efficient binding with excellent high shear rheology.
- Controls backside lint and surface debris.
- Provides superior holdout and coating appearance properties for clay coated recycle board.
- Compatible with modified starches



Adding value to your products - worldwide



KURARAY POVAL™, EXCEVAL™, ELVANOL™ and MOWIFLEX™ are the trademarks for polyvinyl alcohols made by Kuraray. Their key characteristics – outstanding film-forming properties and high binding strength – add real value to your products. Our polymers are water-soluble, highly reactive, crosslinkable and foamable. They have high pigment binding capacity, protective colloid characteristics and thickening effects. The physical and chemical properties of KURARAY POVAL™ make it ideal for a wide variety of applications, ranging from adhesives through paper and ceramics to packaging

films. Many of our polymers are food contact-approved and thus suitable for food applications. Ecologically KURARAY POVAL™ is advantageous due to its biodegradability and the fact that combustion does not generate residues. It is available in various particle sizes from granules to fine powders.

Kuraray produces its wide range of KURARAY POVAL™ grades in Japan, Singapore, Germany and the USA. Kuraray's global production and service network make us your partner of choice for innovative high-quality PVOH resins.

KURARAY - Here to Innovate.

Kuraray America, Inc.

2625 Bay Area Blvd.,
Suite 600 Houston, TX77058
United States of America
Phone: +1 800 423 9762
info.kuraray-poval@kuraray.com

Kuraray Europe GmbH

Philipp-Reis-Str. 4
65795 Hattersheim am Main,
Germany
Phone: +49 69 305 85 351
info.eu-poval@kuraray.com

Kuraray Asia Pacific Pte., Ltd.

250 North Bridge Road
#10-01/02 Raffles City Tower
Singapore 179101
Phone: +65 6337 4123
infopoal.sg@kuraray.com

Kuraray China Co., Ltd.

Unit 2207, 2 Grand Gateway
3 Hongqiao Road, Xuhui Dis-
trict, Shanghai 200030, China
Phone: +86 21 6119 8111
infopoal.cn@kuraray.com

Head Office:

Kuraray Co., Ltd.

Ote Center Bldg.
1-1-13, Otemachi Chiyoda-ku
Tokyo 100-8115, Japan
Phone: +81 3 67 01 1000
infopoal.jp@kuraray.com