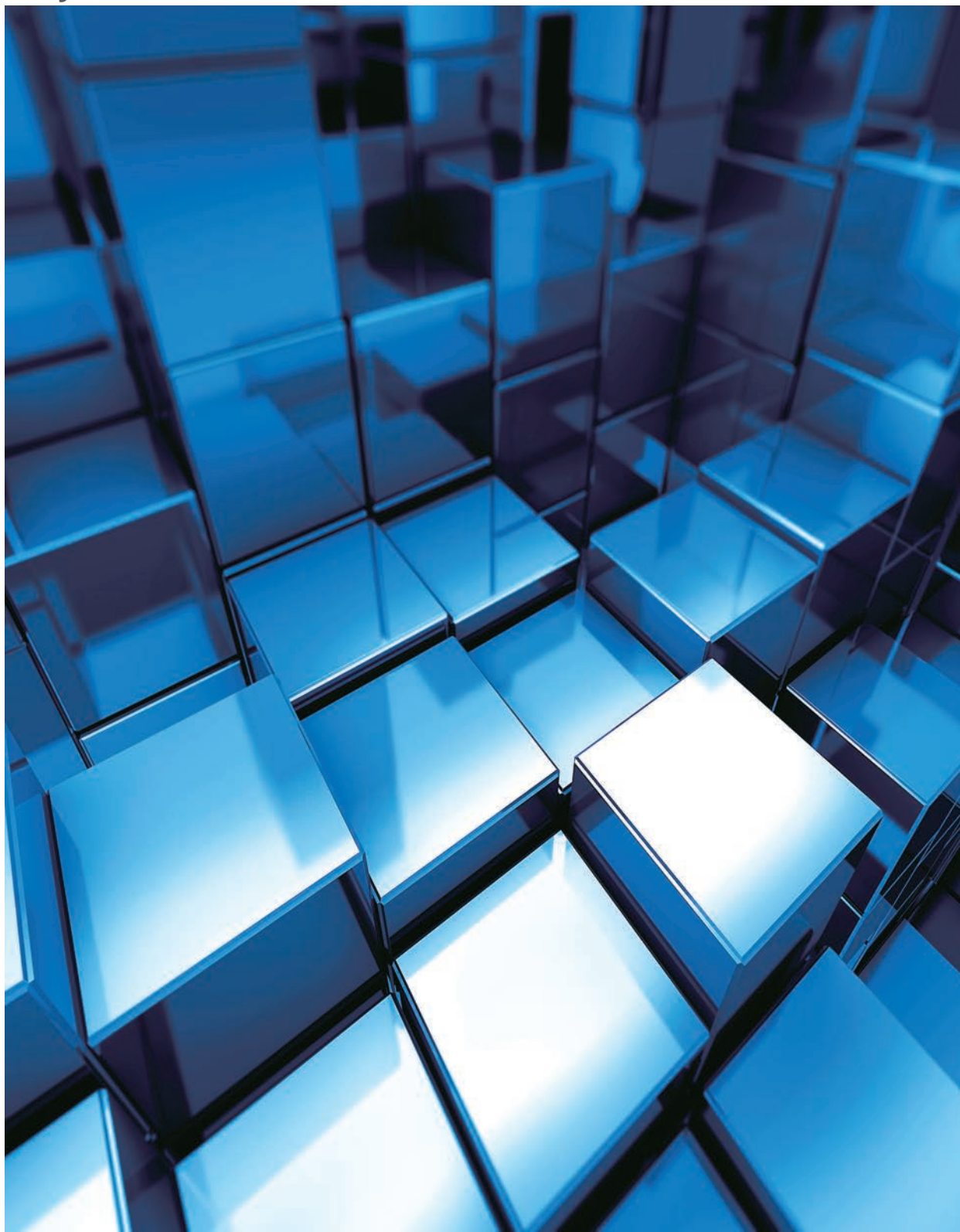




Nissin Chemical Industry Co.,Ltd.

VINYBLAN[®]

Vinyl Chloride Emulsion



VINYBLAN®

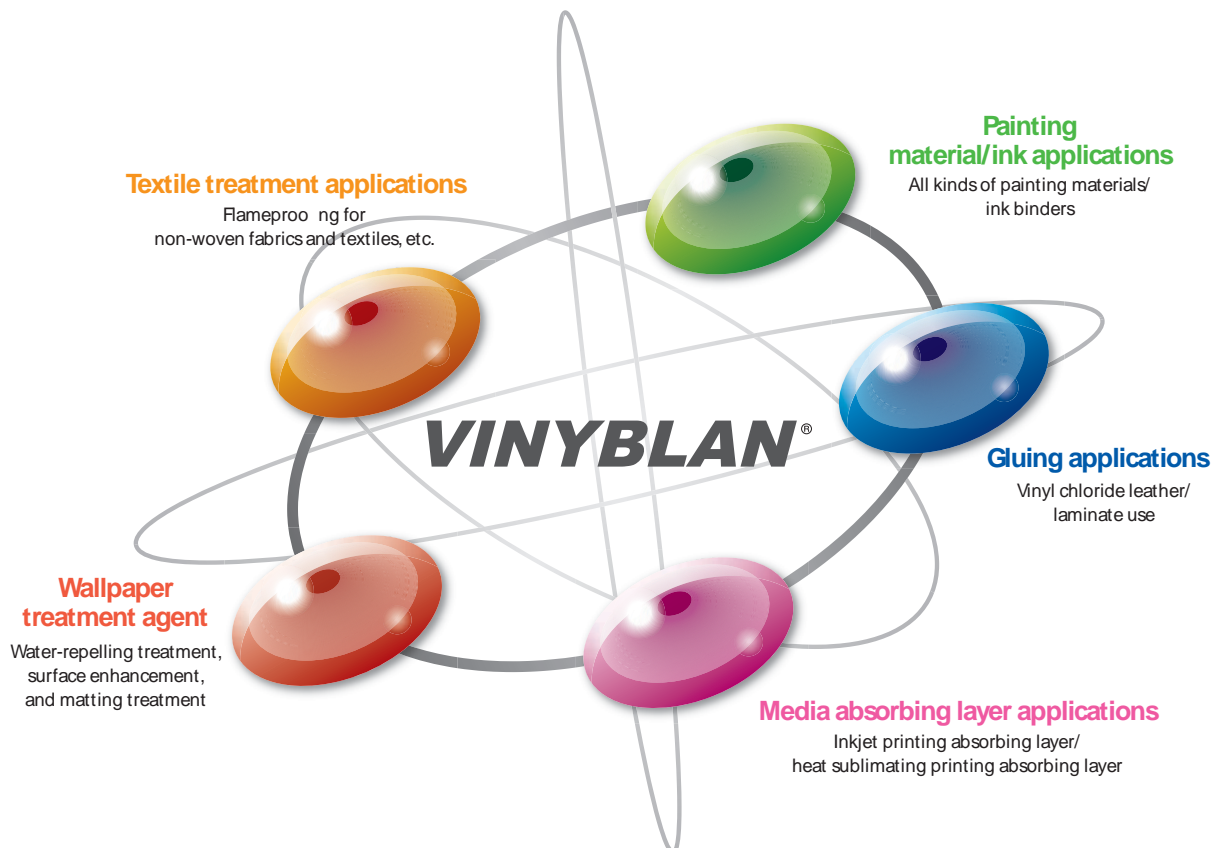
Vinyl chloride emulsion

This is a world-first, ground-breaking emulsion that has been developed using the company's unique polymerization technology. The product is extensively used and highly rated because it leverages the features of vinyl chloride to provide excellent dispersion of colorant etc., chromogenic properties and flame resistance.

Features of Vinyblan

Vinyblan is a copolymerized resin consisting of vinyl chloride with acrylic acid ester and vinyl acetate, it has the following features:

- 1) Water-based emulsion for excellent safety.
- 2) Chemical stability enables excellent miscibility with all kinds of emulsions, inorganic colorants, plasticizers.
- 3) Coats of paint are flame-resistant thanks to self-extinguishing properties.
- 4) Coats of paint have excellent resistance to plasticizer, alcohol, acid, and alkali.
- 5) Strong polarity from vinyl chloride resin, and excellent chromogenic properties when printing.



VINYBLAN basic grades

Grade	Solid Content %	Viscosity (mPa·s)	PH	Average particle size (nm)	Tg (°C)	MFT (°C)	Acid Value (KOHmg/g)
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Vinyl chloride/acrylic acid ester group emulsion products (Vinyl chloride/acrylic acid ester copolymer)

271	43	500	7.5	230	-3	0	14
278	43	200	8.5	180	33	46	5
690	54	200	8.5	200	46	60	6
902	50	300	8.5	500	60	80	9
900	40	200	7.5	330	70	Min. 80°C	6

Vinyl chloride/vinyl acetate group emulsion products (Vinyl chloride/vinyl acetate copolymer)

603	50	300	6.0	150	63	58	12
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Vinyl chloride emulsion products (Vinyl chloride copolymer)

985	37	300	6.0	70	80	Min. 80°C	5
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Vinyl chloride aqueous solution products (Vinyl chloride copolymer)

715S	25	10	7.5	90	25	0°C	8
701	30	50	7.5	30	73	Min. 80°C	46
700	30	50	7.5	30	70	Min. 80°C	57

B-type viscometer/23°C X 6rpm

Printing Material/ink binder applications

Vinyblan is used in the water-based ink field as a printing ink base for vinyl chloride materials such as wallpaper. It is highly regarded for its excellent adhesion to vinyl chloride substrates, its excellent colorant dispersion thanks to the characteristic strong polarity of vinyl chloride, and its excellent mechanical stability.

The 700 series has excellent adhesion to all kinds of substrates due to the polymerization of acrylic aqueous solution as protective colloid.

Application	Grade	Features
Vinyl chloride sheet/wallpaper ink applications	900GT	Excellent thermochromic resistance (150°CX10 minutes; no change in color when heated). Satisfactory colorant dispersion.
	603	Outstanding water resistance after film formation. (no film whitening after being submerged for 24 hours).
Painting material applications	278	Painting materials can be endowed with flame resistance.
Gravure ink Inkjet ink Paper coating	701 700	<ul style="list-style-type: none"> *Small particle Size *Produces a very transparent film *Superior water resistance/alcohol resistance film *Mixes well with alcohol thinners and retarder thinners, coating temperature can be reduced. *Excellent colorant dispersion. <small>Refer to details on pages 7-9.</small>

Media applications

By using Vinyblan surfaces can be endowed with excellent chromogenic properties.

Application	Grade	Features
Industrial IJ printing absorbing layer	278	Transparent film formation possible. (100 - 120°CX10 seconds, thickness 5 microns).
	603	High level of chromogenic properties, Superior water resistance after film formation.
Heat sublimating printing absorbing layer	701	Suppress the increase in viscosity after mixing the silica, printing surface can be endowed with outstanding chromogenic properties.

Textile treatment applications

Since the main ingredient of Vinyblan is vinyl chloride, it has excellent flame resistance and is used as a flame-resistant binder in the flame resistance finishing of all kinds of textiles/non-woven fabrics. It can be used in various methods, including spray, gravure, foaming and dipping.

Application	Grade	Features	Oxygen index number (LOI value)/	Non combustibility (MVSS standard) Coating volume 50g[mm/min]	Noncombustibility (MVSS standard) Coating volume 100g[mm/min]
Textile Non-woven fabric Fireproofing	278	Soft type	24.5	140	N
	902	Semi-hard type	25.5	70	N
	900	Hard Type, Satisfactory heat resistance (no discoloration)	27.5	60	N
	690	High solid content. Satisfactory heat resistance (no discoloration)	25.0	160	N
Fiber flame resistance	985	Highly flame-resistant. Endows all kinds of emulsions with flame resistance.	31.0	N	N

Other Textile treatment applications

Application	Grade	Features
Glass fiber treatment	603	Satisfactory adhesion to glass fiber. Gluing to vinyl chloride film is possible.
Tire cord	690	Improved durability of polyester.

Oxygen index number measurement method

Test pieces: Vinyblan 278/690/900/908/660B/985

Test piece production: Each Vinyblan is poured onto the mold of mold release paper, and items of the right size that have been dried with a desiccator (80°C - 120°C) are cut and taken as test pieces.

(Test piece size: length 10cm x width thickness 1mm).

Combustion test: LOI Standard (conforming to JIS K7201).

Flame resistance (MVSS) measurement method

Backing: 100% polyester woven fabric.

Coating volume: 50g or 100g/m² (dry)

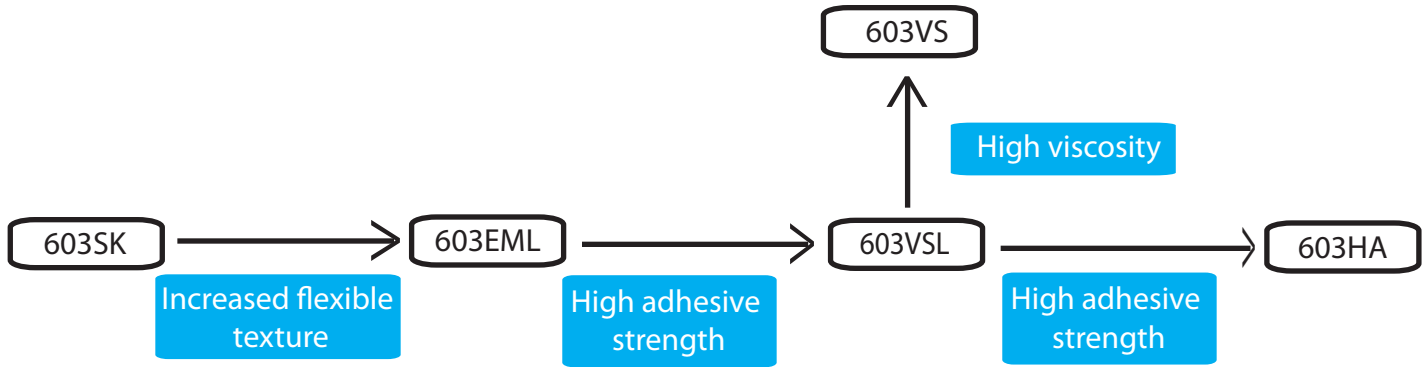
Treatment: Dipping

Drying: 130°C X 5 minutes

Flame resistance: MVSS-302 standard

Vinyl chloride leather glue applications

This heat sealing adhesive has been developed on Vinyblan, using the company's unique blend technology.



Grade	603SK	603EML	603VS	603VSL	603HA
Solid content (%)	50	50	50	50	45
Viscosity (mpa •s)	600	1000	4000	800	1000
PH	7	6	7.5	7.5	7.5

* B-type viscometer : 63°C x 6rpm

Example of vinyl chloride leather gluing:

Backing: Vinyl chloride sheet/staple fiber knitted cloth.

Coating volume: Approximately 20g/m² to side of cloth.

Drying conditions: 130° X 5 minutes.

After coating the backing with Vinyblan and drying it in accordance with the above-mentioned conditions, heat crimping is carried out from the cloth side.



Heat crimping conditions: Condition A 160-180° C x 4kg/m² x 2 seconds

Condition B 160-180° C x 4kg/m² x 10 seconds

Measurement conditions: 180° detachment by Tensilon. Average strength N=3)

Water resistance: Measured immediately after immersing in water for 20 minutes.

	Condition A			Condition B			Water-resistant adhesive strength		
	160	170	180	160	170	180	160	170	180
Heat crimp temperature (°C)	160	170	180	160	170	180	160	170	180
Solvent-type adhesive	0.6	0.9	1.9	2.8	3.9	4.9	1.6	2.3	2.6
603SK	0.8	1.2	2.4	3.6	4.9	6.2	2.0	2.8	3.5
603VS	1.5	1.8	3.0	4.5	5.6	7.0	2.8	3.2	3.8

Units: kg/3cm

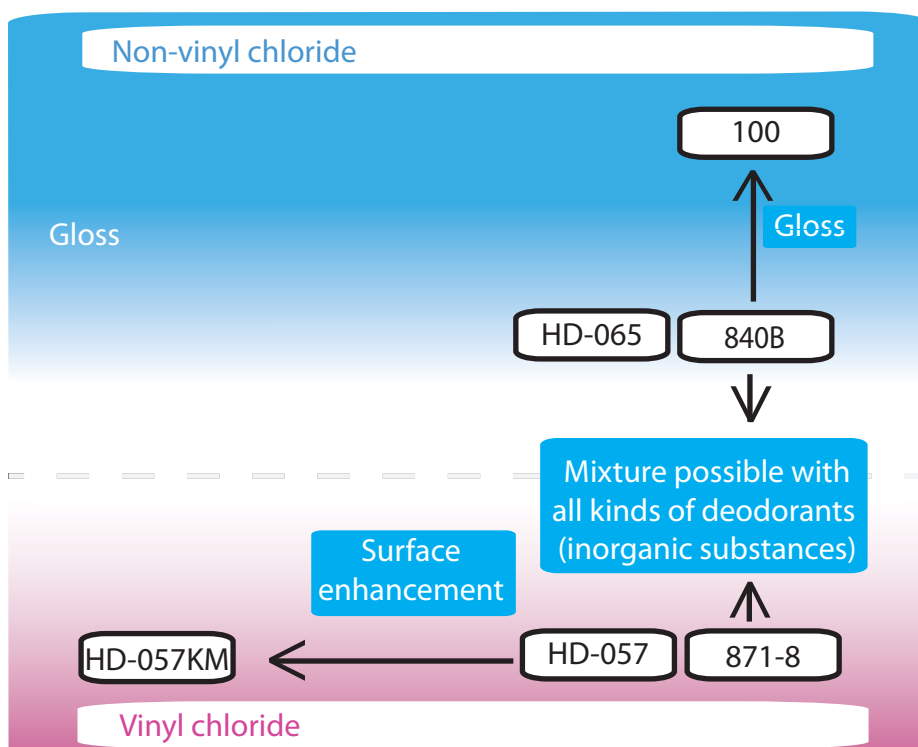
Wallpaper surface treatment applications

This wallpaper surface treatment agent has been developed based on the company's emulsions and using the company's unique blend technology.

	HD-057KM	HD-065	HD-057	840B	871-8	100
Composition	Silicone Vinyl chloride	Acrylic group	Vinyl chloride	Acrylic group	Vinyl chloride	Special acrylic group
Solid content (%)	14	11	14	19	13	28
Viscosity*1 [mPa·s]	600	500	250	400	500	200
PH	8	8	8	8	8	8
Performance	Surface enhancement	—	—	—	—	—
Glaze	Matte	Matte	Matte	Gloss	Matte	Gloss
Water resistance*2	95°	—	—	—	—	—
Remarks				Satisfactory miscibility of deodorants, etc.	Satisfactory miscibility of deodorants, etc.	Normal temperature coating

*1) B-type viscometer: 23° x 6rpm.

*2) Contact angle when fresh roll of vinyl chloride wallpaper has been sprinkled with water after coating has been dried and formed.



VINYBLAN 700 Series

The vinyblan series is a polymerized vinyl chloride emulsion that has been developed without using any emulsifier, based on the company's unique technology as a protective colloid for acrylic aqueous solutions, etc.

Features

1. Excellent water resistance since it does not use an emulsifier.
2. Normal temperature coating is possible by using alcohol as a solvent.
3. Nano-particle size enables production of films that have glossy transparency.
4. Excellent dispersion and satisfactory miscibility with colorants and/or all other kinds of additives.

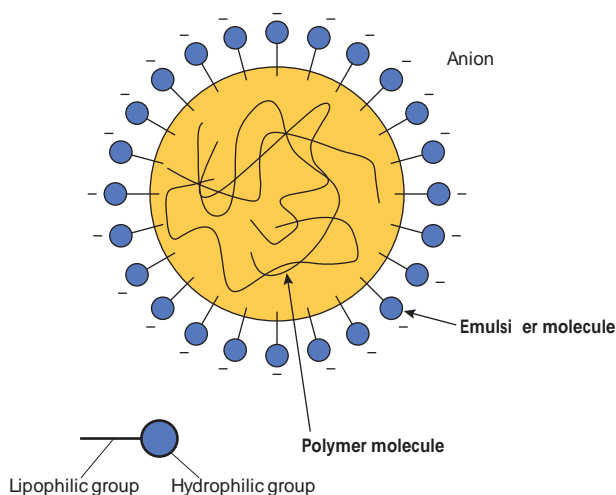


700

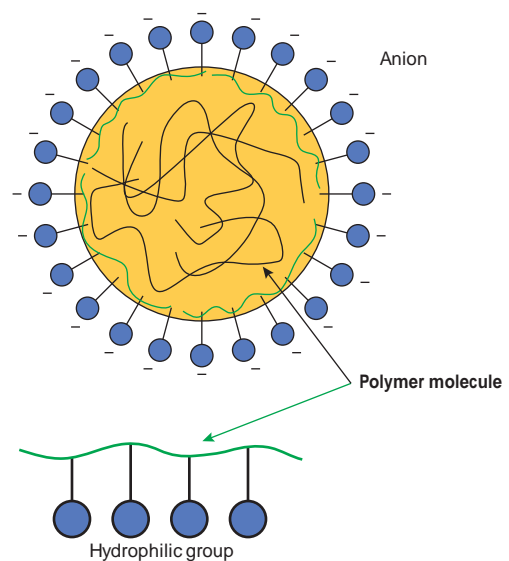
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700 series schematic diagram

Common Emulsion



700 Series



All kinds of solvent resistance tests.

Testing method

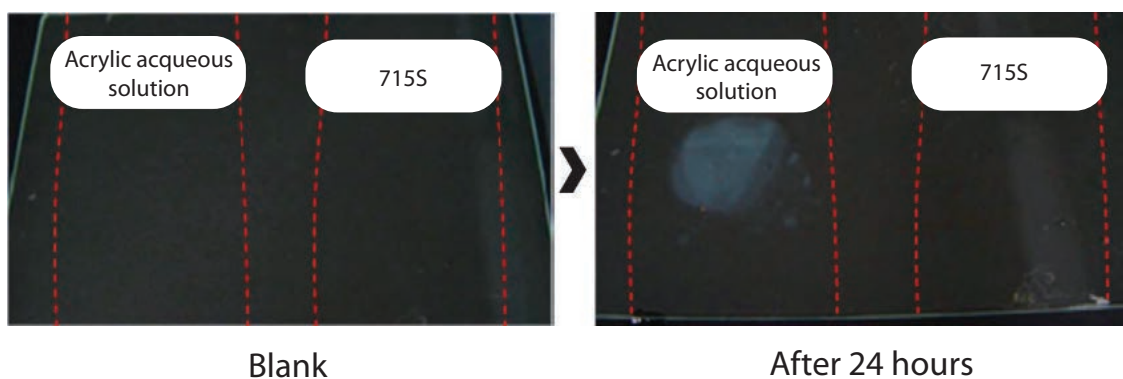
Test piece: Glass plate coated with BC#22

100°C X 5 minutes drying

Testing: Single drop of pure water/alcohol/plasticizer on film and observe state after 24 hours

	Acrylic aqueous solution	700	701	715S
Pure water	No Change	No change	No change	No change
Alcohol (methyl alcohol)	Whitening	No change	No change	No change
Reversing agent (DOP)	Swelling	No change	No change	No change

E.g., immersed in pure water



Colorant dispersion

Test sample: Adjusted with carbon black MA100 (manufactured by Mitsubishi Chemical Corporation) 20g, each Vinyblan 67g, and pure water 13g.

Miscibility: We determined whether or not the adjusted test sample and colorant would mix

Stirring conditions: Stirred with dispar at 2000 rpm x 30 minutes

O: Mixed without thickening

Δ: Mixed but thickened

X: Did not mix, and aggregate was produced

Dispersion: Precipitation was determined by the following criteria.

O: No precipitation

X: Gel

	Acrylic aqueous solution	700	701	715S
Miscibility	X	O	O	O
Dispersion	X	O	O	O

Adhesion to various substrates

Testing method

Mixture: Vinyblan: IPA: Diethylene glycol n Butyl ether: Water=20:15:15:50

Coat with Bar Coater No.6 on each substrate Dried: 60°C x 1 min.

Gluing properties: Tape peeling test

Abrasion resistance: Rubbing test was carried out using gauze (load 200g, repeated 30 times).

Water resistance friction property: Rubbing test was carried out using gauze dipped in water (load 200g, repeated 30 times).

Alcohol resistance: Rubbing test was carried out using gauze dipped in IPA (load 200g, repeated 30 times).

Water resistance: The coated substrate is submerged in water at normal temperatures and allowed to soak for one hour, then conditions are observed.

		Acrylic aqueous solution	700	701	715S
PET	Gluing properties	Δ~O	O	O	O
	Abrasion resistance	Δ	O	O	O
	Water resistance friction property	Δ	Δ	Δ~O	O
	Alcohol resistance	X	Δ	Δ~O	O
	Water resistance	Δ	O	O	O
PVC	Gluing properties	Δ~O	O	O	O
	Abrasion resistance	Δ	O	O	O
	Water resistance friction property	Δ	Δ	Δ~O	O
	Alcohol resistance	X	Δ~O	O	O
	Water resistance	Δ	O	O	O
Aluminum	Gluing properties	O	O	O	O
	Abrasion resistance	Δ~O	O	O	O
	Water resistance friction property	Δ~O	O	O	O
	Alcohol resistance		Δ	Δ~O	O
	Water resistance	Δ~O	O	O	O

O: No change Δ: Partially peeling or Slightly Whitening X: Peeling or Whitening

Solvent miscibility

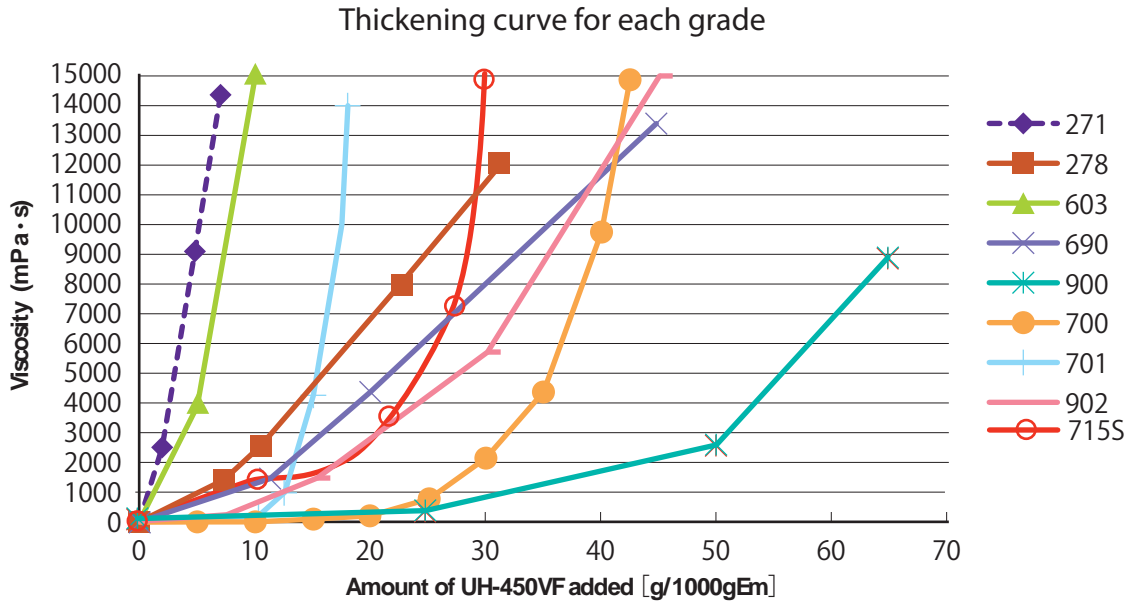
Mixing ratio: VINYBLAN, water and solvent in the proportion 7: 5: 2.

Solvent	700	701	715S
Methanol / Isopropanol	O	O	O
Diethylene glycol / Triethylene glycol	O	O	Δ~X
Diethylene glycol mono n-butyl ether	Δ~X (O)	Δ~X (O)	O
2-pyrrolidone / N-methyl pyrrolidone	O	O	O
Triethylene glycol mono-n-butyl ether	O	O	O
1.5 Pentane diol	O	O	O
MEK	O	Δ	Δ
MIBK	Δ	X	X

O: Mixture possible Δ: Viscosity increasing X: Gelatin

Adjustment of viscosity.

Testing method: Thickener: Adekanol UH-450VF (manufactured by ADEKA, Inc.)
 Gluing properties: All kinds of emulsions are added, and measurements are taken at 23°C/6rpm (BM-type viscometer)



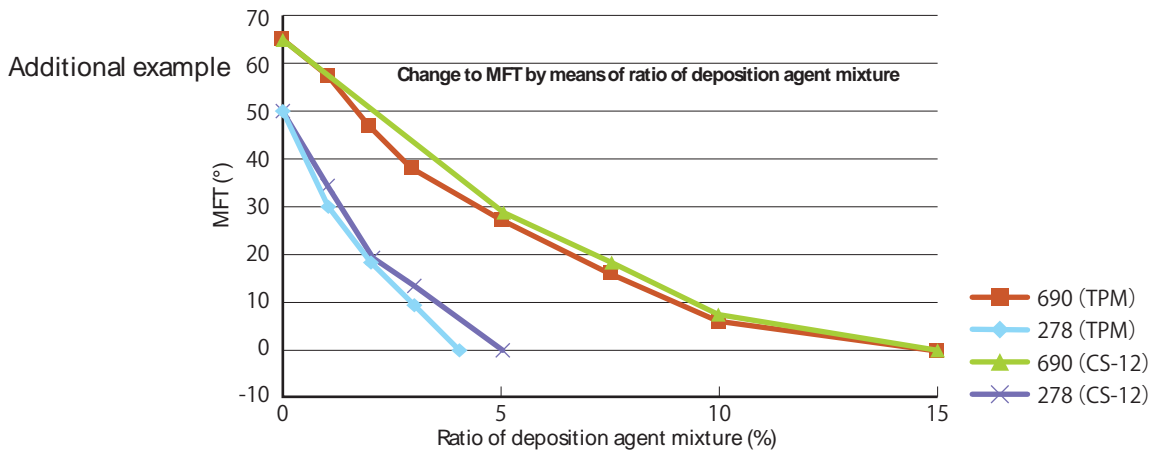
Adjustment of MFT (Minimum Film Temperature)

Miscibility with the high-boiling point solvent and VINYBLAN

	TPG/PG	TPM	CS-12	DPNB/TPNB	DPNB:TPM =1:1	700:DPNB =1:1*	All kinds of phthalate acid plasticizers
271							
278	O	O	Δ	X	O	O	Δ
603							
690							
900	O	O	Δ	Δ	O	O	Δ
902							
985	O	O	X	X	O	O	X

O: Mixture possible Δ: Mixture possible with increased stirring X: Gelatin

Water-soluble high-boiling point solvent can be mixed. Even high-boiling point solvents that are not water-soluble can be mixed with water-soluble high-boiling point solvent or Vinyblan 700.



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