Nissin Chemical Industry Co.,Ltd.

For more information about SOLBIN please contact :

Sales headquarters
Shin Otemachi Building,2-2-1 Otemachi, Chiyoda-ku, Tokyo, Japan
TEL.+81-3-6262-0276(main) FAX.+81-3-6262-0277

Main office and factory
2-17-33 Kitago, Echizen, Fukui Prefecture
TEL.+81-778-22-5100(main) FAX.+81-778-24-0657

Nissin Chemical Industry Shanghai Co.,Ltd. 〈100% owned subsidiary〉
Grand Cru Room 50, 5F GIFCⅡ,1438 Hongqiao Road, Shanghai 201103 P.R.China
TEL.+86-21-6197-6251 FAX.+86-21-6197-6210

Website https://www.nissin-chem.co.jp/english/

SOLBIN

English

https://www.nissin-chem.co.jp/english/products/0003/

Informational video about SOLBIN:

English

https://www.nissin-chem.co.jp/english/products_movie/

WARNING

- Please follow the instructions on the Safety Data Sheet and Technical Data Sheet.
- These products are for industrial use only.
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Nissin Chemical Industry Co.,Ltd.

SOLBIN

Vinyl Chloride-Vinyl Acetate Based Copolymer

SOLBIN

Vinyl Chloride-Vinyl Acetate Based Copolymer

Copolymer resin with characteristics of vinyl chloride and vinyl acetate

SOLBIN is a modified resin that combines the toughness and chemical resistance of vinyl chloride, strong adhesiveness and plasticity of vinyl acetate, and other polar groups that enhance adhesivity and solubility.
Due to its many outstanding characteristics, including it's film lack of odor or taste and high resistance to water penetration, SOLBIN has been used as an essential part of various paints, inks, and adhesives. as a binder for magnetic cards and tapes, and as a coating agent for soft drink cans and moisture-proof cellophanes.

INDEX

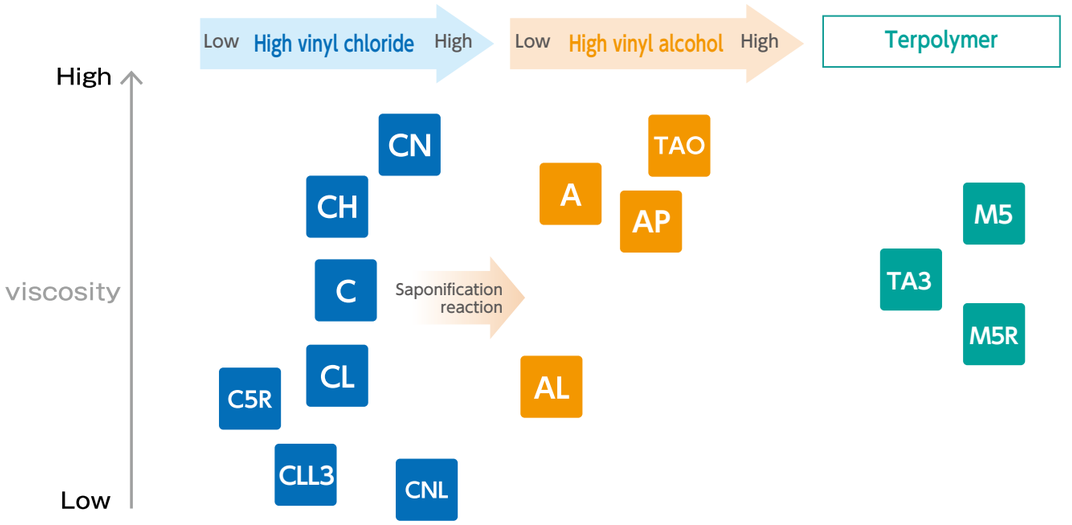
Shin-Etsu
Nissin Chemical Industry Co.,Ltd.

Characteristics of SOLBIN

SOLBIN is a copolymer resin prepared from vinyl chloride and vinyl acetate in addition to other elements, and has the following characteristics:

1. It dissolves in organic solvents such as ketone and ester.
2. It forms an odorless, tasteless, and transparent film.
3. It is highly resistant to chemicals such as acids, alkalis, and salt water.
4. It forms a coating film highly resistant to water.
5. It is highly compatible with other resins such as urethane and melamine resins.
6. Its coating films are thermoplastic and heat-sealable.
7. Its coating films are fire-retardant and self-extinguishing.
8. Products with hydrophilic groups favorably disperse inorganic pigments such as magnetic powder.
9. Products with hydroxyl groups react with isocyanate to form cross-links.

Grade diagram of SOLBIN



SOLBIN

Product Types

Nissin Chemical Industry Co.,Ltd.

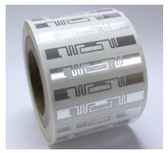
Application list

Coating & Paint

Strong chemical resistance, water resistance allows SOLBIN to be used in various fields of coating/painting.
SOLBIN can also be added into printing media's receiving layer (including Media for Solution-type Ink Jet Ink, and Thermal Sublimation Media).
It can help significantly improve the absorption of ink which leads to better color density and resolution.

Printing ink

SOLBIN has excellent pigment dispersibility and good color developability for ink.
It also has excellent re-dissolubility during printing and is suitable for continuous printing and high speed printing with various printing methods.



Adhesive

SOLBIN coating films are thermoplastic and heat-sealable.
It can be wildly used as a binder in PVC resin based products. The dicarboxylic acid type (SOLBIN M series) also strongly adheres to metals and aluminum.

Grade		Coating & Paint								
		Ink jet printing paper & film	Heat transfer paper & film	Wood coating	Can coating	Marine paint	Strippable paint	Magnetic card	UV curable Coating and Paint	Video, audio and data storage tape
C series	C		●		●					
	CL		●		●				●	
	CLL3									
	CH						●		●	
	CN		●				●			
	CNL									
	C5R	●							●	
A series	A			●	●	●		●		
	AP								●	
	AL			●	●	●		●	●	
	TAO									●
TA3,M series	TA3	●		●					●	●
	M5				●					
	M5R				●					

Grade		Printing Ink						Adhesive			
		Gravure printing ink	Screen painting ink	Ink jet printing ink	Pigment preparation	Electrically conductive paste. & ink	Carbon dispersion	Adhesive or Primer for aluminum	Adhesive or Primer for metal	Adhesive for PVC	Heat seal lacquer
C series	C	●	●		●					●	●
	CL	●	●	●	●						●
	CLL3			●							
	CH	●	●							●	
	CN	●	●							●	
	CNL	●	●								
	C5R	●		●							●
A series	A	●	●		●	●					●
	AP	●									
	AL	●	●		●	●					●
	TAO	●				●	●				
TA3,M series	TA3	●	●	●		●					
	M5	●	●	●				●	●	●	●
	M5R	●	●					●	●	●	●

SOLBIN

Properties of SOLBIN

Nissin Chemical Industry Co.,Ltd.

Properties table

Grade		Composition			Acid value	Hydroxyl value	Degreeof polymerization	K-value (calculated value)	Molecular weight			Glass transition temperature (Tg)	Viscosity *2	Median size	Density		Features	Grade
		VC	VAc	Other *1					Mw	Mn	Mw/Mn				Bulk density	Absolute density		
		% by weight			mg KOH/g	mg KOH/g	—	—	(×10⁴)	(×10⁴)	—	℃	mPa·s	μm	g/cm³			
C series	C	87	13	—	—	—	420	48	7.5	3.6	2.1	70	150	130	0.8	1.31	Standard grade of bipolymer	C
	CL	86	14	—	—	—	300	42	5.0	2.5	2.0	68	60	160	0.7	1.31	Low viscosity type, good solubility	CL
	CLL3	83	17	—	—	—	260	39	3.7	1.4	2.6	66	30	170	0.7	1.31	Specialized type for inkjet	CLL3
	CH	86	14	—	—	—	650	57	9.5	5.0	1.9	70	700	90	0.6	1.31	High viscosity type, good heat resistance / weather resistance	CH
	CN	89	11	—	—	—	750	60	9.9	4.2	2.4	73	40 *3	110	0.5	1.32	High vinyl chloride content type, high viscosity, high coating film strength	CN
	CNL	90	10	—	—	—	200	33	3.5	1.6	2.2	69	30	90	0.7	1.31	Low viscosity type of CN, good solubility	CNL
	C5R	79	21	—	—	—	350	45	5.8	2.6	2.2	64	60	100	0.6	1.25	Specialized type in solubility and flexibility	C5R
A series	A	92	3	5	—	70	420	48	7.3	3.5	2.1	74	220	150	0.7	1.32	Standard grade of saponified type, good compatibility with various resins	A
	AP	92.5	1	6.5	—	83	430	49	8.2	2.9	2.8	75	210	140	0.7	1.32	High vinyl alcohol content type	AP
	AL	92.5	2.5	5	—	64	300	42	5.3	2.7	1.9	74	70	130	0.7	1.31	Low viscosity type	AL
	TAO	91	2	7	—	89	360	45	4.6	2.0	2.3	76	230	150	0.7	1.29	Good dispersibility in pigments and magnetic powder	TAO
TA3,M series	TA3	83	4	13	—	56	350	45	6.4	3.2	2.0	64	80	190	0.7	1.29	Low viscosity type with good pigment dispersibility / thermal stability	TA3
	M5	85	14	1	5.8	—	430	49	6.9	3.3	2.1	70	130	150	0.7	1.31	Good adhesion to metal and aluminum	M5
	M5R	77	22	1	8.7	—	390	47	7.7	3.2	2.4	64	70	110	0.5	1.25	M5 with high vinyl acetate content, good heat sealability at low temperatures	M5R

*1 Composition Other : A-series vinyl alcohol, TA3 Hydroxyalkyl acrylate, M-series dicarboxylic acid

Note : The values in the table are representative values, nor standard values.

*2 Viscosity : Resin concentration 20wt%, Solvent MIBK/toluene=1/1, Measured by type B viscometer(25℃)

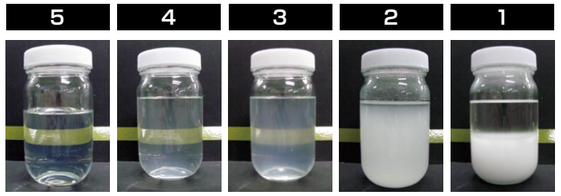
*3 Resin concentration 10wt%

SOLBIN

Properties of SOLBIN

Nissin Chemical Industry Co.,Ltd.

Solubility in organic solvent



Dissolution conditions: solid content 20 wt%, solvent 50°C x 1 hr.
Haze measurement conditions: After dissolution, 25° C x 1 hr, measured in 50 mm cell
*1: Solid content 10 wt%.
*2: Dissolved in ethyl acetate at 50° C for 2 hrs, followed by addition of IPA, and stirred at 50° C for 1 hr.

Solvent	CAS No.	Boiling point (℃)	C series							A series				TA3,M series		
			C	CL	CLL3	CH※1	CN※1	CNL	C5R	A	AP	AL	TAO	TA3	M5	M5R
Alcohol																
Methanol	67-56-1	64	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Isopropanol	67-63-0	82	1	1	1	1	1	1	1	1	1	1	1	1	1	1
n-butanol	71-36-3	117	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ketone																
Acetone	67-64-1	56	5	5	5	5	5	5	5	4	3	4	5	5	5	5
Methyl ethyl ketone	78-93-3	79	5	5	5	5	5	5	5	4	4	5	5	5	5	5
Methyl isobutyl ketone	108-10-1	116	5	5	5	5	5	4	5	4	5	5	5	5	5	5
Cyclohexanone	108-94-1	80	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Isophorone	78-59-1	213	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ether																
Tetrahydrofuran	109-99-9	66	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Glycol ether																
Ethylene glycol monomethyl ether	109-86-4	124	2	2	2	1	1	2	4	2	2	3	3	3	2	2
Ethylene glycol monoethyl ether	110-80-5	135	2	2	2	1	1	2	2	2	2	3	2	2	2	2
Ethylene glycol monobutyl ether	111-76-2	170	1	1	2	1	1	1	1	2	2	2	1	2	1	2
Diethylene glycol n-butyl ether	112-34-5	230	2	2	2	1	1	2	2	2	2	2	2	2	2	2
Dipropylene glycol methyl ether	34590-94-8	190	2	2	2	1	1	2	2	2	2	2	2	2	2	2
Propylene glycol 1-monomethyl ether	107-98-2	120	2	2	2	1	1	2	2	2	2	2	2	2	2	2

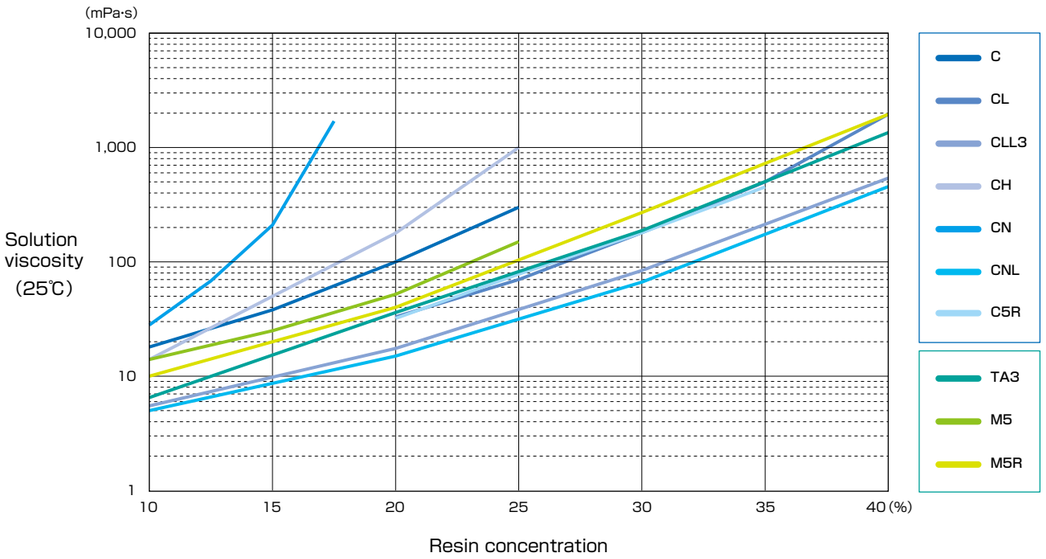
Score		Criteria	Conclusion
5	Soluble	Haze value 0～25%	Can be used by itself.
4	Mostly soluble	Haze value 26～40%	Can be used by itself. but transparency is further improved by mixing with score 5 solvents.
3	Partially soluble	Haze value 41～100%	Diffi cult to use it by itself. However, by mixing in score 4 or 5 solvents as well as lowering Solbin content can improve its solubility.
2	Swell	Swell (Including white turbidity)	Diffi cult to use it by itself. but can be used by lowering the solid content or by mixing with score 5 solvents.
1	Insoluble	Insoluble	Insoluble Cannot be used by itself. Solvents with a score of 5 or higher must be mixed at a ratio of 90% or higher for dissolution.

Solvent	CAS No.	Boiling point (℃)	C series							A series				TA3,M series		
			C	CL	CLL3	CH※1	CN※1	CNL	C5R	A	AP	AL	TAO	TA3	M5	M5R
Aromatic																
Toluene	108-88-3	110	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Xylene	1330-20-7	140	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Linear hydrocarbon																
T-SOL 100		147-182	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ester																
Methyl acetate	79-20-9	57	5	5	5	5	4	3	5	3	3	3	4	5	5	4
Ethyl acetate	141-78-6	77	5	5	5	5	5	3	5	3	5	4	4	5	5	4
Propyl acetate	109-60-4	101	5	5	5	5	5	3	5	3	4	4	5	5	5	5
Butyl acetate	123-86-4	126	5	5	5	5	5	3	5	3	4	4	5	5	5	5
Ethylene glycol monoethyl ether acetate	111-15-9	156	2	3	3	3	2	3	5	2	2	3	3	5	2	4
Ethylene glycol mono n-butyl ether acetate	112-07-2	192	3	3	2	3	2	3	5	2	2	3	3	5	2	3
Diethylene glycol monoethyl ether acetate	112-15-2	220	3	3	2	3	2	3	5	2	2	3	3	3	2	3
Propylene glycol methyl ether acetate	108-65-6	146	2	3	5	5	3	3	5	3	3	3	2	5	2	5
γ-butyrolactone	96-48-0	204	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Diisodecyl phthalate	26761-40-0	253	1	3	2	1	1	2	2	2	2	2	1	1	2	2
Diisononyl phthalate	28553-12-0	244	1	2	2	1	1	2	2	2	2	2	1	2	2	2
Chlorinated hydrocarbon																
Ethylene chloride	107-06-2	84	5	5	5	5	5	5	5	3	3	3	4	5	3	3
Other																
Ethyl acetate/Isopropanol = 8/2 mix ※2			5	5	5	5	3	3	5	3	3	5	5	5	5	5

Solution viscosity

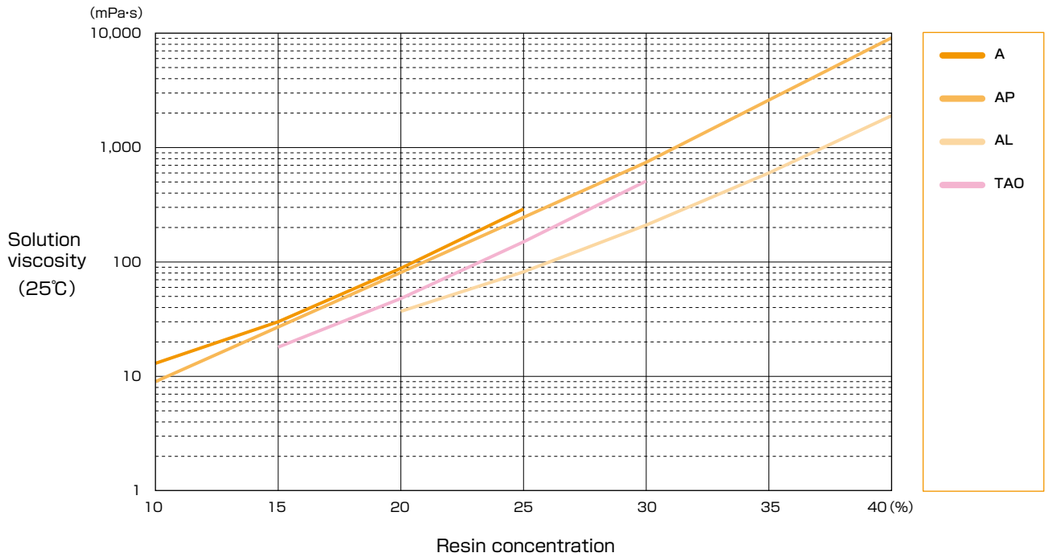
Solution viscosity with methyl ethyl ketone

C series / TA3,M series



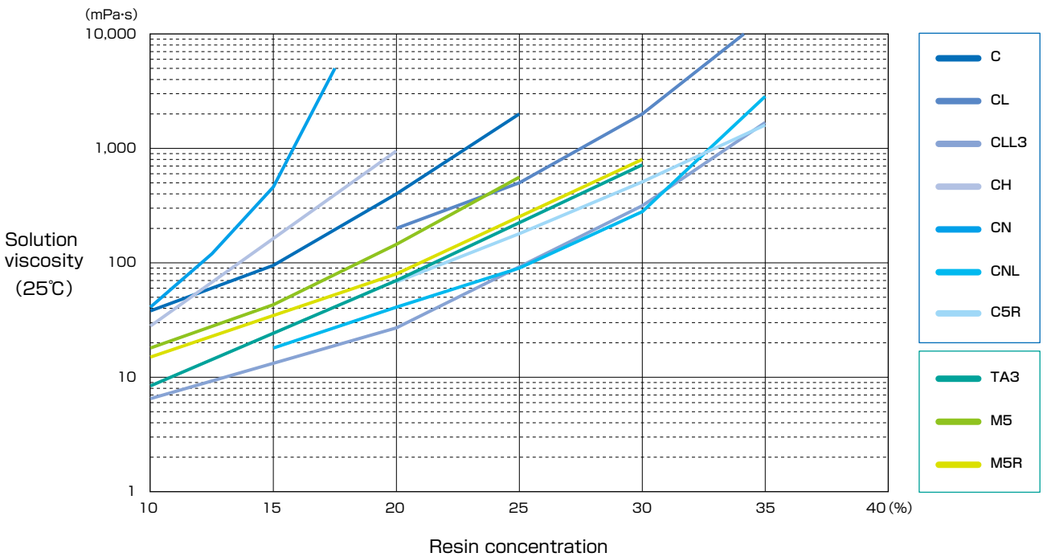
Solution viscosity with methyl ethyl ketone

A series



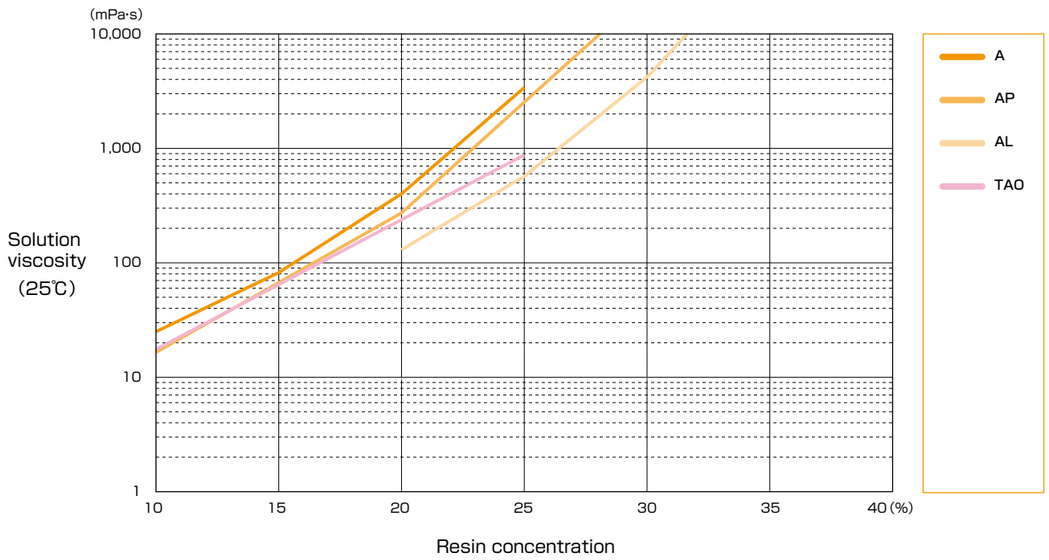
Solution viscosity with ethyl acetate

C series / TA3,M series



Solution viscosity with ethyl acetate

A series



SOLBIN

Properties of SOLBIN

Shin-Etsu
Nissin Chemical Industry Co.,Ltd.

Various resistances

Item	Chemical	Temperature	Immersion time	C	A	TA3	M5
Acid resistance	10% HNO_3	23°C	168 hrs	●	●	●	●
Alkali resistance	10% NaOH	23°C	168 hrs	●	●	●	●
Hot water resistance	Pure water	77°C	45 min	●	▲	●	●
Alcohol resistance	65% ethanol water	23°C	168 hrs	●	●	●	●
Water resistance	Pure water	23°C	168 hrs	●	●	●	●
Saltwater resistance	5% artificial seawater	23°C	168 hrs	●	●	●	●

Coating film resistance condition

Measurement method :
After immersing SOLBIN coating films under each condition, check for whitening of the coating films.

Coating film creation conditions

Dissolution conditions : 20 wt% MEK 50° C x 45 min
Coating conditions : Applicator 6 mil (wet-30 μm)
Drying condition : 120° C x 30 min
After drying, coating film is peeled off and immersed under various conditions.

Criteria		
● No change : ○	▲ Slightly whitened : △	✕ Whitened : ×
		

Base material adhesion

Property evaluation conditions

Measurement method : Tape peeling test

Coating film creation conditions

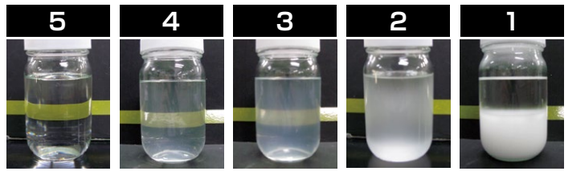
Dissolution conditions : 20 wt% MIBK/TOL 50°C x 45 min
Coating conditions : Bar coater No. 22(wet film 50.3 micron, dry film = 10.1 g/m^2)
Drying conditions : 50°C x 1 hr

Criteria	
● No peeling : ○	✕ Partially peeled off : ×
Tape application position ⟷ 	Tape application position ⟷ 

Base material	C	A	TA3	M5
Polyvinyl chloride	●	●	●	●
Polyethylene terephthalate	●	●	●	●
Acrylonitrile Butadiene Styrene	●	●	●	●
Aluminium	✕	✕	✕	●
Steel(SUS−304)	✕	✕	✕	●
Polycarbonate	●	●	●	●

Base material	C	A	TA3	M5
Glass	✕	●	✕	●
Polyvinylidene chloride	●	●	●	●
Polymethyl methacrylate	●	●	●	●
Mortar	✕	●	●	●
Craft Paper	●	●	●	●
Wood	●	●	●	●

Compatibility with other resins



Score		Criteria
5	Soluble	Haze value 0-25%
4	Mostly soluble	Haze value 26-40%
3	Partially soluble	Haze value 41-100%
2	Swell	Swell (Including white turbidity)
1	Insoluble	Insoluble

Conditions : Dissolving conditions : Solid content 20 wt%, solvent MIBK/Toluene = 1/1, dissolved at 50° C x 1 hr.
Compatibility condition : SOLBIN solution and resin solution are mixed 1:1 and stirred thoroughly.
Haze measurement conditions : After dissolution, sample is allowed to stand at 25° C x 1 hr and measured in a 50 mm cell.
*9 : Solid content 10 wt%, SOLBIN : resin = 7:3

Resins		Chemical Characterization	C	A	TA3	M5
Alkyd resins						
ALUKIDIR 1334-EL	∗1	Medium to long oil alkyd resin	2	5	2	2
ALUKIDIR 1307-60-EL	∗1	Short oil alkyd resin	2	5	5	2
Melamine resins						
AMIDIR P-138	∗1	Butylated urea resin	5	5	5	5
AMIDIR G-821-60	∗1	Butylated melamine resin	5	5	5	5
AMIDIR TD-126	∗1	Butylated benzoguanamine resin	5	5	5	5
Epoxy resins						
JER 828	∗2	Medium viscosity liquid bisphenol A/epichlorohydrin epoxy rein	5	5	5	5
JER 1001	∗2	Solid bisphenol A/epichlorohydrin epoxy resin	5	5	5	5
Urethane resins						
NIPPOLAN 3124	∗3	Solution type polyurethane resin	5	5	5	5
TA24-530E	∗4	Butylated melamine resin	5	5	5	5
TA24-548A	∗4	Butylated melamine resin	5	5	5	5
Acryl resins						
DEGALAN P24	∗5	Polyacrylate resin based on n-buthylmethacrylate and methylmethacrylate	5	5	5	5
DEGALAN PM555	∗5	Organic dispersion of copolymers based on methacrylacidester and olefi nes	5	5	5	5
Dianal BR-87	∗6	Polyacrylate resin based on methylmethacrylate	5	5	5	5
Dianal BR-113	∗6	Polyacrylate resin based on methylmethacrylate	5	5	5	5
Joncryl 819	∗7	Carboxyl acrylic resin	2	5	5	2
EVA						
EVAFLEX 40LX *9	∗8	Ethylene-vinyl acetate copolymer	3	5	3	3
EVAFLEX 45LX *9	∗8	Ethylene-vinyl acetate copolymer	5	4	5	4

∗1 : DIC Corporation ∗2 : Mitsubishi Chemical Corporation ∗3 : Tosoh Corporation ∗4 : Showa Denko Materials Co., Ltd. ∗5 : Evonik Industries AG
∗6 : Mitsubishi Chemical Corporation ∗7 : BASF SE ∗8 : Dow-Mitsui Polychemicals Co., Ltd.

SOLBIN

Properties of SOLBIN

Nissin Chemical Industry Co.,Ltd.

Ink color developability

Addition of SOLBIN reduces unevenness in application and is expected to produce a uniform coating film with good color developability.

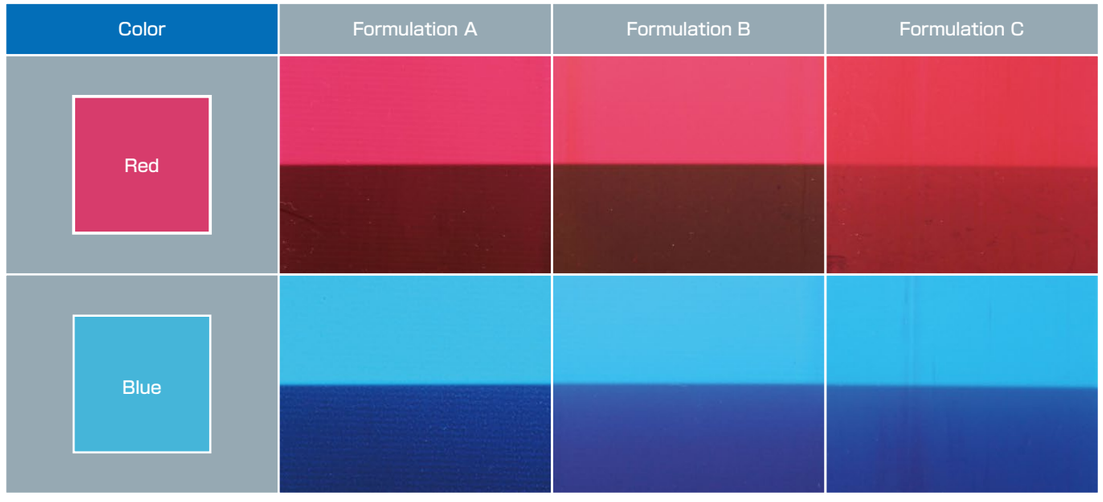
Example of ink formulation

SOLBIN AP is soluble in eco-friendly weak solvents and exhibits good color developability.

Ingredients	Mixing ratio (wt%)		
	Formulation A	Formulation B	Formulation C
Pigment	10	10	10
Ethyl acetate	59	59	59
Isopropyl alcohol	25	25	25
SOLBIN AP	6	2	0
Urethane resin	0	4	6

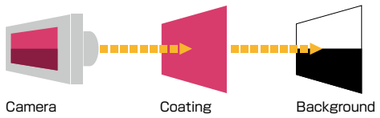
Ink color developability of coating film

The coating film, which has excellent coloring properties, is vivid and transparent without making the background cloudy.



Photography conditions

The camera, coating film, and background (black-and-white paper) were placed at intervals and photographs were taken.
Color development was confirmed by the appearance of the boundary between white and black.

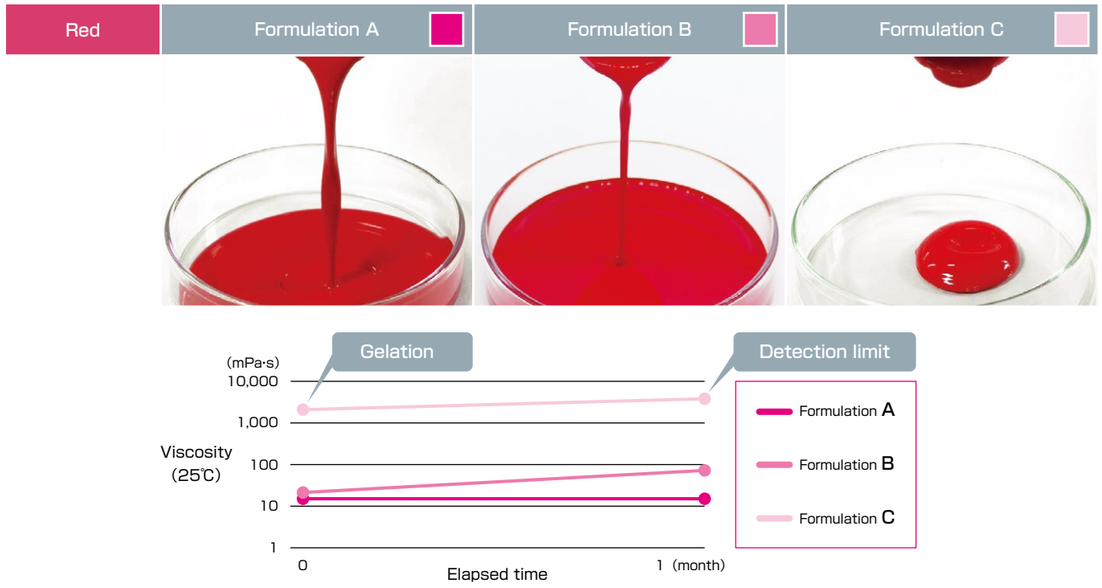


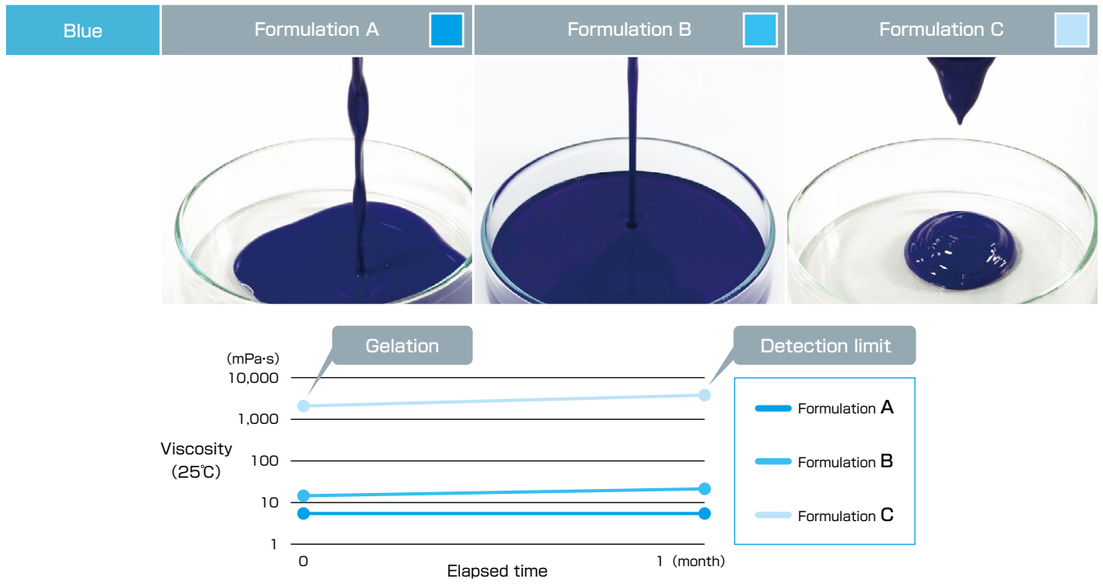
Coating film creation conditions

Coating process : No. 3 bar coater
Base material : PET
Drying : Air-drying

Ink fluidity and stability over time

SOLBIN prevents pigment agglomeration and is expected to provide long-term storage of inks.





SOLBIN

Special functional grade introduction

Nissin Chemical Industry Co.,Ltd.

SOLBIN CLL3

Specialized type for inkjet

SOLBIN CLL3 is a grade with excellent solubility in eco-solvents in addition to the pigment dispersion characteristics of PVC.

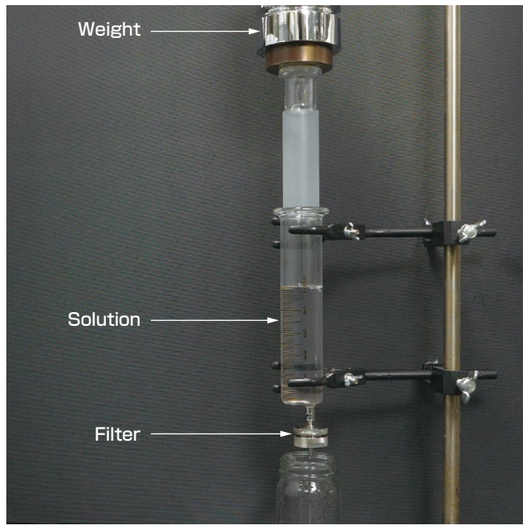
Filter passability

SOLBIN CLL3 is suitable for use in fields where filter clogging is a serious concern, as it can pass through the filter stably without clogging, even with eco solvents.

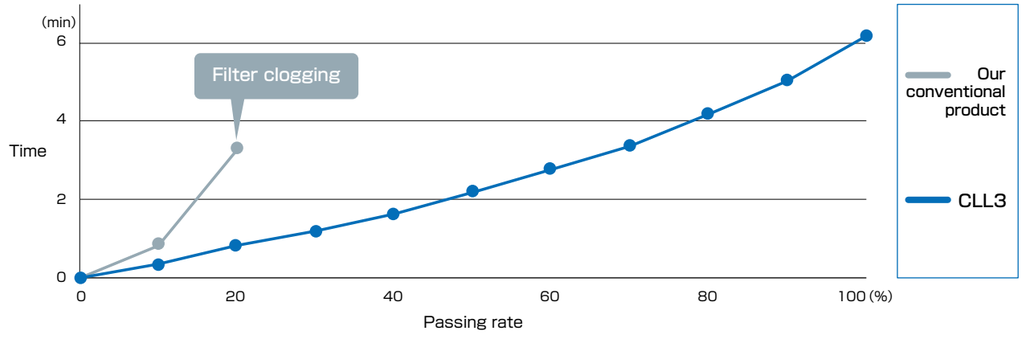
Evaluation method	Time for 100 mL of solution to pass through the filter is measured.
Filter pore size	1μm
Load	4kgf
Solution temperature	25℃

Dissolution condition	
Solid content	5wt%
Solvent	DEGEME CAS No. 1002-67-1
Temperature	60℃ × 2hr

Measurement filter



Filter passability (1μm)



SOLBIN M5&M5R

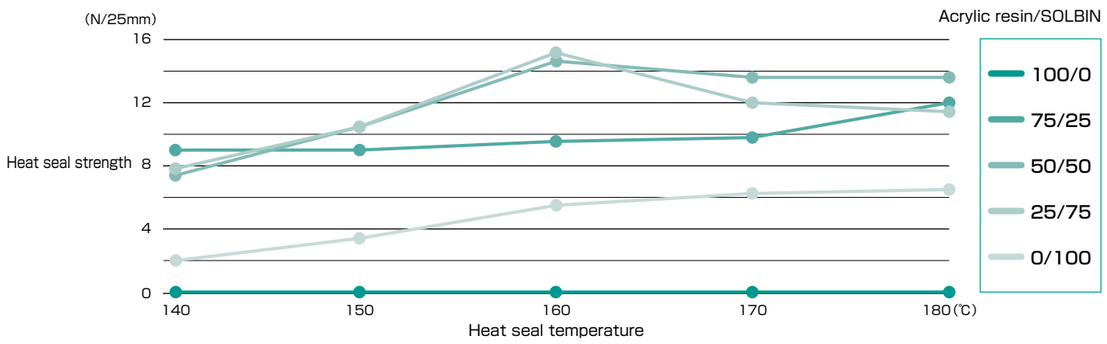
Metal adhesion type

SOLBIN is a thermoplastic resin that exhibits heat-sealing properties.
SOLBIN M5 & M5R containing acid groups are also expected to adhere to metals such as aluminum foil.

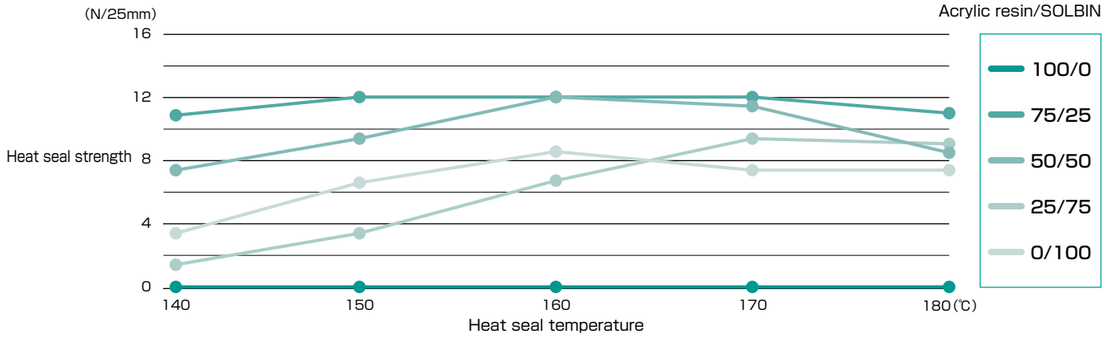
Heat seal strength of M-series/acrylic resin combination system

Measurement conditions			
Dissolution	20wt%MEK	Heat seal	Temperature x 0.25 MPa x 0.5 s
Base material	Alu(aluminum foil) : 1N30 0 (0.030mm) Polyvinyl chloride : VSS1202	Resin	SOLBIN M5, M5R Acrylic resin : Dianal BR-117(Mitsubishi Chemical)
Application	Bar coater #8 dry 3.6g/m^2	Strength unit	N/25mm
Drying	180℃ x 30s	Peeling conditions	T type 200 mm/min

M5 Alu-PVC Heat seal strength



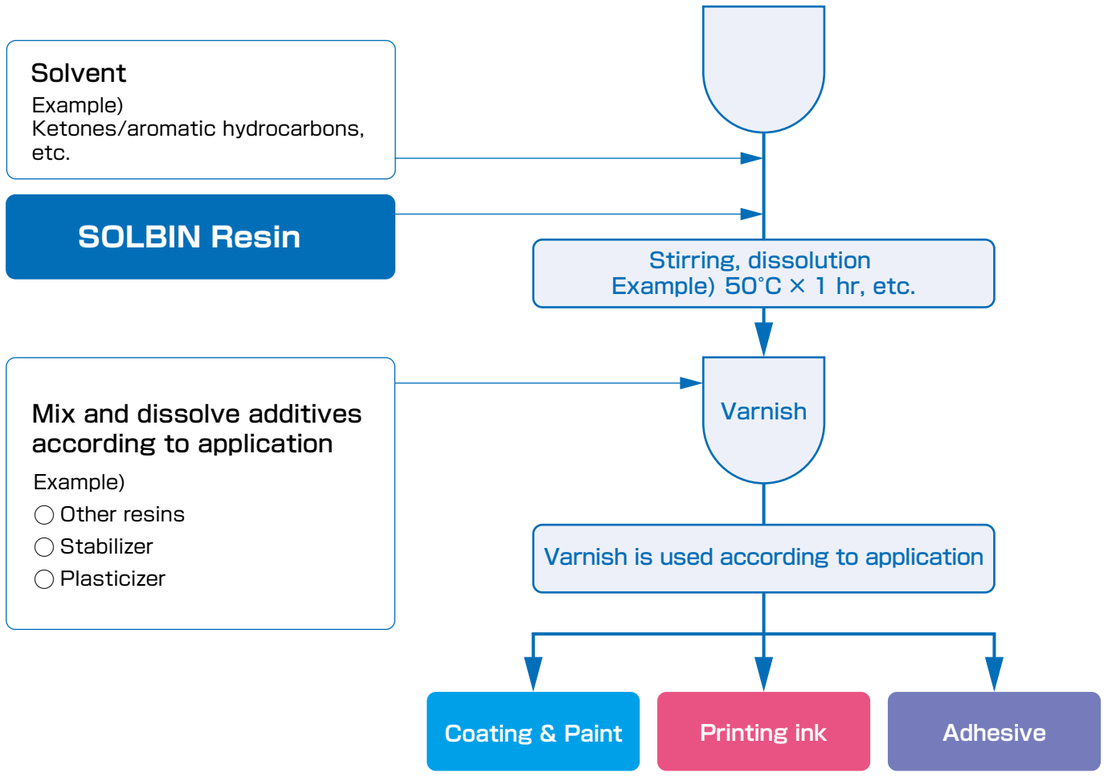
M5R Alu-PVC Heat seal strength



SOLBIN

Common applications of SOLBIN

Varnish preparation



Representative stabilizers used with SOLBIN

Base	Trade name
Tin	TVS #8102*1, TVS #8831*1, TVS #8813*1, ADK STAB 465E*2, ADK STAB OT-9*2
Metal salt	ADK STAB SC-308E*2, ADK STAB AC-290*2, ADK STAB AC-285*2
Epoxy	JER 828*3, JER 834*3, ADK CIZER O-130P*2, ADK CIZER O-180A*2

*1 : Nitto Kasei Co.Ltd.　*2 : ADEKA CORPORATION　*3 : MITSUBISHI CHEMICAL CORPORATION

SOLBIN