

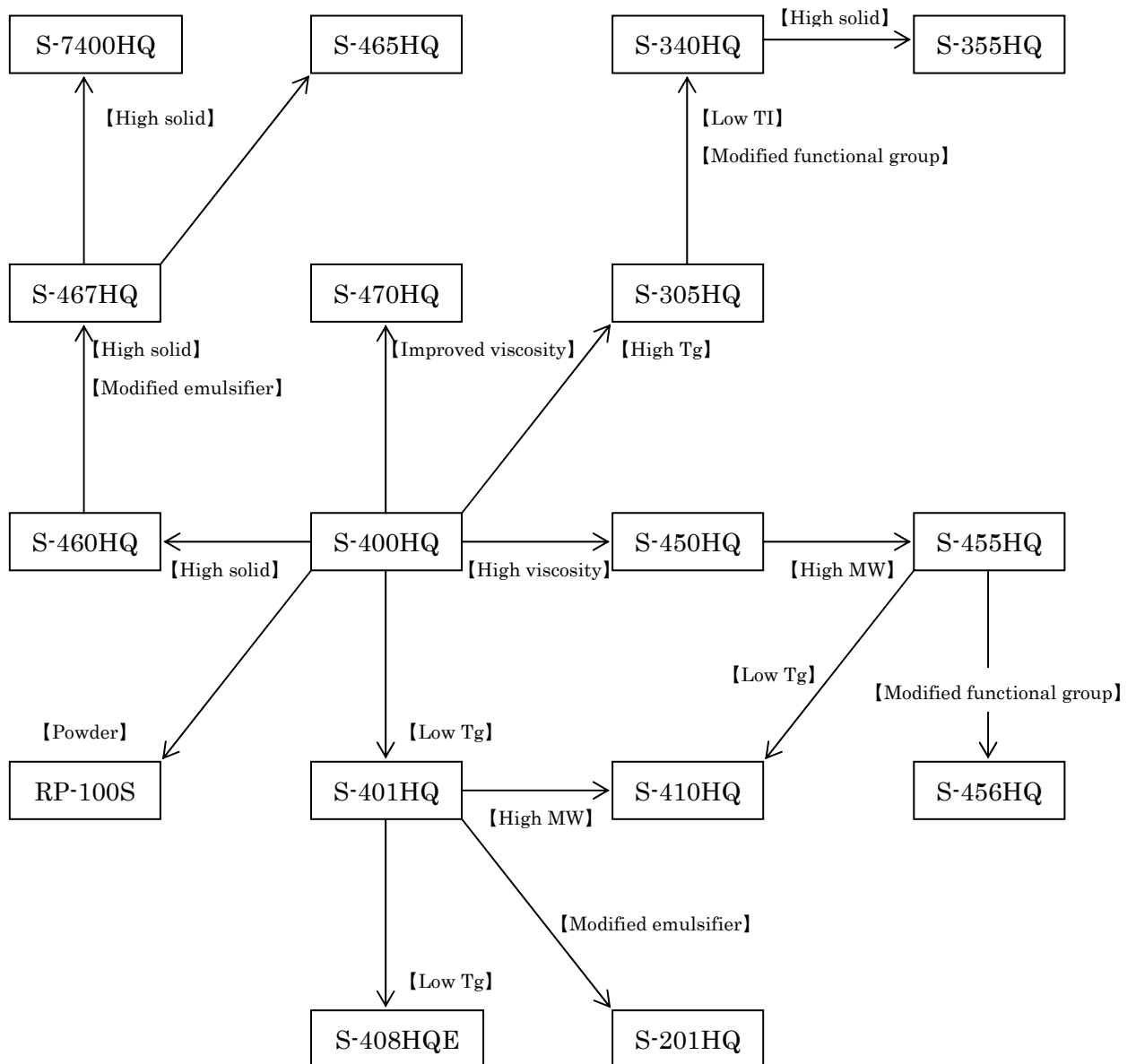
## Sumikaflex 400HQ

Type:	Ethylene-Vinyl acetate Copolymer Emulsion																																					
Properties:	Sumikaflex 400HQ emulsion is a representative grade of ethylene-vinyl acetate copolymer emulsion, which is used in wide variety of applications. The feature is excellent for adhesives, creep resistance, water and alkali resistance and mortar mixture.																																					
Main application:	Adhesives for all Construction and wood Paper container and craft Paintings																																					
Physical properties:	<table><tr><td>Appearance</td><td></td><td>Milky white</td></tr><tr><td>Solid</td><td>(%)</td><td>55 ± 1</td></tr><tr><td>Viscosity</td><td>(mPa·s)</td><td>1100 – 1600</td></tr><tr><td>pH</td><td></td><td>4 – 7</td></tr><tr><td>Ave. Particle size</td><td>(μm)</td><td>0.7</td></tr><tr><td>Density</td><td>(g/cm<sup>3</sup>)</td><td>1.07</td></tr><tr><td>MFT</td><td>(°C)</td><td>0</td></tr><tr><td>Particle charge</td><td></td><td>Nonionic</td></tr><tr><td>Machine stability</td><td></td><td>Good</td></tr><tr><td>Tg</td><td>(°C)</td><td>0</td></tr><tr><td>Film strength</td><td>(MPa)</td><td>12.7</td></tr><tr><td>Film elongation</td><td>(%)</td><td>550</td></tr></table>		Appearance		Milky white	Solid	(%)	55 ± 1	Viscosity	(mPa·s)	1100 – 1600	pH		4 – 7	Ave. Particle size	(μm)	0.7	Density	(g/cm <sup>3</sup> )	1.07	MFT	(°C)	0	Particle charge		Nonionic	Machine stability		Good	Tg	(°C)	0	Film strength	(MPa)	12.7	Film elongation	(%)	550
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## < Technical Information of Sumikaflex 400HQ >

### 1. Grade positioning

#### Basic grades of Sumikaflex 400HQ series



## 2. Emulsion properties

	S-400HQ
Appearance	Milky white
Solid content (%)	55 ± 1
Viscosity (mPa·s)	1100 – 1600
pH	4 – 7
Ave. particle size (μm)	0.7
Density (g/cm <sup>3</sup> )	1.07
MFT (°C)	0
Particle charge	Nonionic
Mechanical stability	Good
Tg (°C)	0

## 3. Film properties

### (1) Film tensile strength

Item		S-400HQ
Dry	Elongation (%)	550
	Strength (MPa)	12.7
Wet	Elongation (%)	600
	Strength (MPa)	3.3

### Test method

Film thickness : 0.15 mm

(Film forming condition and aging: 23°C × 65%RH × 7 days)

Shape of film : Dumbbell No.3

Dry film strength : 23°C × 65%RH, measured after dried for 7 days

Wet film strength : Dipped film in water for 24 hr at 23°C, measured at wet condition

Measurement speed : 500 mm/min

### (2) Film water-drop test

	S-400HQ
Whitening time (min.)	2

### Test method

Foam film (thickness is 0.15 mm) on the slide glass at room temperature. The slide glass is on the 8 point Chinese character of newspaper. Measure the time till that character can't be read when puts one drop of water on the film.

(3) Water and alkali resistance of film

		S-400HQ
Water resistance	Elusion (%)	5
	Absorption (%)	16
Alkali resistance	Elusion (%)	9
	Absorption (%)	20

Test method

Thickness of film: 0.15 mm

Water resistance: Dipped film in water for 4 days at 23°C

Alkali liquid of resistance: Dipped film in 1 N of NaOH for 4 days at 23°C

#### 4. Applications

##### (1) Application of wood working and construction usages

###### 1) Application of mortar enhancement adhesives

(Application of performing paints and construction method)

		S-400HQ	Blank (No primer)
Adhesion (MPa)	Dry*1	2.6(A to B)	0.4 (D)
	Wet*2	2.0 (A to B)	0.9(C to D)

\*1 : air-dried: 4 weeks

\*2 : air-dried: 2 weeks → under water: 2 weeks

##### Evaluation method

Mortar plate: ISO standard ( $7 \times 7 \times 2$  cm)

Coating mortar:

Formulation: Cements/Sand No.5 /Sand No.7 = 500/500/500 g

W/C = 53%

Physical property: Flow value = 167 cm, Limited volume mass = 2.13

##### < Setup method of base material >

The mortar plate is polished and cleaned. The concentrated emulsion of 15% is spread on the mortar plate. The emulsion mass is 150 g/m<sup>2</sup>. It was stood for 1 day at room temperature.

##### < Mortar stamped >

Spread fresh mortar on the mortar plate (Size:  $4 \times 4 \times 1$  cm), then stood for 2 days in the humidity air and at room temperature.

##### < Cure >

After stamped, cured for two days in a humidified air, and then cured in air-dried state (23°C×65%).

##### < Measurement of adhesion >

Measured adhesion in accordance with JIS A1171

Destruction state– A: Spread mortar broken

B: Upper 50% of spread mortar broken

C: A part of spread mortar broken

D: Adhesive failure

2) Application of mortar admixture usages

(Application of admixture and construction method)

	S-400HQ	
	P/C = 5%	P/C = 10%
W/C (%)	70	65
Mortar density (kg/L)	1.99	1.96
Air content (%)	7.7	9.1
Flow value	168	161
Bending strength (MPa)	6.2	6.8
Compress strength (MPa)	53.0	52.0
Adhesion strength (MPa)	1.5 A	1.6 A
Water adsorption (%)	9.8	7.2
Water permeability (g)	9.2	5.1
Dimension stability (%)	0.083	0.090

Test method: Accordance with JIS A 6203 “cement admixture dispersion”

Strength adhesion: broken state – A...Base board broken

(2) Application of adhesion usage

1) Comparative adhesive specification of Sumikaflex 400HQ and vinyl acetate homo emulsion

Material A	S-400HQ	Vinyl acetate homo emulsion
PVC film	Excellent	Bad
Nylon film	Excellent	Bad
PET film	Good	Bad
PP film	Good	Bad
PE film	Bad	Bad
PVDC film	Excellent	Bad
Aluminum	Excellent	Good
Cellophane.	Good	Usual
Poly urethane foam	Excellent	Bad

Polypropylene film is contacted with corona treatment

## 2) Initial adhesion

	S-400HQ
Set time (sec)	22

Emulsion is applied to linerboard (basis weight: 200 g/m<sup>2</sup>) for 3 mils by wet. Immediately, laminate quality paper (basis weight: 90 g/m<sup>2</sup>), perform 180° delaminating quickly, measure the time when 100% paper broken.

### 1) Adhesion of various base materials

		S-400HQ
Dry (N/25 mm)	PET	0.7
	OPP	0.8
Wet (N/25 mm)	PET	0.2
	OPP	0.8

Perform the application of cloth (cotton broadcloth#40) for 100 g/m<sup>2</sup> then adhesive for various base materials. Dry over 4 days in condition of 23°C × 65%RH. Perform the 180° delaminating test (tension speed: 200 mm/min) as is dry test, but as for wet test, keep wetting state after 24 hr exposure in water.

### 2) Adhesion of vinyl chloride plywood

		S-400HQ
Dry strength	(N/25 mm)	49
Wet strength	(N/25 mm)	15
Heat resistance creep	(mm/hr)	40

### Test method

PVC sheet: Half semi rigid PVC sheet

Plywood: Lauan Type I 3 ply 3mm thick

Formulation: Emulsion / toluene = 100 / 6

Coating weight: Wet 130 g/m<sup>2</sup>

Clamping: 50 kg/30cm × 30cm, 20 hours (23°C × 65%RH)

Aging: 6 days after clamping (23°C × 65%RH)

Dry strength: Peel 100 mm/min of 180° angle

Wet strength: after in the water for 20 hours, peel 100 mm/min of 180° angle

Heat resistance creep: Measure the lamination distance in condition of 60°C, 90° angle and 500 g weight.

### 3) Cloth/cloth adhesion

	S-400HQ
Dry strength (N/25 mm)	43
Wet strength (N/25 mm)	5
Heat resistance creep (mm/hr)	14

#### Test method

Textile: Cotton #40

Application:

Coating: emulsion of 40% solid % diluted is applied for 100 g/m<sup>2</sup>, dried for 80°C × 10 min. After dried, perform application of straight emulsion for 100 g/m<sup>2</sup>.

Lamination: Laminate soon after coated and pressed by hand roller

Clamping: 2 kg/15 cm × 15 cm for 20 hours (23°C × 65%RH)

Aging: 7 days after clamping (23°C × 65%RH)

Original adhesive strength: Peel 200 mm/min of at 180° angle

Wet strength: after in the water for 20 hours, peel 200 mm/min at 180° angle

80°C creep: Measure the delaminating distance in condition of 80°C, 500 g weight of T-junction.