SUMIKAFLEX 400HQ

Type:	Ethylene-Vinyl acetate Copolymer Emulsion
Properties:	SUMIKAFLEX 400HQ (S-400HQ) emulsion is a representative grade of ethylene-vinyl acetate copolymer emulsion, which is used in a wide variety of applications. Its feature is excellent for adhesives, creep resistance, water and alkali resistance and mortar mixture.
Main application:	Adhesives for all Construction and wood Paper containers and crafts Painting

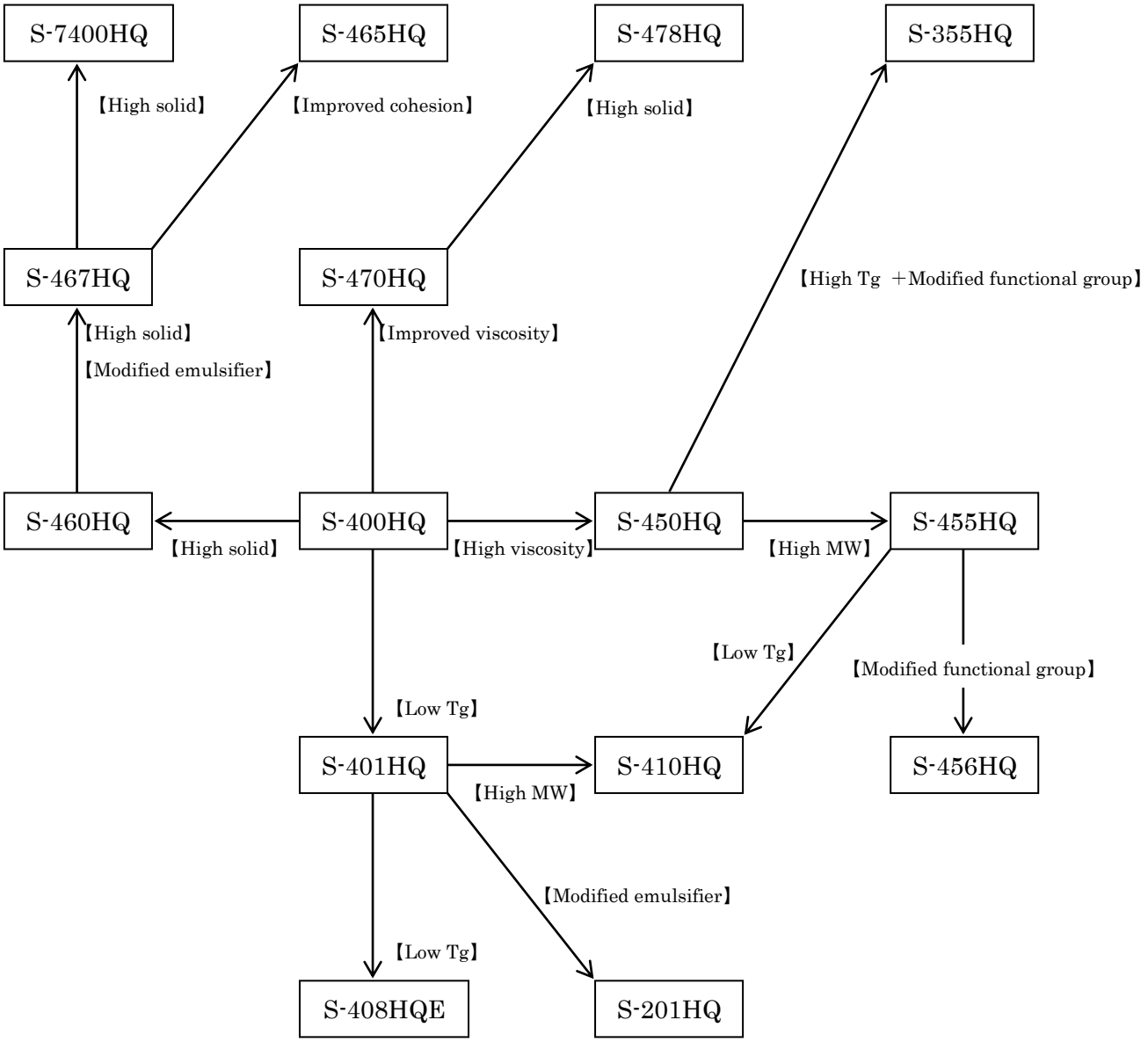
Physical properties:

Appearance		Milky white
Solid content	(%)	55 ± 1
Viscosity	(mPa·s)	1100 – 1600
pH		4 – 7
Ave. Particle size	(μm)	0.7
Density	(g/cm^3)	1.07
MFT	(°C)	0
Particle charge		Nonionic
Machine stability		Good
Tg	(°C)	0
Tensile strength	(MPa)	12.7
Tensile elongation	(%)	550

< Technical Information of SUMIKAFLEX 400HQ >

1. Grade positioning

Basic grades of SUMIKAFLEX 400HQ series



2. Emulsion properties

		S-400HQ
Appearance		Milky white
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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 hours 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 of 0.15 mm) on the slide glass at room temperature. The slide glass is placed on the 8-point Chinese character in a newspaper. Measure

the time until that character cannot be read be read when one drop of water is placed 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 resistance: Dipped film in 1 N NaOH solution 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 × 7 × 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 at 15% is spread on the mortar plate. The emulsion mass is 150 g/m^2. It is left for 1 day at room temperature.

< Mortar stamped >

Spread fresh mortar on the mortar plate (Size: 4 × 4 × 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%RH).

< 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 homopolymer emulsion

Material A	S-400HQ	Vinyl acetate homopolymer 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^2) at 3 mils wet thickness.
Immediately, laminate quality paper (basis weight: 90 g/m^2), perform 180° delaminating quickly, and measure the time until 100% paper is broken.

3) 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) at 100 g/m^2 with adhesive for various base materials. Dry for 4 days under the condition of 23°C × 65%RH. Perform the 180° delaminating test (tension speed: 200 mm/min) as a dry test, but for wet test, keep the cloth in a wet state after 24 hours exposure to water.

4) 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^2

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

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

Dry strength: Peel at 100 mm/min at a 180° angle

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

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

5) 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 content diluted is applied at 100 g/m^2, dried at 80°C × 10 min. After dried, perform application of straight emulsion at 100 g/m^2.

Lamination: Laminate soon after coating and press 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 at 200 mm/min of at a 180° angle

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

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