Technical data

Silica for Waterborne Paints

Nipsil® WE Series

Tosoh Silica Corporation
2020/12/18

1. Preface

Tosoh Silica presents its WE series of Nipsil silica, a fine particle type silica with excellent dispersibility for use in matting agents for waterborne paints.

Our Nipsil specialty silica is widely used as a matting agent for paints, but in waterborne paints, especially in O/W emulsion paints, silica particles aggregate and are unable to sufficiently disperse. Moreover, the aggregate silica remain in the coating film.

To counter this issue, Tosoh Silica developed its WE series using unique technology that controls the wettability between silica and waterborne paint, enabling uniform dispersion in a short time. By blending the WE series, a smooth matte coating film can be obtained.

Nipsil is the registered trademark of Tosoh Silica Corporation.

2. WE Series: Physical Properties

< Characteristics >

WE-1011 (fine particle type)	Excellent smoothness and transparency in high-grade coatings for plastics, woodworking, and interior building materials.
WE-170 (medium particle type)	Excellent matte performance in thick film coatings for metals and building materials.

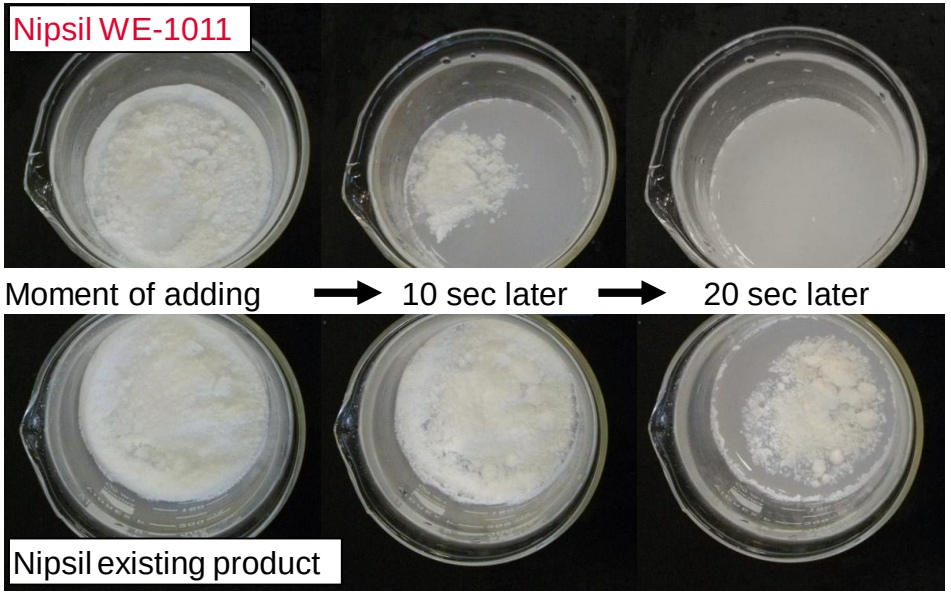
< Physical Properties> * Not guaranteed values

Properties	unit	WE-1011	WE-170	Testing Method
Moisture	%	3.5	3.5	105˚C × 2hr
pH	-	6.5	7.0	4% Susp.
Specific Gravity	g/mL	0.12	0.20	JIS K 6200
Specific Surface Area	m^2/g	125	100	BET method (N_2 Adsorption Method)
Oil Absorption	mL/100g	350	340	JIS K5101-13-1 (Gel method)
Average Particle Size	µm	1.7	3.6	Coulter Counter Method Volume Mean Diameter (AP:30µm)
		4.2	6.7	Laser diffraction method Volume median diameter D_{50}
Degree of Dispersion	µm	20	25	JIS K 5600-2-5
Surface modification	-	○	○	-

3. WE Series: Performance

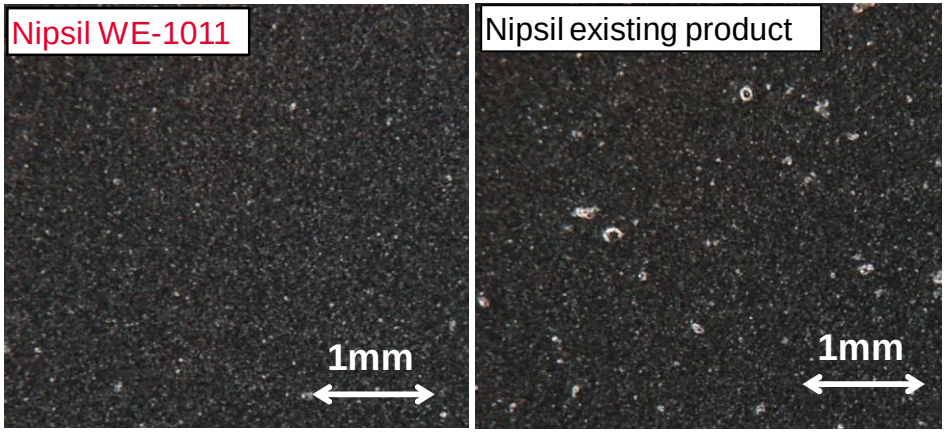
3-1. Water Wettability

The photo on the right shows the water wettability when 1 g of silica is added to a 200 mL beaker containing 50 g of water.



3-2. Silica dispersion

Silica was directly added to a waterborne acrylic emulsion paint (black), and the coating film was prepared after dispersion, coating and drying.



Microscopic image of coating film

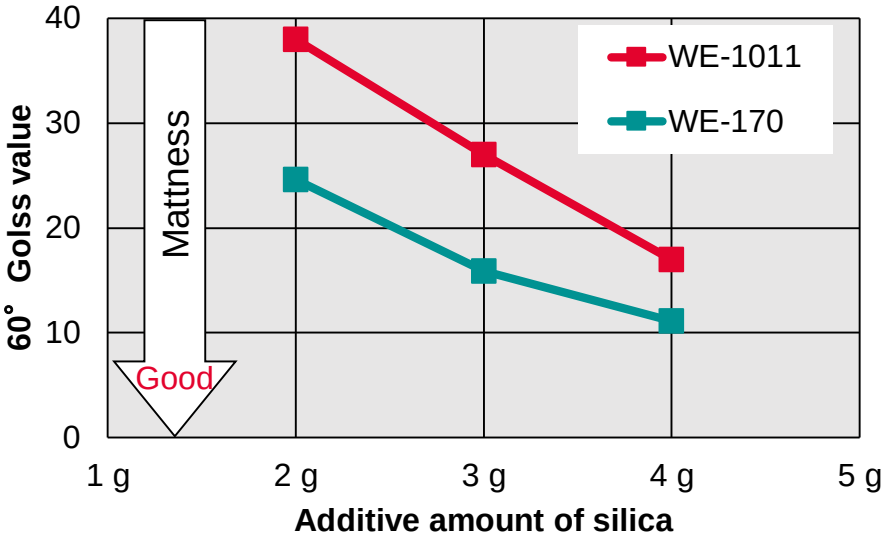
3. WE Series: Performance (cont.)

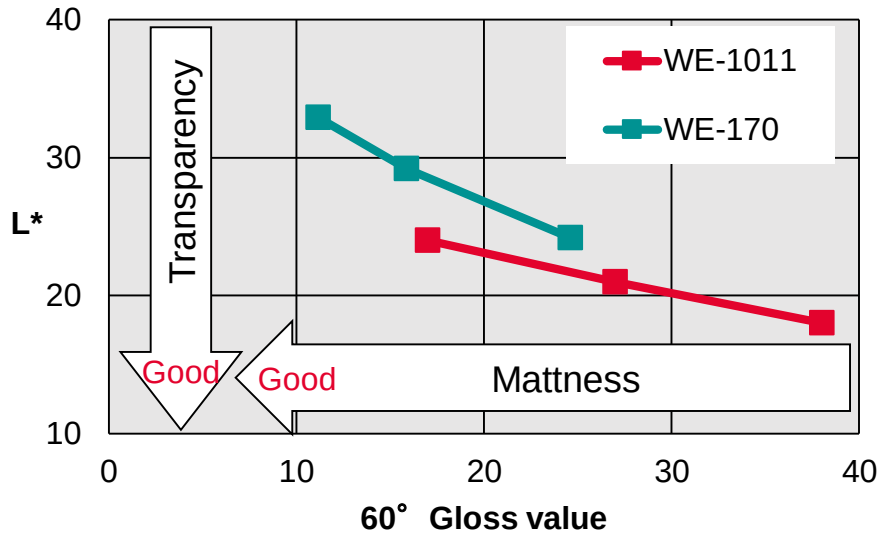
3-3. Mattness and Transparency

Formulation	Waterborne acrylic emulsion clear paint	60 g
	Leveling agent	0.1 g
	Antifoaming agent	0.5 g
	Thickener	0.3 g
	Silica	2 g~4 g
	Water	35 g
	Isocyanate hardner	12 g
Dispersion	High speed mixer	1,000 rpm 10 min
Coating	#20 bar coater	ABS plate
Drying		80˚C 2 hours

WE-1011: excellent transparency

WE-170: excellent mattness





3. WE Series: Performance (cont.)

3-4. Others

(1) Sedimentation stability

The paint used in 3-3 was placed in a 50 mL graduated cylinder, and the sedimentation state and redispersibility were observed after standing.

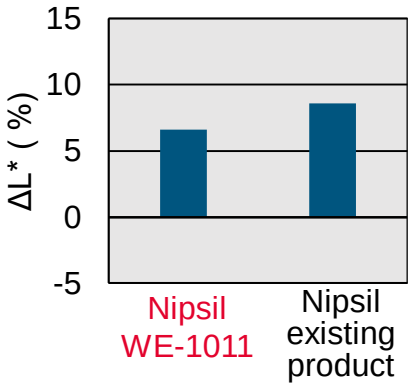
Grades		Nipsil WE-1011	Nipsil existing product
Paint viscosity	mPa･s	43	42
Sedimentation stability (1 month later)	States	No sediment	No sediment
	Redispesibility	○	○

Sedimentation stability of WE-1011 is equivalent to existing products

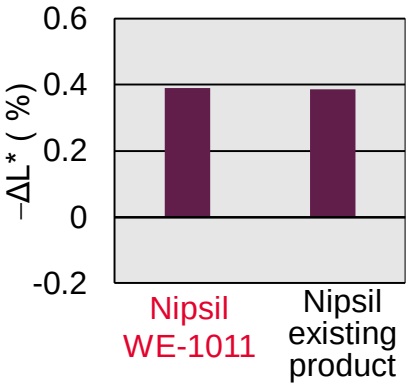
(2) Chemical resistance

The coating films of 3-2 were immersed in the test solutions (A) 0.1% NaOH aq. (pH 12.5) and (B) 0.1% H_2SO_4 aq. (pH 2.0) for 7 days, and the rate of change in L * was confirmed.

(A) Immersion in NaOH aq.



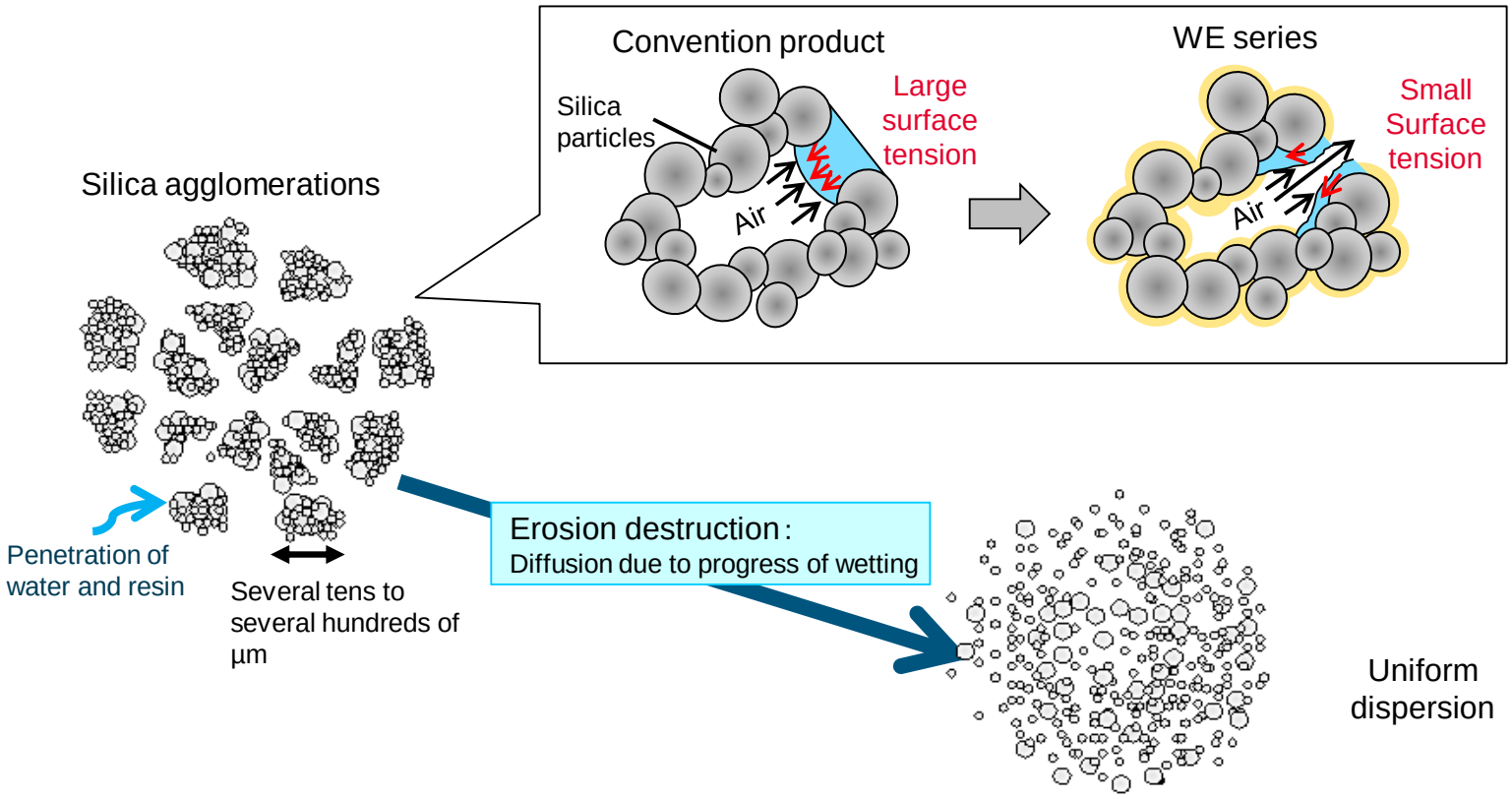
(B) Immersion in H_2SO_4 aq.



Chemical resistance of WE-1011 is equivalent to existing products

4. Dispersion mechanism

Our unique technology improves the wettability to water and O / W emulsions and enables uniform dispersion in waterborne paints.



5. Safety / Packing

(1) Safety

Nipsil is an amorphous silica with no crystalline structure, is harmless and non-toxic.

But even low-harm powder substances can cause lung damage if inhaled in large amounts over a long period of time. So it is obligatory to wear protective equipment such as dust masks, protective gloves and protective goggles in Japan.

Please refer to the SAFETY DATA SHEET (SDS) for more information.

(2) Packing: 10 kg NET in kraft paper bag

Contact Tosoh Silica

To inquire about ordering the sample and other questions, please contact us at:

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