

# SILICA WHITE presentation



16 March 2018

Venue: Kathmandu

Sapporo Snow Festival



**SILICA JAPAN INC.**

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# Greeting Message From Mr. Yamaguchi President of SILICA JAPAN INC.



Please let me deliver my opening message of greetings on the occasion of our 「SILICA WHITE」 presentation. It is now 10 years old since our agent in Nepal 「MARRON TRADING P. LTD.」 started the sale of this product.

They have imported 77 containers (1,540 M/T) of the product till now.

Thanks to the hard efforts of the agent in the tough market, our 「SILICA WHITE」 has been recognized and assessed as one of the best cement admixtures in your country just like in Japan.

Through the sad experiences of the last earthquake, disaster-prevention has become very important and stronger constructions and materials for them are required.

In this presentation, our company is showing how our 「SILICA WHITE」 has been used for Japanese constructions.

I hope that this information would be useful for your construction projects in Nepal

Thank you.

# April 2015 Nepal earthquake



It occurred at 11:56 Nepal Standard time on 25<sup>th</sup> April with a magnitude of 7.8Mw or 8.2Ms.

Its epicenter was east of Gorkha District, about 77km northwest of Kathmandu and its hypocenter was at a depth of approximately 8.2km. Many buildings were destroyed and large avalanches were triggered by the earthquake of maximum Mercalli Intensity of VIII.

Complicated plates and unstable sedimentary rocks under Kathmandu basin might cause another earthquake and it is strongly required to develop new technologies to build strong residences against earthquake urgently.

We Japanese thank you very much for your supports when we had an earthquake in 2011.

We do hope that you recover from the disasters and prepare for the future steadily.

# April 2015 Kathmandu



# March 2011 East Japan earthquake



It occurred at 14:46 11<sup>th</sup> of March 2011.

It was the largest earthquake in Japan ever recorded in Japan with the Magnitude 9.0Mw.

Its hypocenter was approximately 70 km east of Oshika peninsular in Tohoku and the epicenter was at an underwater depth of approximately 29km

It triggered Tsunami, tidal wave, up to 40.5m high and total casualties of death and missing are more than 18,000 people.

More than 400,000 buildings were reported to be collapsed or half collapsed.

# Tsunami 2011





# Material Safety Data Sheet (MSDS)



Product Name: **SILICA WHITE**

## Substance traits

Distinction between single and compound products: single product

Mineral name: Fine-grained pyroclastic vitreous ash

Crystal type: Amorphous material

## Harmful substances

Hazardous nature: None

Harmful effects: None

Environmental impact: None

## First aid measures

Eye contact: Never rub but wash away with clean water

Skin contact: Wash away with water or lukewarm water

Ingestion: Wash the inside of mouth with water

(There is no problem even if the swallowed matter is left as it is.)

Measures at a fire: since it is nonflammable, there is no problem even if it is left as it is

(Harmful gas will not be generated.)

Accidental release measures: Remove it after sprinkling water to prevent dust from spreading

(Cleaning with a vacuum cleaner is preferable.)

## Notes on handling, storing and keeping the product

Handling: Try to prevent dust from spreading as much as possible.

Storing and keeping: Avoid wet or humid place.

## Exposure control

Concentration: 3.0 mg/m<sup>3</sup>

Preferable environment: Installation of dust collector is preferable.

Protection equipment: Wearing a dust mask is advisable depending on the situation.

## Physical and chemical properties

Appearance/color: Tasteless, odorless ash white powder

Particle density: 2.30 g/cm<sup>3</sup>

Solubility: Insoluble in acid and alkali, practically insoluble in water and organic solvent

## Hazardous information (stability/ reactivity)

Stability: Stable with conditions such as temperature, light, and shock

Reactivity: There are no known conditions such as acid, alkali or organic solvent, which may cause a dangerous reaction.

## Hazardous information (stability/ reactivity)

Stability: Stable with conditions such as temperature, light, and shock

Reactivity: There are no known conditions such as acid, alkali or organic solvent, which may cause a dangerous reaction.

Information about harmful effects: None

Ecological Information: None

## Disposal considerations:

Dispose of with consideration of dust arising prevention or consign to industrial waste disposal contractor

## 7 Benefits that 「SILICA WHITE」gives to concrete products

### 1. Concrete surface

#### 【Micro-filler effect】

The particles of SILICA WHITE, which are finer than cement particles, fill the voids between the cement particles and then less water is kept in the voids. As the result, increased free water improves the fluidity of concrete paste and the surface of the finished concrete shall be very smooth.

Water repellent agent is no longer needed.

### 2. Internal structure

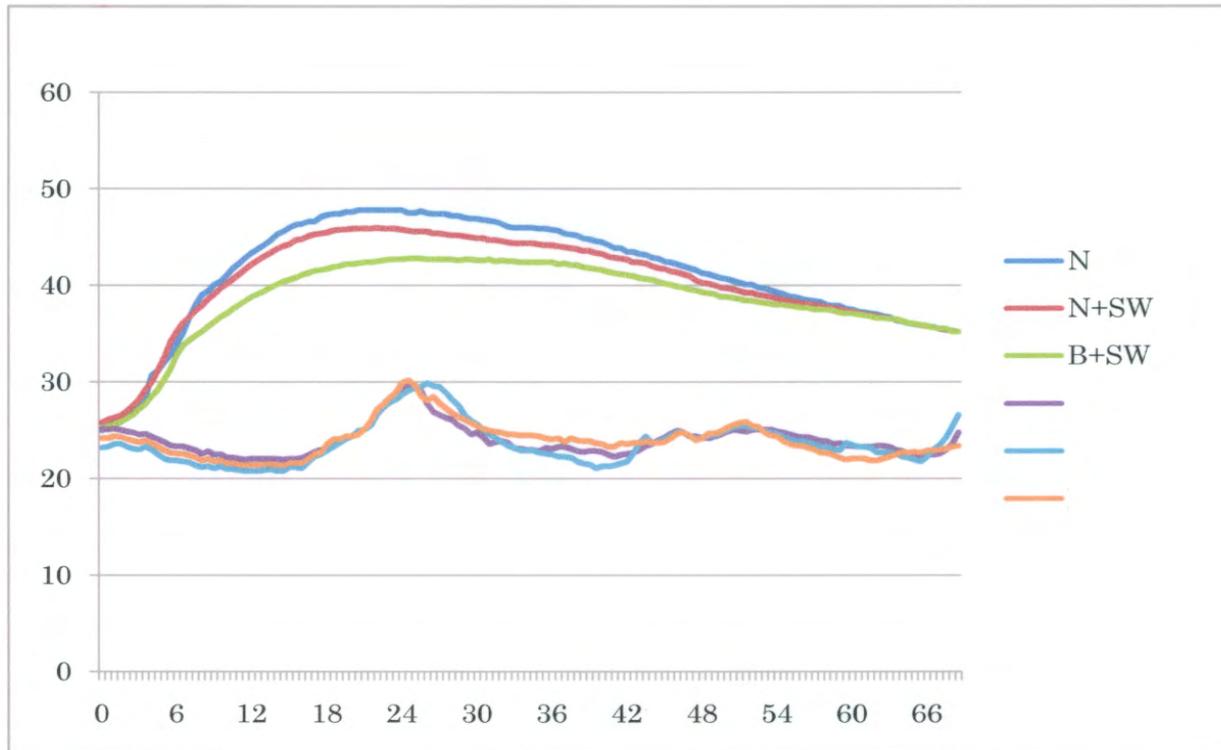
A test result of a pore size distribution measured by the mercury porosimetry has confirmed that the high strength concrete with SILICA WHITE has very dense pore structure. Harder concrete has less cumulative volume of micro pores.

### 3. Low hydration heat

Generally, concrete cracking occurs due to heat of hydration. By adding SILICA CEMENT, internal temperature of concrete falls by 5 degrees Celsius which prevent concrete from cracking.

# Temperature change

1. Micro-filler effect   2. . Internal structure   3. Low hydration heat



N/24-15-25N · N+SW/24-15-25N-SW · B+SW/24-15-25B-SW

	N	N+SW	B+SW
The highest internal temperature	47.8	46.0	42.8
The maximum temperature difference between the air outside	24.3	23.7	19.5

# Test results

## Water Permeability Test Report

Unit : N/mm<sup>2</sup>



SPECIMEN	NO.	WEIGHT BEFORE TEST (gms)	WEIGHT WATER PENETRATION AFTER 1 HOUR (gms)	WATER PENETATION
ORDINARY CEMENT	1	1,424	7.0	1.00
	2	1,435	7.0	
	3	1,437	8.0	
	AVERAGE	—	7.3	
SILICA WHITE 5%	1	1,438	5.4	0.78
	2	1,423	5.4	
	3	1,419	6.7	
	AVERAGE	—	5.8	
SILICA WHITE 10%	1	1,423	5.3	0.70
	2	1,457	5.3	
	3	1,433	4.7	
	AVERAGE	—	5.1	
SILICA WHITE 20%	1	1,442	5.1	0.68
	2	1,435	5.1	
	3	1,431	4.9	
	AVERAGE	—	5.0	

Pore size distribution test by a mercury penetration method



Mortar piece

# SILICA WHITE

## TEST REPORT ON WATER PERMEABILITY AND MORTAR STRENGTH TEST

SPECIMEN	Combination (gram)				Flow RATE	Mass PerUnitVolume Kg / Litter
	SILICA CEMENT	CEMENT	AGGREGATES	WATER		
ORDINARY	0	500	1,500	274	161	2.16
SILICA WHITE 5%	25	500	1,450	276	161	2.17
SILICA WHITE 10%	50	500	1,450	276	161	2.17
SILICA WHITE 20%	100	500	1,400	276	160	2.18

Method of concrete mixing:

Cement mixer : 5 liter cement mixer

Order of input :

Aggregates → SILICA WHITE → Cement → Water

Mixing : One minute without water and then 3 minutes with water

## Examples of construction in Japan



# ISHINOMAKI Technical High School(2004•2005)



Project entity : Miyagi prefecture government

Opened in 2006

Application purpose of SILICA CEMENT

: Strength

Water repellence

Protection against surface deterioration

SILCA WHITE mixed quantity : 20kg/1m<sup>3</sup>



2013 (2years after the earthquake) Tsunami went up the river 2 km and attacked this school building.  
The height of Tsunami was 2m but there was no major damage.

# JOSAI International University

Application purpose of SILICA WHITE

: Strength

Water repellence

Protection against surface deterioration



SILCA WHITE mixed  
quantity : 20kg/1m<sup>3</sup>



Completed: 1995

Photo : 2014

There is no cracking at all 19 years after completion.

# Joint building of Omiya-city Police office and other government offices

Project entity : Saitama prefecture government

Size of the building : 7 stories above ground      Floor space: 12,140m<sup>2</sup>

Construction period : 2015/8 ~ 2018/10



SILCA WHITE mixed quantity : 20kg/1m<sup>3</sup>

Application purpose of SILICA WHITE

: Strength against earthquake

Water repellence

Protection against surface deterioration

Photo: just before completion

# AKITA City Hall

Application purpose of SILICA WHITE  
: Strength against earthquake



SILICA WHITE mixed quantity  
: 20kg/1m<sup>3</sup>

Project entity : Akita city

Size of the building : 6 stories above ground  
and one below.

Floor space: 12,140m<sup>2</sup>

Construction period : 2013/12 ~ 2016/4



# Indoor skating rink in Hachinohe-city, Aomori prefecture



Construction entity: Hachinohe-city

Size of the building: 3 stories above ground and one below.

Floor space: 26,274m<sup>2</sup> Height: 25.4m

Application purpose of SILICA WHITE  
: Strength against earthquake  
Water repellence  
Protection against cracking



Time for Completion : 2016/8~2019/6

Conceptual drawing

SILICA WHITE mixed quantity  
: 20kg/1m<sup>3</sup>

## State of construction progress





# Mito-city new city hall

Construction period : 2016/8~2018/10

Construction entity : Mito city

Size of the building : 8 stories above ground and one below.

Floor space: 40,901m<sup>2</sup>



Application purpose of SILICA WHITE  
: Strength  
Water repellence

Conceptional drawings



SILICA WHITE mixed quantity : 20kg/1m<sup>3</sup>

#### **4. Resistivity to the salt permeability**

A test result of a pore size distribution measured by the mercury porosimetry has also confirmed that the accumulated pore volume of concrete mixed with SILICA WHITE has improved 133% compared to general purpose concrete and the mixed concrete has high resistivity against chloride penetration.

#### **5. Freeze-thaw**

Freezing and thawing test of concrete with SILICA WHITE has proved high relative dynamic elastic coefficient. The mass change after 300 cycles is 100~97.8% and the average is 2.2% relative dynamic elastic coefficient is 96.7%.

#### **6. Abrasion resistance**

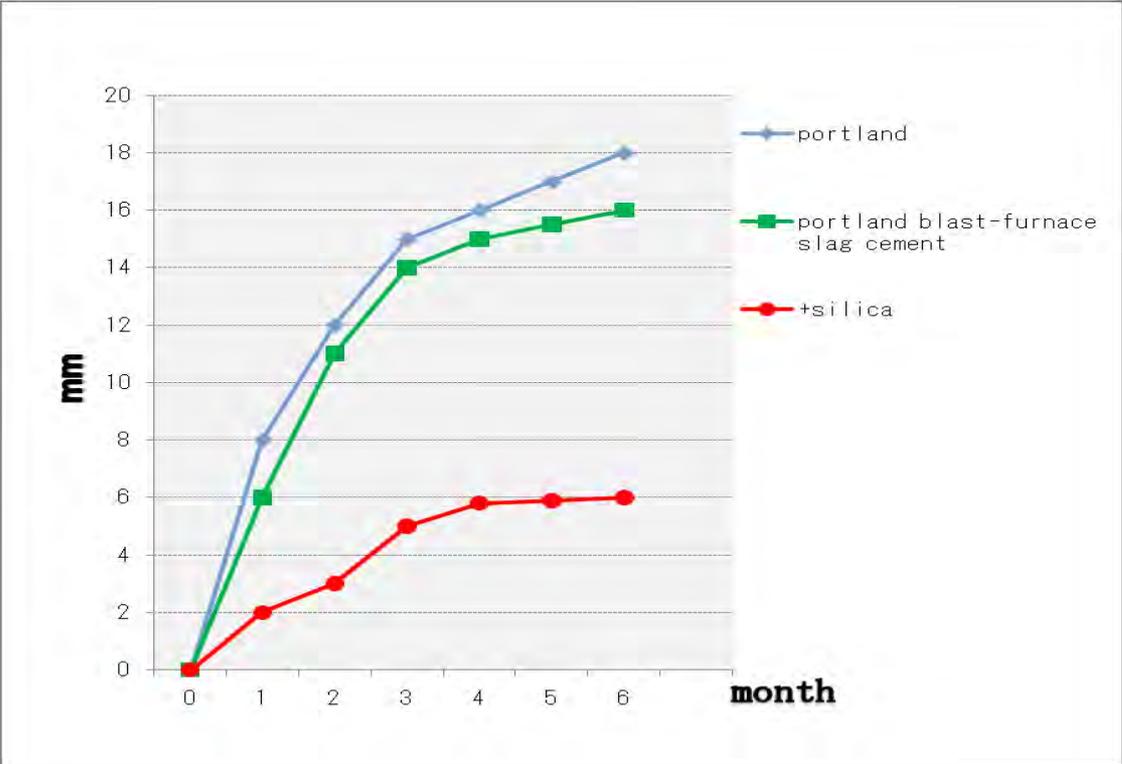
Abrasion coefficient of concrete with SILICA WHITE is 555.4mm<sup>3</sup>/cm<sup>3</sup> which evidences high abrasion resistance.

#### **7. Acid resistance**

Comparison test of mass decrease in 5% sulfuric acid shows that concrete mixed with SILICA WHITE.

(20% of cement volume) has significant acid resistance.

# SALT RESISTANCE



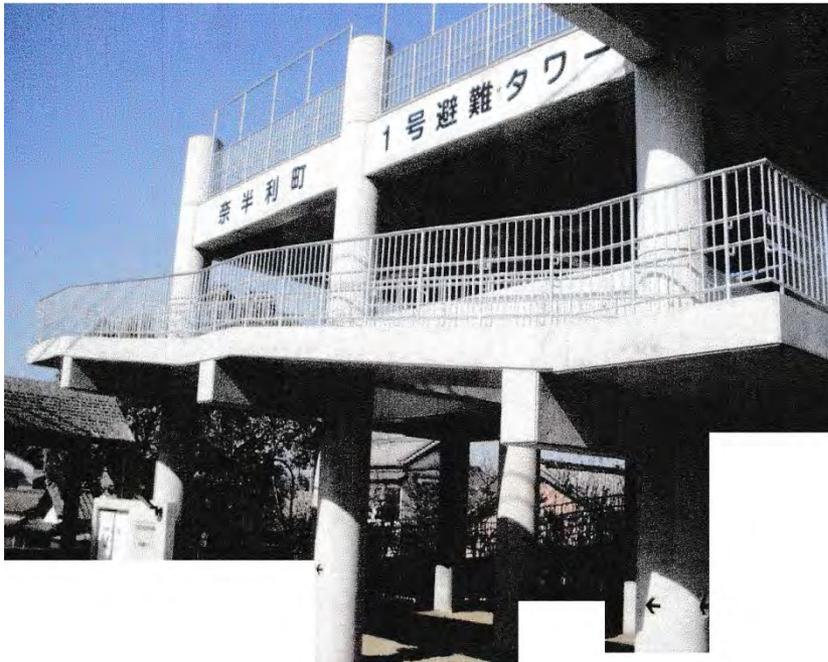
mm		8	12	15	16	17	18
		6	11	14	15	16	16
		2	3	5	6	6	6
		1	2	3	4	5	6

Month

# A disaster prevention project in Kochi prefecture Tsunami tower shelter against 「Nankai Trough earthquake」

Application purpose of SILICA WHITE  
: Strength against earthquake

Construction period : 2012~2015



In Kochi prefecture, it is predicted that a mega “Nankai Trough earthquake” could happen with a probability of 70%. In order to well prepare for it, Kochi prefecture has constructed 36 tower shelters bill 2015.

It is predicted that the casualties by the earthquake could reach 300,000.

Kochi prefecture government has appreciated the benefits of strength and salt resistance of concrete with SILICA WHITE.

The strength of the concrete has improved by 34% by an official laboratory test (NETIS = New Technology Information System) . test .

SILICA WHITE is used for projects of port and fishery industry for its salt resistance.

Examples of construction in Japan

# 「Po-Po 260°」 Ocean amenity facility in Abashiri Port



Project entity : Ministry of Land, Infrastructure, Transport and Tourism



Completed : 1994

Photo : 2012 20 years old

Application purpose of SILICA WHITE

: salt resistance and Protection against surface deterioration

SILICA WHITE mixed quantity : 40kg/1m<sup>3</sup>

Concrete without SILICA WHITE needs to be repaired from time to time.

# New prefectural Yaeyama Hospital project



Construction entity : Okinawa prefecture

Size of the building : 5 stories above ground Floor space: 23,200m<sup>2</sup>

Construction period : 2015/10~2018/4

Application purpose of SILICA WHITE  
: Strength against earthquake and salt



Conceptional drawing



Model



Observation by inhabitant



Mixed volume of SILICA WHITE 20kg/1m<sup>3</sup>

# YOKOHAMA KATSUDAI tunnel

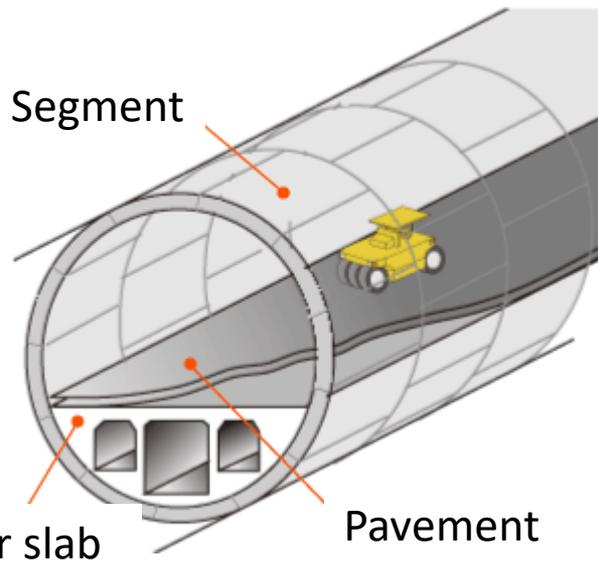
Construction entity: Ministry of Land, Infrastructure, Transport and Tourism  
East Nippon Expressway Company Limited



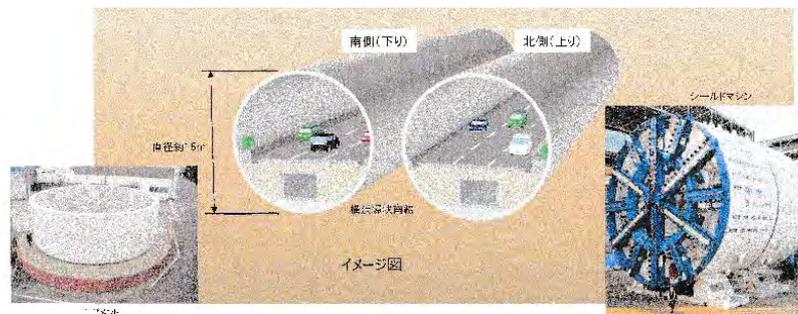
Total length: 1,7km Shield tunneling method  
Construction period: 2015/7~2020/11

Application purpose of SILICA WHITE  
: Strength against earthquake and salt

# Shield tunnel



Tunnel length : 1,300 m x 2 tunnels  
 Tunnel diameter : 15 m



# KOCHI prefectural “ SAKAMOTO RYOMA memorial house”



Sakamoto Ryoma : 1835-67 a famous samurai, Japanese warrior, one of the leaders who led Japan to a modern state

Project entity : KOCHI city

Size of the building : 2 stories above ground and one below.

Floor space: 3,886 m<sup>2</sup>



Construction site : Katsurahama beach

SILICA WHIT MIXED QUANTITY:  
20kg/1m<sup>3</sup>



PHOTO UNDER CONSTRUCTION

Construction period :  
2016/10 ~ 2019/4

Application purpose of SILICA CEMENT:  
Strength against earthquake and salt

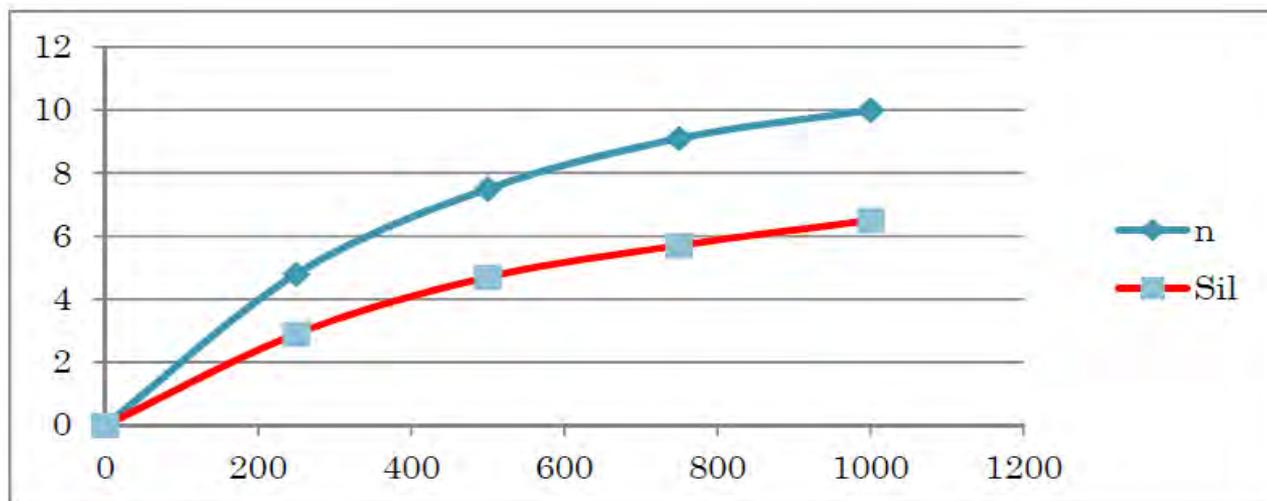
# ABRASION RESISTANCE TEST DATA

## 6. Abrasion resistance test

Tested abrasion coefficient is  $555.4\text{mm}^3/\text{cm}^3$  which shows high abrasion resistance.

Abrasion tester (testing by weight loss)

W/C = 40%	250SPINS	500SPINS	750SPINS	1000SPINS
1:2 MORTAR	4.8g	7.5g	9.1g	10g
1:2 MORTAR Silica White (10%)	2.9g	4.7g	5.7g	6.5g



# SAPPORO sidewalk under the ground (2011)

An underground passage from Sapporo Station down to central area of the city.  
520m long and 150,000 people walk there every day.

Application purpose of SILICA WHITE: Surface abrasion



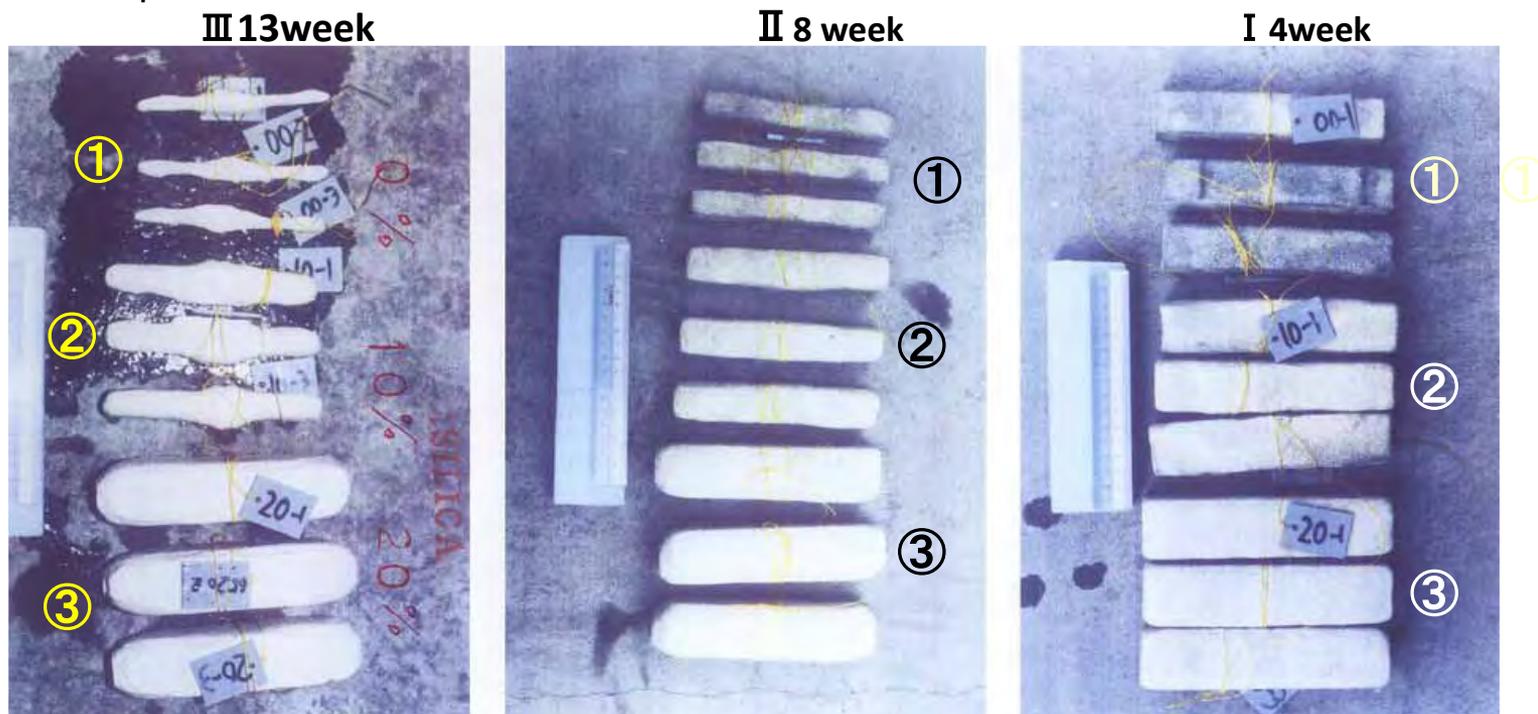


# Acid resistance test

## MIXING

Test item	W/C (%)	No.	MIXING(g)				SLUMP FLOW
			cement	silica	water	sand	
<b>SILICA WHITE</b>	65	I	520	0	338	1040	242
		II	468	10%	338	1040	245
		III	416	20%	338	1040	246

results photos



## Test results of concentration measuring of “ammonia gas” produced by concrete.

### Detected gas concentration

	Gas concentration after 24h continuous inhalation (ppb)
SILICA WHITE mixed	7.8

Important art objects like national treasures, important cultural properties, paints and other art objects could be deteriorated by ammonium gas produced from concrete.

It is necessary to use gas absorption mat especially when national treasures are displayed.

◎ Concentration standards of each pollutants for the  
preservation of cultural properties :

(Tokyo research institute for cultural properties  
Numbers are recommended values.)

Ammonia (Alkaline) ・ ・ ・ less than 30 ppb 以下

Formaldehyde ・ Acetaldehyde ・ ・ less than 40ppb

Acetic acid ・ Formic acid (organic acid) ・ ・ less than 200 $\mu\text{g}/\text{m}^3$

Examples of construction with SILICA WHITE in Japan



## HAKODATE Jomon Culture Center



Project entity: Hakodate city

Size of the building : one story above ground Floor space: 1,7333m<sup>2</sup>

Construction period : 2011/6 ~ 2011/10

SILICA WHITE mixed quantity : 20kg/1m<sup>3</sup>



This clay figure found in the Chobonaino Ruins is hollow inside, its surface fine and thin with exquisite patterns. This figure, which became the first to be designated as a national treasure in Hokkaido, will be on permanent exhibition here.

The 15<sup>th</sup> Public building award of Japan 2016 : Award of excellence

Application purpose of SILICA WHITE : Prevention of ammonium gas generation , cracking, surface deterioration. Strength against earthquake and water penetration.

# SILICA WHITE

## CHEMICAL COMPOSITION



Silica (SiO<sub>2</sub>) and Alumina(Al<sub>2</sub>O<sub>3</sub>) are main components that initiate the pozzolanic reaction.

Test date: 2017.9.19

NAME		SILICA CEMENT (AMORPHOUS SUBSTANCE)
CHEMICAL COMPOSITION (%)	Lg, Loss	3.35
	SiO <sub>2</sub>	85.50
	Al <sub>2</sub> O <sub>3</sub>	6.30
	Fe <sub>2</sub> O <sub>3</sub>	0.80
	CaO	0.75
	K <sub>2</sub> O	0.75
	Na <sub>2</sub> O	1.35
	TiO <sub>2</sub>	0.05
	ZrO <sub>2</sub>	0.60
MEAN PARTICLE SIZE (μm)		4
SPECIFIC SURFACE AREA(cm <sup>2</sup> /g)		60,000
PH		6.0~6.5
SPECIFIC GRAVITY(g/cm <sup>3</sup> )		2.5
CHLORIDE CONTENT		NO DETECTION
METAL		NO DETECTION
ARSENIC		NO DETECTION
LEAD		NO DETECTION

# ASTM : American Society for Testing and Materials

“N” Pozzolan CLASS N

TABLE 1 Chemical Requirements

<b>Chemical Composition</b>	<b>ASTM C 618</b>	<b>SILICA WHITE</b>
Total Silica Aluminum	70.0	91.0
Silica Dioxide		80.3
Aluminum Oxide		9.4
Iron Oxide		1.3
Sulfur Trioxide	4.0	No detection
Moisture content, max, %	3.0	1.0
Loss on ignition, max, %	10.0	3.35

## TABLE 1 Physical Requirements

<i>Fineness</i>		
Amount retained when wet-sieve on 45µm (No.325) sieve, max %	34	10.0
<i>Strength activity index</i>		
With portland cement , at 7 days, mni percent of control	$\geq 75$	Currently being tested
With Portland cement, at 28 days, mni percent of control	$\geq 75$	Currently being tested
Water requirement, max, percent of control	115	Currently being tested
<i>Soundness</i>		
Autoclave expansion of contraction, max, %	$0.8 \geq$	0.5
<i>Uniformity requirements</i>		
The density and fineness of individual samples shall not vary from the average established by the ten preceding is less than ten, by more than: number is leaa than ten, by more than:		
Density, max variation from average, %	5	$5 \leq$
Percent retained on 45-µm (No.325), max variation, percentage points from average	5	$5 \leq$

# MIXING PROCEDURE OF SILICA WHITE



## ◇PROCEDURE

- ① MIX FINE AGGREGATE AND SILICA WHITE
- ② MIX CEMENT
- ③ MIX COARSE AGGREGATE AND MIX DRY
- ④ ADD WATER AND AE WATER REDUCING AGENT AND MIX TEHM

## ◇MIXING AMOUNT

MIXING AMOUNT OF SILICA CEMENT DEPENDS UPON THE USAGE. (ratio by weight)

<b>Super Structure Concrete (Above Ground)</b>	<b>3~10~20% of the amount of cement</b>
Sub Structure Concrete(Under Ground)	5 - 10% of the amount of cement
With Cement Mortar	10 - 20% of the amount of cement
With Cement Mortar	3 - 10% of the amount of cement
Hard Concrete - No slump	More than 7% of the amount of cement
Marine Structure (Under Water)	10 - 20% of the amount of cement

## LIST OF TEST RESULTS OF CONCRETE WITH SILICA WHITE FROM SILICA JAPAN INC.

In Japan, concrete factory is obliged to get the approval from JIS (Japan Industrial Standard) and the concrete only from such factories can be used for constructions. If mixing design of the concrete is set at 24N, the concrete over 27N by adding 3N at 56 days' test can be used for buildings, facilities and workpieces. If the finished concrete is 26N and below, it must be reinforced or destroyed. There is a very strict regulation for the production of normal concrete in Japan. So there is no data of normal concrete in this list.

international standard today. The function of water reducing agent and cement admixture is completely different. We use the concrete with the strength of 18N, 21N, 24N, 27N for low-rise buildings, 30N to 50N for high-rise buildings and 50N to 150N for superhigh-rise buildings. Slump test proves the quality of the concrete. If it is too big, quality of the concrete can be poor. Though there is a difference in the usage of the concrete such as buildings and civil engineering, the slump is set at 8 to 21cm. Slump test is performed by using test mixer (60L). There are some data which do not show the volume of each materials when  $1\text{m}^3$  is converted to 60L.

# Test results

※ C=cement(kg/m<sup>3</sup>) W=water(kg/m<sup>3</sup>) S(sand)=fine aggregate(kg/m<sup>3</sup>)  
 G=coarse aggregate(kg/m<sup>3</sup>) A=chemical admixture(kg/m<sup>3</sup>)

## Goshogawara technical high school

W/C-51.0 % (kg)

Mixing Design	C	W	S	G	A	SW
<b>30N-S18</b>	338	172	880	956	4.39	<b>34</b>

Compressive Strength	7day	28day
	28.3N	<b>39.7N</b>

## Akita City Government Buildings

W/C-44.0 % (kg)

Mixing Design	C	W	S	G	A	SW
<b>42N-S18</b>	398	175	746	961	3.79	<b>38</b>

Compressive Strength	7day	28day
	-	<b>58.0N</b>



## Gatakami City Government Buildings

W/C-44.6% (kg)

Mixing Design	C	W	S	G	A	SW
<b>40N-S21</b>	392	175	682	941	4.10	<b>20</b>

Compressive Strength	7day	28day
	38.5N	<b>51.2N</b>

## Oomiya Pilce Station

W/C-39.7% (kg)

Mixing Design	C	W	S	G	A	SW
<b>42N-S21</b>	461	183	721	483	5.99	<b>20</b>

Compressive Strength	7day	28day
	39.0N	<b>53.6N</b>

## HOTEL 「Kaihoru」

W/C-40.7% (kg)

Mixing Design	C	W	S	G	A	SW
<b>42N-S21</b>	430	175	852	856	3.87	<b>20</b>

Compressive Strength	7day	28day
	38.3N	<b>51.8N</b>



工事名		セメント内訳					
配合	40 N/mm <sup>2</sup>	スラブ	歩道	25 m/m	N	歩道	歩道
(kg/m <sup>3</sup> )	セメント	単位水	単位水	単位水	単位水	単位水	単位水
歩道配合	424	168	536	230	645	276	5.51
表面水率			2.8 %	1.3 %	0 %	0 %	
試験機り配合	12.72	4.50	16.53	6.99	19.35	8.28	0.8



# QUALITY ASSURANCE

PRODUCT : 「SILICA WHITE」

- ① QUANTITY : 20kg/1BAG
- ② PACKAGE : IN PAPER BAG

QUALITY ASSURANCE PERIOD :

5 ~ 7 YEARS AFTER THE PRODUCTION DATE

STORAGE CONDITIONS :

- ① THE PRODUCT SHOULD BE STORED IN ROOFED WAREHOUSE
- ② THE WAREHOUSE SHOULD NOT HAVE MOISTURE
- ③ THE WAREHOUSE SHOULD BE SUFFICIENTLY DRY
- ④ THE BAGS SHOULD NOT BE STACKED MORE THAN 15 LAYERS AND KEEP STUFF OFF THE TOP

WE CAN NOT GUARANTEE THE QUALITY ASSURANCE PERIOD IF THE BAGS ARE NOT STORED AS INSTRUCTED ABOVE



CONCRETE REPAIR MATERIAL

**WATER PROOF, PREMIXED MORTAR**

# **SILICA ROC MORTAR**

YOU ONLY HAVE TO POUR WATER

SILICA ROC MORTAR IS A PREMIXED MORTAR OF FINE POWDER OF SILICA-WHITE (FINER THAN CEMENT PARTICLES) CEMENT AND SPECIAL AGGREGATE, THIS PRODUCT HAS BEEN DEVELOPED AS AN ALTERNATIVE TO RESIN MORTAR FOR BETTER QUALITY CONTROL OF CONCRETE AND FOR AVOIDING POSSIBLE WRONG MIX PROPORTION, BY MIXING WITH WATER YOU CAN HAVE EASILY WATERPROOF ANTI-EFFLORESCENT WATER TIGHT AND STRONG MORTAR WITH HIGH WORKABILITY AND LESS SHRINKAGE CRACKS.

## RAW MATERIALS

CEMENT, SIZE-CONTROLLED SAND, CHEMICAL AGENTS, SILICA WHITE  
IN A MOISTUREPROOF BAG (20KG)

## APPLICATION SAMPLES:

- FOR REPAIR PURPOSES SUCH AS : SEPARATER, ROCK POCKET, CONCRETE JOINT, WINDOW FRAME FILLER
- FOR PLASTER WORKS SUCH AS : BLOCKS, BRICKS, BUILDING STONES, TILES ETC

## MAJOR CHARACTERISTICS

PREMIXED MORTAR: HIGH WORKABILITY WITH SIMPLY MIXING WITH WATER.

NO WRONG MIX PROPORTION AND EXECUTION ERROR ANY MORE

ANTI-EFFLORESCENT: BY USING SILICA-WHITE AND SPECIAL ADMIXTURE IT REDUCES  
THE RISK OF EFFLORESCENT, CRACKS AND SEPARATON DRAMATICALLY

WATERPROOF: THE COMBINATION OF SILICA-WHITE AND SPECIAL ADMIXTURE  
REALIZES

HIGH DENSE CONCRETE THAT GETS WATERPROOF AFTER HARDENING

## SILICA ROCK MORTAR CHEMICAL COMPOSITION

Item	Mixing Weight ( kg )	Mixing rate ( % )
Cement	7.00	34.8779
Quartz sand	10.00	49.8256
Silica cement	3.00	14.9477
Metolose	0.01	0.0498
Stearic acid	0.06	0.2990
<b>TOTAL</b>	<b>20.07</b>	<b>100.000</b>



Quartz sand : <http://en.wikipedia.org/wiki/Quartz>

Metolose : <http://www.metolose.jp/e/industrial/index.shtml>

Stearic acid : [http://en.wikipedia.org/wiki/Stearic\\_acid](http://en.wikipedia.org/wiki/Stearic_acid)

- How to use :
1. mix it with water of 3 to 5% of cement volume.
  2. adjust the hardness for the best workability.



Thank you very much for your kind attention for long time

SILICA JAPAN INC. Advisor

SHIGEO SATO

SILICA JAPAN INC. Managing Director.

MASAHIRO SASAKI



SILICA JAPAN INC.