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# **DAIPALITE-E** series

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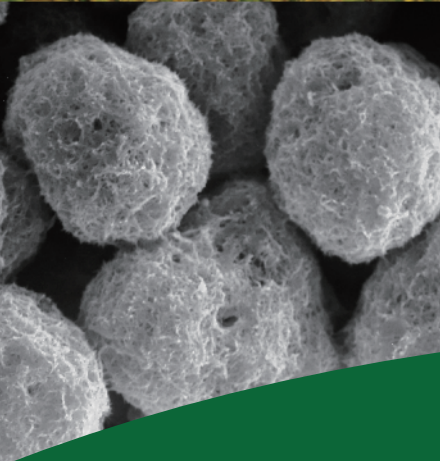
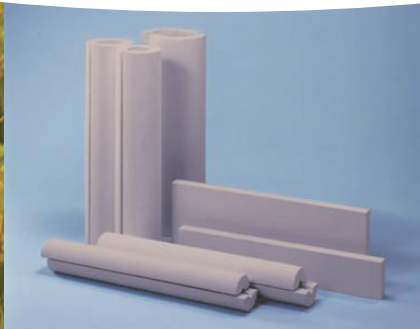
Environment-friendly calcium silicate thermal insulation material using rice husk

ASTM C533 Type I

**DAIPALITE-E<sup>A</sup>**  
**DAIPALITE-E<sup>iA</sup>**

JIS A 9510 1-15

**DAIPALITE-E**  
**DAIPALITE-E<sup>i</sup>**



Environment-friendly calcium silicate  
thermal insulation material using rice husk

ASTM C533 Type I

**DAIPALITE-E<sup>A</sup>**  
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JIS A 9510 1-15

**DAIPALITE-E**  
**DAIPALITE-Ei**

# DAIPALITE-E series

## Environmental contribution of DAIPALITE-E series

Calcium silicate thermal insulation material 'DAIPALITE-E series' (DAIPALITE-E<sup>A</sup> / Ei<sup>A</sup> / E / Ei) was developed in 1985 as part of an ODA research cooperation project between the National Institute of Standards and Technology of Malaysia and other companies. Based on manufacturing technology that uses rice husk as fuel and raw material, these are manufactured at the Vietnam plant of our subsidiary (JIC Vietnam). Rice husk combustion energy from rice husk boiler is used to synthesize calcium silicate crystals, and rice husk ash is used as a high-purity raw material. The DAIPALITE-E series is an environment-friendly thermal insulation material that contributes to reducing environmental impact through its own manufacturing process, and achieves energy savings by improving the thermal efficiency of plant equipment with excellent thermal insulation performance.



Vietnam plant



Rice husk warehouse

## Feature of DAIPALITE-E<sup>A</sup> / E


DAIPALITE-E<sup>A</sup> is a calcium silicate thermal insulation material (density 170kg / m<sup>3</sup>) based on ASTM C533 Type I, and DAIPALITE-E is a calcium silicate thermal insulation material (density 155kg / m<sup>3</sup> or lower) based on JIS A 9510 1-15. Both are lightweight insulation materials. These main components, calcium silicate hydrate, are Xonotlite crystals and have extremely high heat resistance. These are inorganic, non-combustible and non-asbestos materials that can be used with confidence. These are used in various industrial facilities such as oil refining plants, power plants, and petrochemical plants, and they have pipe cover type and board type thermal insulation materials depending on the shape of the equipment to be kept warm.

## Feature of DAIPALITE-Ei<sup>A</sup> / Ei


DAIPALITE-Ei<sup>A</sup> and DAIPALITE-Ei are impregnated with a special corrosion inhibitor on the entire surface of DAIPALITE-E<sup>A</sup> and DAIPALITE-Ei, respectively. CUI (Corrosion Under Insulation) does not only reduce the thermal efficiency of the facility, but may cause the contents to leak, explode, fire, etc., which is a serious problem common to industrial facilities around the world. DAIPALITE-Ei<sup>A</sup> / Ei impregnated with a special corrosion inhibitor contributes to CUI countermeasures by its water-repellent function and chemical effect.

### Product line-up of DAIPALITE-E series

Standard type	Normal product (No water-repellent)	Water-repellent product (CUI countermeasure type)
Based on ASTM C 533 Type I (Main features: Stronger than JIS type)	DAIPALITE-E <sup>A</sup>	DAIPALITE-Ei <sup>A</sup>
JIS A 9510 1-15 (Main features: Lighter weight and better thermal insulation than ASTM type)	DAIPALITE-E	DAIPALITE-Ei (It is a surface water-repellent product and does not possess the water repellency classified in 4.3 of JIS A 9510 1-15.)





Boiler



Drying machine

**JIC VIETNAM**

Hanoi city

Ho Chi Minh city

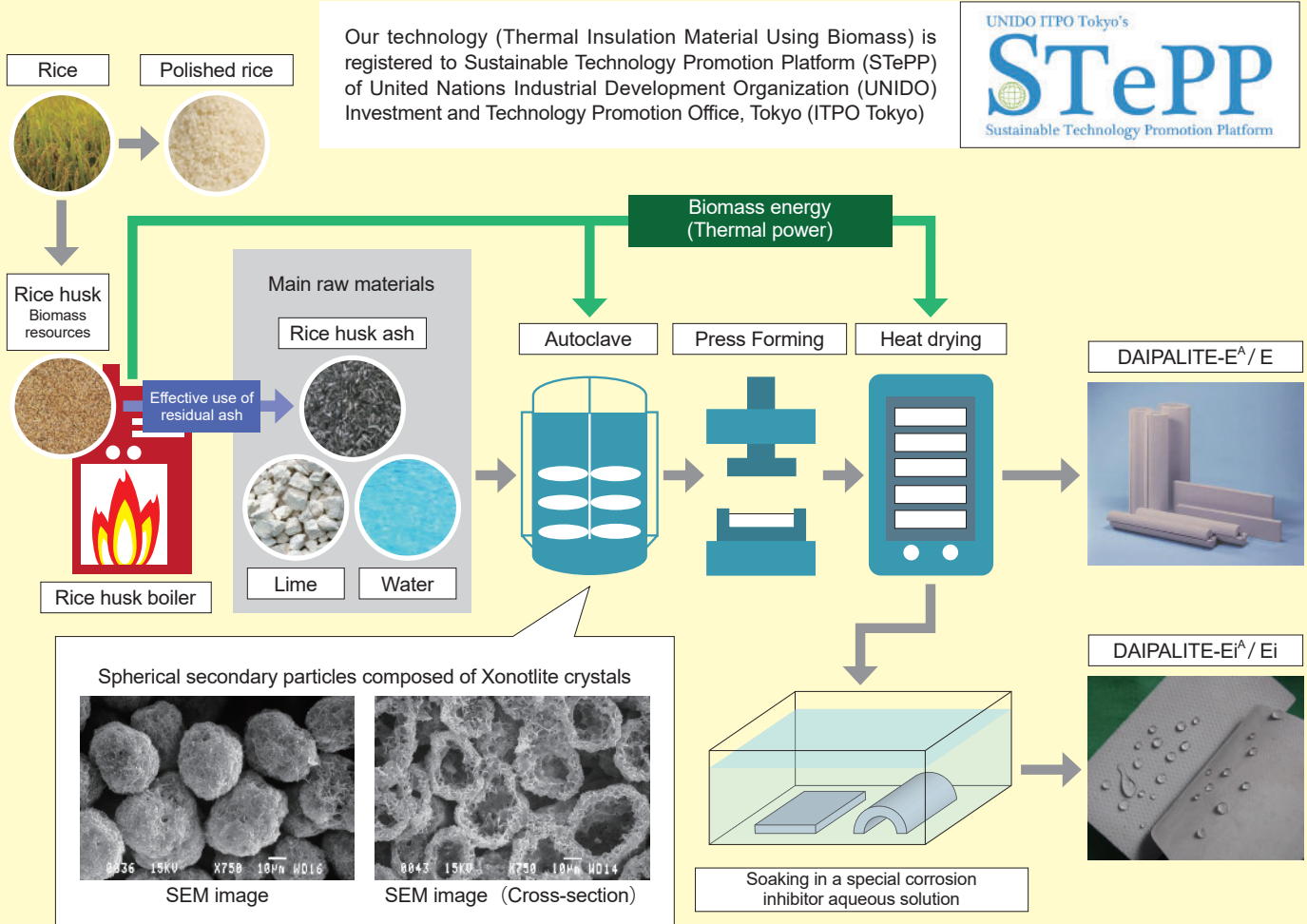
An Giang Province

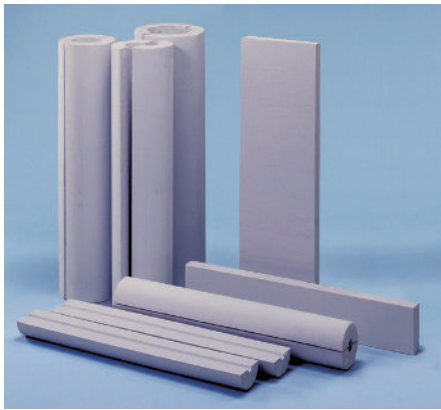
**JIC VIETNAM**

**Company Profile (Plant)**

Company name	JIC VIETNAM ONE MEMBER CO., LTD.
Location	Tan Trung Industrial and Handicraft Cluster, Phu Tan District, An Giang Province, The Socialist Republic of Vietnam
Founded	September, 2014
Capital	153,924 million VND
Investor	wholly owned by JAPAN INSULATION CO., LTD.
Production quantity	1000 tons / year

**DAIPALITE-E series manufacturing process (original manufacturing method in Vietnam plant)**





Innovative,  
Environment-Friendly

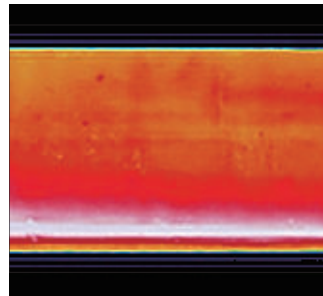
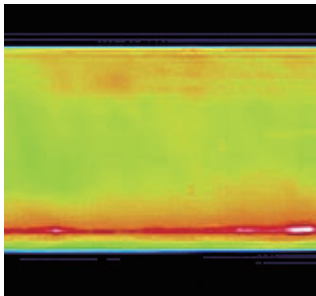
Inorganic ,Non-combustible,  
Asbestos-free

ASTM C 533  
Type I product

# DAIPALITE-E<sup>A</sup>

DAIPALITE-E<sup>A</sup> is a calcium silicate thermal insulation material based on ASTM C 533 Type I. It is a thermal insulation material for industrial equipment, pre-formed for pipes and blocks, and is used in various industrial facilities such as oil refinery plants, power plants, petrochemical plants, etc. It is inorganic, non-combustible and asbestos-free, so it can be used with confidence.

## Surface temperature by thermography



DAIPALITE-E<sup>A</sup>

ASTM C533 Type I

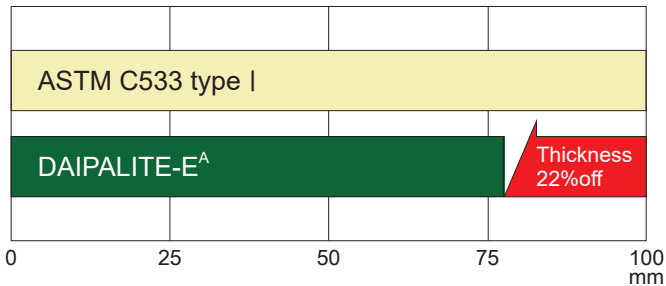
Surface Temp. 45.2°C  
Heat loss:163W/m

Surface Temp. 48.5°C  
Heat loss:190W/m

### Conditions

Pipe inside temp : 300°C Pipe outer diameter : 114mm  
Thermal insulation thickness : 50mm

## Thickness as same heat loss [mm]



### Conditions

Outside air temperature : 25°C  
Heat loss : Same (less than 123W/m)  
Pipe inside temp : 300°C Pipe outer diameter : 114mm

Standard physical properties of DAIPALITE-E<sup>A</sup> (reference values)

Apparent Density	170 Kg/m <sup>3</sup>
Flexural Strength	≥ 344kPa (≥ 34.4N/cm <sup>2</sup> )
Compressive Strength	≥ 688kPa (≥ 68.8N/cm <sup>2</sup> )
Heating Linear Shrinkage	2.0% max.
Maximum Service Temperature	1000° C
Recommended service temperature range	Ordinary temperature ~ 1000°C

## Composition and mechanism of DAIPALITE-E series

DAIPALITE-E series is a molded thermal insulation material made of calcium silicate hydrate of Xonotlite crystals (photo 1) with high heat resistance, and it is added with reinforcing fibers. Xonotlite crystals constitute spherical secondary particles (photo 2), and these mainly constitute the thermal insulation material. Since these spherical particles are hollow (photo 3), the thermal insulation material is lightweight and has high thermal insulation performance.

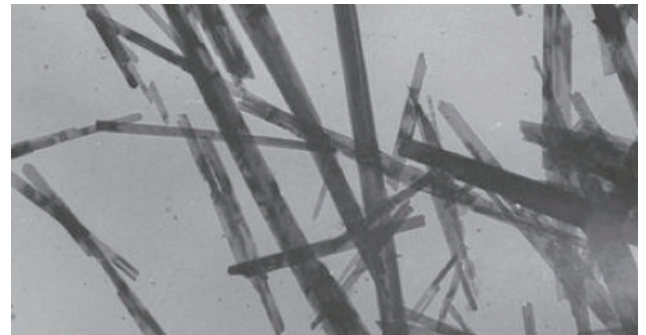
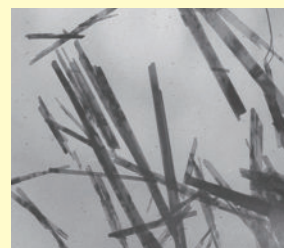


Photo 1 Xonotlite crystal TEM image

## Efficient and economical products (details on page 6)

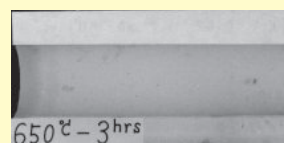
Since DAIPALITE-E series is made of calcium silicate hydrate of Xonotlite crystals, it has better heat resistance than other calcium silicate products.



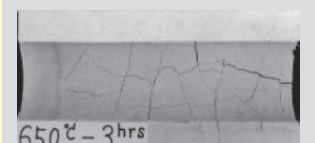
Xonotlite crystal



Tobermorite crystal



650°C - 3hrs  
Heated Xonotlite-based calcium silicate thermal insulation material (DAIPALITE series)



650°C - 3hrs  
Heated Tobermorite-based calcium silicate thermal insulation material (Conventional product)

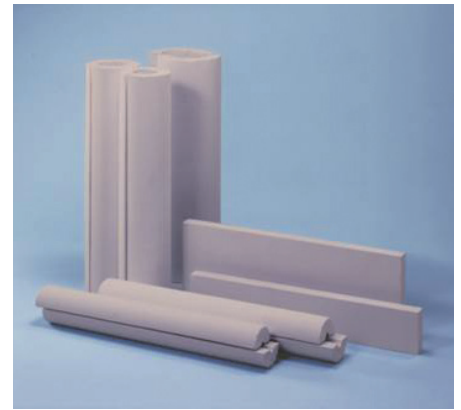
Innovative,  
Environment-Friendly

Inorganic, Non-combustible,  
Asbestos-free

JIS A 9510  
Type. 1-15 product

# DAIPALITE-E

DAIPALITE-E is a calcium silicate thermal insulation material JIS A 9510 1-15 (JIS certified product). It is a thermal insulation material for industrial equipment, pre-formed for pipes and blocks, and is used in various industrial facilities such as oil refinery plants, power plants, petrochemical plants, etc. It is inorganic, non-combustible and asbestos-free, so it can be used with confidence.



Spherical secondary particles composed of Xonotlite crystals

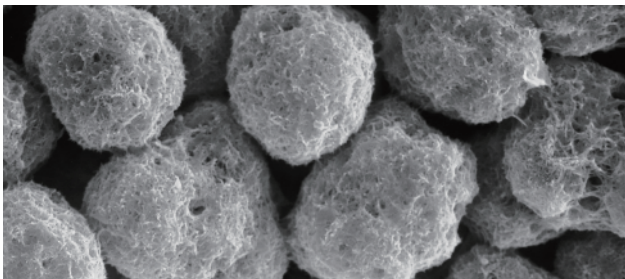


Photo2 SEM image

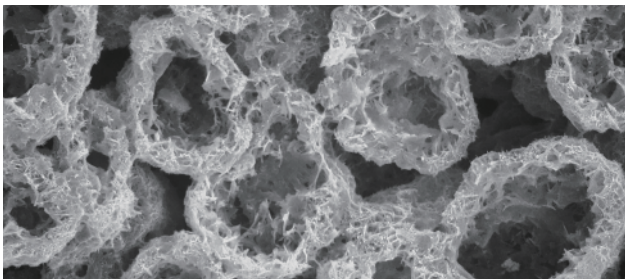
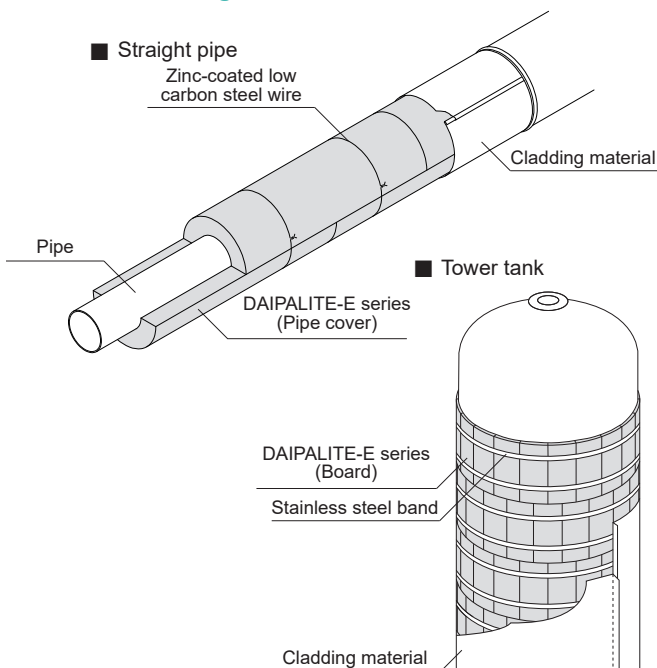
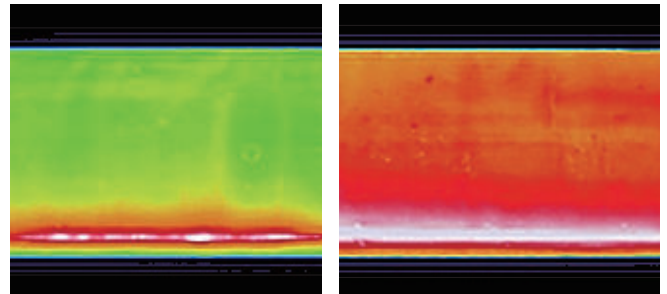


Photo3 SEM image (Cross-section)

## Installation image



## Surface temperature by thermography



DAIPALITE-E

Surface Temp. 44.8°C  
Heat loss: 160W/m

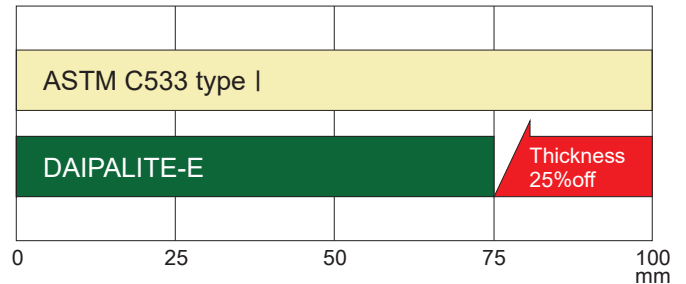
ASTM C533 Type I

Surface Temp. 48.5°C  
Heat loss: 190W/m

### Conditions

Pipe inside temp : 300°C Pipe outer diameter : 114mm  
Thermal insulation thickness : 50mm

## Thickness as same heat loss [mm]

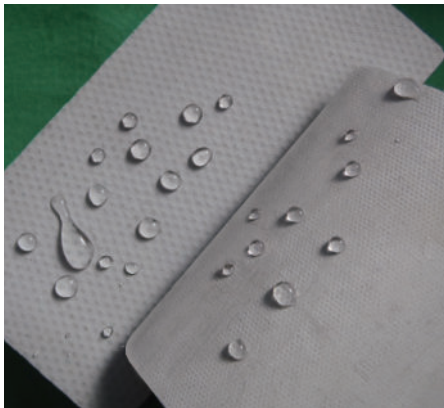


### Conditions

Outside air temperature : 25°C  
Heat loss : Same (less than 123W/m)  
Pipe inside temp : 300°C Pipe outer diameter : 114mm

## Standard physical properties of DAIPALITE-E (reference values)

Apparent Density	$\leq 155 \text{ Kg/m}^3$
Flexural Strength	$\geq 200\text{kPa}$ ( $\geq 20\text{N/cm}^2$ )
Compressive Strength	$\geq 300\text{kPa}$ ( $\geq 30\text{N/cm}^2$ )
Heating Linear Shrinkage	2.0% max.
Maximum Service Temperature	1000° C
Recommended service temperature range	Ordinary temperature ~ 1000°C



Innovative,  
environment- friendly

Inorganic , Non-combustible,  
Asbestos-free

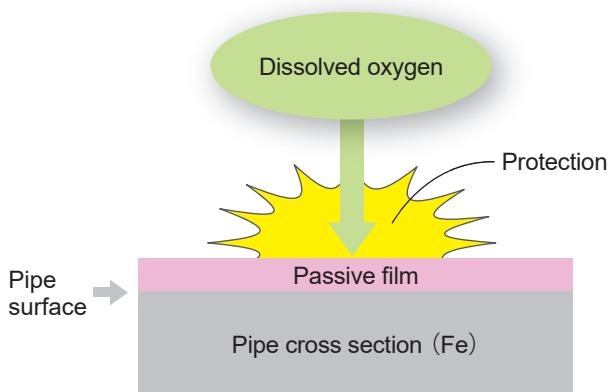
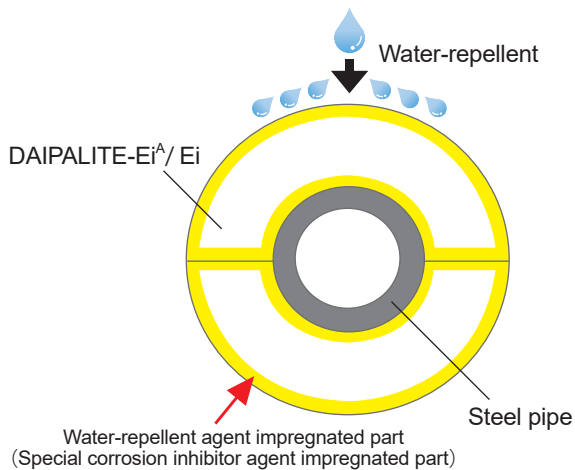
ASTM C 533 Type I product  
JIS A 9510 1-15 product

# DAIPALITE-Ei<sup>A</sup> & DAIPALITE-Ei

DAIPALITE-Ei<sup>A</sup> is a calcium silicate thermal insulation material based on ASTM C 533 Type I and DAIPALITE-Ei is a calcium silicate thermal insulation material JIS A 9510 1-15. Both products have water-repellent and chemical corrosion inhibition performance, and is used in various industrial facilities such as oil refinery plants, power plants, petrochemical plants, etc.

## Special effects of DAIPALITE-Ei<sup>A</sup>/ Ei (details on page 9)

DAIPALITE-Ei<sup>A</sup> / Ei is surface-treated with a special corrosion inhibitor containing soluble components ( $\text{Na}^+$ ,  $\text{SiO}_3^{2-}$ ). When the components are dissolved in water, the pH of the solution is more than 10, and a passive film is formed on the pipe surface, preventing iron corrosion.



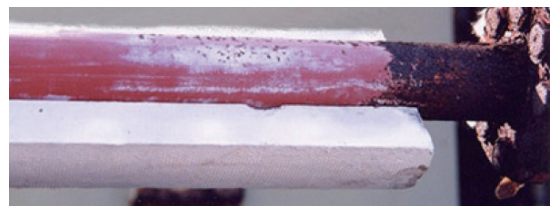
DAIPALITE-Ei<sup>A</sup> / Ei is a water-repellent material but not a waterproof material. There is no guarantee that corrosion will not occur. Please observe the precautions shown at the end of this catalog.

## Secular change of piping covered with thermal insulation material \*

\* The covered material is a calcium silicate thermal insulation material made in Japan, which is equivalent to DAIPALITE-Ei.



Crude oil piping at a thermal power plant (7 years) : The piping was covered with water-repellent calcium silicate thermal insulation material. The small white circle on the pipe is due to the hole which was opened accidentally after the inspection. There is evidence that water has flowed for several years. The piping was not corroded.



Steam (12K) piping at a steel plant (14years) : The left side was almost uncorroded where it was covered with our water-repellent calcium silicate thermal insulation material. On the right side, the corrosion was considerably progressing in the area covered with mineral fiber thermal insulation material.

## Corrosion test of carbon steel piece immersed in eluent of thermal insulation material (details on page 10)

Pulverize a certain volume of thermal insulation material and make each eluate extracted with distilled water. Carbon steel piece is immersed in each eluate and left at 70°C for 4 weeks.



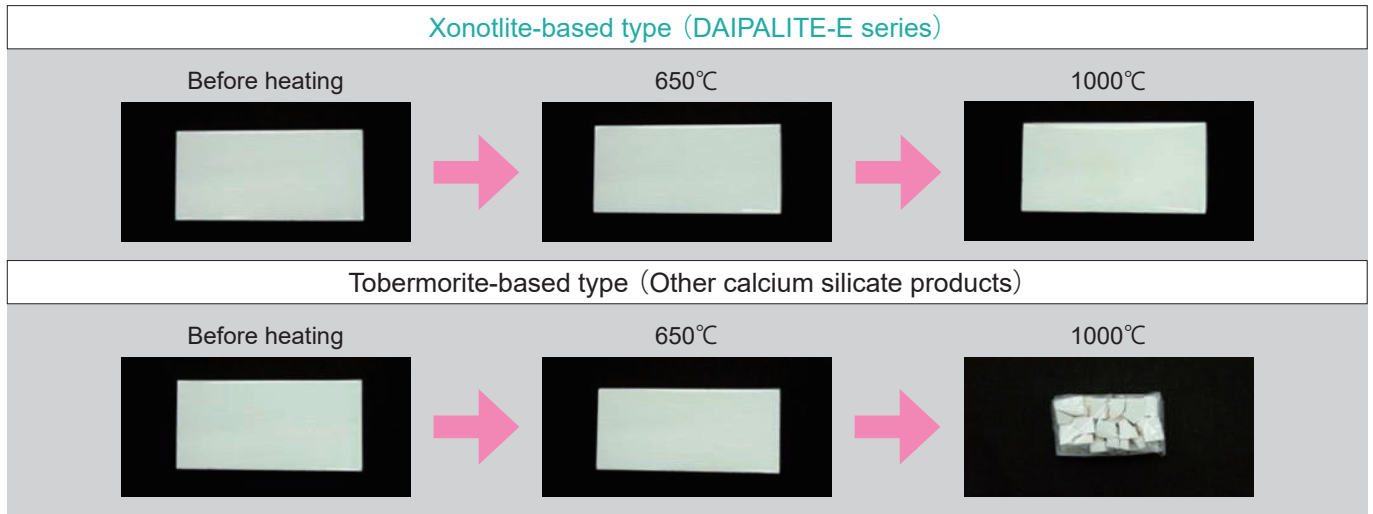
DAIPALITE-Ei<sup>A</sup>/ Ei  
Almost no corrosion



Rock wool  
Many Corrosion of about 600µm depth can be seen.

**Heating test result (entire surface)**

Tobermorite-based calcium silicate thermal insulation material retains its shape up to 650°C , while Xonotlite-based calcium silicate thermal insulation material retains its shape up to 1000 °C . After heating the Xonotlite-based calcium silicate thermal insulation material at 1000°C for 3 hours, the maximum heating liner shrinkage is 2.0%.



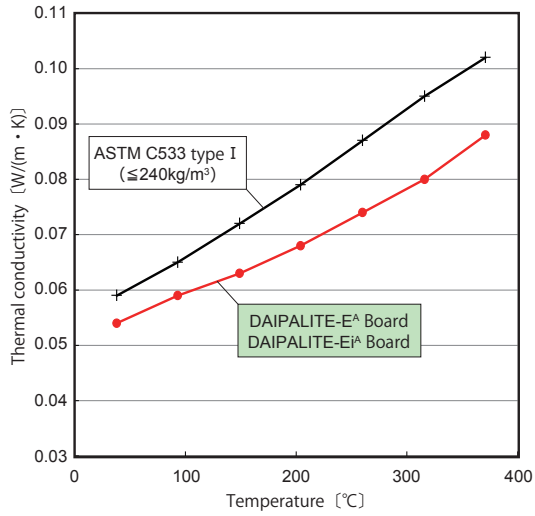
**Heating test result (one side)**

Generally, Tobermorite-based calcium silicate thermal insulation material can be used up to 650°C . However, if it is heated from only one side, many cracks will occur. Even if no crack occurs, it becomes brittle. On the other hand, the Xonotlite-based calcium silicate thermal insulation material has no cracks. Therefore, Xonotlite-based calcium silicate thermal insulation material can be used repeatedly.

Heating temperature	Xonotlite - based type (DAIPALITE-E series)	Tobermorite - based type (Other calcium silicate products)
300°C	 300℃-3hrs	 300℃-3hrs
400°C	 400℃-3hrs	 400℃-3hrs
500°C	 500℃-3hrs	 500℃-3hrs
600°C	 600℃-3hrs	 600℃-3hrs
650°C	 650℃-3hrs	 650℃-3hrs

Thermal insulation performance / Thermal conductivity

ASTM C 533 Type I



Temperature [°C]		38	93	149	204	260	316	371
Thermal conductivity W/(m·K)	ASTM Requirement	.059	.065	.072	.079	.087	.095	.102
	Pipe cover	.052	.056	.061	.067	.073	.080	.088
	Board/GHP	.054	.059	.063	.068	.074	.080	.088

■ Thermal conductivity of temperature regression equation

Thermal conductivity  $\lambda$  [W/(m·K)] , Temperature  $\theta$  [°C]

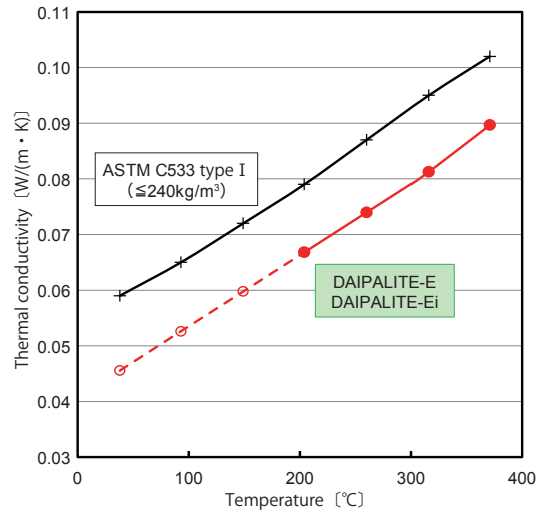
Pipe cover

$$\lambda = 0.0489 + 7.885 \times 10^{-5} \cdot \theta + 2.032 \times 10^{-10} \cdot \theta^3$$

Board

$$\lambda = 0.0516 + 7.240 \times 10^{-5} \cdot \theta + 1.884 \times 10^{-10} \cdot \theta^3$$

JIS A 9510 1-15



Temperature [°C]		38	93	149	204	260	316	371
Thermal conductivity W/(m·K)	ASTM Requirement	.059	.065	.072	.079	.087	.095	.102
	Pipe cover Board	.046 *	.053 *	.060 *	.067	.074	.081	.090

\* The value calculated by substituting the specified temperature into the temperature regression equation [200 ≤  $\theta$  ≤ 300] of the thermal conductivity below.

■ Thermal conductivity of temperature regression equation

Thermal conductivity  $\lambda$  [W/(m·K)] , Temperature  $\theta$  [°C]  
Common to pipe cover and board

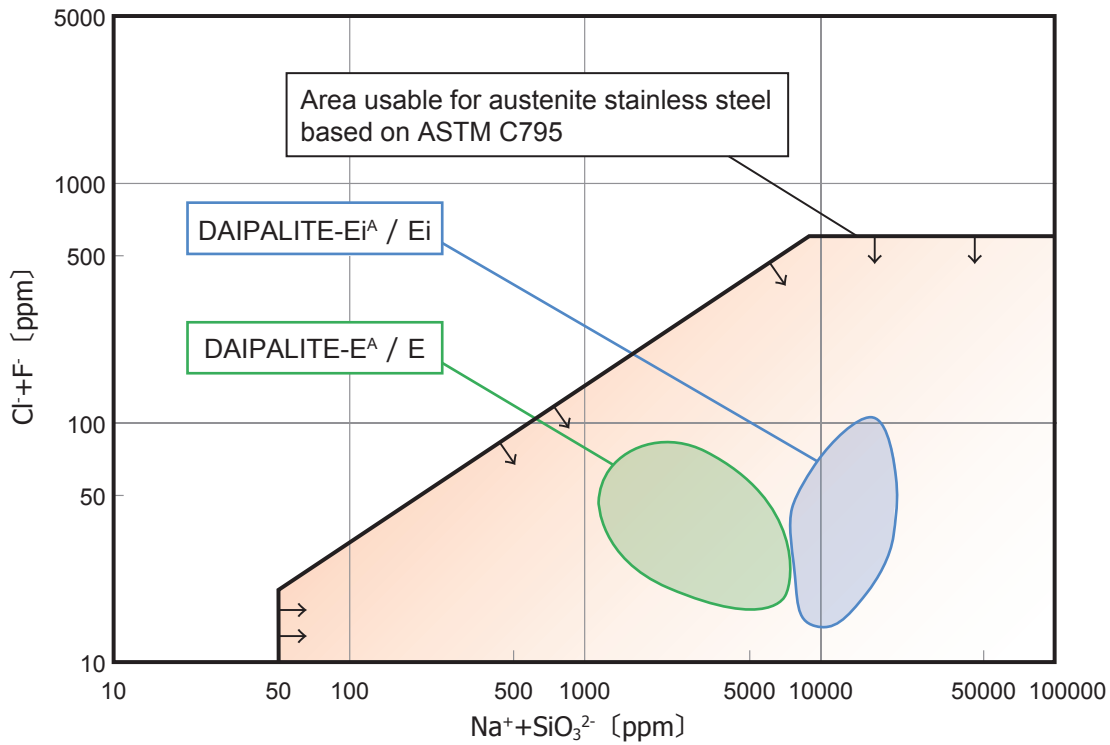
[200 ≤  $\theta$  ≤ 300]

$$\lambda = 0.0407 + 0.000128 \cdot \theta$$

[300 <  $\theta$  ≤ 600]

$$\lambda = 0.0555 + 2.05 \times 10^{-5} \cdot \theta + 1.93 \times 10^{-7} \cdot \theta^2$$

**Stress corrosion cracking inhibition (ASTM C795)**



These calcium silicate materials have performance to satisfy ASTM standards as a thermal insulation material in contact with austenitic stainless steel.

■ Evaluation criteria based on ASTM C795

- 1) Na<sup>+</sup>+ SiO<sub>3</sub><sup>2-</sup> ions: ≥ 50ppm
- 2) Acceptable range of Cl<sup>-</sup>+F<sup>-</sup> and Na<sup>+</sup>+SiO<sub>3</sub><sup>2-</sup> (See above figure)
- 3) pH: ≤ 12.5 (at 25°C)
- 4) The stress corrosion test (ASTM C692) must be passed.

**List of ASTM C533 test results (only ASTM products are supported)**

Property	Test Methods	ASTM C533 Requirement	Test Results
Density (Dry) Average*	ASTM C302	≤ 240 kg/m <sup>3</sup>	Pass
Flexural Strength*	ASTM C203	≥ 344 kPa (50 psi)	Pass
Compressive Strength*	ASTM C165	≥ 688 kPa (100 psi)	Pass
Abrasion Resistance Weight Loss by Tumbling*	ASTM C421	After the first 10 min <20%, After the second 10min <40%	Pass
Linear Shrinkage after Heat Soaking*	ASTM C356	Less than 2% after 24hr, Soaking period at 650°C	Pass
Hot Surface Performance of High Temperature*	ASTM C411	Warpage ≤ 6mm Cracking : no cracks completely through the insulation thickness. Surface cracks on hot face are acceptable	Pass
Surface Burning Characteristics*	ASTM E84	Flame spread - 0, Smoke Developed-0	Pass
Apparent Thermal Conductivity*	ASTM C177/GHP ASTM C518/HFM ASTM C335/Pipe cover ASTM C1045	Temp. [°C]    38    93    149    204    260    316    371	Pass
		λ W/(m·K)    ≤ .059    ≤ .065    ≤ .072    ≤ .079    ≤ .087    ≤ .095    ≤ .102	Pass
Stress Corrosion Performance* (Austenitic Stainless Steel)	ASTM C795 ASTM C692 ASTM C871	① Na <sup>+</sup> + SiO <sub>3</sub> <sup>2-</sup> ions : ≥ 50ppm ② Acceptable range of Cl <sup>-</sup> + F <sup>-</sup> and Na <sup>+</sup> + SiO <sub>3</sub> <sup>2-</sup> ③ pH ≤ 12.5 (at 25°C) ④ The stress corrosion test (ASTM C692) must be passed.	Pass
Moisture Content*	ASTM C1616	≤ 20%	Pass
Combustibility*	ASTM E136	Non-Combustible	Pass
Corrosion**	ASTM C1617	Mass Loss Corrosion Rate (MLCR) ≤ DI (The MLCR of Type 1 materials, when tested with extracted solutions, shall be equal to or less than that determined when tested with DI Water)	Pass

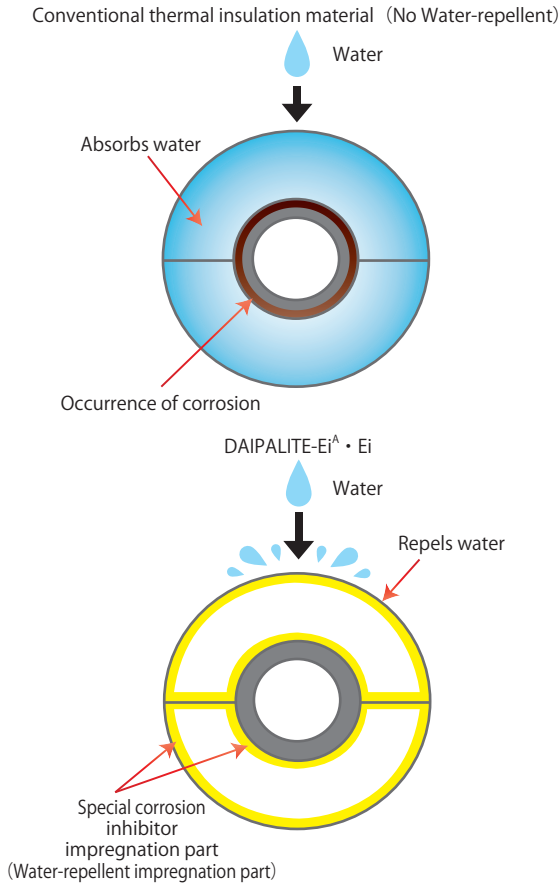
\* Tested product : DAIPALITE-E<sup>A</sup>

\*\* Tested product : DAIPALITE-E<sup>iA</sup>(Water-repellent type)

## Various performances of water-repellent thermal insulation material

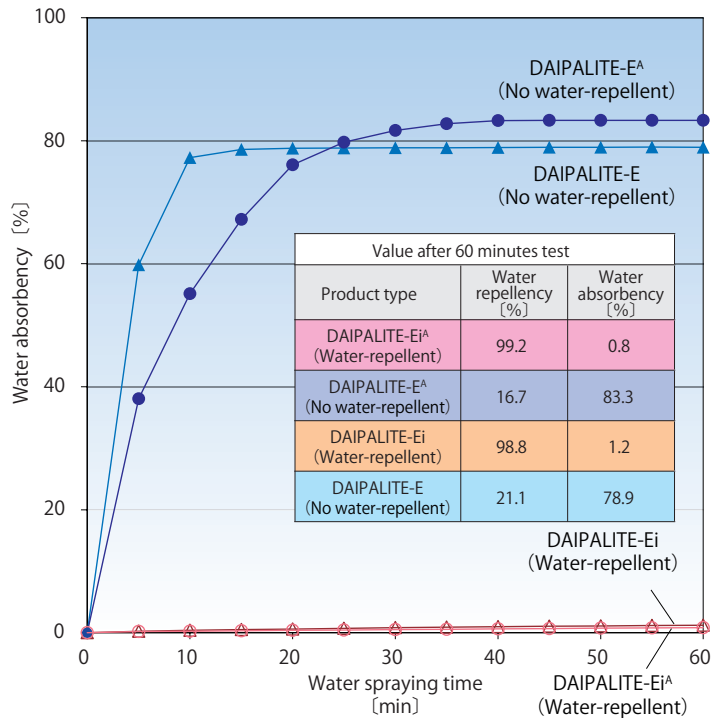
### Water-repellent mechanism

The following is a comparative example of a conventional thermal insulation material and DAIPALITE-Ei<sup>A</sup> / Ei when water contacts the thermal insulation material.



### Water-repellent performance

In order to measure water repellency and water absorbency, the thermal insulation material was sprinkled for 60 minutes. The results are as follows. (by a test method similar to the JIS A 9510, measured in November 2020) However, DAIPALITE-Ei is a surface water-repellent product and does not have the water repellency classified in 4.3 of JIS A9510 1-15.



$$\text{Water absorbency [\%]} = (M_1 - M_0) / (V \times \rho_w) \times 100 \text{ [\%]}$$

$$\text{Water repellency [\%]} = \left(1 - \frac{M_1 - M_0}{V \times \rho_w}\right) \times 100$$

M<sub>0</sub>: Mass of test piece before test [g]

M<sub>1</sub>: Mass of test piece after test [g]

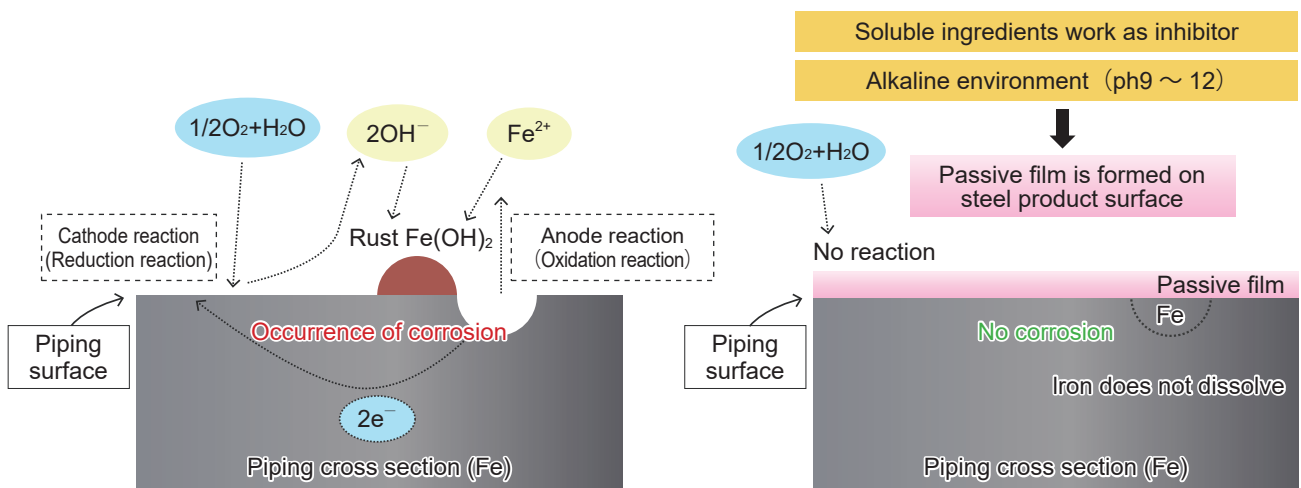
V: Volume of specimen [cm<sup>3</sup>]

ρ<sub>w</sub>: Water density (= 1g/cm<sup>3</sup>)

Conventional thermal insulation materials with no water repellency will drastically decrease the thermal insulation performance and corrode the piping. Corrosion not only reduces the thermal efficiency of the facility, but can also cause serious incidents such as leakage, explosion, fire, etc. DAIPALITE-Ei<sup>A</sup> / Ei repels water and maintains thermal insulation performance. Even if water enters from the outside through the joints and touches the surface of the steel material, another function works and counters CUI. (See below for corrosion-inhibiting effect)

### Corrosion-inhibiting effect

Special corrosion inhibitors contain soluble components (Na<sup>+</sup>, SiO<sub>3</sub><sup>2-</sup>). Even if water enters between the DAIPALITE-Ei<sup>A</sup> / Ei and the steel surface through the joint, the soluble component is effective as a corrosion inhibitor. Furthermore, the pH of the aqueous solution of soluble components is more than 10, and a passive film is formed, which prevents iron corrosion.



Conceptual diagram of iron corrosion reaction in water

### Immersion corrosion test of carbon steel piece by elution of the various insulation materials

The picture below shows the corrosion status of carbon steel pieces immersed in eluates of various thermal insulation materials for a certain period. The carbon steel pieces immersed in the eluate of DAIPALITE-Ei<sup>A</sup> / Ei remained in good condition with almost no corrosion observed visually and by SEM (electron microscope) observation. On the other hand, the carbon steel pieces immersed in the eluate of other thermal insulation materials were corroded.

**Procedure of the test**

① Crush each thermal insulation material of the fixed volume and extract with distilled water.

② Keep a piece of carbon steel in the 70°C eluent water for 4 weeks.

	DAIPALITE-Ei <sup>A</sup> / Ei (Water-repellent)	DAIPALITE-E <sup>A</sup> / E (No water-repellent)	Urethane foam	Glass wool	Rock wool	Distilled water
<b>Picture</b>						
<b>SEM Picture</b>						
<b>Corrosion condition</b>	Almost no corrosion	Corrosion of 5 ~ 10µm depth can be seen	Many Corrosion of 400µm depth can be seen	Some Corrosion of about 400µm depth can be seen	Many Corrosion of about 600µm depth can be seen	Corrosion of 40 ~ 80µm depth can be seen

**DAIPALITE-E series / Product size and product quantity per case**

**Standard dimension [mm]**

	Internal Diameter	Thickness	Width	Length
Pipe cover	22 ~ 610	25* 30 40 50 65 75	—	914
Board	—		303 × 914 150 × 914	

※ DAIPALITE-E / Ei thickness 25mm is for board only. (DAIPALITE-E / Ei does not have the 25 mm thick pipe cover)

**QUANTITY PER CARTON (PIPE COVER)**

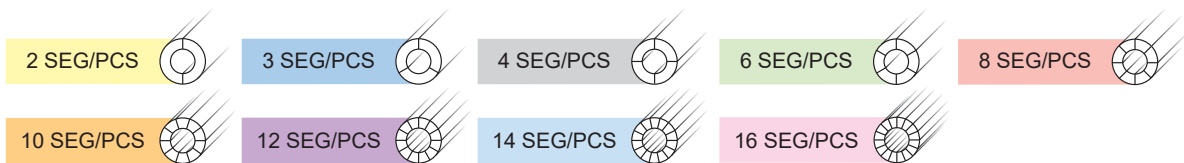
Carton dimension : 335mmL x 535mmW x 925mmH

(in)	INNER DIAMETER (mm)	THICKNESS & QUANTITY PER CARTON ( Unit : PIECES )					
		25mmT <sup>*1</sup>	30mmT	40mmT	50mmT	65mmT	75mmT
1/2	22	32	26	17	12	7	6
3/4	27	28	24	15	10	6-1/2	5
1	34	26	20	13-1/2	10	6	5
1-1/4	43	24	18	11	8-1/2		
1-1/2	49	20	15	10	7-1/2	5-1/2	4
2	61	16	12	8	7	4-1/2	3-1/2
2-1/2	73	12	10	7	6	4	3-1/2
2-1/2	76 <sup>*2</sup>		10	7	6		
3	89	11	9	6	5-1/2	3-1/2	2-1/2
3-1/2	102	9	7	6	4-1/2		
4	114	8	7	5	4	3	2-1/2
4-1/2	127		6		4		
5	141	6	5	4	3-1/2	2-1/2	2
6	168	6-1/3	5-1/3	3-1/2	3	2	1-1/2
7	194	5-1/3	4-2/3	3-1/3	2-1/3	2	1-2/3
8	219	5	4	3-1/3	2-1/3	1-2/3	1-2/3
9	244		4-1/4	2-2/3	2-1/3	1-2/3	1-1/3
10	273	5	4	3	2-2/4	1-2/4	1-1/4
12	324	4	3-1/4	2-1/4	1-3/4	1-2/4	1-1/4
	345				2		
14	356	4-1/6	3-2/6	2-3/6	1-5/6	1-1/4	1
	378		3-2/6	2-3/6	1-5/6	1-2/6	1-1/6
16	406	3-5/6	3	2-2/6	1-5/6	1-1/6	1
	427						1
18	457	3-2/6	3	2	1-4/6	1	1
	478						1
20	508		2-3/6	1-5/6	1-2/6	1	1
22	559	2-7/8	2-3/8	1-6/8	1-2/6	1	5/6
24	610	2-6/8	2-2/8	1-5/8	1	4/6	4/6
26	660				1-1/8	7/8	6/8
28	711			1-3/8		7/8	6/8
30	762					6/8	5/8
32	813						4/8
34	864				9/10		6/10
36	914				9/10		6/10
38	965				9/10		
40	1016				7/10		5/10
42	1067				8/12		6/12
46	1168					5/12	4/12
48	1219				8/12		
52	1320				8/14		6/14
58	1473				8/16		

Quantity of segments per piece

\*1 The 25mm thickness is for DAIPALITE-E<sup>A</sup> / Ei<sup>A</sup> only

\*2 The 76mm inner diameter is for DAIPALITE-E / Ei only



**QUANTITY PER CARTON (BOARD)**

Carton dimension : 315mmL x 545mmW x 925mmH

Width X Length [mm]	THICKNESS & QUANTITY PER CARTON ( Unit : PIECES )					
	25mmT	30mmT	40mmT	50mmT	65mmT	75mmT
150×914	40	32	24	20	16	14
303×914	20	16	12	10	8	7

(in)	Pipe cover inside diameter [mm]	All thickness of thermal insulation material [mm] **													
		80	90	100	115	125	130	140	150	165	175	180	190	200	
		Combination of thermal insulation material's thickness [inside diameter× thickness of single, mm]													
1/2	22	22×30 89×50	/	22×50 127×50	/	/	22×30 89×50 194×50	/	/	/	/	22×30 89×75 244×75	/	/	
3/4	27	27×40 114×40	27×40 114×50	/	27×40 114×75	/	27×40 114×50 219×40	27×40 114×50 219×50	/	27×40 114×50 219×75	/	27×40 114×75 273×65	27×40 114×75 273×75	/	
1	34	34×50 141×30	34×50 141×40	34×50 141×50	34×50 141×65	34×50 141×75	34×50 141×50 244×30	34×50 141×50 244×40	34×50 141×50 244×50	34×50 141×50 244×65	34×50 141×50 244×75	34×50 141×65 273×65	34×50 141×65 273×75	/	
1-1/2	49	49×30 114×50	/	/	/	/	49×30 114×50 219×50	/	/	/	/	49×30 114×75 273×75	/	/	
2	61	61×50 168×30	61×50 168×40	61×50 168×50	61×50 168×65	61×50 168×75	61×65 194×65	61×65 194×75	61×50 168×50 273×50	61×50 168×50 273×65	61×50 168×50 273×75	61×65 194×65 324×50	61×65 194×75 345×50	61×50 168×75 324×75	
2-1/2	73	73×30 141×50	73×40 168×50	/	73×40 168×75	73×30 141×65	73×30 141×50 244×50	73×65 219×75	/	73×65 219×50 324×50	/	73×40 168×75 324×65	73×40 168×75 324×75	/	
3	89	89×50 194×30	89×50 194×40	89×50 194×50	89×75 244×40	89×75 244×50	89×65 219×65	89×75 244×65	89×75 244×75	89×65 219×50 324×50	89×75 244×50 345×50	89×75 244×65 378×40	89×75 244×65 378×50	/	
4	114	114×50 219×30	114×50 219×40	114×50 219×50	114×50 219×65	114×50 219×75	114×50 219×50 324×30	114×65 244×75	114×50 219×50 324×50	114×50 219×50 324×65	114×50 219×50 324×75	114×65 244×40 324×75	114×50 219×75 378×65	114×50 219×75 378×75	
5	141	141×50 244×30	141×50 244×40	141×50 244×50	141×50 244×65	141×50 244×75	141×50 244×40 324×40	141×50 244×40 324×50	141×50 244×50 345×50	141×50 244×65 378×50	141×50 244×75 406×50	141×65 273×65 406×50	141×50 244×65 378×75	141×50 244×75 406×75	
6	168	168×50 273×30	168×50 273×40	168×50 273×50	168×50 273×65	168×50 273×75	168×50 273×50 378×30	168×75 324×65	168×75 324×75	168×50 273×40 356×75	168×50 273×50 378×75	168×50 273×65 406×65	168×50 273×65 406×75	168×75 324×50 427×75	
7	194	/	194×25 244×65	194×25 244×75	194×65 324×50	194×75 345×50	194×65 324×65	194×65 324×75	194×75 345×50 457×25	194×25 244×65 378×75	194×75 345×50 457×50	194×65 324×65 457×50	194×75 345×50 457×65	194×75 345×50 457×75	
8	219	219×50 324×30	219×50 324×40	219×50 324×50	219×50 324×65	219×50 324×75	219×65 356×65	219×75 378×65	219×75 378×75	219×50 324×40 406×75	219×50 324×50 427×75	219×50 324×65 457×65	219×50 324×65 457×75	219×50 324×75 478×75	
9	244	244×40 324×40	244×40 324×50	244×50 345×50	244×65 378×50	244×75 406×50	244×65 378×65	244×65 378×75	244×75 406×75	244×40 324×50 427×75	244×50 345×50 457×75	244×65 378×65 508×50	244×65 378×50 478×75	244×75 406×75 559×50	
10	273	273×50 378×30	273×50 378×40	273×50 378×50	273×50 378×65	273×50 378×75	273×65 406×65	273×65 406×75	273×75 427×75	273×50 378×65 508×50	273×50 378×50 478×75	273×65 406×75 559×40	273×65 406×75 559×50	/	
12	324	324×40 406×40	324×40 406×50	324×25 378×75	324×65 457×50	324×50 427×75	324×65 457×65	324×65 457×75	324×75 478×75	324×65 457×50 559×50	/	324×40 406×75 559×65	324×40 406×75 559×75	/	
14	356	356×50 457×30	356×50 457×40	356×50 457×50	356×75 508×40	356×75 508×50	356×50 457×50 559×30	356×75 508×65	356×75 508×75	356×75 508×50 610×40	356×75 508×50 610×50	/	356×75 508×50 610×65	356×75 508×50 610×75	
16	406	406×50 508×30	406×50 508×40	406×50 508×50	406×75 559×40	406×75 559×50	406×50 508×50 610×30	406×75 559×65	406×75 559×75	406×50 508×50 610×65	406×50 508×50 610×75	/	/	/	
18	457	457×50 559×30	457×50 559×40	457×50 559×50	457×50 559×65	457×75 610×50	/	457×75 610×65	457×75 610×75	/	/	/	/	/	
20	508	508×50 610×30	508×50 610×40	508×50 610×50	508×50 610×65	508×50 610×75	/	/	/	/	/	/	/	/	

\* Inside diameter of thermal insulation material which is next to the plumbing [mm]

\*\* After combined thickness of thermal insulation material [mm]

(in)	Pipe cover inside diameter* [mm]	All thickness of thermal insulation material [mm] **												
		80	90	100	115	125	130	140	150	165	175	180	190	200
		Combination of thermal insulation material's thickness [inside diameter× thickness of single, mm]												
1/2	22	22×30 89×50	/	22×50 127×50	/	/	/	22×30 89×50 194×50	/	/	/	22×30 89×75 244×75	/	/
3/4	27	27×30 89×50	27×40 114×50	/	27×40 114×75	/	27×65 168×65	27×40 114×50 219×50	/	27×40 114×50 219×75	/	27×30 89×75 244×75	27×40 114×75 273×75	/
1	34	34×50 141×30	34×50 141×40	34×50 141×50	34×50 141×65	34×50 141×75	/	34×50 141×50 244×40	/	34×50 141×50 244×65	/	/	34×50 141×65 273×75	/
1-1/4	43	/	43×40 127×50	/	/	/	/	/	/	/	/	/	/	/
1-1/2	49	49×30 114×50	/	/	/	/	49×30 114×50 219×50	/	/	/	/	49×30 114×75 273×75	/	/
2	61	61×50 168×30	61×50 168×40	61×50 168×50	61×50 168×65	61×50 168×75	61×65 194×65	61×75 219×65	61×75 219×75	61×50 168×75 324×40	61×50 168×50 273×75	/	61×50 168×75 324×65	61×75 219×50 324×75
2-1/2	73	73×30 141×50	/	/	73×65 219×50	73×30 141×65 273×30	73×65 219×65	73×65 219×75	/	73×65 219×50 324×50	/	73×40 168×75 324×65	73×40 168×75 324×75	/
3	89	89×50 194×30	89×50 194×40	89×50 194×50	89×75 244×40	89×75 244×50	/	89×75 244×65	89×75 244×75	/	89×75 244×50 345×50	89×75 244×65 378×40	89×75 244×65 378×50	/
3-1/2	102	102×30 168×50	/	/	/	/	102×30 168×50 273×50	/	/	/	/	102×30 168×75 324×75	/	/
4	114	114×50 219×30	114×50 219×40	114×50 219×50	114×50 219×65	114×75 273×50	114×50 219×50 324×30	114×75 273×65	114×75 273×75	114×50 219×50 324×65	114×75 273×50 378×50	114×75 273×65 406×40	114×75 273×50 378×65	114×75 273×50 378×75
4-1/2	127	127×30 194×50	/	/	/	/	/	/	/	/	/	/	/	/
5	141	141×50 244×30	141×50 244×40	141×50 244×50	141×50 244×65	141×50 244×75	141×50 244×40 324×40	141×50 244×40 324×50	141×50 244×50 345×50	141×50 244×65 378×50	/	141×65 273×65 406×50	141×50 244×65 378×75	141×50 244×75 406×75
6	168	168×50 273×30	168×50 273×40	168×50 273×50	168×50 273×65	168×50 273×75	168×50 273×50 378×30	168×50 324×65	168×75 324×75	168×50 273×40 356×75	168×50 273×50 378×75	168×50 273×65 406×65	168×50 273×65 406×75	168×75 324×50 427×75
7	194	/	/	/	/	194×75 345×50	/	/	/	/	194×75 345×50 457×50	/	/	194×75 345×50 457×75
8	219	219×50 324×30	219×50 324×40	219×50 324×50	219×50 324×65	219×50 324×75	219×65 356×65	219×75 378×65	219×75 378×75	219×50 324×40 406×75	219×50 324×50 427×75	219×50 324×65 457×65	219×50 324×65 457×75	219×50 324×75 478×75
9	244	/	/	244×50 345×50	244×65 378×50	244×75 406×50	244×65 378×65	244×65 378×75	244×75 406×75	244×75 406×50 508×40	244×75 406×50 508×50	244×65 378×65 508×50	244×75 406×75 559×40	244×75 406×75 559×50
10	273	273×50 378×30	273×50 378×40	273×50 378×50	273×50 378×65	273×50 378×75	273×65 406×65	273×65 406×75	273×75 427×75	273×65 406×50 508×50	273×50 378×50 478×75	273×65 406×75 559×40	273×65 406×75 559×50	/
12	324	324×40 406×40	324×40 406×50	/	324×65 457×50	324×50 427×75	324×65 457×65	324×65 457×75	324×75 478×75	324×65 457×50 559×50	/	324×65 457×75 610×40	324×40 406×75 559×75	/
14	356	356×50 457×30	356×50 457×40	356×50 457×50	356×50 457×65	356×50 457×75	356×50 457×50 559×30	356×75 508×65	356×75 508×75	356×50 457×50 559×65	356×75 508×50 610×50	/	356×75 508×50 610×65	356×75 508×50 610×75
16	406	406×50 508×30	406×50 508×40	406×50 508×50	406×50 508×65	406×75 559×50	406×50 508×50 610×30	406×75 559×65	406×75 559×75	406×50 508×50 610×65	406×50 508×50 610×75	/	/	/
18	457	457×50 559×30	457×50 559×40	457×50 559×50	457×50 559×65	457×75 610×50	/	457×75 610×65	457×75 610×75	/	/	/	/	/
20	508	508×50 610×30	508×50 610×40	508×50 610×50	508×50 610×65	508×50 610×75	/	/	/	/	/	/	/	/

\* Inside diameter of thermal insulation material which is next to the plumbing [mm]

\*\* After combined thickness of thermal insulation material [mm]

## Export Reference List 2019.1~2023.12

### ■ Explanation of Abbreviations

[JICV Products (made in Viet Nam)]

DL-E : JIS A 9510 1-15 product

(Heat resistance temp. 1,000°C, lightweight type)

DL-Ei : JIS A 9510 1-15 product

(Heat resistance temp. 1,000°C, lightweight, surface water repellent type)

DL-E<sup>Δ</sup> : ASTM C533 Type I product

(Heat resistance temp. 1,000°C, high-strength type)

\* Meaning of additional sign

(B) : Flat board

(C) : Pipe cover

(AC) : Arch cover (curved board for large diameter, produced in Japan)

I : Surface water repellent product (for only Japanese product)

The "I" is a Capital letter of the alphabet "I".

WPA : Full water repellent product (for only Japanese product)

[JIC Products (made in Japan)]

NB : Heat resistance temp. 650°C type product

DL : JIS A 9510 1-15 product (Heat resistance temp. 1,000°C, lightweight type)

UB : The latest model calcium silicate thermal insulation product, high insulation performance type

TL : JIS A 5430 0.5TK product calcium silicate fireproofing material

TL-UL : Design No. XR301 (at UL 1709) product calcium silicate fireproofing material (old product)

TR : Calcium silicate heat insulation support

NT : JIS A 5430 product calcium silicate fireproofing material

The white row is the products produced at a plant in Japan, the yellow row is a plant in Vietnam.

### ■ Southeast Asia

Delivery	Destination	Field	Customers	Construction works	Products	Application
Dec. 2023	VIETNAM	Refinery	Kyoei Steel Vietnam Co., Ltd.	Maintenance	DL-E <sup>Δ</sup> (B)	Equipment
Dec. 2023	SINGAPORE	Maintenance	Ematco Industrial Pte Ltd	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Dec. 2023	Malaysia	Maintenance	GUSTEAM CORPORATION SDN. BHD.	Maintenance	DL-Ei <sup>Δ</sup> (C)	Piping
Nov. 2023	SINGAPORE	Petrochemical	PCS Pte. Ltd.	Maintenance	DL(B)-WPA, DL(AC)-WPA	Equipment
Nov. 2023	INDONESIA	Chemical	PT Pupuk Kalimantan Timur	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Oct. 2023	INDONESIA	Smelting	MEISEI INDUSTRIAL CO., LTD.	MSP Project	DL-E <sup>Δ</sup> (C)	Piping
Oct. 2023	INDONESIA	Power Plant	PT HM Sampoerna	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Oct. 2023	THAILAND	Chemical	Chemical Plant in Thailand	Expansion Project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Sep. 2023	THAILAND	Refinery	STAR PETROLEUM REFINING (SPRC)	Maintenance	DL-E(C)	Piping & Equipment
Sep. 2023	MALAYSIA	Petrochemical	ONGC 98/2 project offshore India	Thermal Insulation Work	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Aug. 2023	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-Ei <sup>Δ</sup> (C)(B)	Piping & Equipment
Aug. 2023	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Aug. 2023	THAILAND	Chemical	Chemical Plant in Thailand	Expansion Project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Jul. 2023	SINGAPORE	Petrochemical	Meisei International Pte Ltd	Maintenance	DL-Ei(B), DL-Ei(C)	Tower
Jul. 2023	INDONESIA	Chemical	PT. Asahimas Chemical	Maintenance	DL-Ei <sup>Δ</sup> (C)	Equipment
Jul. 2023	MALAYSIA	Module	Morimatsu Dialog (Malaysia) Sdn Bhd	Thermal Insulation Work	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Jun. 2023	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-Ei <sup>Δ</sup> (C)(B)	Piping & Equipment
Jun. 2023	THAILAND	Refinery	STAR PETROLEUM REFINING (SPRC)	Maintenance	DL(C)	Piping & Equipment
May. 2023	SINGAPORE	Petrochemical	Ematco Industrial Pte Ltd	Maintenance	DL-E <sup>Δ</sup> (C) DL-E <sup>Δ</sup> (B)	Piping & Equipment
May. 2023	VIETNAM	Power Plant	VIETNAM COMPANY	VANPHONG II Power Plant	DL-E <sup>Δ</sup> (C)	Piping
May. 2023	VIETNAM	Power Plant	IHI Corporation	Van Phong thermal power plant project	DL-E <sup>Δ</sup> (C)	Piping
Apr. 2023	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Feb. 2023	THAILAND	Refinery	STAR PETROLEUM REFINING (SPRC)	Maintenance	DL(C)	Piping & Equipment
Feb. 2023	VIETNAM	Power Plant	IHI Corporation	Van Phong thermal power plant project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping
Dec. 2022	INDONESIA	Power Plant	PT. Nichias Sunijaya	Sampoerna Project	DL-E <sup>Δ</sup> (C)	Piping
Nov. 2022	VIETNAM	Refinery	Isolite Ceramic Fibers Sdn Bhd	Maintenance	DL-E <sup>Δ</sup> (B)	Equipment
Nov. 2022	MALAYSIA	Petrochemical	Nichias South East Asia Sdn.Bhd.	IDEMITSU 2SP-Project	DL-E(C)	Piping
Nov. 2022	VIETNAM	Power Plant	Thai Nichias Engineering Co., Ltd.	Van Phong thermal power plant project	DL-E <sup>Δ</sup> (C) DL-E <sup>Δ</sup> (B)	Piping & Equipment
Nov. 2022	VIETNAM	Power Plant	IHI Corporation	Van Phong thermal power plant project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping
Nov. 2022	VIETNAM	Power Plant	NICHIAS CORPORATION	Van Phong thermal power plant project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Aug. 2022	INDONESIA	Power Plant	PT. Nichias Sunijaya	Kelseltang 2 Project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Jun. 2022	VIETNAM	Chemical	ENERGY SAVING INDUSTRY	Hyosung HSVC OL1	DL-Ei <sup>Δ</sup> (C)	Piping
May. 2022	VIETNAM	Chemical	Phu Khang Co.,LTD.	SEIKO PMC Project	DL-Ei <sup>Δ</sup> (C) DL-E <sup>Δ</sup> (B)	Piping & Equipment
Feb. 2022	INDONESIA	Chemical	PT. WILLICH ISOLASI PRATAMA	KPI Bontang Project	DL-E <sup>Δ</sup> (C)	Piping & Equipment
Aug. 2021	MALAYSIA	LNG Plant	Malaysia LNG Sdn.Bhd.	Natural Gas Dryer	DL(B)-WPA, DL(C)-WPA, DL(AC)-WPA	Equipment
Jul. 2021	VIETNAM	Maintenance	Doosan Heavy Industries	Nghi Son II Power Plant	DL-E <sup>Δ</sup> (B)	Equipment

■ Southeast Asia

Delivery	Destination	Field	Customers	Construction works	Products	Application
Jun. 2021	THAILAND	Petrochemical	Kuraray Advanced Chemicals (Thailand) Co., Ltd.	Harmony Project	UL-TL(I)	Column & Beam
Jun. 2021	VIETNAM	Chemical	ENERGY SAVING INDUSTRY	Hyosung HSVC OL1	DL-Ei <sup>Δ</sup> (C)	Piping
Jun. 2021	INDONESIA	Power Plant	Supreme Energy, Marubeni	Rantau Dedap Geothermal Project	DL-E <sup>Δ</sup> (C)	Piping
Apr. 2021	VIETNAM	Chemical	ENERGY SAVING INDUSTRY	Hyosung HSVC PP5	DL-Ei <sup>Δ</sup> (C)	Piping
Apr. 2021	VIETNAM	Maintenance	VIETNAM JAPAN GAS JOINT STOCK COMPANY	JVG Project	DL-E <sup>Δ</sup> (C)	Piping
Mar. 2021	INDONESIA	Power Plant	Petrochemical	PT. Kaltim Parna Industri	Maintenance	Piping & Equipment
Mar. 2021	VIETNAM	Maintenance	Phu My Fertilizer Plant	Phu My Fertilizer Project (Maintenance)	DL-E <sup>Δ</sup> (C)	Piping
Feb. 2021	INDONESIA	Power Plant	PT PLN (Persero)	Kalselteng 2 Coal Fired Power Plant Project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Nov. 2020	INDONESIA	Power Plant	MIITSUBISHI HITACHI POWER SYSTEMS, LTD.	Tanjung Jati XTJB6 Project	DL-E <sup>Δ</sup> (C)	Piping & Equipment
Nov. 2020	THAILAND	Power Plant	Electricity Generating Authority of Thailand	EGAT Maemo Power Plant Project	DL-E(B)	Equipment
Nov. 2020	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Oct. 2020	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance (OFFSHORE PROJECT)	DL-E <sup>Δ</sup> (B)	Equipment
Sep. 2020	VIETNAM	Furnace	VIET NHAT FURNACE CO.,LTD	Maintenance	DL-E <sup>Δ</sup> (B)	Furnace
Aug. 2020	INDONESIA	Petrochemical	PT. NIPPON SHOKUBAI I INDONESIA	Acrylic Acid Plant Expand Project (NSI-PJ) Tank Area	DL-Ei <sup>Δ</sup> (C),DL-Ei <sup>Δ</sup> (B)	Tank
Jul. 2020	INDONESIA	Petrochemical	PT. NIPPON SHOKUBAI I INDONESIA	Acrylic Acid Plant Expand Project (NSI-PJ)	DL-E <sup>Δ</sup> (C)(B), DL-Ei <sup>Δ</sup> (C)(B)	Piping
Jul. 2020	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance (OFFSHORE PROJECT)	DL-E <sup>Δ</sup> (C),DL-Ei <sup>Δ</sup> (C)	Piping
Jul. 2020	THAILAND	Refinery	STAR PETROLEUM REFINING (SPRC)	Install New 2nd HVGO Feed Filter	DL(C)	Piping & Equipment
Mar. 2020	MALAYSIA	Food industry	East Asia Palm Products Sdn Bhd	---	DL-E <sup>Δ</sup> (C)	Piping
Apr. 2020	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Mar. 2020	INDONESIA	Food industry	---	Sugar Plant Sulteng	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Mar. 2020	MALAYSIA	LNG Plant	Malaysia LNG Sdn.Bhd.	Field Trial for Natural Gas Dryer	DL(B)-WPA, DL(C)-WPA, DL(AC)-WPA	Piping & Equipment
Jan. 2020	INDONESIA	Mining Industry	PT. Indonesia Asahan Aluminium (PERSERO)	Furnaces	XL(B)	Equipment
Dec. 2019	VIETNAM	Maintenance	VIETNAM COMPANY	Maintenance	DL-E <sup>Δ</sup> (C)	Piping
Nov. 2019	INDONESIA	Power Plant	MIITSUBISHI HITACHI POWER SYSTEMS, LTD.	Central Java Indonesia Unit2	DL-Ei <sup>Δ</sup> (B), DL-Ei <sup>Δ</sup> (C)	Piping & Equipment
Nov. 2019	SINGAPORE	Chemical	Asahi Kasei Plastics Singapore Pte Ltd	Shutdown Maintenance Project 2019	DL(B)-WPA, DL(C)-WPA, DL(AC)-WPA	Piping & Equipment
Oct. 2019	THAILAND	Power Plant	BLCP Power Limited	BLCP Power Project	DL-E(B)	Equipment
Oct. 2019	INDONESIA	Petrochemical	PT Panca Amara Utama	Amonia Banggai Project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Oct. 2019	VIETNAM	Maintenance	VIETNAM COMPANY	CS Insulation System Project	DL-E <sup>Δ</sup> (C)	Piping
Sep. 2019	INDONESIA	Power Plant	MIITSUBISHI HITACHI POWER SYSTEMS, LTD.	Tanjung Jati XTJB5 Project	DL-E <sup>Δ</sup> (B), DL-E <sup>Δ</sup> (C)	Piping & Equipment
Sep. 2019	SINGAPORE	Petrochemical	Asahi Kasei Synthetic Rubber Singapore Pte. Ltd.	AKSS Plant Modification Work	DL-E(B), DL-E(C)	Piping & Equipment
Sep. 2019	SINGAPORE	---	Foster Asia Pacific Pte Ltd.	Maintenance	DL(B)-WPA, DL(C)-WPA	Piping & Equipment
Sep. 2019	THAILAND	Refinery	STAR PETROLEUM REFINING (SPRC)	Maintenance	DL(C)	Piping
Sep. 2019	VIETNAM	Petrochemical	ENERGY SAVING INDUSTRY	Hyosung HSVC PP4	DL-Ei <sup>Δ</sup> (C),DL-Ei <sup>Δ</sup> (B)	Piping
Jul. 2019	SINGAPORE	Refinery	Singapore Refining Company (SRC)	Cable Duct Fireproofing	TL(B)	Equipment
Jul. 2019	MALAYSIA	Power Plant	Kapar Energy Ventures Sdn.Bhd.	Unit 2 Insulation work for Main pipe	UB(C)	Piping & Equipment
Jun. 2019	THAILAND	Refinery	STAR PETROLEUM REFINING (SPRC)	Maintenance	DL(C)	Piping
Jun. 2019	INDONESIA	Petrochemical	PT Chandra Asri Petrochemical Tbk	BUTENE 1 & MTBE Project	DL-E <sup>Δ</sup> (B)	Equipment
May. 2019	VIETNAM	Chemical	VIETNAM JAPAN GAS JOINT STOCK COMPANY	MGP 44000 AIR SEPARATION PLANT-PHU MY 3 PROJECT	DL-E(C)	Piping
Apr. 2019	VIETNAM	Chemical	VIETNAM JAPAN GAS JOINT STOCK COMPANY	MGP 44000 AIR SEPARATION PLANT-PHU MY 3 PROJECT	DL-E(B), DL-E(C)	Piping & Equipment
Apr. 2019	INDONESIA	Power Plant	MIITSUBISHI HITACHI POWER SYSTEMS, LTD.	Central Java Indonesia Project Unit 2	DL-E <sup>Δ</sup> (B)	Piping & Equipment
Mar. 2019	PHILIPPINES	Power Plant	INSULATION KOREA CO., LTD.	Philippines Project	UL-TL(B)	Column & Beam
Jan. 2019	VIETNAM	Maintenance	PHU KHANG TRADING TECHNICAL CO.,LTD	Phu Khang Project Additional	DL-E <sup>Δ</sup> (C)	Piping
Jan. 2019	INDONESIA	Petrochemical	PT Idemitsu Lube Teckno Indonesia	Delta- I Project	DL-Ei <sup>Δ</sup> (C)	Piping

■ East Asia

Delivery	Destination	Field	Customers	Construction works	Products	Application
Nov. 2023	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Oct. 2023	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	LOTTE CHEMICAL DAESAN MS Furnace burner tile	UB(B)	Equipment
Oct. 2023	KOREA	Chemical	INSULATION KOREA CO., LTD.	KCC Project	DL(C)	Piping
Sep. 2023	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL-E(B)	Equipment
Sep. 2023	CHINA	Furnace	ROCKY-SHA (SHANGHAI)CO., LTD.	Furnaces	UB(B)	Equipment
Aug. 2023	CHINA	Furnace	ROCKY-SHA (SHANGHAI)CO., LTD.	Furnaces	UB(B) DL(B)	Equipment
Aug. 2023	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Aug. 2023	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	Project 1	XL(B)-WPA	Equipment
Aug. 2023	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	JNK SK NEP GTG DUCT	DL-E <sup>△</sup> (B)	Equipment
May. 2023	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	Shenandoah Project	UB(B)	Equipment
Apr. 2023	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Feb. 2023	CHINA	Furnace	ROCKY-SHA (SHANGHAI)CO., LTD.	Furnaces	UB(B)	Equipment
Feb. 2023	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	LG NCC Project	UB(B)	Equipment
Jan. 2023	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Nov. 2022	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B)	Equipment
Oct. 2022	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	LG Daesan #7&8 low No. X burner replacement refractory construction	UB(B)	Equipment
Jul. 2022	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Jun. 2022	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	DLE&C Yeosu APAO Fireproof coating construction	UL-TL(B)-WPA	Equipment
Jun. 2022	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	YNCC Furnaces	UB(B)	Equipment
Jun. 2022	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Jun. 2022	HONG KONG	Power Plant	Mitsubishi Power, Ltd.	Hong Kong Lamma #12	DL-E <sup>△</sup> (C)	Piping
Apr. 2022	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B)	Equipment
Mar. 2022	KOREA	Power Plant	ENERGY SAVING INDUSTRY	Seongam Incinerator ~ SKC Line	UB(C), UB-WP <sup>△</sup>	Piping
Jan. 2022	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Sep. 2021	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	YNCC Furnaces	UB(B)	Equipment
Sep. 2021	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E <sup>△</sup> (B)	Equipment
Sep. 2021	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	UL-TL(B)	Column & Beam
Aug. 2021	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	LG Daesan #6 Nox Burner	UB(B)	Equipment
Aug. 2021	CHINA	Furnace	ROCKY-SHA (SHANGHAI)CO., LTD.	Furnaces	UB(B)	Equipment
Jul. 2021	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	YNCC Furnaces	UB(B) XL(B)	Equipment
Mar. 2021	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	Lotte Chemical / LG Yeosu SM Heater SSH BA-1301(#1)	UB(B)	Equipment
Dec. 2020	KOREA	Chemical	ENERGY SAVING INDUSTRY	Maintenance	DL-E <sup>△</sup> (C)	Piping
Nov. 2020	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B)	Equipment
Nov. 2020	CHINA	Furnace	ROCKY-SHA (SHANGHAI)CO., LTD.	Furnaces	UB(B)	Equipment
Oct. 2020	HONG KONG	Power Plant	Mitsubishi Power, Ltd.	Hong Kong Lamma #11	DL-E <sup>△</sup> (C), DL-E <sup>△</sup> (B)	Piping
Sep. 2020	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	UL-TL(B)	Column & Beam
Aug. 2020	KOREA	Power Plant	INSULATION KOREA CO., LTD.	New ASEAN 345kv substation Fire proof	NTL, NTL-I	Column & Beam
Aug. 2020	KOREA	Chemical	ENERGY SAVING INDUSTRY	Buhmwoo - S-oil Steam Line	UB(C), UB(C)-WPA	Piping
Jul. 2020	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	D-NC Twin Furnace Reduce Nox-Nurner Tile Change	UB(B)	Equipment
Jun. 2020	CHINA	Furnace	ROCKY-SHA (SHANGHAI)CO., LTD.	Furnaces	UB(B)	Equipment
Jun. 2020	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B)	
Jun. 2020	KOREA	Petrochemical	INSULATION KOREA CO., LTD.	Y2C Project Recycle Furnace	UB(B)	Equipment
Apr. 2020	TAIWAN	Refinery	ISOLITE FANSHIN (TAIWAN) CO., LTD.	Maintenance	DL-E(B)	Equipment
Feb. 2020	CHINA	Steel Plant	MAANSHAN IRON & STEEL COMPANY LIMITED.	Maintenance	DL(B)	Equipment
Jan. 2020	TAIWAN	Refinery	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B), UB(B)	Equipment
Dec. 2019	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B)	
Nov. 2019	TAIWAN	Petrochemical	Oriental Petrochemical (Taiwan) Co. Ltd. (INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited)	OPTC Project	TL-UL	Column & Beam

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Delivery	Destination	Field	Customers	Construction works	Products	Application
Aug. 2019	KOREA	Petrochemical	ENERGY SAVING INDUSTRY	SK PP PROJECT	UB(C), UB(C)-WPA	Piping
Jul. 2019	TAIWAN	Petrochemical	INSULATION & MATERIALS SOLUTIONS H.K. Co., Limited	Maintenance	DL(B)	
May. 2019	KOREA	Power Plant	INSULATION KOREA CO., LTD. (KOREA MIDLAND POWER CO.,LTD.)	Dan In Ri Electric Power Additional	NT(B)	Column & Beam
Jan. 2019	KOREA	Power Plant	INSULATION KOREA CO., LTD. (KOREA MIDLAND POWER CO.,LTD.)	Dan In Ri Electric Power Additional	NT(B)	Column & Beam

## Notes and caution on Design and Construction

Before using our calcium silicate thermal insulation materials DAIPALITE-E series (DAIPALITE-E<sup>A</sup>, DAIPALITE-Ei<sup>A</sup>, DAIPALITE-E, DAIPALITE-Ei), hereinafter collectively to an “our products”, please be sure to read and confirm the following. Although the following includes the basic notes of caution, prohibited actions, and disclaimers about our products and relevant products, please also refer to the work instructions or the accompanying notes of caution on the product the construction method and the construction work for each product before using it. If you have any questions, please contact our sales staff.

### 1. Notes and caution on Design

- 1) Work out the design that satisfies the specifications required by customers and/or the law and the relevant enforcement orders, notifications and certifications for each region where our products are used.
- 2) Do not design and use our products in the areas directly exposed to water without adequate waterproof treatment. It may cause damage to the product.
- 3) Do not design and use our products in the areas exposed to a particularly heavy concentric load or impact load. It may cause damage to the product. If you have to take into account the load, etc., please consult our sales staff.
- 4) Do not design and use our products in the wet place always in contact with soil or water. It may cause the durability deterioration of the product and, in some cases, cause damage to the product.
- 5) Do not design and use our products in the location that may come under a chemically harmful effect. This may cause deterioration of the durability of the product and, in some cases, cause damage to the product.

### 2. Notes and caution on Construction

- 1) Our products shall be constructed with the method according to the requirements by customers and/or the law and the relevant enforcement orders, notifications and certifications for each region where our products are used.
- 2) Do not construct our products with a method in which the loaded screws are supported by our product. This may cause damage to the product or dropping of the product. The construction must be constructed so that the screws shall always be supported by supporting materials such as the steel furring.
- 3) Do not construct any finishing work, such as tiling or mortar, on our products. There is a risk of falling of the finishing materials.
- 4) Although the processing of our products, such as cutting, drilling, and chamfering, at the construction site is possible, take extra care in the handling of the product during the work so as not to damage its corners and edges by contact, etc. This may cause a defective appearance.
- 5) Do not put any objects on our product or get on them.

### 3. Notes and caution on the use of water-repellent thermal insulation materials

Water-repellent thermal insulation materials (DAIPALITE-Ei<sup>A</sup>, DAIPALITE-Ei) have water-repellency, don't have waterproof. Incorrect use may result in accidents. Be sure to observe the following instructions.

- 1) No underwater use.
- 2) Where the thermal insulation material may be constantly exposed to water, adopt a design that completely precludes water ingress.
- 3) If such a design is impractical, adopt design that ensures easy and quick water drainage even in the event of water ingress.
- 4) In the case of a temporary ingress of rainwater etc., excellent water repellent effect of the product is achieved. But, there are some locations, such as upper surfaces, where water may not drain immediately. If this is likely, avoid attaching waterproofing material to the thermal insulation material, and also avoid sealing exterior joints to allow easy evaporation of entrapped water. If the thermal insulation material including lingering water is heated, it will be adversely affect the thermal insulation material.
- 5) The maximum effective temperature of the water repellent is 250° C, beyond which its water-repellency is lost. Even if the internal temperature exceeds 250° C, the water repellent will be sufficiently effective as long as the surface temperature of the thermal insulation material does not exceed 250° C. No problem occurs under normal conditions of use.
- 6) The delivered surface water-repellent products are water-repellent on all surfaces. When cutting these products at a construction site, you can add water repellency by applying our water-repellent treatment liquid to the cut surface. Please contact us for details.

### 4. Notes and caution on Storage and Transportation

- 1) When storing our products, do not store them in a place exposed to rain, water, or moisture. If the products absorb water, this may cause a decrease in strength and grow algae or mold. When our products have to be stored in a place where they may be exposed to water splashing, always cover the products with a waterproof sheet to prevent exposure.
- 2) Store our products in a place away from direct sunlight. In particular, when the products are packed with a film, note that the film may be damaged by deterioration due to sunlight, and the protection capability for the products may be lost.
- 3) Store our products in a level, flat place as far as possible. Do not store our products in a stack exceeding 1 m or by propping them against something. This may cause the products to tumble, fall, topple, or deform when a force is applied to them.
- 4) For our products packed in a corrugated cardboard case, store the case in the vertical position (in a direction in which the products in the case are in a standing position). If our products are stored in a horizontal position, the products in the case are susceptible to damage by a force on the case.
- 5) If our products are transported by a vehicle, carrier, etc., stack them as flat as possible and protect them with a sheet to prevent them from falling. Additionally, when the products are transported, loaded, and unloaded, take extra care so as not to damage the corners or edges of the products by contact, etc. It is recommended that our products be protected with cushioning materials before the operation.
- 6) For our products that are in the shape of a plate, carry them by holding the board surface vertically. If our products are carried by holding the board surface horizontally, our products may be damaged due to deflection or vibration.

### 5. Notes and caution on Safety and Health

- 1) Be sure to observe the instructions on our product safety data sheet and the terms of laws and regulations related to health and safety, such as the Industrial Safety and Health Law, and construct our products with the greatest care.
- 2) When cutting or processing our products, always observe the regulations concerning the prevention of dust hazards in each region. Furthermore, use a dust collector or dust arrester and wear a dust mask, protective glasses, protective gloves and long-sleeved protective clothing according to the need for protection of the human body. When an electric cutting machine is used, use a machine equipped with a dust collector.
- 3) If the powdery chips of our products get into the eyes, rinse cautiously with water for several minutes. If wearing contact lenses that can be removed easily, remove the contact lenses. Thereafter, continue rinsing. If the powdery chips of the products become attached to the skin, wash the area with plenty of water and soap, and then rinse with warm water.
- 4) After the construction of our products, be sure to gargle the throat and wash the hands. Additionally, if powdery chips from the products become attached to the clothes, brush off enough to pay attention to the scattering of dust. Wash the clothes before reuse.
- 5) If you feel unwell, and if skin irritation occurs, consult a physician for diagnosis and treatment.
- 6) Do not eat, drink or smoke when using this product.

### 6. Notes and caution on containing component

Among the ingredients contained in the product, there are ingredients that may have a harmful effect on the human body. In addition, the contents of ingredients are different depending on each product and thus the contents of hazards and harmful influence can vary. For precautions on ingredients contained in the products, please check the latest safety data sheet of each product issued by our company.

### 7. Notes and caution for other

- 1) The color tone of our products may vary from production lot to on the production lot. The color tone or gloss may also change due to the surface treatment such as water-repellent treatment.
- 2) Please discard our product accordance with the rules on waste in each region.
- 3) Although the surface of our water-repellent products may look wet due to water leaks, this has no influence on the water-repellent performance.
- 4) The spots (white, gray, etc.) on the surface of our products are grains of calcium silicate that occur under normal manufacturing conditions and have no influence on quality.
- 5) Since the various notes may be updated by the latest information, please refer to our website for more information.

### 8. Disclaimers

If any problems related to our products occur during use, please contact our sales staff, and we will respond to them faithfully. Note, however, that we are not responsible for any problems if the problem is fall under to any of the following:

- 1) When the problem arises due to failure to conform to the provisions set by us or in the various certificates and specifications.
- 2) When the problem arises due to failure to conform to the prohibited actions and notes of caution described above.
- 3) When the problem arises due to the user's unique specification, construction method, materials, parts, etc., clearly deviating from the recommended standard specifications by us.
- 4) When the problem arises from the construction or site management outside the range of construction to which we are responsible.
- 5) When the problem arises from an external factor other than our products or construction method, such as the building structure, deformation of foundation, aging, and collision from the outside, etc.
- 6) When the structure, performance, or specifications are modified by a third party after the delivery of the products and the problem arises from such modification.
- 7) When the problem arises from the intention or fault of the user or a third party.
- 8) When the problem, such as dirt, arises from dust due to normal aging or exhaust gas.
- 9) When the problem arises from the use, storage, or transportation etc. under a condition other than the normally expected environmental conditions (temperature, humidity, barometric pressure, water pressure, etc.).
- 10) When the problem arises from a special factor of a natural disaster, such as earthquake and typhoon etc.
- 11) When the problem of contamination arises due to algae, mold, or rust of a metal object like a screw from the use, storage, or transportation etc. in an environment where water immersion due to defective water prevention work, dew condensation due to a humid environment, such an aeration, heat insulation, and steam supply, or extreme high humidity occur.

Our products may be subject to the laws and regulations, etc. of the government or industry body in any jurisdiction where our products are designed, constructed or used. Therefore, designer, constructor or user of our products shall comply with all such applicable laws and regulations as may be applied to our products in such jurisdiction and at its own expenses obtain and arrange for the maintenance of all government approvals, if any.

## Manufacture and sales



Website  
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### Plant

JIC VIETNAM ONE MEMBER CO., LTD.

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PT944E-2408-ver2.2.0

An innovative, Eco-friendly material

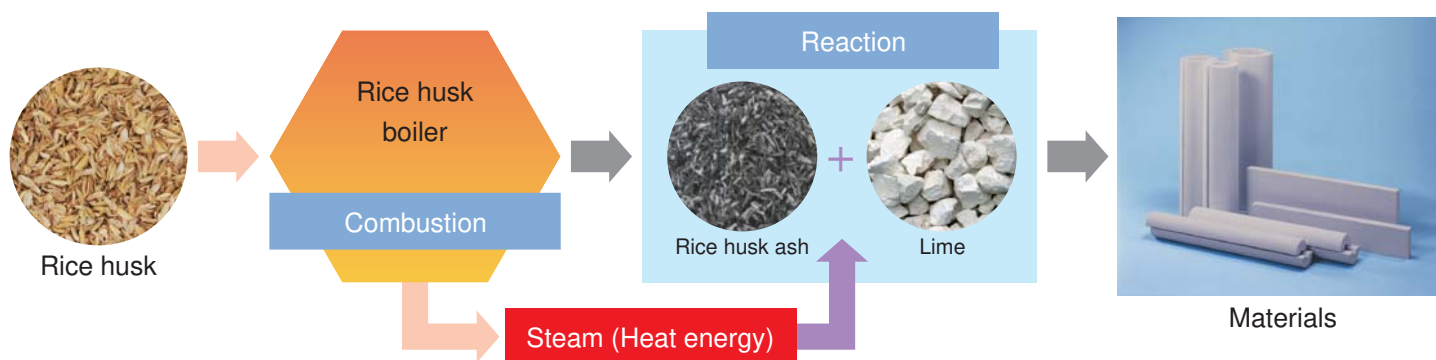
Calcium silicate thermal insulation material  
Equivalent to JIS A 9510 Type. 1-15 product

# DAIPALITE-E

DAIPALITE-E is a calcium silicate thermal insulation material which is pre-formed for pipe and block section and used for facilities. DAIPALITE-E is inorganic, asbestos free and noncombustible. DAIPALITE-E is supplied to various industrial fields, such as refinery plants, power plants, petrochemical plants and others.

## Environment-friendly production process

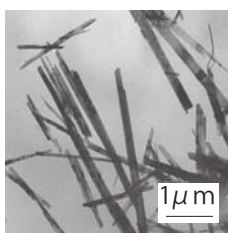
JIC is the first and the only one that succeeded in inventing the production process using rice husk. Rice husk is used as energies for reaction of raw materials and drying formed products. The rice husk ash is used for as a raw material instead of Silica rock. This unique process is certificated as an environment-conscious business by Viet Nam Government. The process contributes to reduce 4,200 ton CO<sub>2</sub>/ year.



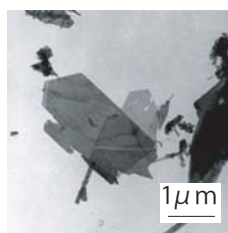
## Efficient and Economical product

DAIPALITE-E is composed of Xonotlite Crystal, which makes the heat performance of the product superior to other calcium silicate products.

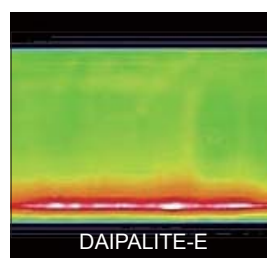
Xonotlite crystal  
(DAIPALITE-E)



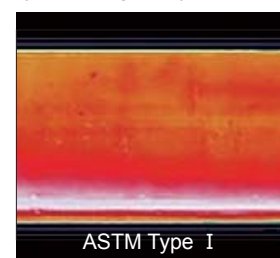
Tobermorite crystal  
(Conventional product)



Surface temperature by thermography



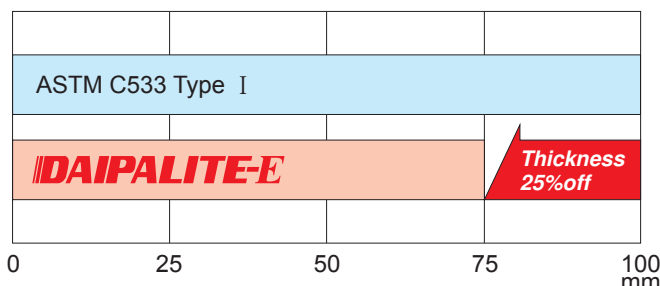
Surface Temp. 44.8°C  
Heat loss: 160W/m



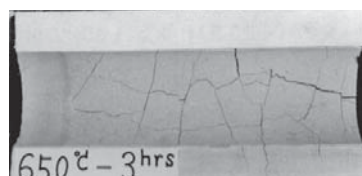
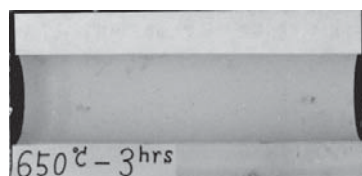
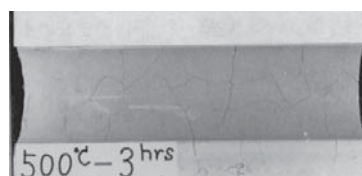
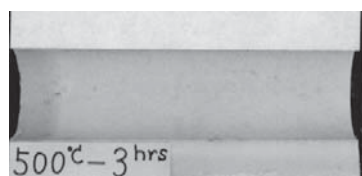
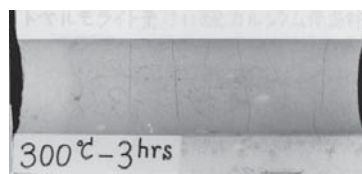
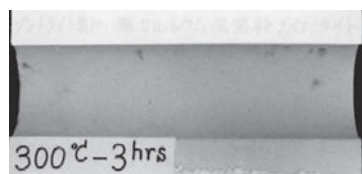
Surface Temp. 48.5°C  
Heat loss: 190W/m

Conditions  
Pipe inside temp.: 300°C Pipe outer diameter: 114mm  
Thermal insulation thickness: 50mm

Thickness as same heat loss



Conditions:  
Outside air temperature: 25°C  
Heat loss: Same (less than 123W/m)  
Pipe inside temp.: 300°C  
Pipe outer diameter: 114mm

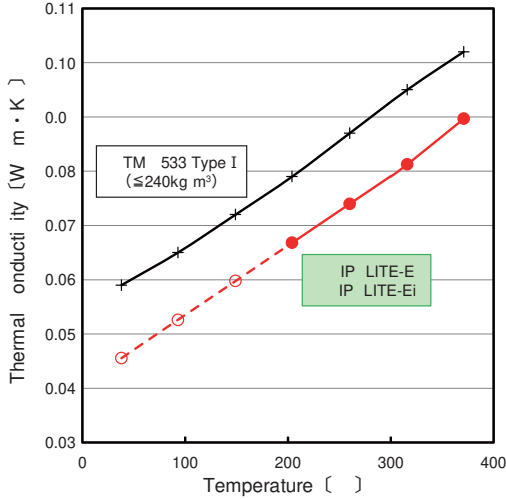


An innovative, Eco-friendly material

Calcium silicate thermal insulation material  
Equivalent to JIS A 9510 Type. 1-15 product

# DAIPALITE-E

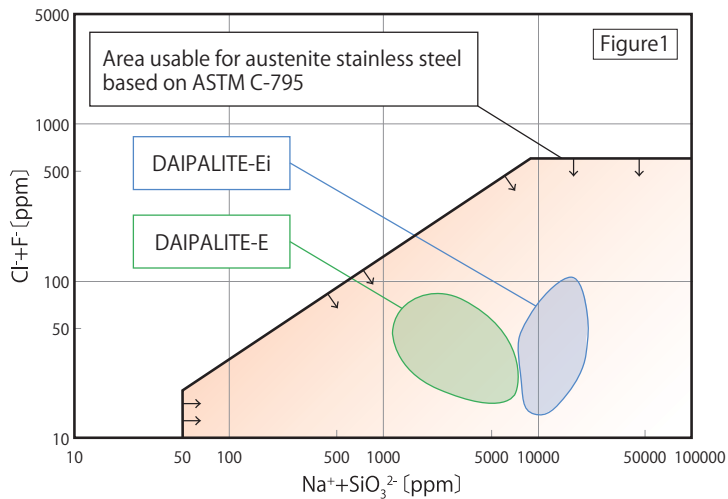
## Thermal conductivity



Temperature [°C]		38	93	149	204	260	316	371
Thermal conductivity W/(m·K)	Requirement	.059	.065	.072	.079	.087	.095	.102
	DAIPALITE-E	.046*	.053*	.060*	.067	.074	.081	.090

\* It is the reference value that substitutes target temperature for a temperature equation of regression to show to the Thermal Conductivity (200 ≤ θ ≤ 300) of the right chart and calculated.

## Stress corrosion cracking inhibition : Passed in test per ASTM C-795



These calcium silicate materials have performance to satisfy ASTM standards as a thermal insulation material in contact with austenitic stainless steel.

## Standard dimension [mm]

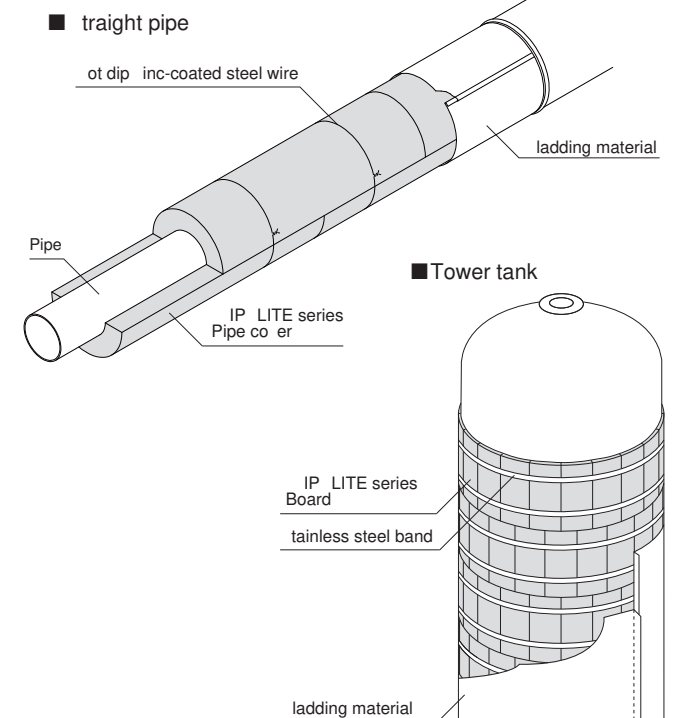
	Internal Diameter	Thickness	Width	Length
Pipe cover	22 ~ 610	25* 30 40 50	—	914
Board	—	65 75	303×914 150×914	

\* The 25mm thickness is for board only.

## Standard physical properties (reference values)

Apparent Density	155kg/m <sup>3</sup> or less
Heating Linear Shrinkage	2.0% max.
Maximum Service Temperature	1000°C
Thermal Conductivity W/(m·K) (θ : temperature [°C])	$[200 \leq \theta \leq 300]$ $\lambda = 0.0407 + 0.000128 \cdot \theta$ $[300 < \theta \leq 600]$ $\lambda = 0.0555 + 2.05 \times 10^{-5} \cdot \theta + 1.93 \times 10^{-7} \cdot \theta^2$

## Installation image



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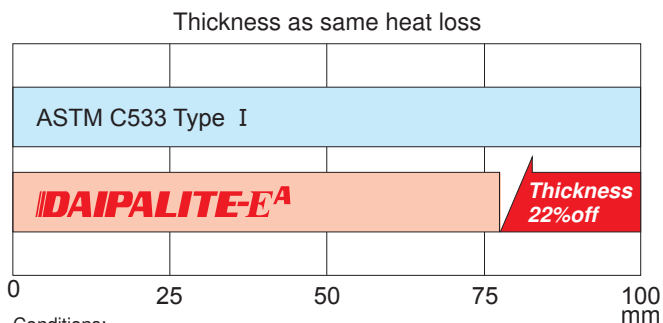
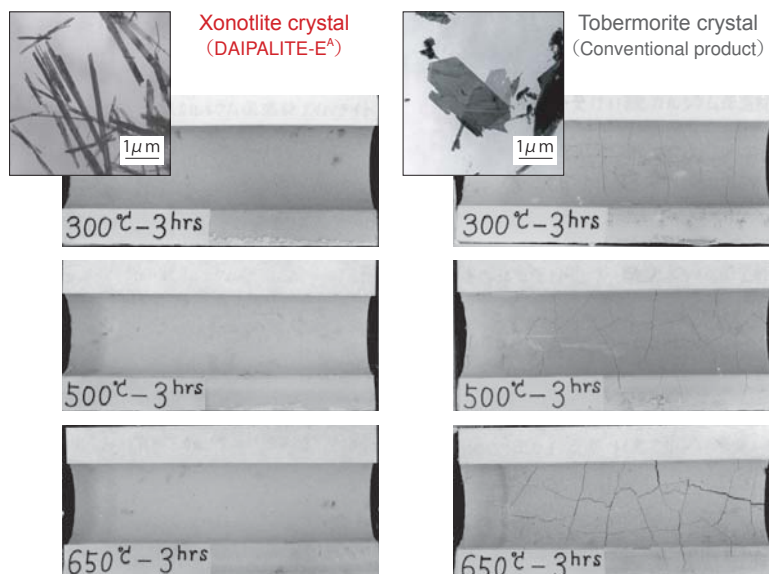
Calcium silicate thermal insulation material  
ASTM C 533 Type I product

# DAIPALITE-E<sup>A</sup>

DAIPALITE-E<sup>A</sup> is a calcium silicate thermal insulation material which is pre-formed for pipe and block section and used for facilities. DAIPALITE-E<sup>A</sup> is inorganic, asbestos free and noncombustible. DAIPALITE-E<sup>A</sup> is supplied to various industrial fields, such as refinery plants, power plants, petrochemical plants and others.

## Very lightweight and high heat resistant performance

- The density is 170kg/m<sup>3</sup>.
- Composed of Xonotlite crystal, which makes the heat performance of the product superior to other calcium silicate products and the maximum service temperature is 1000°C .

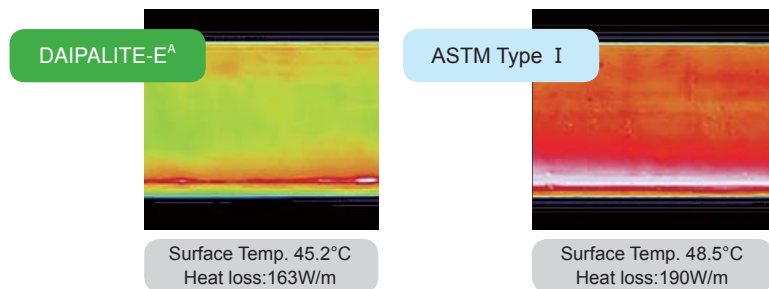


Conditions:  
Outside air temperature: 25°C  
Heat loss: Same (less than 123W/m)  
Pipe inside temp.: 300°C  
Pipe outer diameter: 114mm

## Standard dimensions [mm]

	Internal Diameter	Thickness	Width	Length
Pipe cover	22 ~ 610	25 30 40 50 65 75	—	914
Board	—		303×914 150×914	

## Surface temperature by thermography



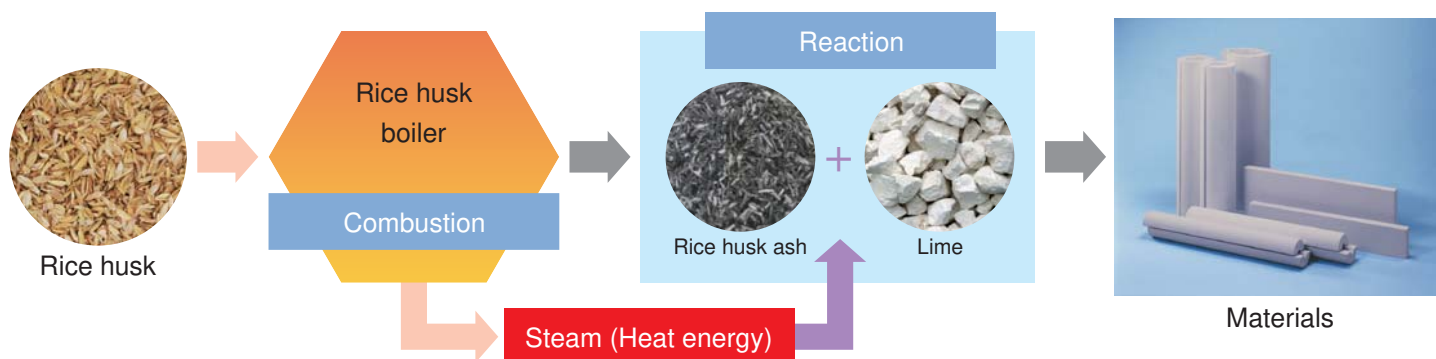
Conditions  
Pipe inside temp.: 300°C Pipe outer diameter: 114mm  
Thermal insulation thickness: 50mm

## Standard physical properties (reference values)

Apparent Density	170kg/m <sup>3</sup>
Heating Linear Shrinkage	2.0% max.
Maximum Service Temperature	1000°C
Thermal Conductivity W/(m·K) (θ : temperature [°C])	Pipe cover $\lambda = 0.0489 + 7.885 \times 10^{-5} \cdot \theta + 2.032 \times 10^{-10} \cdot \theta^3$ Board $\lambda = 0.0516 + 7.240 \times 10^{-5} \cdot \theta + 1.884 \times 10^{-10} \cdot \theta^3$

## Environment-friendly production process

JIC is the first and the only one that succeeded in inventing the production process using rice husk. Rice husk is used as energies for reaction of raw materials and drying formed products. The rice husk ash is used for as a raw material instead of Silica rock. This unique process is certificated as an environment-conscious business by Viet Nam Government. The process contributes to reduce 4,200 ton CO<sub>2</sub>/ year.

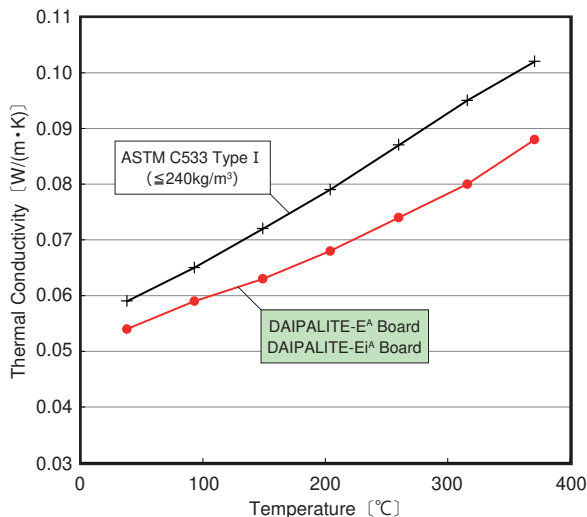


An innovative, Eco-friendly material

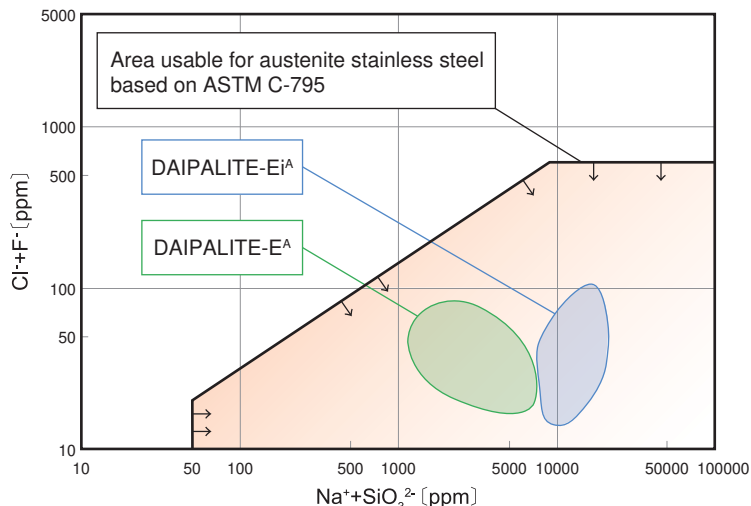
Calcium silicate thermal insulation material  
ASTM C 533 Type I product

# DAIPALITE-E<sup>A</sup>

## Thermal conductivity



## Stress corrosion cracking inhibition: Passed in test per ASTM C-795



Temperature [°C]		38	93	149	204	260	316	371
DAIPALITE-E <sup>A</sup> Thermal conductivity W/(m·K)	Requirement	.059	.065	.072	.079	.087	.095	.102
	Pipe cover	.052	.056	.061	.067	.073	.080	.088
	Board/GHP	.054	.059	.063	.068	.074	.080	.088

These calcium silicate materials have performance to satisfy ASTM standards as a thermal insulation material in contact with austenitic stainless steel.

## Technical Data

Property	Test Methods	ASTM C533 Requirement								Test Results
Density (Dry) Average	ASTM C302	≤ 240 kg/m <sup>3</sup>								Pass
Flexural Strength	ASTM C203	≥ 344 kPa (50 psi)								Pass
Compressive Strength	ASTM C165	≥ 688 kPa (100 psi)								Pass
Abrasion Resistance Weight Loss by Tumbling	ASTM C421	After the first 10 min <20%, After the second 10min <40%								Pass
Linear Shrinkage after Heat Soaking	ASTM C356	Less than 2% after 24hr, Soaking period at 650°C								Pass
Hot Surface Performance of High Temperature	ASTM C411	Warpage ≤ 6mm Cracking : no cracks completely through the insulation thickness. Surface cracks on hot face are acceptable								Pass
Maximum Service Temperature	ASTM C447	649°C (1200°F)								Pass
Surface Burning Characteristics	ASTM E84	Flame spread - 0, Smoke Developed-0								Pass
Apparent Thermal Conductivity	ASTM C177/GHP ASTM C518/HFM ASTM C335/Pipe cover ASTM C1045	Temp. [°C]	38	93	149	204	260	316	371	Pass
		λ W/(m·K)	≤ .059	≤ .065	≤ .072	≤ .079	≤ .087	≤ .095	≤ .102	Pass
Stress Corrosion Performance (Austenitic Stainless Steel)	ASTM C795 ASTM C692 ASTM C871	① Na <sup>+</sup> + SiO <sub>3</sub> <sup>2-</sup> ions : ≥ 50ppm ② Acceptable range of Cl <sup>-</sup> + F <sup>-</sup> and Na <sup>+</sup> + SiO <sub>3</sub> <sup>2-</sup> ③ pH ≤ 12.5 (at 25°C) ④ The stress corrosion test (C-692) must be passed.								Pass
Moisture Content	ASTM C1616	≤ 20%								Pass
Combustibility	ASTM E136	Non-Combustible								Pass
Corrosion* (DAIPALITE-Ei <sup>A</sup> )	ASTM C1617	Mass Loss Corrosion Rate (MLCR) ≤ DI (The MLCR of Type 1 materials, when tested with extracted solutions, shall be equal to or less than that determined when tested with DI Water)								Pass

\* Water-repellent material



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Water-repellent, Anti-corrosive

Calcium silicate thermal insulation material  
Equivalent to JIS A 9510 Type. 1-15 product

# DAIPALITE-Ei

DAIPALITE-Ei is a calcium silicate thermal insulation material which is pre-formed for pipe and block section and used for facilities. DAIPALITE-Ei is inorganic, asbestos free and noncombustible. DAIPALITE-Ei provides both water-repellent function and corrosion inhibition effect and is supplied to various industrial fields, such as refinery plants, power plants, petrochemical plants and others.

## Special effects of DAIPALITE-Ei

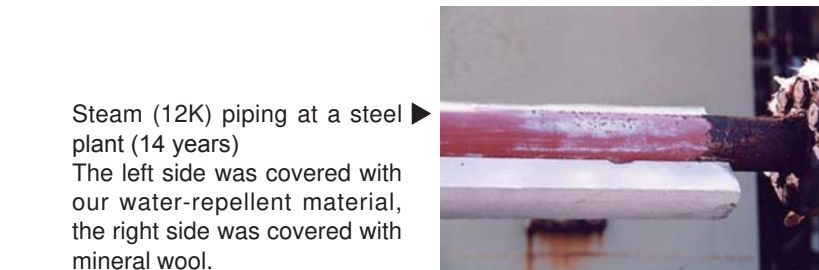
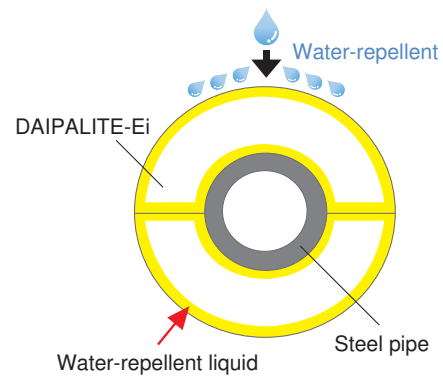
DAIPALITE-Ei is attached a special liquid which contains soluble ingredients ( $\text{Na}^+$ ,  $\text{SiO}_3^{2-}$ ). When the ingredients dissolved in water, it cause the water pH to be 10.6 (surface part) and forms passive film. The passive film coats a pipe and inhibits corrosion of iron.



◀ Clued oil piping at a thermal power plant (7 years)  
A white small circle on the piping was a trace of water flowing for years as a hole has been opened accidentally after an inspection. Still it's been in good condition.

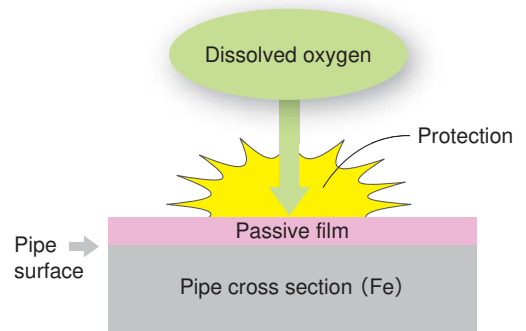


## Water-repellent function



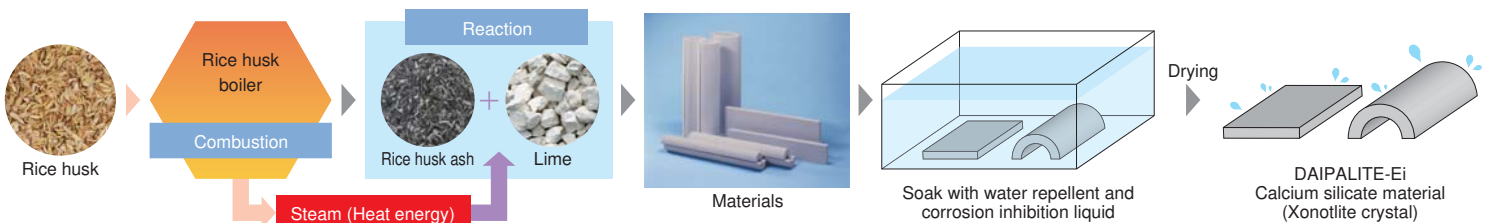
▶ Steam (12K) piping at a steel plant (14 years)  
The left side was covered with our water-repellent material, the right side was covered with mineral wool.

## Corrosion inhibition function



## Economical and Environmentally production process

JIC is the first and the only one that succeeded in inventing the production process using rice husk. Rice husk is used as energies for reaction of raw materials and drying formed products. The rice husk ash is used for as a raw material instead of Silica rock. This unique process is certificated as an environment-conscious business by Viet Nam Government. The process contributes to reduce 4,200 ton  $\text{CO}_2$  / year.



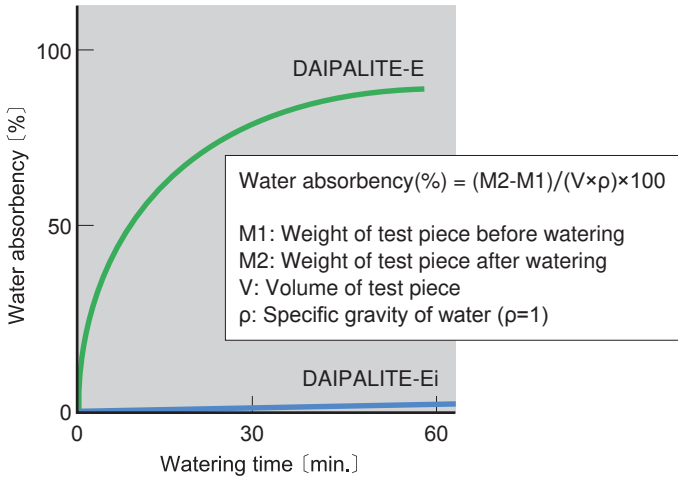
Water-repellent, Anti-corrosive

Calcium silicate thermal insulation material  
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# DAIPALITE-Ei

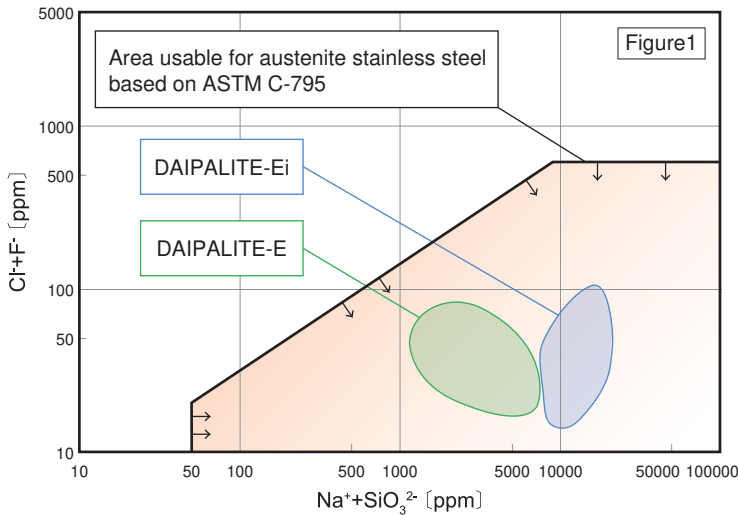
## Water-repellent performance

Materials were watered for 60 minutes to measure water repellencies and absorbencies. The result is showed as below.



## Stress corrosion cracking inhibition : Passed in test per ASTM C-795

These calcium silicate materials have performance to satisfy ASTM standards as a thermal insulation material in contact with austenitic stainless steel.



## Standard dimensions [mm]

	Internal Diameter	Thickness	Width	Length
Pipe cover	22 ~ 610	25 * 30 40 50 65 75	—	914
Board	—	—	303 × 914 150 × 914	—

※ The 25mm thickness is for board only.

## Standard physical properties (reference values)

Apparent Density	155kg/m <sup>3</sup> or less
Heating Linear Shrinkage	2.0% max.
Maximum Service Temperature	1000° C
Thermal Conductivity W/(m·K) (θ : temperature [°C])	$200 \leq \theta \leq 300$ $\lambda = 0.0407 + 0.000128 \cdot \theta$ $300 < \theta \leq 600$ $\lambda = 0.0555 + 2.05 \times 10^{-5} \cdot \theta + 1.93 \times 10^{-7} \cdot \theta^2$

## Corrosion test of steel piece immersed in eluent of thermal insulation material

Pulverize a certain volume of thermal insulation material and make each eluate extracted with distilled water. Steel piece (SS-41) is immersed in each eluate and left at 70°C for 4 weeks.



DAIPALITE-Ei  
Almost no corrosion



Rock wool  
Many Corrosion of about 600µm depth can be seen.

- DAIPALITE-Ei is a water-repellent material, not water-proof. The functions of water-repellent and corrosion inhibition of DAIPALITE-Ei will be effective with correct installation and keeping in good condition. It is not always a guarantee of your facilities and incorrect use may result in accidents.
- The recommended temperature in use DAIPALITE-Ei is under 250°C of the surface temperature of the facilities as the water-repellent function will be lost over it.



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Water-repellent, Anti-corrosive

Calcium silicate thermal insulation material  
ASTM C 533 Type I product

# DAIPALITE-Ei<sup>A</sup>

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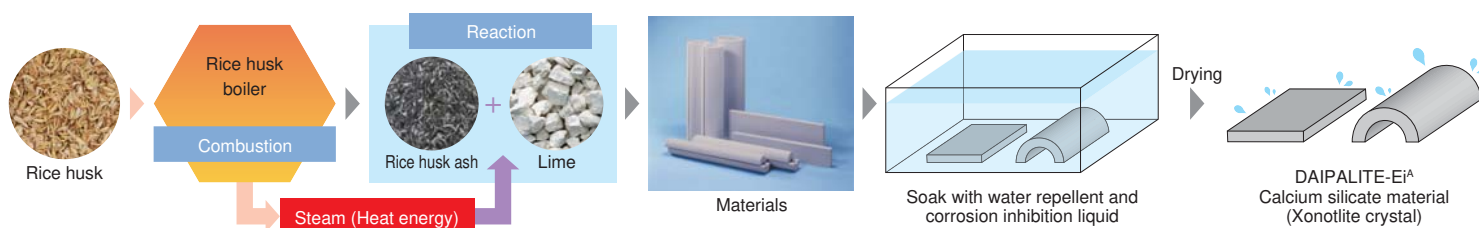
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A white small circle on the piping was a trace of water flowing for years as a hole has been opened accidentally after an inspection. Still it's been in good condition.

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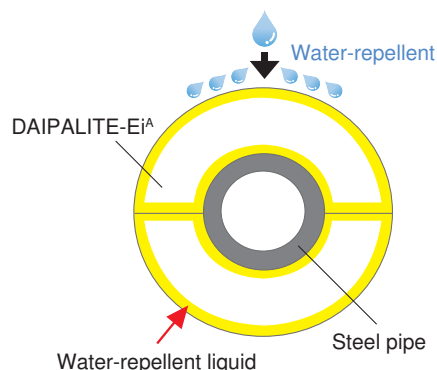


## Economical and Environmentally production process

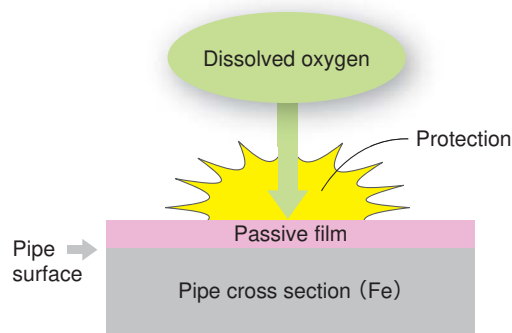
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### Water-repellent function



### Corrosion inhibition function



### Standard dimensions [mm]

	Internal Diameter	Thickness	Width	Length
Pipe cover	22 ~ 610	25 30 40 50	—	914
Board	—	65 75	303 × 914 150 × 914	

### Standard physical properties (reference values)

Apparent Density	170kg/m <sup>3</sup>
Heating Linear Shrinkage	2.0% max.
Maximum Service Temperature	1000°C
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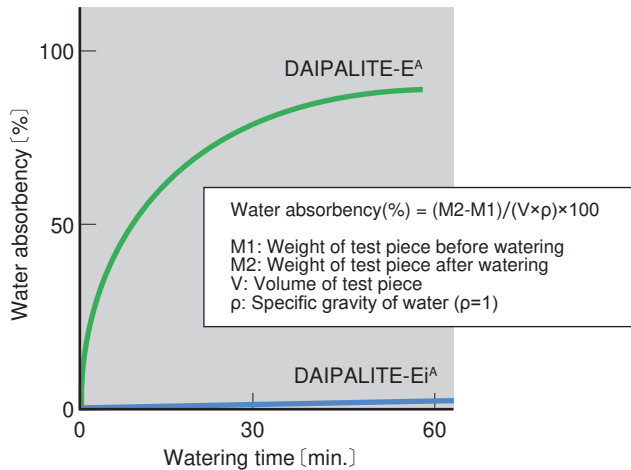
Water-repellent, Anti-corrosive

Calcium silicate thermal insulation material  
ASTM C 533 Type I product

# DAIPALITE-Ei<sup>A</sup>

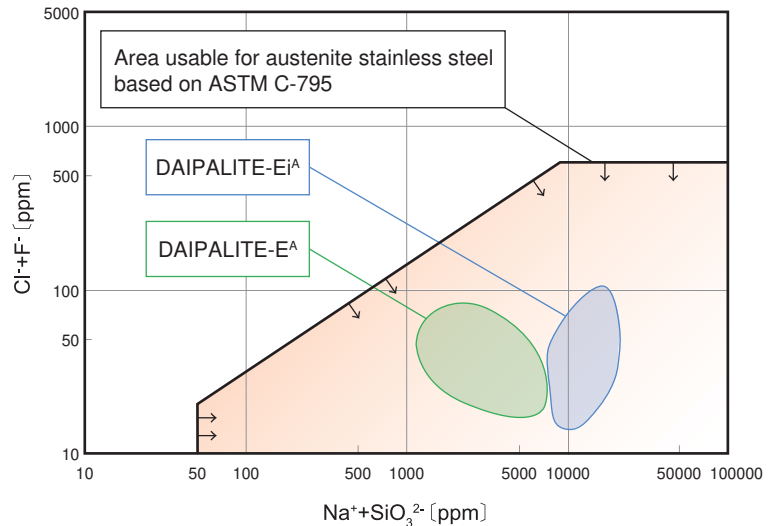
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## Technical Data

Property	Test Methods	ASTM C533 Requirement	Test Results
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Compressive Strength*	ASTM C165	≥ 688 kPa (100 psi)	Pass
Abrasion Resistance Weight Loss by Tumbling*	ASTM C421	After the first 10 min <20%, After the second 10min <40%	Pass
Linear Shrinkage after Heat Soaking*	ASTM C356	Less than 2% after 24hr, Soaking period at 650°C	Pass
Hot Surface Performance of High Temperature*	ASTM C411	Warpage ≤ 6mm Cracking : no cracks completely through the insulation thickness. Surface cracks on hot face are acceptable	Pass
Maximum Service Temperature*	ASTM C447	649°C (1200°F)	Pass
Surface Burning Characteristics*	ASTM E84	Flame spread - 0, Smoke Developed-0	Pass
Apparent Thermal Conductivity*	ASTM C177/GHP ASTM C518/HFM ASTM C335/Pipe cover ASTM C1045	Temp. [°C]    38    93    149    204    260    316    371	Pass
		λ W/(m·K)    ≤ .059    ≤ .065    ≤ .072    ≤ .079    ≤ .087    ≤ .095    ≤ .102	Pass
Stress Corrosion Performance* (Austenitic Stainless Steel)	ASTM C795 ASTM C692 ASTM C871	① Na <sup>+</sup> + SiO <sub>3</sub> <sup>2-</sup> ions : ≥ 50ppm ② Acceptable range of Cl <sup>-</sup> + F <sup>-</sup> and Na <sup>+</sup> + SiO <sub>3</sub> <sup>2-</sup> ③ pH ≤ 12.5 (at 25°C) ④ The stress corrosion test (C-692) must be passed.	Pass
Moisture Content*	ASTM C1616	≤ 20%	Pass
Combustibility*	ASTM E136	Non-Combustible	Pass
Corrosion* (DAIPALITE-Ei <sup>A</sup> )	ASTM C1617	Mass Loss Corrosion Rate (MLCR) ≤ DI (The MLCR of Type 1 materials, when tested with extracted solutions, shall be equal to or less than that determined when tested with DI Water)	Pass

■ This material is a water-repellent thermal insulation material, not waterproof thermal insulation material. Incorrect use may result in accidents.  
 ■ The maximum effective temperature of the water repellent is 250°C , beyond which its water-repellency is lost. Even if the internal temperature exceeds 250°C , the water repellent will be sufficiently effective as long as the surface temperature of the thermal insulation material does not exceed 250°C . No problem occurs under normal conditions of use.

\* DAIPALITE-Ei<sup>A</sup> is a material based on DAIPALITE-E<sup>A</sup>.



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