

Concrete Anchors made of Fine Ceramics

MEIDEN

Quality connecting the next

Ceramic Insert Ceramic Anchor

(Cast in Place Construction Method)

(Post Installation Construction Method)

Made with high purity alumina ceramic material with a relative permeability of 1 for excellent insulation, corrosion resistance, and fireproofing.



Highly purified alumina (Al₂O₃) aiming at high durability and reliability

Ceramic Insert (Cast in Place Construction Method)

Ceramic Anchor (Post Installation Construction Method)

Today in our society, concrete structures supporting our life are required to have high durability. High durability is required of inserts and anchors embedded in the concrete as well. We realized high performance ceramic inserts and ceramic anchors for concrete based on ceramics material technology and fabrication technology accumulated over many years. Ceramic inserts and anchors offered by us provide well-known advantages to customers. Please use these products for your purpose.



CERAMIC INSERT / **CERAMIC ANCHOR**
Cast in Place Construction Method / Post Installation Construction Method

High electric insulation performance

Ceramic inserts and anchors made of high-purity alumina (Al₂O₃) offer excellent electric insulation performance and rust proofing performance in case of contact ferrous materials.

High corrosion resistance

Ceramic inserts and anchors made of high-purity alumina (Al₂O₃) demonstrate excellent corrosion resistance against acid, alkaline, moisture and salts.

High fire resistant performance

Even if the products are exposed to high temperature, high-purity alumina (Al₂O₃) based inserts and anchors do not deteriorate and distort easily due to high heat resistance.

Relative permeability = 1

Measurement method: Capacitance
Frequency: 10-1000 MHz

*Measured by the Japan Fine Ceramics Center

Registration to New Technology Information

New Technology and New Construction Method
of Shizuoka Prefecture

Registration No.: 1310

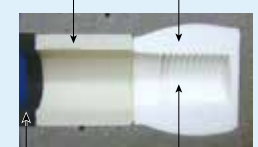
Name: Ceramic insert

URL: http://www2.pref.shizuoka.jp/all/new_technique.nsf/index

Cross sectional view
of ceramic inserts and anchors
embedded in concrete

Meiden Ceramic Insert

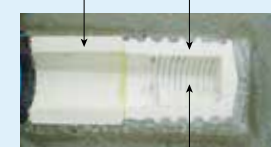
Sleeve Main body



Rubber gasket Screw thread

Meiden Ceramic Anchor

Sleeve Main body



Screw thread

Consistent product quality and high strengths

Strength of the products is generally greater than the required specification and has sufficient allowance, since products are made with high quality and high-purity alumina combined with an original production process and a well-established quality control system.

Wide range of product mix

Products ranging from M10 (10mm of normal diameter) to M36 are available.

We can offer products specially designed for screw shapes and sizes according to customer needs. please contact us in this regard.

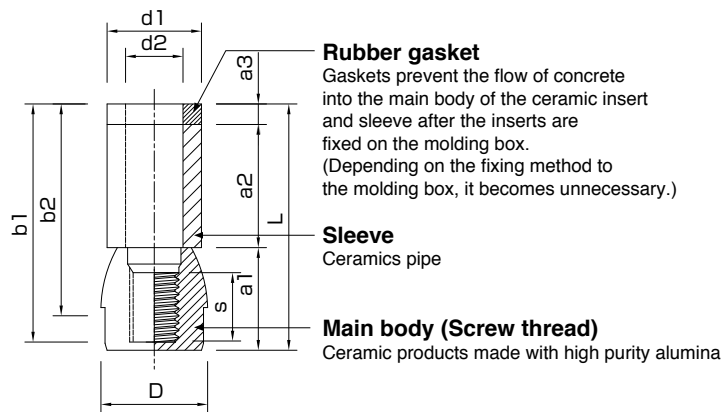
Result of screw thread strength test



The ceramic insert has a mechanical strength higher than iron bolts.

Ceramic Insert for Cast in Place Construction Method

Features of ceramic inserts



The size list

Nominal diameters		M10		M12		M16		M20	M22	M24	M30	M36
Total length	L	40	60	84	70	80	116	100	110	120	150	180
Length of main body	a1	22	25	25	35	35	44	48	52	62	74	74
Length of sleeve	a2	15	30	54	30	40	76	51	57	63	83	101
Thickness of rubber gasket	a3	3	5	5	5	5	5	5	5	5	5	5
Max. diameter of insert	D	22	25	25	32	32	40	44	48	62	74	74
Diameter of sleeve outer	d1	20	23	23	28	28	34	37	40	53	60	60
Diameter of sleeve inside	d2	12	14	14	18	18	22	24	26	32	40	40
Effective length of screw	s	13.1	16.2	16.2	18.0	18.0	25.6	29.4	34.5	45.5	52.0	52.0
Nominal depth of insert (Maximum length of fitting)	b1	37.5	57.0	81.0	65.0	75.0	111.0	93.0	103.0	114.0	145.0	174.0
Effective depth of insert (Recommended minimum length of fitting)	b2	32.5	52.0	76.0	59.7	69.7	105.7	87.2	95.0	104.5	130.0	157.0

Standard products Product specified according to specifications for a temporary material-fixing scaffold on a bridge, which is recommended by the Japan Prestressed Concrete Constructors Association. Make-to-order product



- The mounting bolts to be fitted with ceramic inserts should be securely screwed in for more than the values b2 specified in the table above.
- When used at less than the b2 value or when a bolt with worn screw threads is used, screw threads may be damaged or strength may be reduced.
- For bolts to be coupled, the use of Stainless steel bolts is recommended.

Calculation example for tensile strength of ceramic inserts

●Pa2 : Allowable tensile strength of ceramics insert at concrete cone fracture (kN)

$$Pa1 = \{\phi 1 \cdot \sqrt{(Fc \times 10.2) \cdot Ac / 100}\} \cdot 9.8 / 1000$$

$\phi 1$: Reduction coefficients

Fc : Concrete compressive strength at design standard N/mm^2

Ac : Effective projected area of cone fracture in horizontal direction mm^2

$$Ac = \pi \cdot Le \cdot (Le + D)$$

Le : Effective embedded depth mm

D : Max. diameter of insert mm

●Pa2 : Allowable tensile strength of metal bolt yield (kN)

$$Pa2 = (\phi 2 \cdot \sigma b \cdot As) / 1000$$

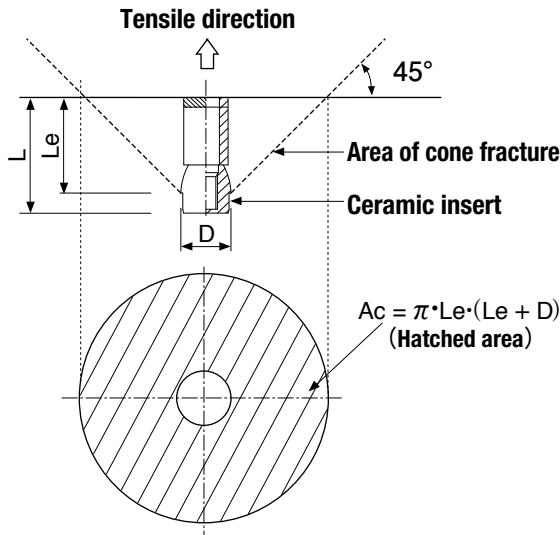
$\phi 2$: Reduction coefficients

σb : Yield point of bolt N/mm^2

As : Stress area of bolt mm^2

List of reduction coefficients

	Standard products		Products conforming to the standard specifications of the Japan Prestressed Concrete Constructors Association	
	$\phi 1$	$\phi 2$	$\phi 1$	$\phi 2$
Long-term load application	0.4	2/3	1/3	2/3
Short-term load application	0.6	1.0		



Calculation table of allowable tensile strength

呼び径		M10	M12	M16		M20	M22	M24	M30	M36	
L (mm)		40	60	70	80	100	110	120	150	180	
Le (mm)		31	51	57	67	84	94	106	125	154	
D (mm)		22	25	32		40	44	48	62	74	
Ac (mm²)		5,162	12,177	15,937	20,838	32,723	40,753	51,283	73,435	110,308	
ob (N/mm²)		210	210	210		210	210	210	210	210	
As (mm²)		58	84.3	157		245	303	353	561	817	
Pa1 (kN)	Long term	Fc	M10	M12	M16		M20	M22	M24	M30	M36
		18	2.7	6.5	8.5	11.1	17.4	21.6	27.2	39.0	58.6
		21	3.0	7.0	9.1	12.0	18.8	23.4	29.4	42.1	63.3
		24	3.2	7.5	9.8	12.8	20.1	25.0	31.5	45.0	67.7
		27	3.4	7.9	10.4	13.6	21.3	26.5	33.4	47.8	71.8
		30	3.5	8.4	10.9	14.3	22.4	27.9	35.2	50.4	75.6
		33	3.7	8.8	11.5	15.0	23.5	29.3	36.9	52.8	79.3
		36	3.9	9.1	12.0	15.7	24.6	30.6	38.5	55.2	82.9
		40	4.1	9.6	12.6	16.5	25.9	32.3	40.6	58.1	87.3
		45	4.3	10.2	13.4	17.5	27.5	34.2	43.1	61.7	92.6
		48	4.5	10.6	13.8	18.1	28.4	35.3	44.5	63.7	95.7
		50	4.6	10.8	14.1	18.4	29.0	36.1	45.4	65.0	97.7
	Short term	Fc	M10	M12	M16		M20	M22	M24	M30	M36
		18	4.1	9.7	12.7	16.6	26.1	32.5	40.9	58.5	87.9
		21	4.4	10.5	13.7	17.9	28.2	35.1	44.1	63.2	94.9
		24	4.7	11.2	14.7	19.2	30.1	37.5	47.2	67.6	101.5
		27	5.0	11.9	15.6	20.3	31.9	39.8	50.0	71.7	107.6
		30	5.3	12.5	16.4	21.4	33.7	41.9	52.7	75.5	113.5
		33	5.6	13.1	17.2	22.5	35.3	44.0	55.3	79.2	119.0
		36	5.8	13.7	18.0	23.5	36.9	45.9	57.8	82.7	124.3
		40	6.1	14.5	18.9	24.7	38.9	48.4	60.9	87.2	131.0
		45	6.5	15.3	20.1	26.3	41.2	51.3	64.6	92.5	139.0
48	6.7	15.8	20.7	27.1	42.6	53.0	66.7	95.5	143.5		
50	6.9	16.2	21.2	27.7	43.5	54.1	68.1	97.5	146.5		
Pa2 (kN)	Long term	M10	M12	M16		M20	M22	M24	M30	M36	
		8.1	11.8	22.0		34.3	42.4	49.4	78.5	114.4	
	Short term	M10	M12	M16		M20	M22	M24	M30	M36	
12.2		17.7	33.0		51.5	63.6	74.1	117.8	171.6		

呼び径		M12	M16
L (mm)		84	116
Le (mm)		75	103
D (mm)		25	32
As (mm ²)		23,562	43,684
σb (N/mm ²)		235	235
As (mm ²)		84.3	157
Pa1 (kN)	Fc	M12	M16
	30	13.5	25.0
	33	14.1	26.2
	36	14.7	27.3
	40	15.5	28.8
	45	16.5	30.6
	48	17.0	31.6
	50	17.4	32.2
Pa2 (kN)		M12	M16
		13.2	24.6

Standard products Products conforming to the standard specifications of the Japan Prestressed Concrete Constructors Association

Screw strength of ceramic insert

Size	M10	M12	M16	M20	M22	M24	M30	M36
Strength (kN)	¹⁾ 34.2	¹⁾ 51.4	¹⁾ 95.8	²⁾ 154.4	²⁾ 190.9	²⁾ 222.4	²⁾ 353.4	²⁾ 514.7

Notes: The standard values specified in the table above are applicable when fitting value is more than b2; internal depth (minimum recommendable value) specified in the table on previous page.

¹⁾: Values specified by the Japan Prestressed Concrete Constructors Association [Insert Design and Construction Manuals (draft)]

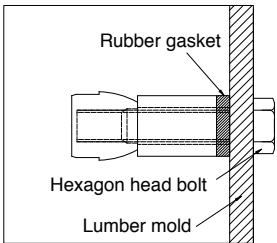
²⁾: The same values as the guaranteed load values for steel nuts in Tensile Strength Rank 5 specified in JIS B1052 [Mechanical Properties of Steel Nuts]

Ceramic Anchor for Post Installed Construction Method

Fixing methods of ceramic inserts to a mold

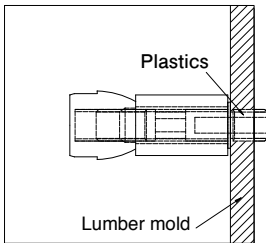
● Bolt fixing method

Standard type

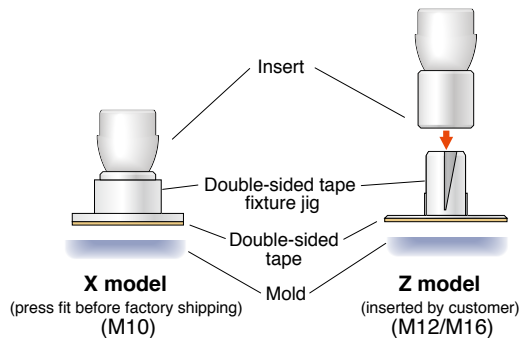


● Tap fixing method

Installation from inside of the mold: T type

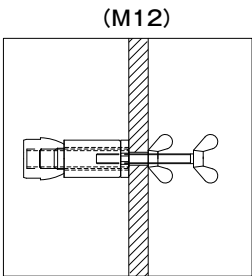


● Type with double-sided tape affixed



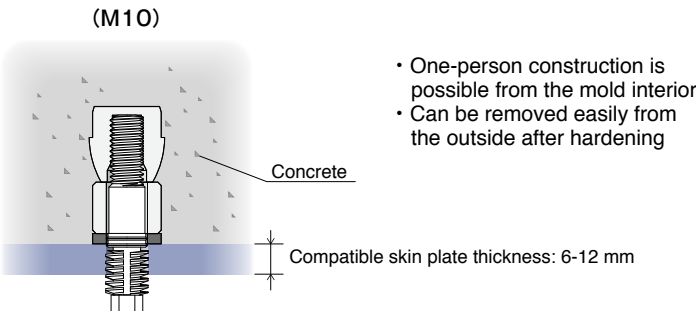
● Worm jig fixture method

Method without opening a large hole in the mold: WM type



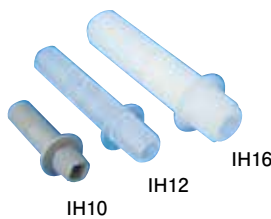
● One-way type

Effective method when using an underground model steel mold (M10)



● Tap fixing type

(insert holder)



• Applicable sizes are:
CEM10-SCL40
CEM12-SCL60
CEM16-SCL70 • 80

● Double-sided adhesive



Compatibility table

Type	X model	Z model	Embedding length	Fill-in cap
M10-40	○	×	41mm	KB10
M12-60	×	○	57mm	KE12
M12-84	×	○	81mm	KE12
M16-70	×	○	67mm	KE16
M16-80	×	○	77mm	KE16
M16-116	×	○	113mm	KE16

Material: PE

● Worm jig fixing type

● One-way type

● Embedded cap

● Hole plug

(M10)

● Embedded plug

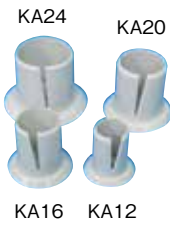
(M12, M16)



• Applicable sizes are:
M12



M10



• Applicable sizes are:
M12, M16, M20, M24



KB10



KC12 KC16

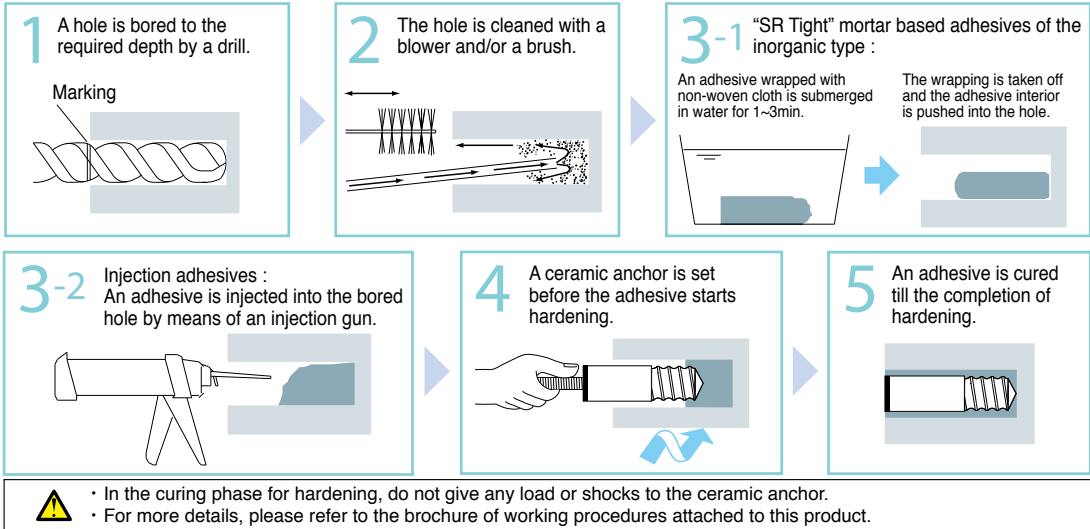
• Applicable sizes are:
M12, M16

Installation procedure of ceramic anchors

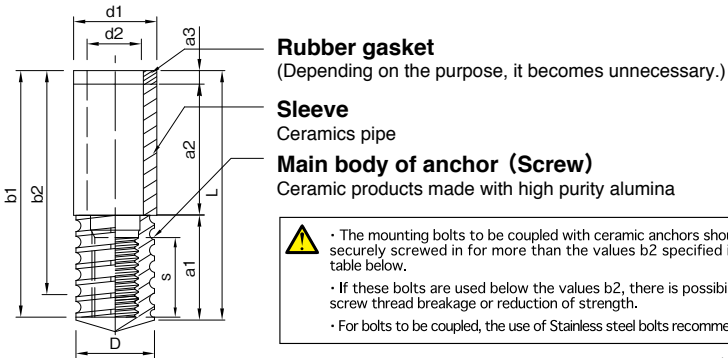
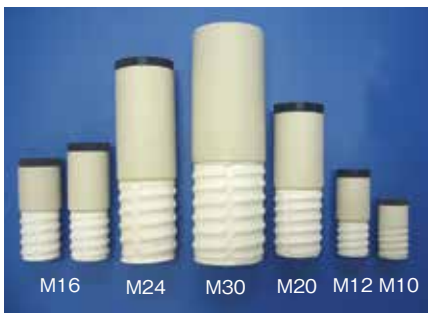
Ceramic anchors are comprised of the main body of the anchor and sleeve respectively. A hole is bored to the required depth with a drill. After adhesive is injected into the hole, the anchor is embedded and

adheres to concrete. Recommended adhesives are of the SR TIGHT (Cement mortar capsule), the Ceme-Force Anchor (cement mortar injection), the HIT-RE500 (epoxy injection).

Installation procedures



Sizes of ceramic anchors



The size list

Nominal diameters		M10		M12		M16		M20	M24	M30
Effective embedded depth	L	40	60	70	80	100	130	150		
Length of main body	a1	22	25	35	44	52	62			
Length of sleeve	a2	15	30	30	40	51	73	88		
Thickness of rubber gasket	a3	3	5	5	5	5	5	—		
Max. diameter of the anchor	D	21	22	27	32	39	48			
Diameter of sleeve outer	d1	20	23	28	34	40	48			
Diameter of sleeve inside	d2	12	14	18	22	26	32			
Effective length of screw	s	13.1	16.1	20.0	29.3	38.2	44.6			
Nominal depth of anchor (Maximum length of fitting)	b1	38.0	57.0	68.0	78.0	96.0	127.0	147.0		
Effective depth of anchor (Recommended minimum length of fitting)	b2	33.0	52.0	59.7	69.7	87.2	114.5	132.0		

Specification for construction

For SR Tight or HIT-RE500

Nominal diameters		M10	M12	M16		M20	M24	M30
Hole diameters	(mm)	25	25	30		38	42	52
Hole depth	(mm)	45	65	75	85	105	135	155
Volume of adhesive	(cc)	16.5	15.9	23.3	24.7	56.6	39.4	101.2
Feed volume	SR TIGHT	(The number of samples to be fed)		SRM-2250 × 1		SRM-2565 × 1	SRM-2565 × 2	—
	HIT-RE500	(The number of shots)		2 ~ 3		2 ~ 3	3 ~ 4	3 ~ 4
Amount of 1-trigger discharge: Approx. 8ml						7 ~ 8	5 ~ 6	13 ~ 14

For Ceme-Force Anchor

Nominal diameters		M10	M12	M16		M20	M24	M30
Hole diameters	(mm)	25	28	35		40	47	62
Hole depth	(mm)	45	65	75	85	105	135	155
Volume of adhesive	(cc)	16.5	27	49.2	53.9	73.7	98.3	281.8
Feed volume	Ceme-Force Anchor	(The number of shots)		1 ~ 2		2	3 ~ 4	4 ~ 5
	Amount of 1-trigger discharge: Approx. 8ml					5 ~ 6	7 ~ 8	21 ~ 22

*Remove the rubber seal before placing an embedding cap, hole plug, or embedding stopper in an insert or anchor.

Calculation example for tensile strength of ceramic anchors

●Pa1 : Allowable tensile strength of ceramics anchor at concrete cone fracture (kN)

$$Pa1 = \{\phi 1 \cdot 0.75 \cdot \sqrt{F_c \times 10.2} \cdot A_c / 100\} \cdot 9.8 / 1000$$

$\phi 1$: Reduction coefficient

F_c : Concrete compressive strength at design standard

N/mm²

A_c : Effective projected area of cone fracture in horizontal direction

mm²

$$A_c = \pi \cdot L_e \cdot (L_e + D)$$

L_e : Effective embedded depth

mm

D : Boring diameter of ceramic anchor

mm

●Pa2 : Allowable tensile strength of metal bolt yield (kN)

$$Pa2 = (\phi 2 \cdot \sigma_b \cdot A_s) / 1000$$

$\phi 2$: Reduction coefficient

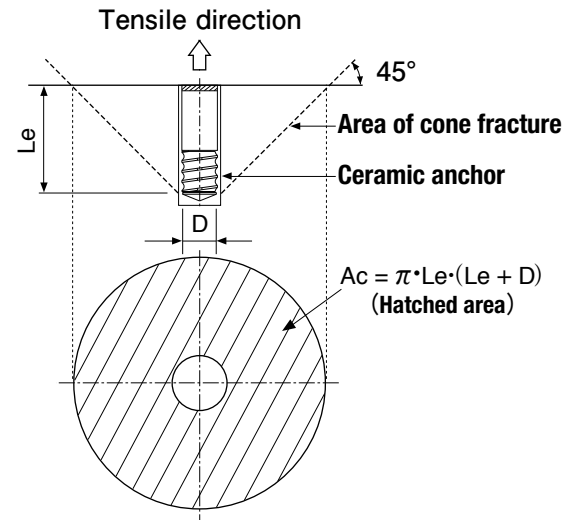
σ_b : Yield point of bolt

N/mm²

A_s : Stress area of bolt

mm²

	$\phi 1$	$\phi 2$
Long-term load application	0.4	2/3
Short-term load application	0.6	1.0



■ Calculation table of allowable tensile strength

			M10	M12	M16		M20	M24	M30
Le (mm)			40	60	70	80	100	130	150
D (mm)			21	22	27		32	39	48
Ac (mm ²)			7665	15457	21331	26892	41469	69021	93305
σ_b (N/mm ²)			210	210	210		210	210	210
As (mm ²)			58	84.3	157		245	353	561
Pa1 (kN)	Long term	Fc	M10	M12	M16		M20	M24	M30
		18	3.1	6.2	8.5	10.7	16.5	27.5	37.2
		21	3.3	6.7	9.2	11.6	17.8	29.7	40.1
		24	3.5	7.1	9.8	12.4	19.1	31.7	42.9
		27	3.7	7.5	10.4	13.1	20.2	33.7	45.5
		30	3.9	7.9	11.0	13.8	21.3	35.5	48.0
		33	4.1	8.3	11.5	14.5	22.4	37.2	50.3
		36	4.3	8.7	12.0	15.2	23.4	38.9	52.6
		40	4.6	9.2	12.7	16.0	24.6	41.0	55.4
		45	4.8	9.7	13.4	16.9	26.1	43.5	58.8
	Short term	48	5.0	10.1	13.9	17.5	27.0	44.9	60.7
		50	5.1	10.3	14.2	17.9	27.5	45.8	61.9
		Fc	M10	M12	M16		M20	M24	M30
		18	4.6	9.2	12.7	16.1	24.8	41.2	55.8
		21	4.9	10.0	13.8	17.4	26.8	44.5	60.2
		24	5.3	10.7	14.7	18.6	28.6	47.6	64.4
		27	5.6	11.3	15.6	19.7	30.3	50.5	68.3
		30	5.9	11.9	16.5	20.7	32.0	53.2	72.0
		33	6.2	12.5	17.3	21.8	33.6	55.8	75.5
		36	6.5	13.1	18.0	22.7	35.0	58.3	78.8
Pa2 (kN)	Long term	M10	8.1	11.8	22.0		34.3	49.4	78.5
		M12	12.2	17.7	33.0		51.5	74.1	117.8
	Short term	M10	12.2	17.7	33.0		51.5	74.1	117.8
		M12	12.2	17.7	33.0		51.5	74.1	117.8
		M16	12.2	17.7	33.0		51.5	74.1	117.8
		M20	12.2	17.7	33.0		51.5	74.1	117.8

■ Screw strength of ceramic anchor

Size	M10	M12	M16	M20	M24	M30
Strength (kN)	23.2	33.7	62.8	98.0	141.2	224.4

Note: The standard values specified in the table above are applicable when fitting value is more than b2: internal depth (minimum recommendable value) specified in the table on previous page.

Adhesive for ceramic anchors

Types of adhesives for ceramic anchors

[Types of adhesives for ceramic anchors]

Name	Classification	Main component	Major applications
SR Tight	Capsule type	Cement mortar	Used where heat-resisting and corrosion-proof properties are required
Ceme-Force Anchor	Injection type cartridge	Cement mortar	Used where heat-resisting and corrosion-proof properties are required, and work time is short (possible to work underwater and use materials with large diameters)
HIT-RE500		Epoxy resin	Used for underwater working or when large-diameter materials are used

[Application table for fixing materials]

Name	M10	M12	M16	M20	M24	M30
SR Tight	○	○	○	○	×	×
Ceme-Force Anchor	○	○	○	○	○	○
HIT-RE500	○	○	○	○	○	○

○ : Applicable × : Not applicable

1. Cement mortal type encapsulated adhesive/ SR TIGHT



*For M20, 2 items of SRM-2565 are required.

The SR TIGHT is the cement mortar type inorganic adhesive developed for ceramic anchors.

[Features]

Light mass and free mixing

Easy handling, light mass, unnecessary mixing, and unnecessary feeding associated with its design in encapsulated form.

High quality

Simply submerging in water allows for a well balanced water and adhesive ratio, and consistent performance is achieved.

Non-shrinkage

The SR TIGHT causes non-shrinkage after curing and offers consistent strength.

Non-flammable

The SR TIGHT is non-flammable and high heat resistance is obtained since it is formulated with cement mortar.

Handling

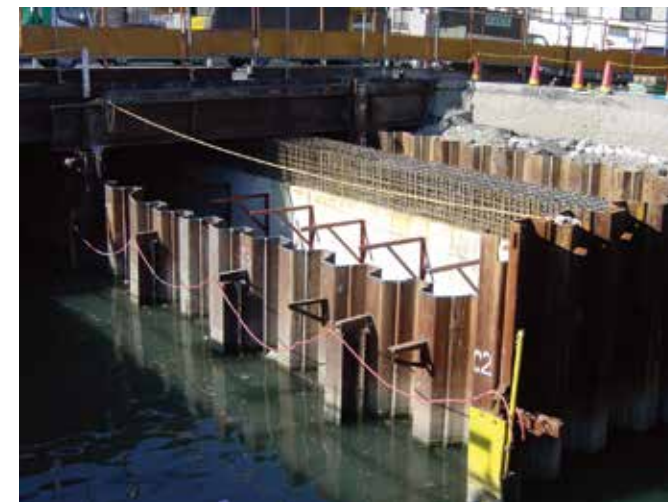
Workable as an adhesive used for ceiling due to high viscosity

[Performance]

Temperature	20°C	10°C	5°C
*1 Strength build-up time	0.5h	1.5h	2.0h
*2 Cure time	12h	24h	36h

*1 Never move the ceramic anchors until the strength appearance time has been attained.

*2 Cure time denotes the time to attain the pull-out strength.



Example applications: Ceramic anchors are used as an example for the temporary material-fixing bracket on bridge construction in rivers. Ceramic anchors offer many advantages, such as non-corrosion, unnecessary post treatments on implanted anchors, and unnecessary application of mortar to holes.

Ceramic Inserts and Ceramic Anchors demonstrate

<Applications>

Temporary scaffold for material fixing and pipeline fixing jig

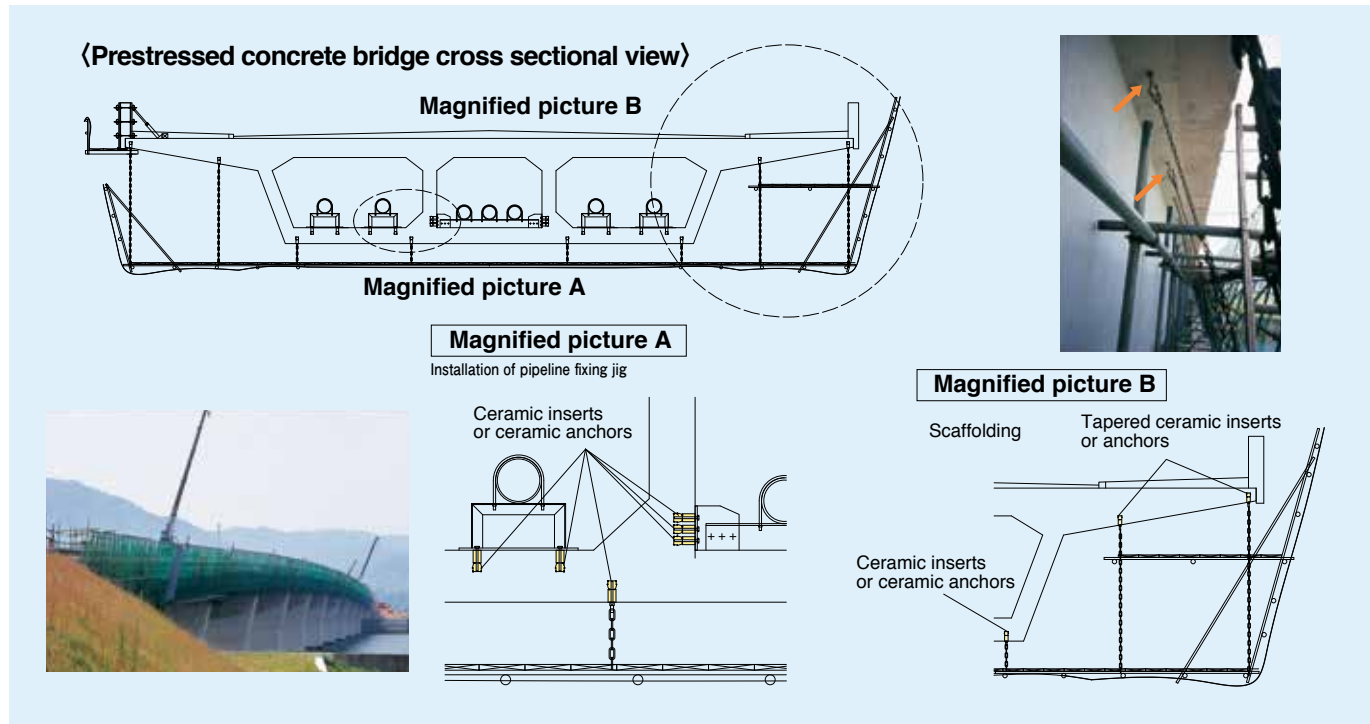
<Prestressed concrete bridge cross sectional view>

Magnified picture B

Magnified picture A

Magnified picture A
Installation of pipeline fixing jig

Magnified picture B
Scaffolding
Tapered ceramic inserts or anchors
Ceramic inserts or ceramic anchors

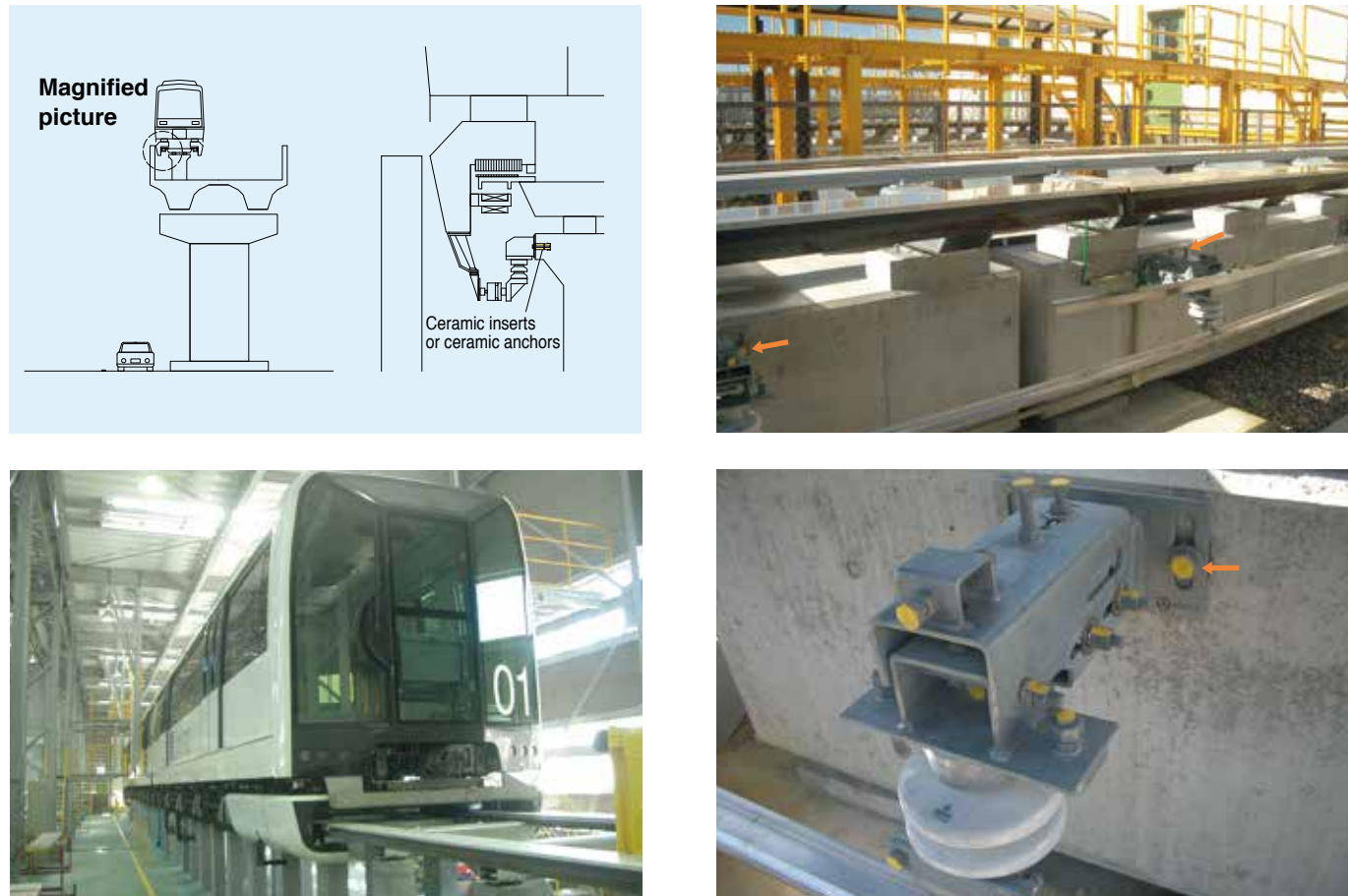


At bridge construction, ceramic inserts and ceramic anchors are used for temporary material fixing in hanging scaffolding where safety is critical. In addition to this application, ceramic inserts and ceramic anchors are able to be used for many applications such as the connection of scaffolds, inspection of sidewalks, sidewalls, and pillars of sound insulation panel.

For linear motor trains

Magnified picture

Ceramic inserts or ceramic anchors



Ceramic inserts and ceramic anchors made of high purity alumina are used in places where electric insulation is required. No corrosion occurs even with contact with metal parts. Thus, ceramic inserts and ceramic anchors are concrete friendly products.

2. Ceme-Force Anchor (made by Sumitomo Osaka Cement Co., Ltd.: Inorganic injection type)

The Ceme-Force Anchor is an inorganic injection type fixing agent applicable to ceramic anchors. Exclusive water is put in the cartridge, stirred, and injected into the borehole.

[Features] World-new inorganic injection type

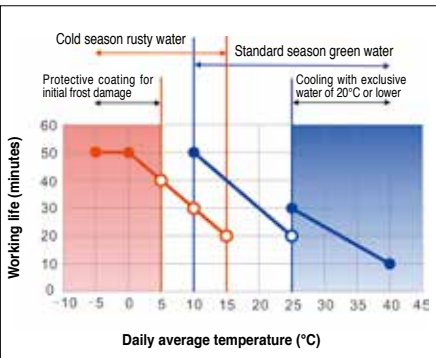
Durability	Since it is inorganic, it is resistant to fire and water.
Non-flammability	Incombustible without any odor
Working on wet surfaces	Possible
Upward processing	Possible
Adhesiveness	Equivalent to organic materials



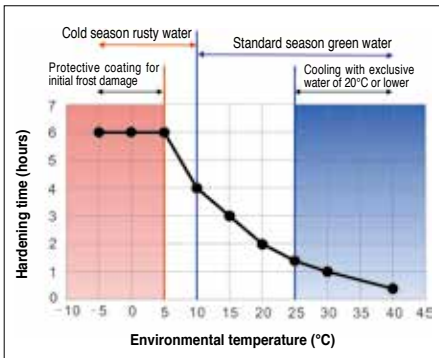
CEME-FORCE Anchor: 150ml is contained.
CEME-FORCE Anchor Jumbo: 450ml is contained.

[Usage temperatures, handling time, and hardening time]

● Handling time



● Hardening time



- Switch between standard season green water and cold season rusty water using an average daily temperature of 10°C as a reference.
- Do not use cold season rusty water at a temperature of 15°C or less.
- At an atmospheric temperature of 25°C or higher, use exclusive water to cool so that the temperature is 20°C or lower. If cooling is not performed, rapid hardening may occur.
- At a temperature of 5°C or lower, carry out anti-freezing processing until hardening is finished after construction.

3. HIT-RE500 (made by HILTI: Epoxy resin injection type)

The HIT-RE500 by HILTI is a double-cartridge injection type fixing agent applicable to ceramic anchors.

[Features]

High quality	The main agent and the hardening material are sealed in foil bags. Various technical data are available.
Stirring not required	Automatic mixing is performed by the mixing nozzle. Uniform and equable resin material can be injected.
Speedy work	Using a handy dispenser, working is possible by simply pulling the trigger.
Economy	Whenever in need, only a required quantity of resin can be consumed. If there is any remainder of resin, it can be used for the next time.
Environmental consideration	Since the resin is styrene-free, it is friendly to the environment. There is no strong smell, and the volume of industrial refuse after work has been reduced to 1/4 of the conventional.



Contents: 300ml
(Effective capacity to be used: Approx. 280ml)

[Hardening time]

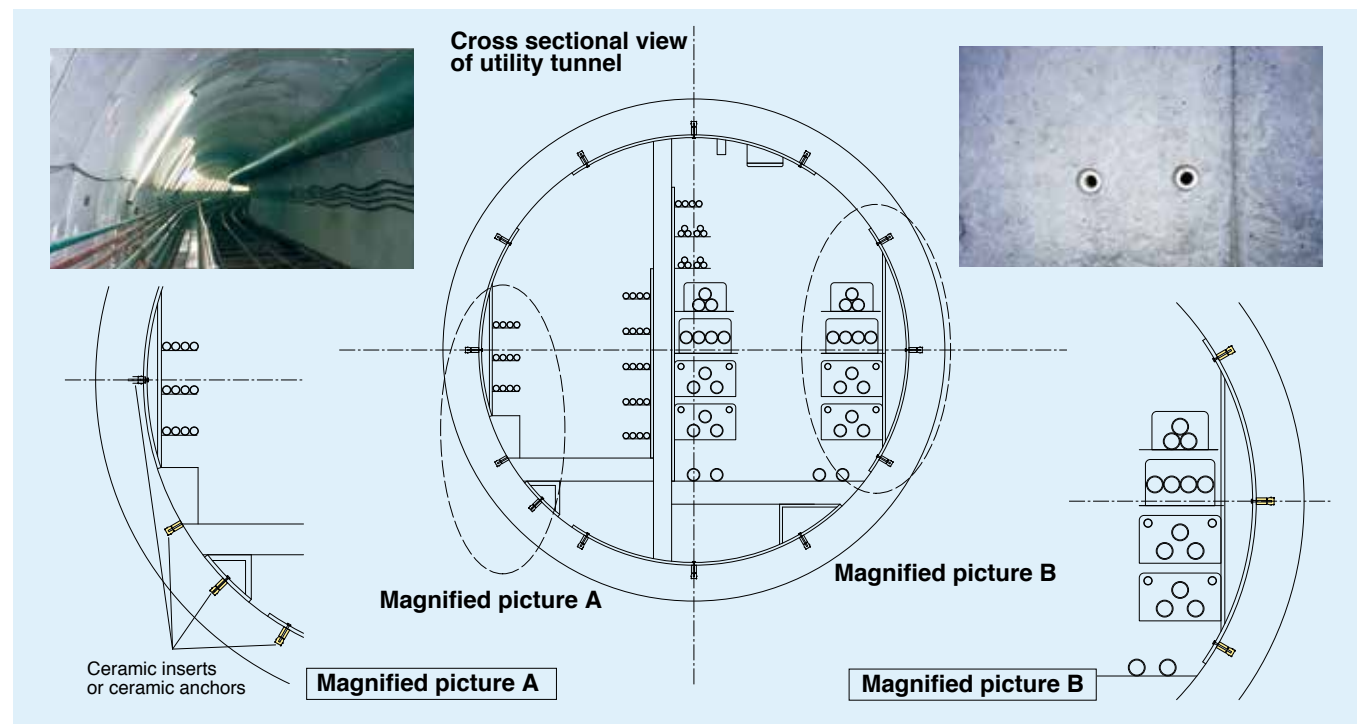
Base material	40°C	30°C	20°C	10°C	0°C	-5°C
*3 Time to gel state (tgel)	12 minutes	20 minutes	30 minutes	2 hours	3 hours	4 hours
*4 Cure time (tcure)	4 hours	8 hours	12 hours	24 hours	50 hours	72 hours

*3 Ceramic anchors should be inserted within the time to gel state.

*4 The load should be applied after the lapse of cure time.

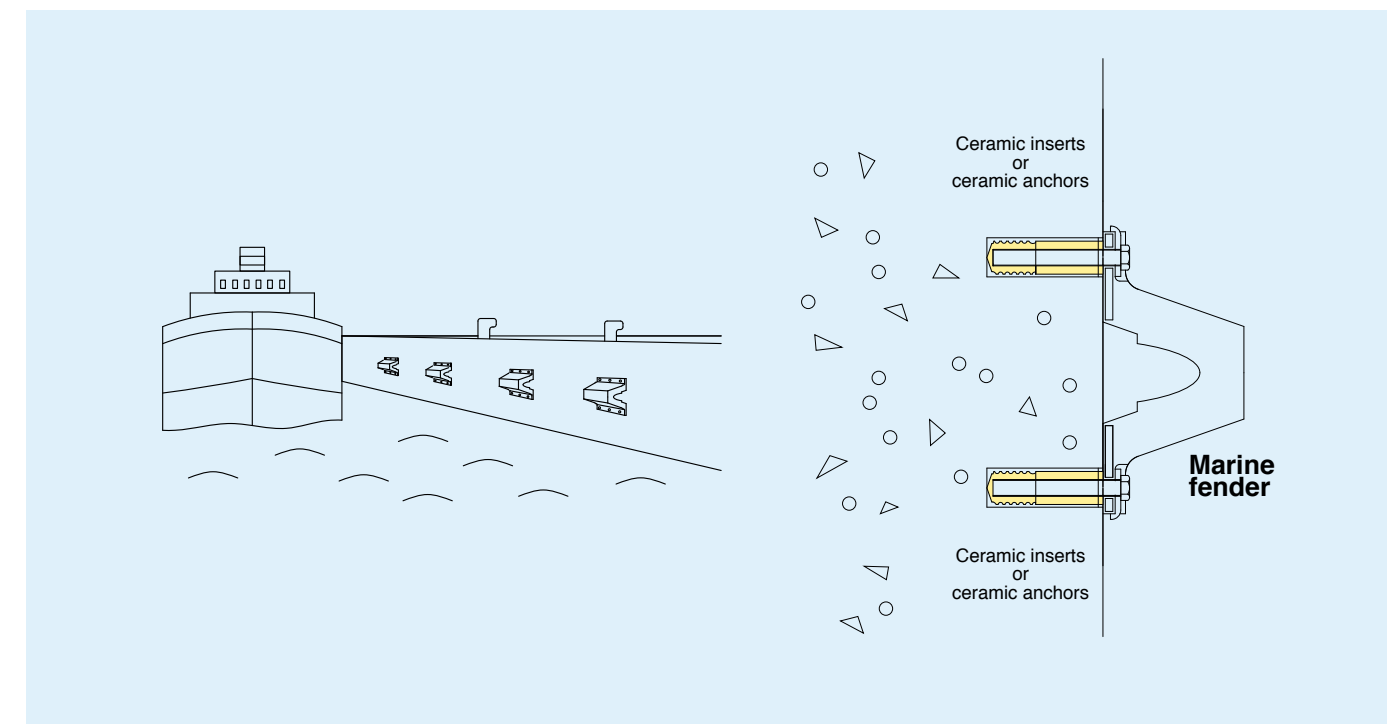
Note: For more details about the processing method, please refer to the relevant working instruction brochure.

Construction for underground and underwater utility tunnels



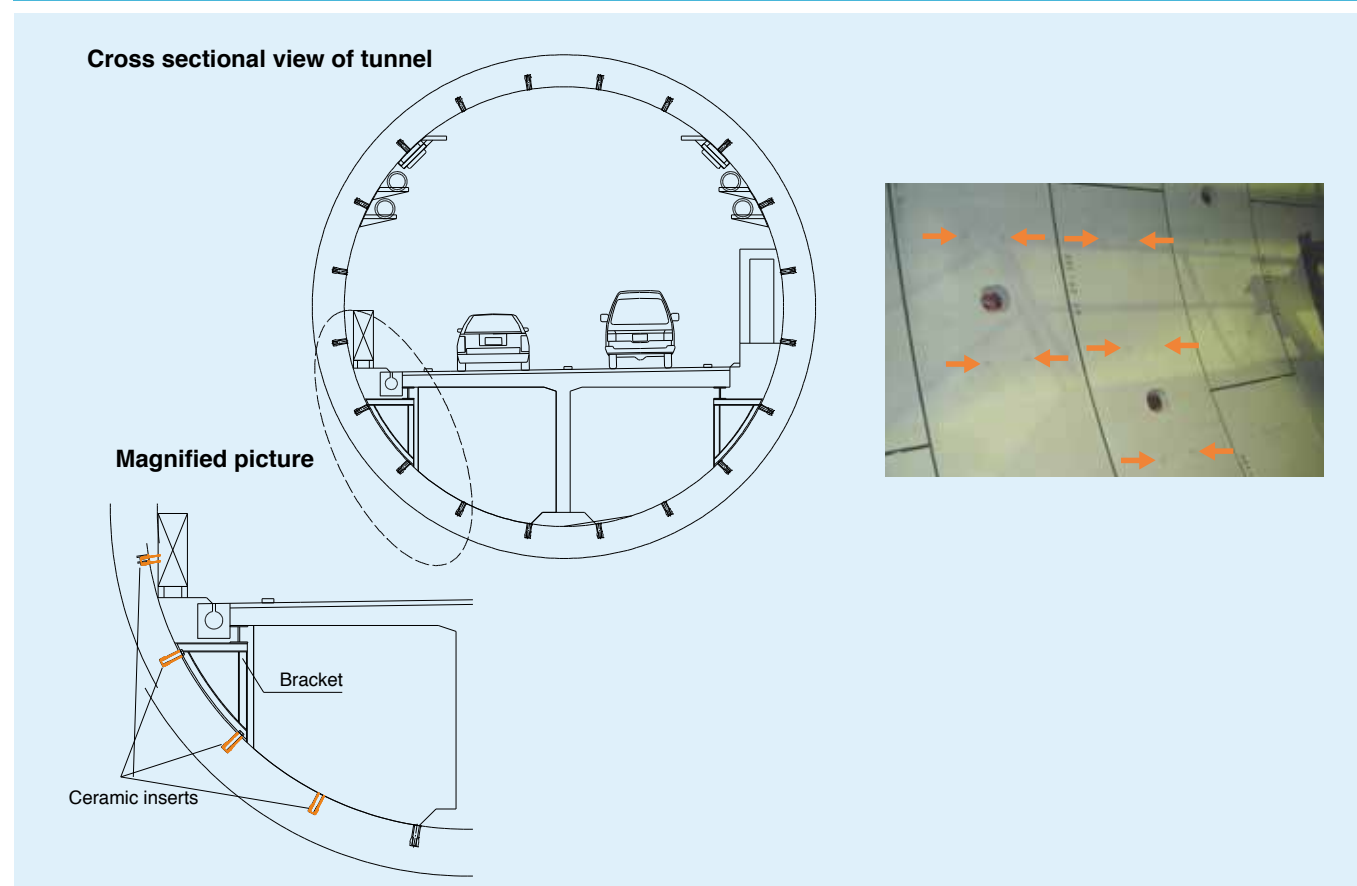
Ceramic inserts and ceramic anchors are widely used for fixing an installation jig of piping in structures of shield tunnel.

Marine fender for moored ships



Marine fender are installed for the wharfs to protect the sides of ships. Ceramic inserts and anchors are also used for fixing the marine fender due to high corrosion resistance to seawater.

Tunnels for roads and railroads



Ceramic inserts and ceramic anchors implanted in concrete of tunnels are used for the fixing of brackets or other hard ware where there are many applications such as floor installations, pipelines, lighting, etc. Those products are used for the fixing of fireproof panels due to extremely high heat resistance, and low thermal expansion coefficient preventing concrete from collapsing at high temperatures.

Installation of fireproof panels

Fixing for curtain wall and fireproof panels for ceiling



Ceramic inserts and ceramic anchors can be used for the fixing of exterior walls and fireproof ceiling panels in skyscrapers. Ceramic inserts and ceramic anchors never generate rust due to high corrosion resistance.

Waterworks, sewerage, and manufacturing plants

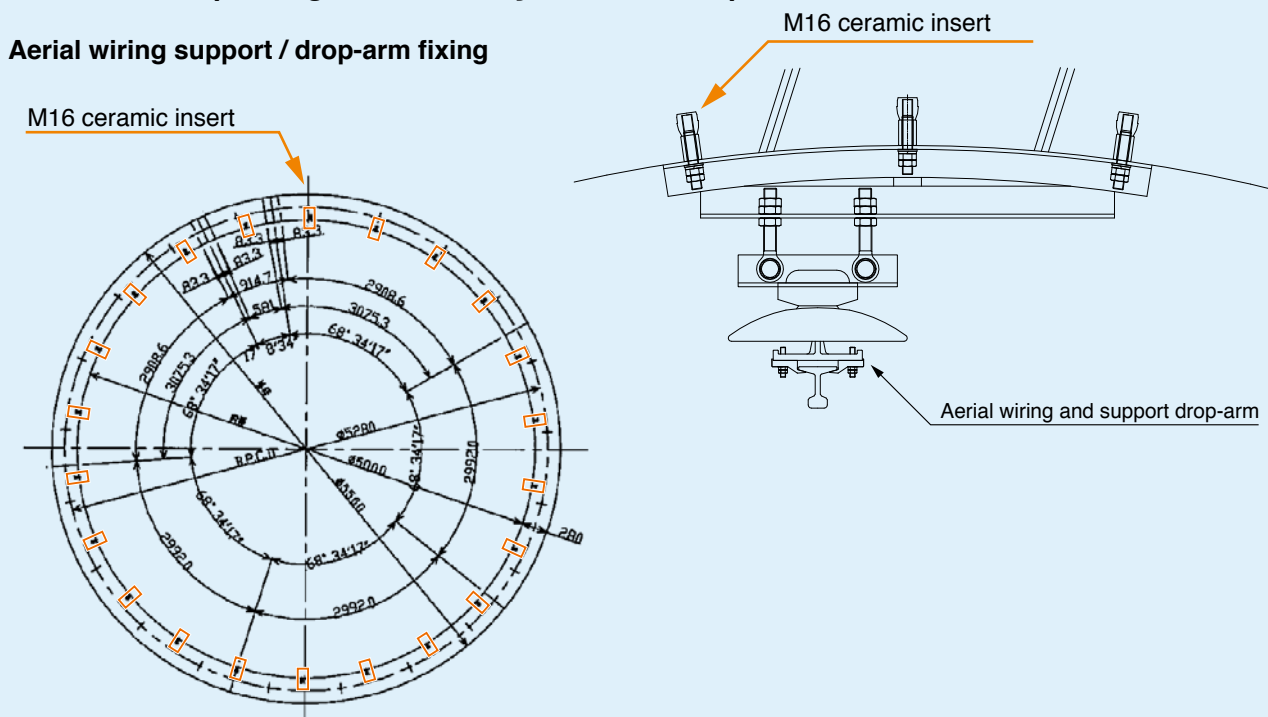


Ceramic inserts and ceramic anchors demonstrate excellent corrosion resistance to water in the application to waterworks, sewerage, and manufacturing plants.

For a railway tunnel

Shield tunnel (underground railway construction)

Aerial wiring support / drop-arm fixing



Types of ceramic inserts

CEM — SCL

Example: CEM16-SCL70

Nominal diameter of screw

10 : M10
12 : M12
16 : M16
20 : M20
22 : M22
24 : M24
Other

Embedded depth

40 : 40mm (M10)
60 : 60mm (M12)
70 : 70mm (M16)
80 : 80mm (M16)
84 : 84mm (M12)
100 : 100mm (M20)
110 : 110mm (M22)
116 : 116mm (M16)
120 : 120mm (M24)

Specialty grade

X : Double-sided adhesive tape fixing type (M10)
Z : Double-sided adhesive tape fixing type (M12, M16)
T : Tapered sleeve type

Arbitrary angles can be supported

Types of ceramic anchors

CAM — SCL

Example: CAM16-SCL80-2565

Nominal diameter of screw

10 : M10
12 : M12
16 : M16
20 : M20
24 : M24
30 : M30

Effective embedded depth

40 : 40mm (M10)
60 : 60mm (M12)
70 : 70mm (M16)
80 : 80mm (M16)
100 : 100mm (M20)
130 : 130mm (M24)
150 : 150mm (M30)

Physical properties of ceramic vs. conventional materials

	Alumina ceramics	Stainless steel	Steel	Concrete
Bulk density	3.6	—	7.85	2.2-2.4
Vickers' Hardness (GPa)	12.76	1.96	2.35	—
Young's modulus (N/m2)	3.14×10 ¹¹	1.93×10 ¹¹	2.06×10 ¹¹	0.21×10 ¹¹
Coefficient of thermal expansion (1/°C)	8.5×10 ⁻⁶	17.3×10 ⁻⁶	10.0×10 ⁻⁶	10.0×10 ⁻⁶
Poisson's ratio (—)	0.23	0.30	0.17	0.17
Compressive strength (MPa)	1961.3	—	—	23.5-44.1
Tensile strength (MPa)	—	519.8	402.1-509.9	2.4-4.4
Bending strength (MPa)	294.2	—	—	4.7-8.8
Coefficient of thermal conductivity (W/m · k)	25.1	16.7	75.3	1.6



Caution: Safe handling of ceramic inserts and ceramic anchors

Please take a close look at safe handling procedures for ceramic inserts and ceramic anchors respectively prior to the handling of these products.

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