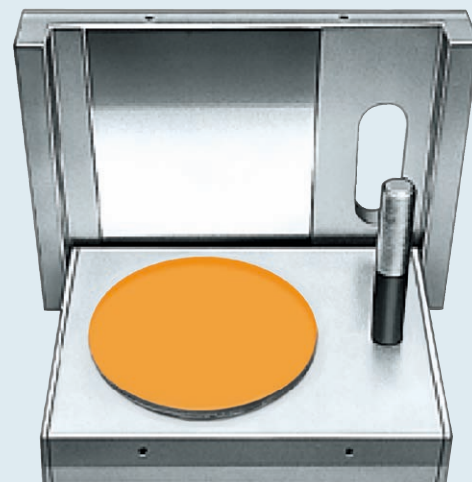


# A shoe that insulates supports for pipes such as water pipes and structures such as abutments

Insulation Shoe Type I: FLUOROGOLD System

Insulation Shoe Type II: UNI-TON™ Bearing System



## What is an insulation shoe?

Most water pipes require electrical corrosion prevention equipment, but aqueducts and their lower structures in particular may be electrically shorted through shoes. Pipe supports and structures such as abutments, therefore, must be electrically insulated without exception.

The insulation shoe is a shoe that provides electrical insulation using the shoe of a pipe support. It has a structure that supports the vertical load of the upper structure, allows movement caused by pipe elongation and contraction safely and smoothly, and provides electrical insulation\*<sup>1</sup> between the upper and lower shoes. We provide plate type FLUOROGOLD System “Insulation Shoe Type I,” which absorbs movement, and UNI-TON Bearing System “Insulation Shoe Type II,” which absorbs the angle of deflection. For this bearing system, we received guidance from the Design Committee at the Japan Water Steel Pipe Association.

## Features of Insulation Shoe Type I

- This product is an economical, compact shoe that can support high loads.
- Sliding material with a low coefficient of friction\*<sup>2</sup> absorbs movement in the horizontal direction and reduces stress applied to structures such as bases. The sliding material has non-adhesiveness and self-lubricating capabilities, and requires no lubrication. Fine sand and dust on the surface are taken into the material as it slides, enabling the sliding characteristics to remain stable over a long period of time.
- The sliding material (PTFE containing filler) is chemically inert and has excellent weather resistance.
- Anchor bolt portions in contact with the shoes are coated with a PVDF lining with excellent insulating capability and strength.

## Features of Insulation Shoe Type II

- This product is a compact shoe that can support high loads.
- Chloroprene rubber (elastomer) sealed in the lower shoe (base pot) absorbs the angle of deflection in the vertical direction, preventing the occurrence of an unbalanced load and stress concentration on the sliding surface. The deflection angle absorption capability is  $\pm 1^\circ$  for the standard model ( $\pm 2^\circ$  for special design).
- The upper shoe (sole plate) and ring support bottom plate are prevented from being lifted, by penetrating the insulation bolts embedded in the lower shoe (base pot) through the upper shoe and bottom plate to mount them.
- For movable type shoes, sliding material with a low coefficient of friction\*<sup>2</sup> absorbs movement in the horizontal direction. The sliding material smoothly moves across a wide range of surface pressure from low to high surface pressure and ensures stable operation even without lubrication. It does not cause stick-slip or generate sounds.
- The sliding materials (PTFE containing filler and SUS304 or SUS316) have excellent wear resistance and weather resistance.
- Elastomer completely binds the upper, lower, and side surfaces and does not change the height even if the load changes.
- The outer circumference of the metal (SS400) part is coated with heavy-duty anti-corrosion paint (L-2).
- This product can be installed by welding it onto steel construction or securing it on a concrete structure with anchor bolts.

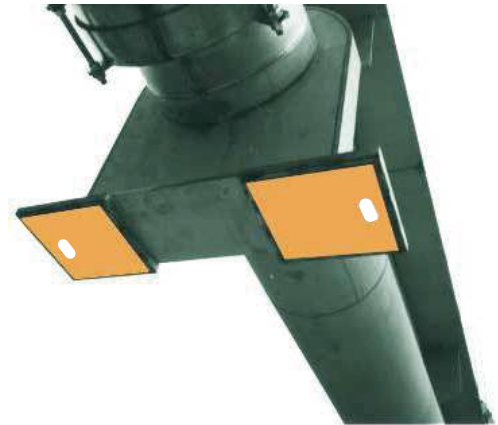
\*1: The electrical resistance between the upper and lower shoes is  $10^6\Omega$  or more (when measured at a test voltage of 500 V and in dry indoor conditions).

\*2: The sliding material employs polytetrafluoroethylene (PTFE) as the main component to enhance wear resistance and mechanical strength, containing filler with insulating capability.

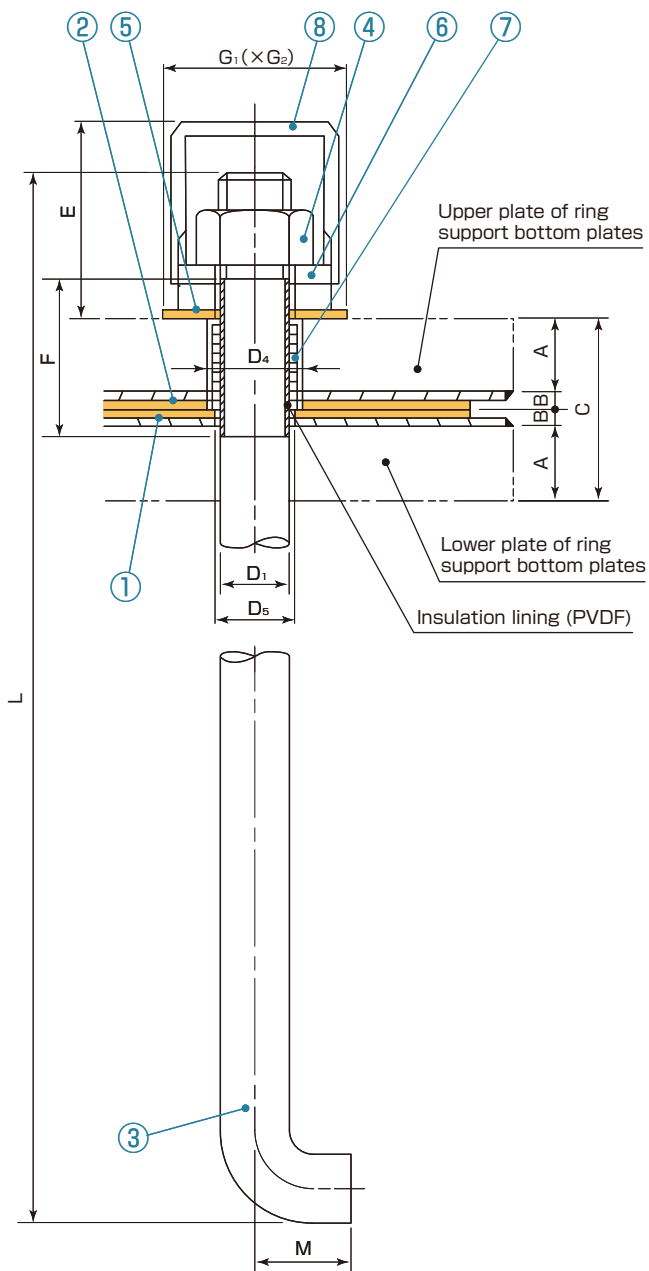
Note: Insulation Shoe Type I cannot absorb inclinations in the vertical direction and is therefore used for small spans with a small angle of deflection.

## Insulation Shoe Type I For fixed/movable point

This product is a plate type shoe that provides electrical insulation and absorbs movement in the horizontal direction.



### Structural drawing



### Component list

Component number	Name	Material	Qty
1	FLUOROGOLD	SS400+PILAFロン	1
2	FLUOROGOLD	SS400+PILAFロン	1
3	Insulation anchor bolt	SS400+PVDF	1*1
4	Hexagon nut	SS400	1*1
5	Insulation washer	SS400+PILAFロン	1*1
6	Screw washer	SS400	1*1
7	Insulation sleeve	FRP	1*1
8	Protection cap	PVC	1*1

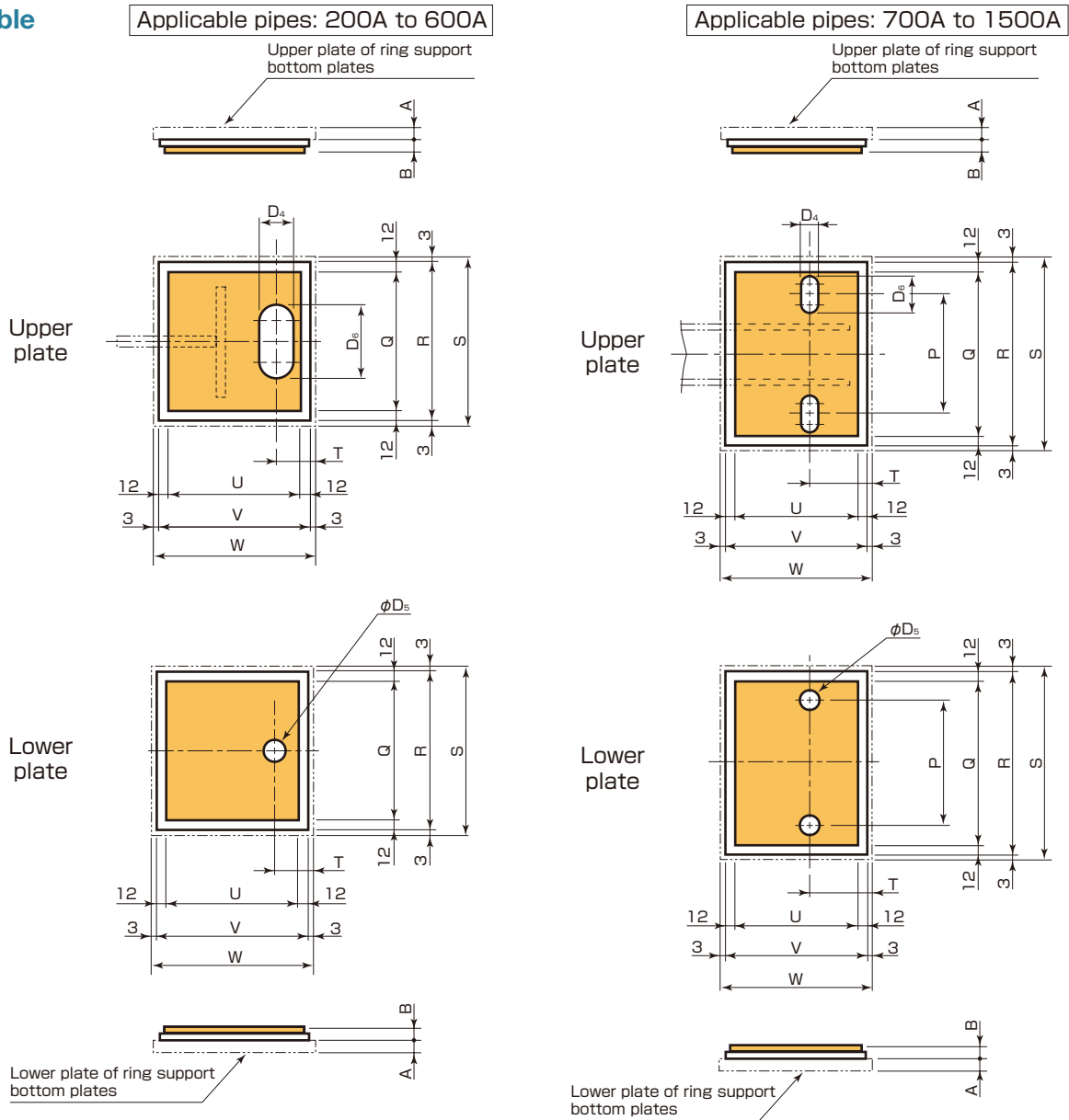
Note: SUS304 or SUS316 can also be used as the metal material.

\*1: For 700A to 1500A, the quantity is 2.

- For the dimension of each part in the structural drawing, refer to the size table on page 3.
- When presenting the number of units or design conditions, note that shoes will be attached to both legs of the pipe support.  
(The allowable vertical support load in the size table indicates a value per shoe.)
- The ring support bottom plates (upper and lower plates) indicated by dimension A in the structural drawing and size table are outside the scope of manufacturing. However, ring support bottom plates (upper and lower plates) must be manufactured according to the dimensions shown in the size table.

# FLUOROGOLD System Insulation Shoe Type I

## Size table



Unit: mm

Applicable pipe nominal size	Bottom plate section			Insulation anchor bolt						Insulation washer $G_1 \times G_2^{*1}$	Upper plate of bottom plates			Lower plate of bottom plates	Movable length	Upper and lower plates of bottom plates				P	T	Allowable vertical support load kN(tonf)	
	Bottom plate thickness	FLUOROGOLD		L	M	$D_1$	E	F	$D_4$		$D_5$	$\phi D_4$	$D_5$			S	W	FLUOROGOLD					
		A	B							C				R	V			Q	U				
200A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
250A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
300A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
350A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
400A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
450A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
500A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
600A	22	5.6	55.2	300	0	22	66.4	50	65×120	30	70	30	25	20	160	160	154	154	130	130	-	40	167 {17}
700A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	370	300	364	294	340	270	240	120	1107 {113}
800A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	380	300	374	294	350	270	250	120	1147 {117}
900A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	390	300	384	294	360	270	260	120	1176 {120}
1000A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	400	300	394	294	370	270	270	120	1215 {124}
1100A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	420	300	414	294	390	270	290	120	1284 {131}
1200A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	430	350	424	344	400	320	300	150	1588 {162}
1350A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	440	350	434	344	410	320	310	150	1627 {166}
1500A	25	5.6	61.2	600	50	24	66.4	53	65×90	32	72	32	27	20	450	350	444	344	420	320	320	150	1676 {171}

Notes 1) We design and manufacture products with non-standard dimensions separately.

2) For the dimension symbols of insulation anchor bolts and insulation washers, refer to the structural drawing on page 2.

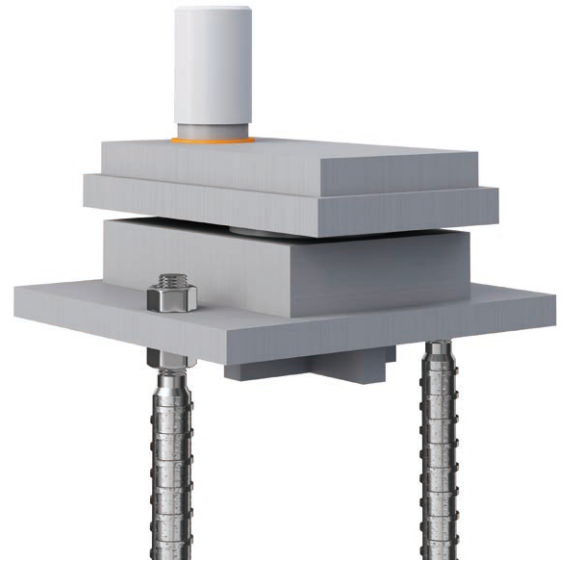
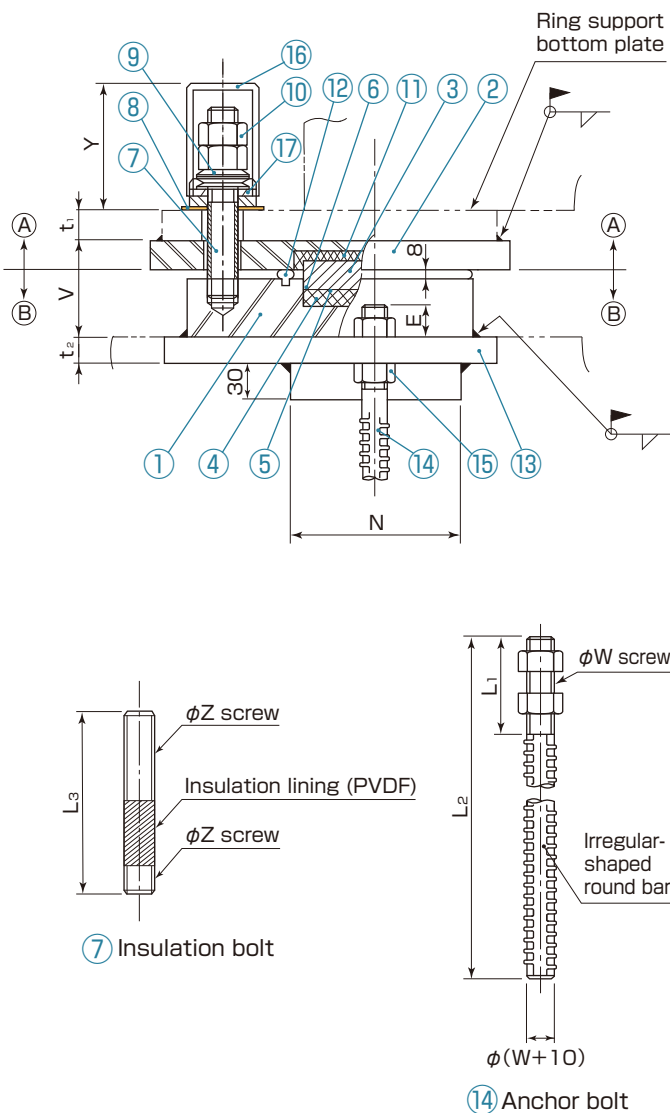
\*1: For fixed type shoes, the dimensions are 65 × 65 mm for all sizes.

\*2: For fixed type shoes, the hole on the upper plate is a round hole.

## Insulation Shoe Type II For fixed point

This product is a fixed type shoe that provides electrical insulation and absorbs the angle of deflection in the vertical direction.

### Structural drawings



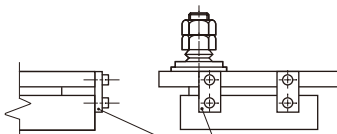
### Component list

Component number	Name	Material	Qty
1	Base pot	SS400	1
2	Sole plate	SS400	1
3	Piston	SUS304	1
4	Elastomer	Chloroprene rubber	1
5	Shim	PTFE	1
6	Seal ring	PTFE containing filler	1
7	Insulation bolt	SS400+PVDF	1
8	Insulation washer	PTFE containing filler+SS400	1
9	Conical spring washer	Steel	3
10	Hexagon nut (A)	SS400	2
11	Insulating plate	FRP (Epoxy glass)	1
12	Dust seal	Chloroprene rubber	1
13	Masonry plate	SS400	1
14	Anchor bolt	SD345	2
15	Hexagon nut (B)	SS400	4
16	Protection cap	PVC	1
17	Screw washer	SS400	1

Note: SUS304 or SUS316 can also be used as the metal material (except for conical spring washers).

Note, however, that anchor bolts are made of round bars.

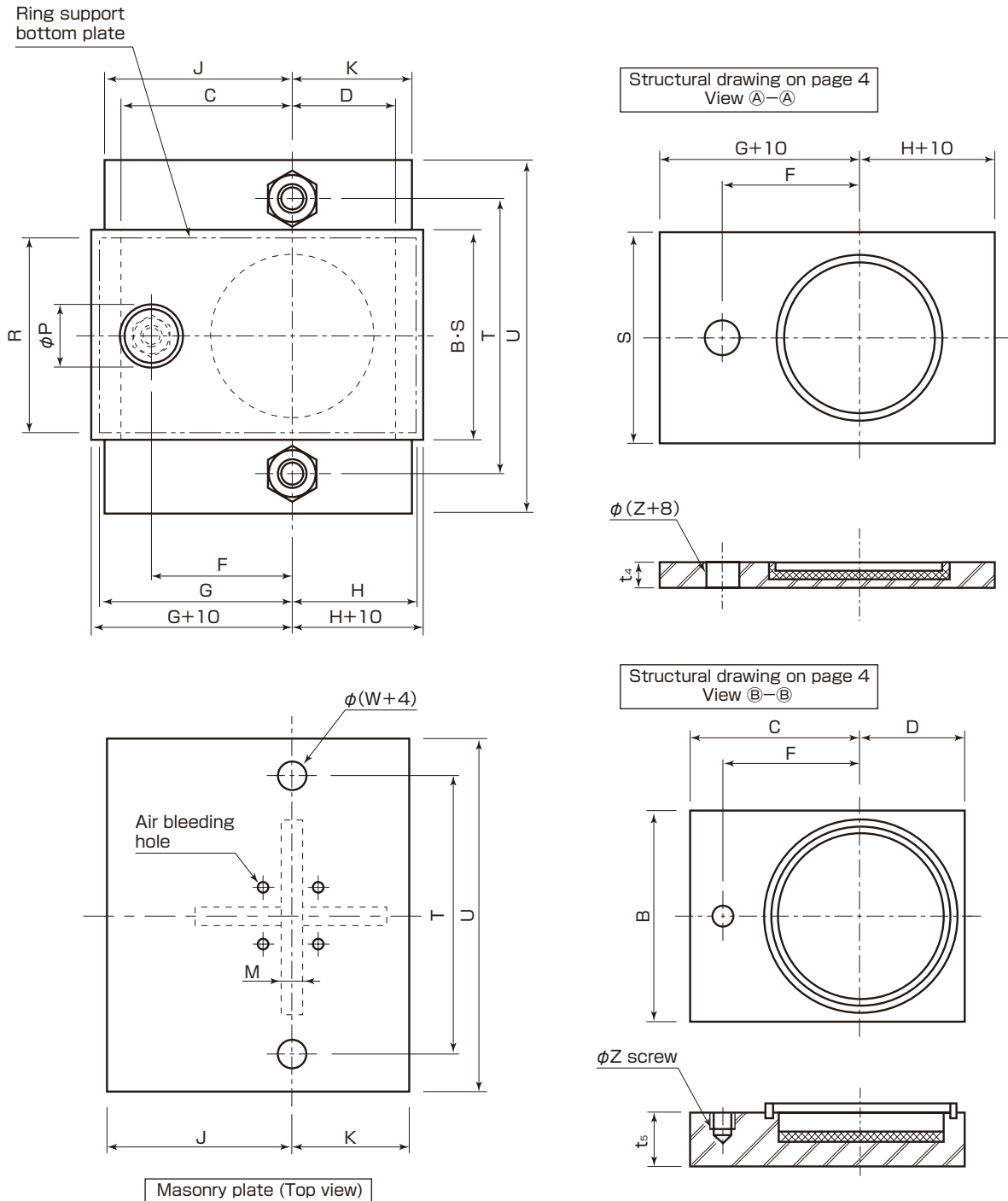
The insulation shoe is shipped with the upper shoe (sole plate) and lower shoe (base pot) secured with temporarily securing brackets. After installation, remove the temporarily securing brackets.



Temporarily securing bracket (4 positions)  
After installing the upper and lower shoes, remove the temporarily securing brackets.

- For the dimension of each part in the structural drawings, refer to the size table on page 5.
- When presenting the number of units or design conditions, note that shoes will be attached to both legs of the pipe support.  
(The bearing capacity in the size table indicates a value per shoe.)
- The ring support bottom plate indicated by dimension  $t_1$  in the structural drawing and size table is outside the scope of manufacturing. However, the ring support bottom plate must be manufactured according to the dimensions shown in the size table.
- In this product cannot be attached to the ring support for 80A and 100A.

## Size table



Model	Bearing capacity kN{tonf}*1			Bottom plate																	Unit: mm			Weight kg							
	Vertical load	Horizontal load	Uplift load	G	H	R	t <sub>1</sub>	B	C	D	E	F	J	K	M	N	P	Y	S	T	U	V	W		Z	t <sub>2</sub>	t <sub>4</sub>	t <sub>5</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>
Type 1	98 {10}	24,5 {2,5}	9,8 {1}	120	85	120	22	140	105	70	24	70	125	90	22	120	65	104,4	140	220	270	70	20	24	22	20	42	75	500	156	28
Type 2	98 {10}	24,5 {2,5}	9,8 {1}	150	85	120	22	140	135	70	24	105	155	90	22	120	65	104,4	140	220	270	70	20	24	22	20	42	75	500	156	32
Type 3	147 {15}	36,75 {3,75}	14,7 {1,5}	175	100	140	25	160	155	80	24	125	175	100	22	140	65	104,4	160	240	290	80	20	24	22	25	47	75	500	164	42
Type 4	196 {20}	49 {5}	19,6 {2}	190	115	170	25	190	170	95	28	135	190	115	25	170	75	114,4	190	280	340	85	24	30	25	25	52	90	500	185	60
Type 5	392 {40}	98 {10}	39,2 {4}	225	150	230	25	250	200	125	41	165	220	145	25	230	75	114,4	250	360	450	100	36	30	25	30	62	115	650	190	111

Notes 1) We design and manufacture products with non-standard dimensions separately.

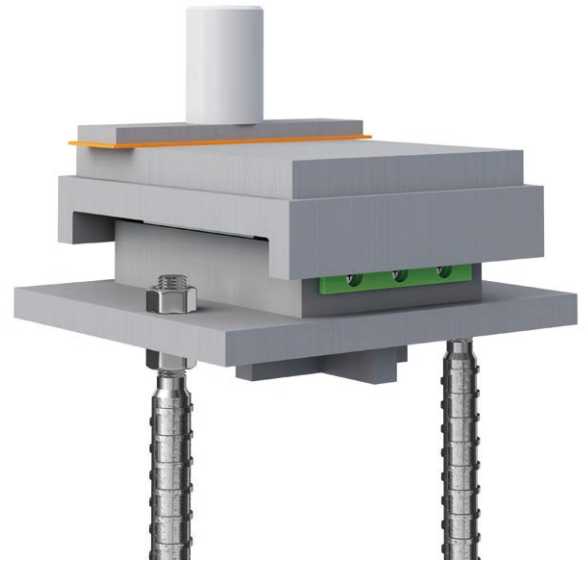
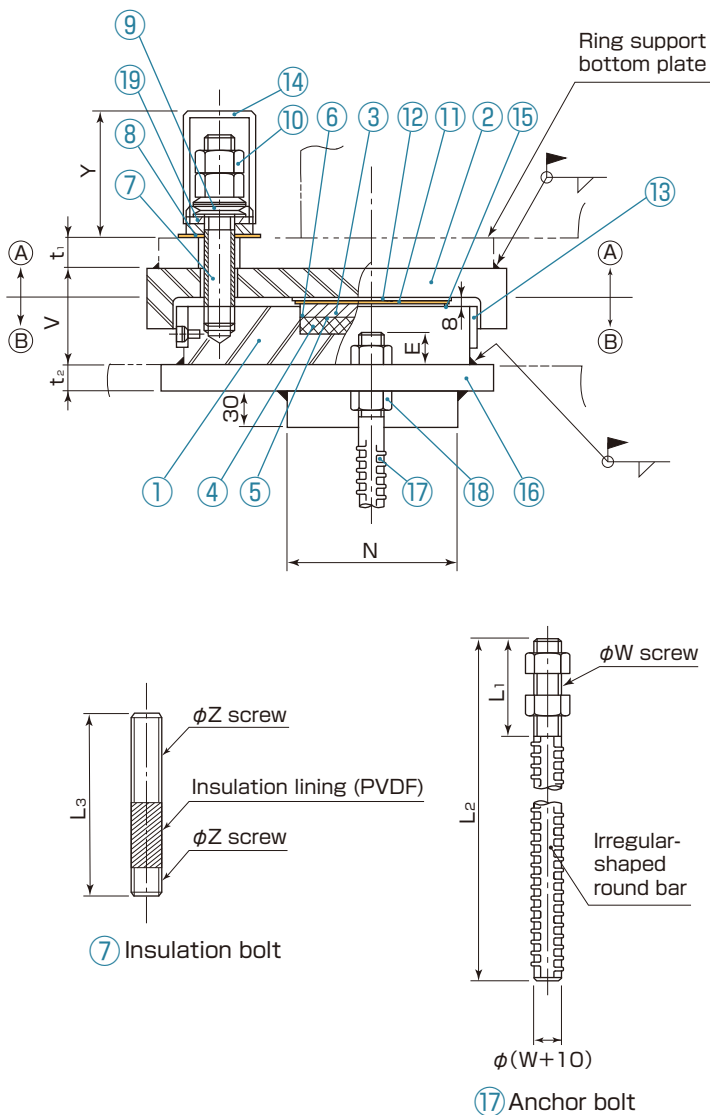
2) For any dimension symbols not shown in the figures above, refer to the structural drawing on page 4.

\*1: The vertical load indicates values measured at all times, and the horizontal load and uplift load indicate values measured in the event of earthquakes (short time period).

## Insulation Shoe Type II For movable point

This product is a movable type shoe that provides electrical insulation, absorbs movement in the horizontal direction, and absorbs the angle of deflection in the vertical direction.

### Structural drawings



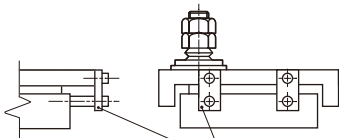
### Component list

Component number	Name	Material	Qty
1	Base pot	SS400	1
2	Sole plate	SS400	1
3	Piston	SUS304	1
4	Elastomer	Chloroprene rubber	1
5	Shim	PTFE	1
6	Seal ring	PTFE containing filler	1
7	Insulation bolt	SS400+PVDF	1
8	Insulation washer	PTFE containing filler+SS400	1
9	Conical spring washer	Steel	3
10	Hexagon nut (A)	SS400	2
11	Insulated bearing	PTFE containing filler	1
12	Slide plate	SUS304	1
13	Side insulating plate	FRP (Epoxy glass)	2
14	Protection cap	PVC	1
15	Fluid sealant	Silicone	Filled
16	Masonry plate	SS400	1
17	Anchor bolt	SD345	2
18	Hexagon nut (B)	SS400	4
19	Screw washer	SS400	1

Note: SUS304 or SUS316 can also be used as the metal material (except for conical spring washers).

Note, however, that anchor bolts are made of round bars.

The insulation shoe is shipped with the upper shoe (sole plate) and lower shoe (base pot) secured with temporarily securing brackets. After installation, remove the temporarily securing brackets.

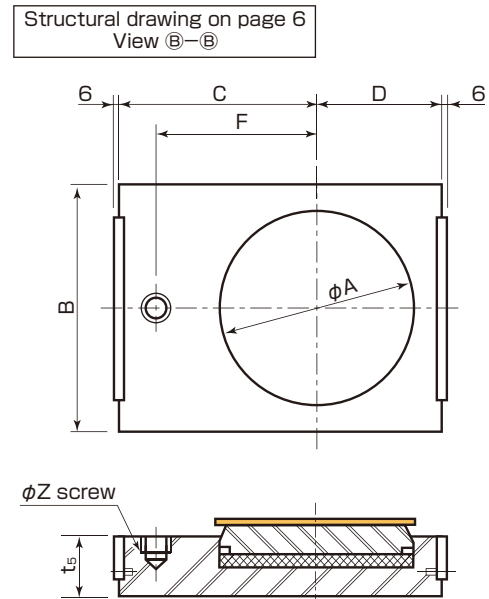
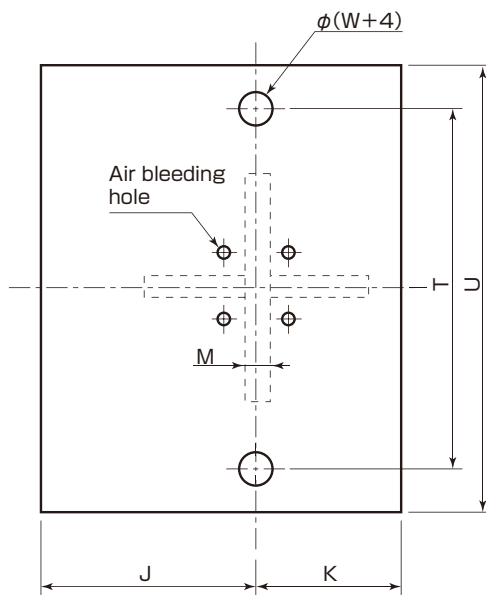
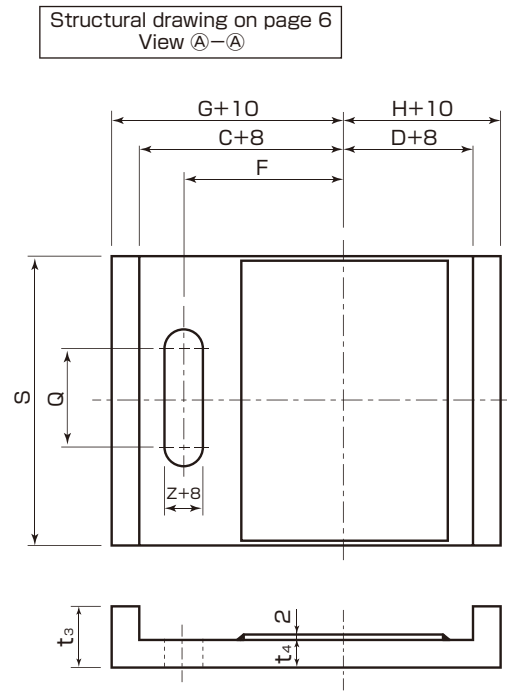
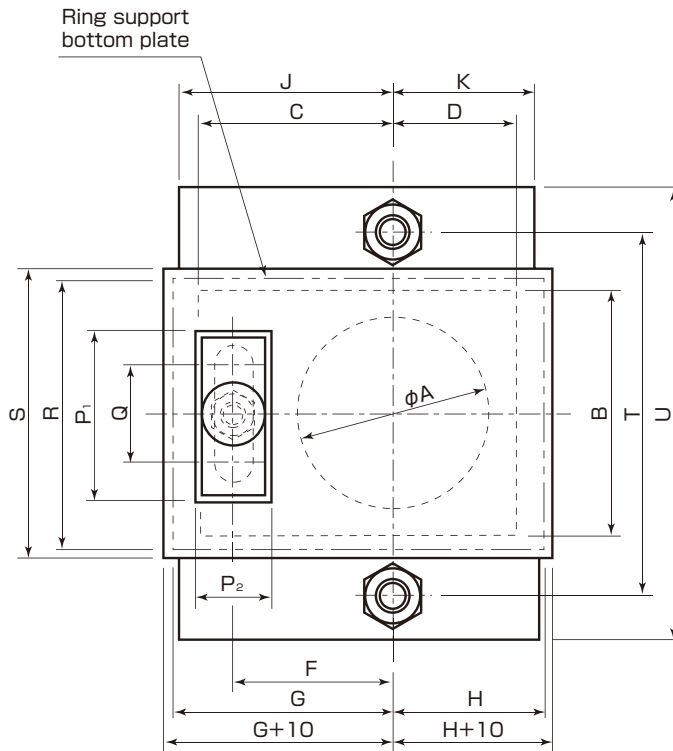


Temporarily securing bracket (4 positions)  
After installing the upper and lower shoes, remove the temporarily securing brackets.

- For the dimension of each part in the structural drawings, refer to the size table on page 7.
- When presenting the number of units or design conditions, note that shoes will be attached to both legs of the pipe support. (The bearing capacity in the size table indicates a value per shoe.)
- The ring support bottom plate indicated by dimension  $t_1$  in the structural drawing and size table is outside the scope of manufacturing. However, the ring support bottom plate must be manufactured according to the dimensions shown in the size table.
- This product cannot be attached to the ring support for 80A and 100A.

# UNI-TON Bearing System Insulation Shoe Type II

## Size table



Model	Bearing capacity kN(tonf)*1			Bottom plate				Movable length																	Unit: mm			Weight kg								
	Vertical load	Horizontal load	Uplift load	G	H	R	t <sub>1</sub>		A	B	C	D	E	F	J	K	M	N	Q	P <sub>1</sub>	P <sub>2</sub>	Y	S	T	U	V	W		Z	t <sub>2</sub>	t <sub>3</sub>	t <sub>4</sub>	t <sub>5</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>
Type 6	98 {10}	24,5 {2,5}	9,8 {1}	120	85	185	22	±50	100	140	105	70	24	70	125	90	22	120	100	240	65	104,4	205	240	290	70	20	24	22	42	20	42	75	500	156	32
Type 7	98 {10}	24,5 {2,5}	9,8 {1}	150	85	185	22	±50	100	140	135	70	24	105	155	90	22	120	100	240	65	104,4	205	240	290	70	20	24	22	42	20	42	75	500	156	37
Type 8	147 {15}	36,75 {3,75}	14,7 {1,5}	175	100	205	25	±50	120	160	155	80	24	125	175	100	22	140	100	240	65	104,4	225	260	310	80	20	24	22	50	25	47	75	500	164	49
Type 9	196 {20}	49 {5}	19,6 {2}	190	115	225	25	±50	140	190	170	95	28	135	190	115	25	170	100	250	75	114,4	245	290	350	85	24	30	25	52	25	52	90	500	185	67
Type 10	392 {40}	98 {10}	39,2 {4}	225	150	280	25	±50	195	250	200	125	41	165	220	145	25	230	100	250	75	114,4	300	370	460	100	36	30	25	62	30	62	115	650	190	120

Notes 1) We design and manufacture products with non-standard dimensions separately.

2) For any dimension symbols not shown in the figures above, refer to the structural drawing on page 6.

\*1: The vertical load indicates values measured at all times, and the horizontal load and uplift load indicate values measured in the event of earthquakes (short time period).

### ■ Characteristics of FLUOROGOLD / insulated bearing

Item	Characteristic value
Tensile strength (Minimum) MPa {kgf/cm <sup>2</sup> }	13.7 {140}
Elongation (Minimum) %	200
Specific gravity	2.22
Hardness (Durometer D)	60 to 70
Coefficient of thermal expansion 1/°C	6.5×10 <sup>-5</sup>

### ■ Coefficients of friction of sliding materials (FLUOROGOLD / insulated bearing)

Item	Relationship between surface pressure and coefficient of friction		
Surface pressure MPa {kgf/cm <sup>2</sup> }	3.43 {35}	13.7 {140}	24.1 {246}
Coefficient of friction*1	0.12 or less	0.10 or less	0.08 or less

\*1: This item shows coefficients of static and kinetic frictions when the sliding velocity is 0.042 cm/s or less and the mating surface is made of SUS304 2S or lower level stainless steel.

### ■ Characteristics of elastomer (chloroprene synthetic rubber)

Item	Testing method	Criteria
Static shear modulus of elasticity MPa {kgf/cm <sup>2</sup> }	Section 6 of JIS K 6254 (Static shear modulus of elasticity)	0.8±0.1 {8±1.0}
Elongation at break (Minimum) %	JIS K 6251	400
Oil resistant test		
Volume change (Maximum) %	Section 8.1 of JIS K 6258 No. 3 oil: 100°C × 72 h	+120
Aging test		
Rate of change of tensile stress at 25% %	Section 3.3 of JIS K 6257 100°C × 72 h	-10 to +100
Rate of elongation change at break (Minimum) %	Section 3.3 of JIS K 6257 100°C × 72 h	-50 or more
Compression set %	JIS K 6262 100°C × 24 h	35 or less
Ozone resistance	Section 10 of JIS K 6259-1 50±5pphm, 20% elongation 40°C × 96 h	No cracks or significant changes

### ■ Installation precautions

Insulation shoes electrically insulate the lower and upper structures. When using insulation shoes, note that the lower and upper structures must not be energized.



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<b>Safety precaution</b>	● When using this product, please use correctly and pay sufficient attention to safety.
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\* Please understand that this catalog may change without prior notice.  
\* The values shown on this catalog are reference values, not guaranteed values.