Seismic Control NSV

ISO 9001/ISO 14001
OHSAS 18001
MADE IN KOREA

SEISMIC CONTROL

PRODUCT OVERVIEW

SEISMIC CONTROL

Domestic Seismic Design Standards

1) KBC 2016 (Public notice of Ministry of Land, Infrastructure and Transport, Standards and Explanation of Building Construction)
2) KECG 9701-2009 (Construction Guidelines for Seismic Design of Building, Electricity and Facilities)
3) Regulation on Structure Standards of Building (Decree No. 555, Ministry of Land, Infrastructure and Transport, 2018. 11. 9)
4) ACT ON FIRE PREVENTION AND INSTALLATION, MAINTENANCE, AND SAFETY CONTROL OF FIRE-FIGHTING SYSTEMS (Enforcement date: 2018. 9. 3)
5) SPECIAL ACT ON MANAGEMENT OF DISASTERS IN SUPER HIGH-RISE BUILDINGS AND COMPLEX BUILDINGS WITH UNDERGROUND CONNECTIONS (Enforcement date: 2018. 6. 27)
6) Establishment of Seismic Design Standards of Fire Fighting System (Public notice of Ministry of the Interior and Safety, No. 2015-138)

Overseas Seismic Design Standards

1) FEMA (Federal Emergency Management Agency)
2) IBC2015 (International Building Code)
3) ASCE 7-10, 41-13 (American Society of Civel Engineers
4) SMACNA (Seismic Restraint Manual : Guidelines for Mechanical System)
5) 2015 ASHRAE HANDBOOK HVAC APPLICATIONS CH.55
6) UFC 3-310-04 (Unified Facilities Criteria) - D.O.D. (Department Of Defense)
7) EC-8 (EUROCIDE 8: Design of structures for earthquake resistance)

Seismic Design - Equivalent Static Loads

1. Seismic Design Force

If an seismic design force method is applied for building design according to seismic design category and seismic classification, seismic design force by earthquake are calculated using an seismic design force method. seismic design force by earthquake Fp are as follows. Fp shall be independently applied to axial and orthogonal directions while considering together running weight acting on nonstructural components. If wind load acting on nonstructural outer wall exceeds Fp, the design shall be for wind load.

Seismic design force (Fp)

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I}\right)}\left(1 + 2\frac{z}{h}\right)$$

Seismic design force for max. (Fp)

$$F_p = 1.6 S_{DS} I_p W_p$$

Seismic design force for min. (Fp)

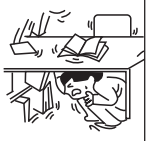
$$F_p = 0.3 S_{DS} I_p W_p$$

Where: F_P : Seismic design force acting on center of mass of nonstructural components
a_P : Amplification factor that varies from 1.0 to 2.5
S_{DS} :Spectral acceleration at short period
W_P : Component operating weight
h : Average roof height of structure with respect to the base
R_P : Component response modification factor that varies from 1.0 to 12.0
I_P: Component Importance factor that caries from 1.0 to 1.5
z : Height in structure of point of attachment of component with respect to the base.
$z = 0$: If a nonstructural components is located below the structure base.
$z = h$: If a nonstructural components is located to the roof or higher place of a structure

SEISMIC COEFFICIENTS FOR MECHANICAL AND ELECTRICAL COMPONENTS

MECHANICAL AND ELECTRICAL COMPONENTS	a_p[a]	R_p[b]	Ω_0[c]
Air–side HVAC, fans, air handlers, air conditioning units, cabinet heaters, air distribution boxes, and other mechanical components constructed of sheet metal framing.	2 ½	6	2 ½
Wet–side HVAC, boilers, furnaces, atmospheric tanks and bins, chillers, water heaters, heat exchangers, evaporators, air separators, manufacturing or process equipment, and other mechanical components constructed of high–deformability materials.	1	2 ½	2 ½
Engines, turbines, pumps, compressors, and pressure vessels not supported on skirts and not within the scope of Chapter 15.	1	2 ½	2 ½
Skirt–supported pressure vessels not within the scope of Chapter 15.	2 ½	2 ½	2 ½
Elevator and escalator components.	1	2 ½	2 ½
Generators, batteries, inverters, motors, transformers, and other electrical components constructed of high deformability materials.	1	2 ½	2 ½
Motor control centers, panel boards, switch gear, instrumentation cabinets, and other components constructed of sheet metal framing.	2 ½	6	2 ½
Communication equipment, computers, instrumentation, and controls.	1	2 ½	2 ½
Roof–mounted stacks, cooling and electrical towers laterally braced below their center of mass.	2 ½	3	2 ½
Roof–mounted stacks, cooling and electrical towers laterally braced above their center of mass.	1	2 ½	2 ½
Lighting fixtures.	1	1 ½	1 ½
Other mechanical or electrical components.	1	1 ½	1 ½
VIBRATION ISOLATED COMPONENTS AND SYSTEMS[b]			
Components and systems isolated using neoprene elements and neoprene isolated floors with built–in or separate elastomeric snubbing devices or resilient perimeter stops.	2 ½	2 ½	2 ½
Spring isolated components and systems and vibration isolated floors closely restrained using built–in or separate elastomeric snubbing devices or resilient perimeter stops.	2 ½	2	2 ½
Internally isolated components and systems.	2 ½	2	2 ½
Suspended vibration isolated equipment including in–line duct devices and suspended internally isolated components.	2 ½	2 ½	2 ½
DISTRIBUTION SYSTEMS			
Piping in accordance with ASME B31, including in–line components with joints made by welding or brazing.	2 ½	12	2 ½
Piping in accordance with ASME B31, including in–line components, constructed of high or limited deformability materials, with joints made by threading, bonding, compression couplings, or grooved couplings.	2 ½	6	2 ½
Piping and tubing not in accordance with ASME B31, including in–line components, constructed of high–deformability materials, with joints made by welding or brazing.	2 ½	9	2 ½
Piping and tubing not in accordance with ASME B31, including in–line components, constructed of high– or limited–deformability materials, with joints made by threading, bonding, compression couplings, or grooved couplings.	2 ½	4 ½	2 ½
Piping and tubing constructed of low–deformability materials, such as cast iron, glass, and nonductile plastics. a	2 ½	3	2 ½
Ductwork, including in–line components, constructed of high–deformability materials, with joints made by welding or brazing.	2 ½	9	2 ½
Ductwork, including in–line components, constructed of high– or limited–deformability materials with joints made by means other than welding or brazing.	2 ½	6	2 ½
Ductwork, including in–line components, constructed of low–deformability materials, such as cast iron, glass, and nonductile plastics.	2 ½	3	2 ½
Electrical conduit and cable trays	2 ½	6	2 ½
Bus ducts	1	2 ½	2 ½
Plumbing	1	2 ½	2 ½
Manufacturing or process conveyors (nonpersonnel).	2 ½	3	2 ½

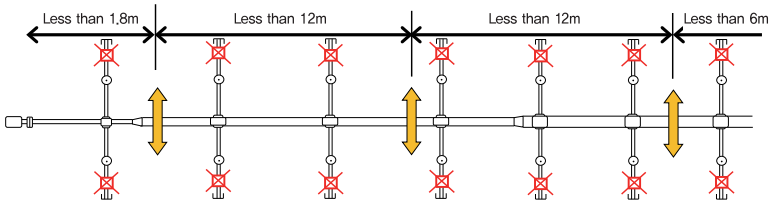
Earthquake intensity and magnitude

Seismic level	JMA		MM		Richter	Situations
	Intensity	Ground acceleration	Intensity	Ground acceleration	Magnitude	
	Ⅰ (Slight earthquake)	0.8~2 gal	Ⅰ	–	2	Not felt except by very few under especially favorable conditions.
	Ⅱ (Weak earthquake)	2.5~8 gal	Ⅱ	–		Felt only by a few people especially on upper floors of buildings.
			Ⅲ	–	3	Felt quite noticeably by people indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Duration estimated.
	Ⅲ (Minor earthquake)	8~25 gal	Ⅳ	15~20	4	Felt indoors by many, outdoors by few during the day. Dishes, windows, doors disturbed. Standing motor cars rock noticeably.
	Ⅳ (Moderate earthquake)	25~80 gal	Ⅴ	30~40		Many people rush outside. Some heavy furniture moved. A few instances of fallen chimneys.
			Ⅵ	60~70	5.1 5.1 5.8	
	Ⅴ (Very strong earthquake)	80~250 gal	Ⅶ	100~150		All people rush outside. Damage negligible in buildings of good design and construction. Considerable damage in poorly built or badly designed structures. Some chimneys broken.
	Ⅵ (Violent earthquake)	250~400 gal	Ⅷ	150~300	6.3 6	Damage slight in specially designed structures. Considerable damage in ordinary substantial buildings with partial collapse. Heavy furniture overturned.
			Ⅸ	500~550	7	Damage considerable in specially designed structures. Damage great in substantial buildings, with partial collapse. Ground split.
	Ⅶ (Disastrous earthquake)	≥ 400 gal	Ⅹ	Over 600	7.4	Most masonry and frame structures destroyed with foundations. Rails bent. Ground severely split. River bank, steep slope landslides.
			Ⅺ	–	8	Few, if any, (masonry) structures remain standing. Rails bent greatly. Bridges destroyed. Underground pipelines completely out of service. Earth slumps and landslides in soft ground.
			Ⅻ	–		Waves seen on ground surfaces. Objects thrown upward into the air.

JMA : Japan Meteorological Agency
MM : Modified Mercalli

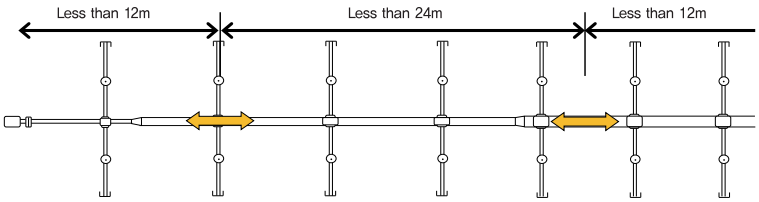
Lateral Sway Bracing

- Lateral sway bracing shall be provided on all feed and cross mains regardless of size and all branch lines and other piping with a diameter of 65 mm and larger.
- The distance between the last brace and the end of the pipe shall not exceed 1.8m.
- Spacing shall not exceed a maximum interval of 12m on centerline.

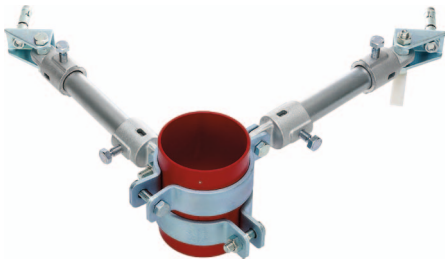


Longitudinal Sway Bracing

- A longitudinal sway bracing shall be provided on all feed and cross mains regard less of size.
- The distance between the last brace and the end of the pipe shall not exceed 12m.
- Spacing shall not exceed a maximum interval of 24m on centerline.

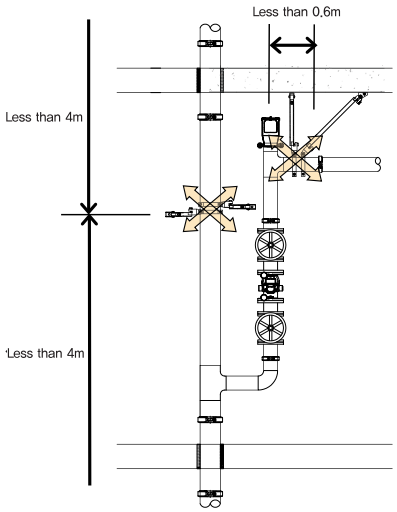


4-Way Sway Bracing



(For vertical pipe installation)

(For horizontal pipe installation)



- Tops of risers piping exceeding 1m in length shall be provided with a four-way brace.
- When a four-way brace at the top of a riser is attached on the horizontal piping, it shall be within 600 mm of the centerline of the riser and the loads for that brace shall include both the vertical and horizontal pipe.
- The distance between 4-way Sway Bracing shall not exceed 8m.

Components of SEISMIC Sway Braicing for Fire Protection System

ND-10A/B

Adapter

- Features

Adapter for sway bracing used with manufacturer's ND-30 (structure attachment) or ND-20 (pipe clamp)
Compose sway bracing system with Sch. pipe

- Material : Spheroidal graphite cast iron

Model name	Sch #40 Pipe
ND-10A	25A
ND-10B	32A

ND-20/21

Pipe Clamp

- Features

Pipe clamp of sway bracing used with manufacturer's ND-10 (adapter) or ND-40 (swivel adapter)
Compose sway bracing system with Sch. pipe

- Material : Rolled steel

Model name	Applicable pipe diameter	Remarks
ND-20	32~200A	general fire protection system
ND-21	40~100A	CPVC

ND-30A/B

Structure Attachment

- Features

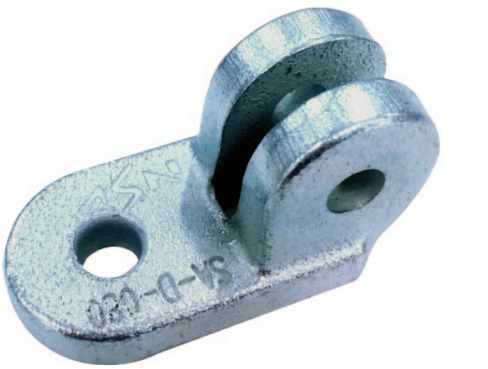
Structure attachment of sway bracing system used with manufacturer's ND-10 (adapter) or ND-50 (beam structure attachment)
Compose sway bracing system with Sch. pipe.

- Material : Spheroidal graphite cast iron

Model name	Sch #40 Pipe
ND-30A	25A
ND-30B	32A

ND-40

Swivel Adapter



- Features

Adapter of swivel system for low height ceiling space used with manufacturer's ND–20 (pipe clamp), ND–10 (adapter) Compose sway bracing system with Sch. pipe

- Material : Spheroidal graphite cast iron

Model name	pipe diameter
ND–40	40~100A

ND-50

Beam Structure Attachment

For Sway Bracing System

- Features

The beam structure attachment is used to attach the seismic system to a beam structure.
Mainly used when a seismic anchor cannot be used or welding is not allowed.

- Material : Rolled steel

- Specification : 10mm ~ 32mm

Model name	pipe diameter	Rated load per installation angle				KFI Certificate No.
		30°	45°	60°	90°	
ND–50	50A	3,559	5,032	6,163	7,117	Beotim 18–20
	65A					
	80A					
	100A					
	125A	4,481	6,337	7,762	8,963	
	150A					
	200A					

NP

Bracing Pipe

- Material : KS D 3562

Model name	Specification	Pipe diameter	Slenderness ratio	Least Radius of Gyration (mm)	Max. length (mm)	Max. horizontal load per angle of sway brace (kgf)		
						30° ~ 44°	45° ~ 59°	60° ~ 90°
NP–25A	SCH. #40	25A	≤ 100	10.7	1,000	1,429	2,021	2,475
			≤ 200		2,100	420	594	728
			≤ 300		3,000	187	264	323
NP–32A		32A	≤ 100	13.7	1,200	1935	2,737	3,352
			≤ 200		2,700	569	805	986
			≤ 300		4,000	253	357	438

Seismic Anchor and Bolt

ND-A10
Seismic Anchor

ND-A11
Seismic Anchor

ND-B10
High Tensile Anchor

● Features

The seismic anchor is designed to use by inserting into a preconfigured anchor hole. The sleeve is expanded to fit the anchor size to be fixed by a tightening nut.

● Material : Rolled steel

Model name	Diameter (mm)	Anchor length (mm)	Effective anchorage depth (mm)	Tensile load (kN)	Shear load (kN)	Thread length (mm)
ND-A1012	12	90	60	10.5	12	30
ND-A1012	12	105	70	12.5	12	48
ND-A1110	10	70	45	7.2	7.8	50
ND-A1116	16	130	75	16.5	24	55
ND-B1010	10	100	80	24	56.8	30
ND-B1016	16	130	100	33.5	78.8	45
ND-B1020	20	170	120	46.5	110.4	50

ND-N10 Lock Nut

● Features

When a friction ring contacts threads of a bolt, stress is generated by spring action. The repulsive force pressures the threads of the bolt, generating frictional torque that blocks free rotation. It is easy to couple, as skilled technique and dedicated tools are not necessary, and it shows stable anti-loosening.

● Application : Facilities where swaying and repeated load is applied

Model name	Specification	B (mm)	H (mm)	Installation torque (N·m)
ND-N10-12	M12	24	18	62
ND-N10-16	M16	30	20	155
ND-N10-20	M20	36	24	300
ND-N10-24	M24	42	30	520

ND-H

System components

① ND-30 A/B (structure attachment)
② ND-20 (pipe clamp)
③ ND-10 A/B (adapter)
④ NP-25A/32A Sch. #40 pipe
⑤ M12 seismic anchor bolt

- **Slenderness ratio (L/r)** : Less than 300mm (L: System length, r : Min. rotation radius)
- **Min. embedment depth of anchor bolt** : 50mm

ND-30 A/B

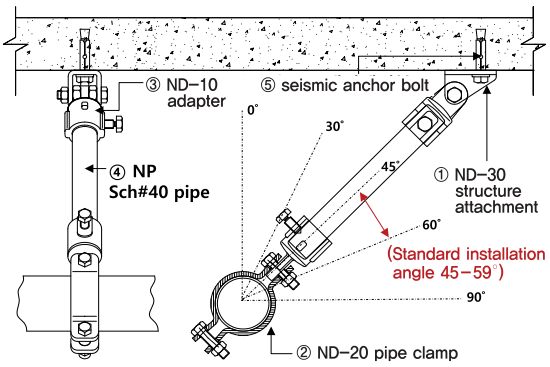
Structure Attachment

ND-20

Pipe Clamp

ND-10 A/B

Adapter



Installation Standards

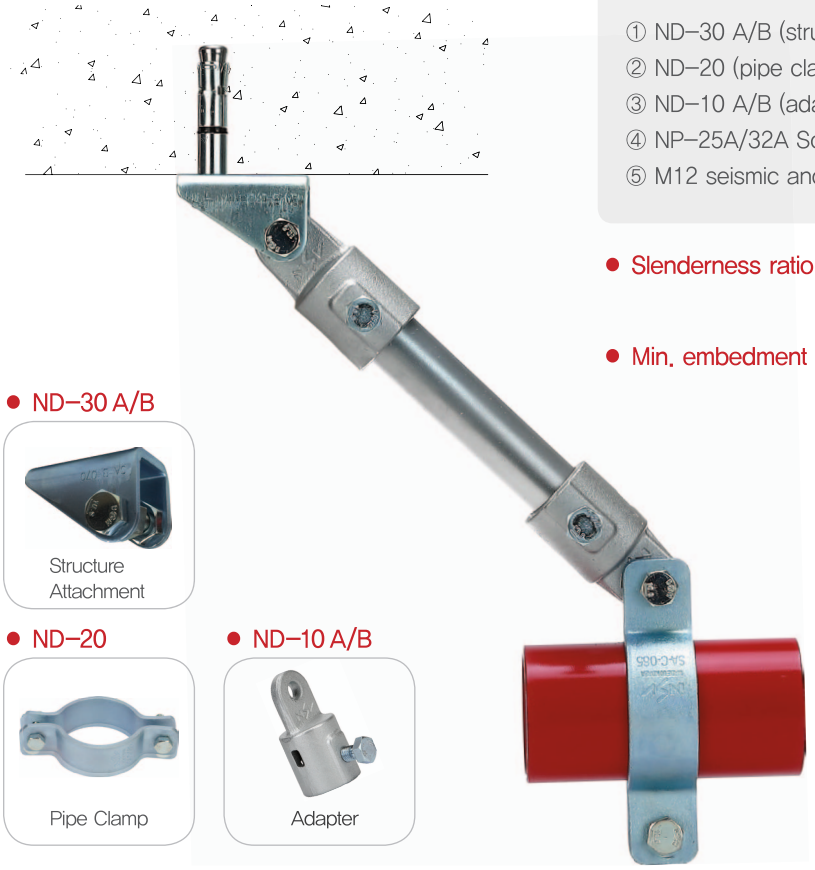
1) Lateral sway bracing shall be provided on all feed and cross mains regardless of size and all branch lines and other piping with a diameter of 65 mm and larger.
2) Spacing shall not exceed a maximum interval of 12m and the distance between the last brace and the end of the pipe shall not exceed 1.8 m.

Rated load per pipe diameter and installation angle

Model name	Pipe diameter	Rated load per installation angle (N)				KFI Certificate No.
		30°	45°	60°	90°	
ND-H-32	32A	2,224	3,145	3,852	4,448	Beotim 18-34
ND-H-40	40A					
ND-H-50	50A	3,558	5,032	6,163	7,117	Beotim 17-38
ND-H-65	65A					
ND-H-80	80A					
ND-H-100	100A					
ND-H-125	125A	4,481	6,337	7,762	8,963	
ND-H-150	150A					
ND-H-200	200A					

Sway Bracing (Longitudinal)

ND-V



- ND–30 A/B

Structure Attachment

- ND–20

Pipe Clamp

- ND–10 A/B

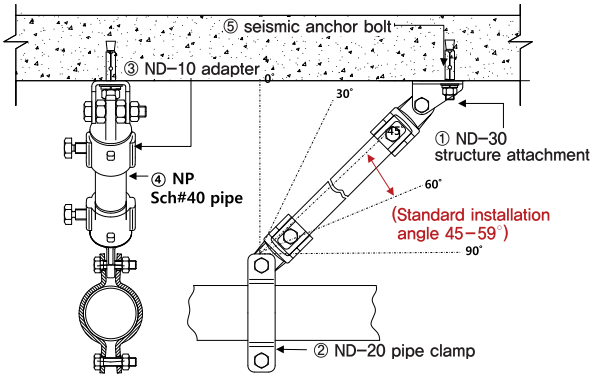
Adapter

- System components

① ND–30 A/B (structure attachment)
② ND–20 (pipe clamp)
③ ND–10 A/B (adapter)
④ NP–25A/32A Sch. #40 pipe
⑤ M12 seismic anchor bolt

- Slenderness ratio (L/r) : Less than 300mm (L: System length, r : Min. rotation radius)

- Min. embedment depth of anchor bolt : 50mm



- Installation Standards

1) Longitudinal sway bracing shall be provided on all feed and cross mains regardless of size and it shall be excluded for all branch lines and other piping.
2) Spacing shall not exceed a maximum interval of 24m and the distance between the last brace and the end of the pipe shall not exceed 12m.

- Rated load per pipe diameter and installation angle

Model name	Pipe diameter	Rated load per installation angle (N)				KFI Certificate No.
		30°	45°	60°	90°	
ND–V–32	32A	2,224	3,145	3,852	4,448	Beotim 18–34
ND–V–40	40A					
ND–V–50	50A	3,558	5,032	6,163	7,117	Beotim 17–38
ND–V–65	65A					
ND–V–80	80A					
ND–V–100	100A					
ND–V–125	125A	4,481	6,337	7,762	8,963	
ND–V–150	150A					
ND–V–200	200A					

ND-4W

Vertical Pipe Installation Type

Horizontal Pipe Installation Type

System components

① ND-30 A/B (structure attachment)
② ND-20 (pipe clamp)
③ ND-10 A/B (adapter)
④ NP-25A/32A Sch. #40 pipe
⑤ M12 seismic anchor bolt

Min. embedment depth of anchor bolt : 50mm

Installation Standards

1) Tops of risers piping exceeding 1m in length shall be provided with a four-way brace.
2) When a four-way brace at the top of a riser is attached on the horizontal piping, it shall be within 600 mm of the centerline of the riser and the loads for that brace shall include both the vertical and horizontal pipe.
3) The distance between 4-way Sway Bracing shall not exceed 8m.

ND-10 A/B

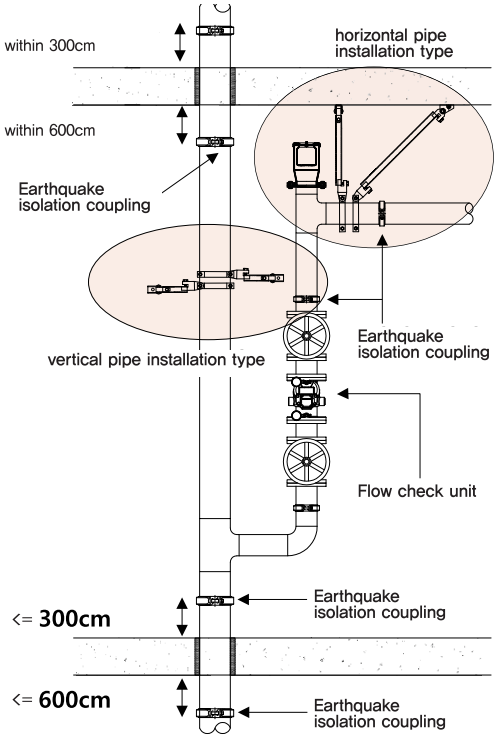
Adapter

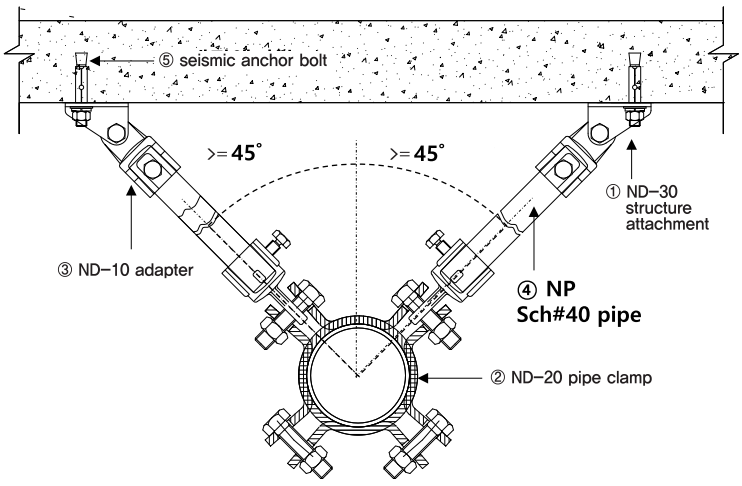
ND-20

Pipe Clamp

ND-30 A/B

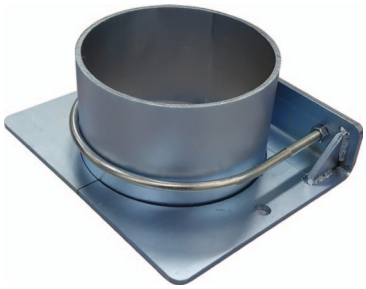
Structure Attachment

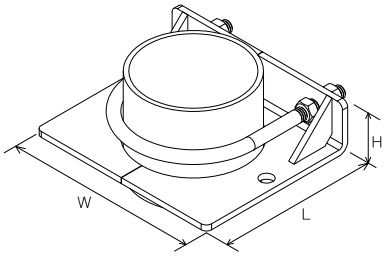




Sway Bracing (4-way Riser Pipe, Floor support type)

ND-F1





Features

It is used when there is no structure to support a riser pipe sway brace support. Its space utilization is excellent in a narrow pit.

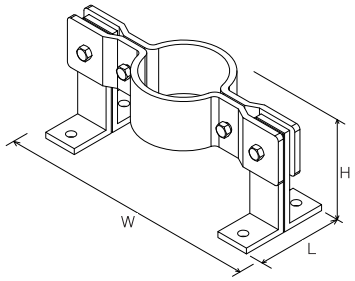
Installation Standards

1) Tops of risers piping exceeding 1m in length shall be provided with a four–way brace.
2) When a four–way brace at the top of a riser is attached on the horizontal piping, it shall be within 600 mm of the center–line of the riser and the loads for that brace shall include both the vertical and horizontal pipe.
3) The distance between 4–way Sway Bracing shall not exceed 8m.

Model name	Pipe diameter	Dimension (mm)		
		W	H	L
ND–F1–150	150A	246	50	218
ND–F1–200	200A	306	70	276
ND–F1–250	250A	358		328
ND–F1–300	300A	416		382

NOTE : Specifications and dimensions are subject to change without prior notice for the enhancement of product performance and quality.

ND-F2



Features

It is used when there is no structure to support a riser pipe sway brace support. Its space utilization is excellent in a narrow pit.

Installation Standards

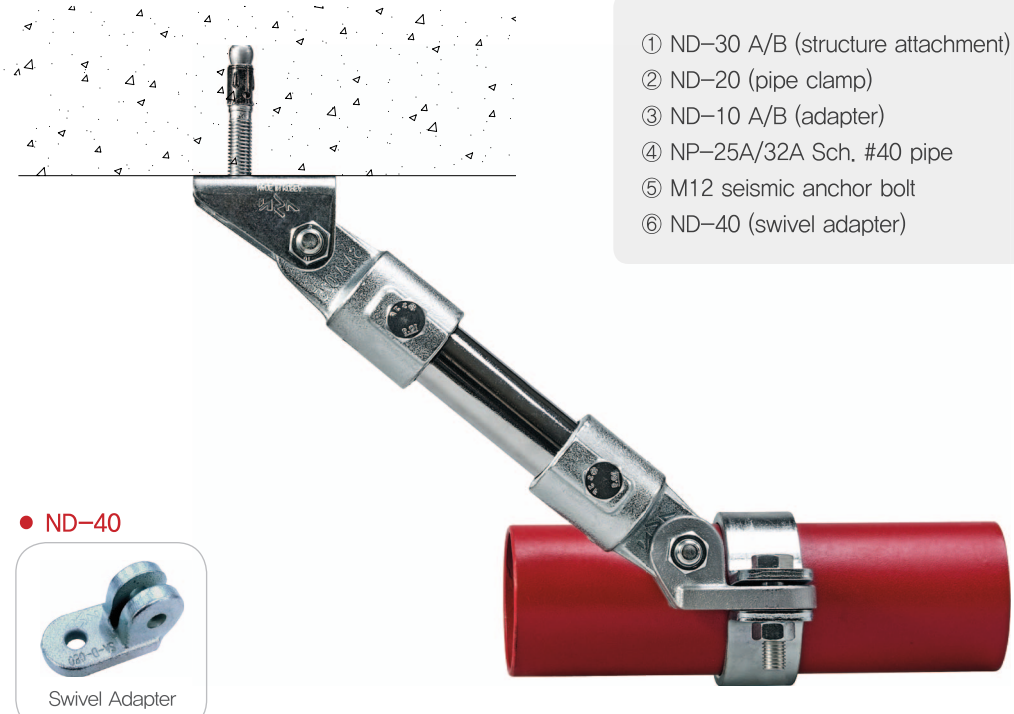
1) Tops of risers piping exceeding 1m in length shall be provided with a four–way brace.
2) When a four–way brace at the top of a riser is attached on the horizontal piping, it shall be within 600 mm of the center–line of the riser and the loads for that brace shall include both the vertical and horizontal pipe.
3) The distance between 4–way Sway Bracing shall not exceed 8m.

Model name	Pipe diameter	Dimension (mm)		
		W	H	L
ND–F2–150	150A	450	158	134
ND–F2–200	200A	500	165	
ND–F2–250	250A	570		
ND–F2–300	300A	630		

NOTE: Specifications and dimensions are subject to change without prior notice for the enhancement of product performance and quality.

Sway Bracing (Longitudinal, for low height ceiling space)

ND-R KFI



- Features

① ND-30 A/B (structure attachment)
② ND-20 (pipe clamp)
③ ND-10 A/B (adapter)
④ NP-25A/32A Sch. #40 pipe
⑤ M12 seismic anchor bolt
⑥ ND-40 (swivel adapter)

- ND-40

Swivel Adapter

- ND-10 A/B

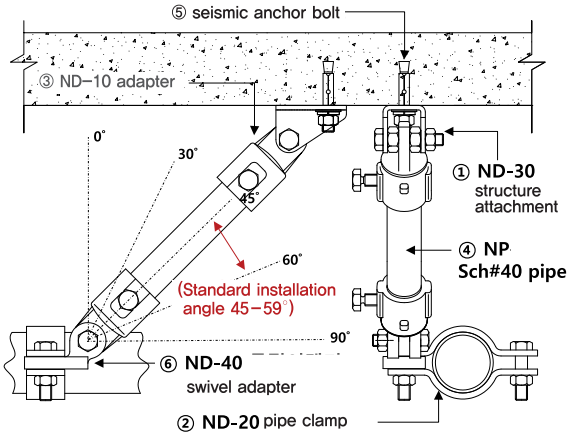
Adapter

- ND-20

Pipe Clamp

- ND-30 A/B

Structure Attachment



- Min embedment depth of anchor bolt : 50mm
- It is beneficial when applying to the common area of a Apartment house or low height ceiling space within a house
- Installation Standards

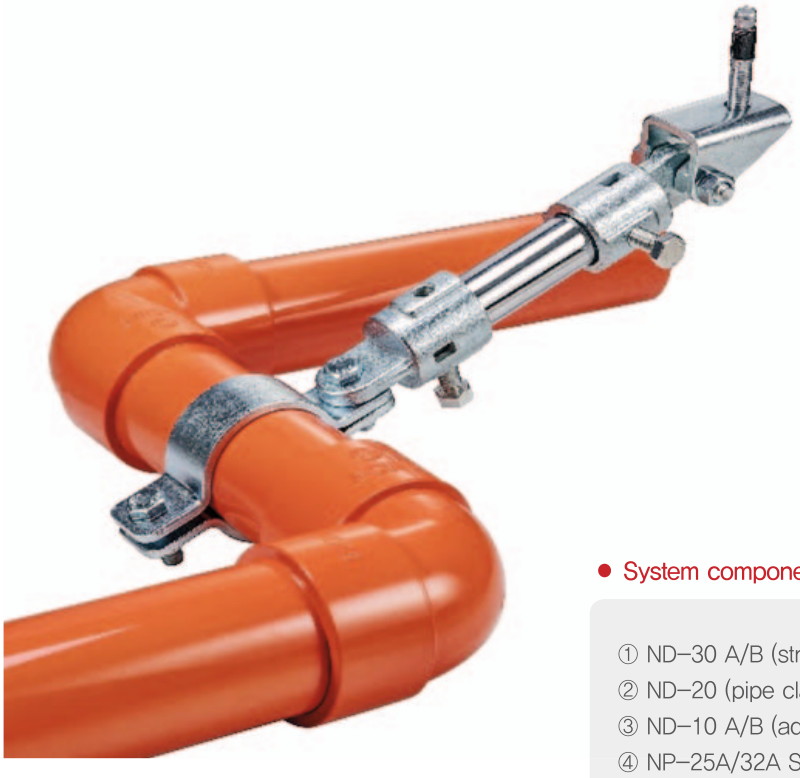
1) It is used when a longitudinal sway bracing is not installed due to a narrow space between the ceiling and pipe top surface.
2) For installation Standards, that of the longitudinal sway bracing is applied.

- Rated load per pipe diameter and installation angle

Model name	Pipe diameter	Rated load per installation angle (N)			KFI Certificate No.
		45°	60°	90°	
ND-R-40	40A	4,718	5,778	6,672	Beotim 18-35
ND-R-50	50A				
ND-R-65	65A				
ND-R-80	80A				
ND-R-100	100A				

Sway Bracing (Lateral, CPVC)

ND-CP KFI



● ND-30 A/B

Structure Attachment

● ND-21 (CPVC)

Pipe Clamp

● ND-10 A/B

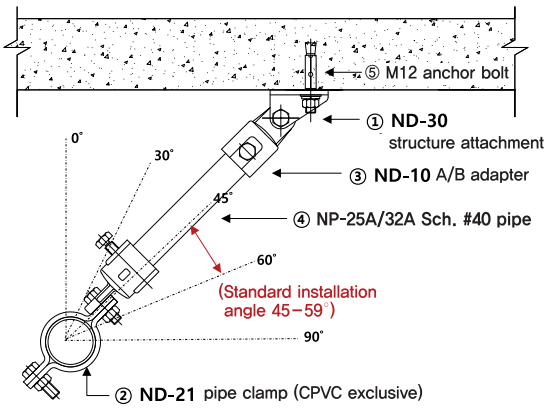
Adapter

● System components

① ND-30 A/B (structure attachment)
② ND-20 (pipe clamp) – for CPVC
③ ND-10 A/B (adapter)
④ NP-25A/32A Sch. #40 pipe
⑤ M12 anchor bolt

● Min. embedment depth of anchor bolt : 50mm

● Slenderness ratio (L/r) : Less than 300mm (L: System length, r : Min. rotation radius)



● Installation Standards

1) If the distance between ceiling and pipe top surface is less than 150mm, it is possible not to install a lateral sway Bracing
2) In case of a fire protection pipe that passes the anteroom and interior of a house or multi-tenant house is made of CPVC , if it is using a lateral/ longitudinal Sway Bracing for used in steel pipe, it becaomes pipe breakage is a concern, so the direction of the lateral Sway Bracing is diverted to be used as a longitudinal sway Bracing.
3) A lateral Sway Bracing is used instead of longitudinal Sway Bracing within 600 mm from the pipe centerline of the section where a longitudinal Sway Bracing is used and from the direction of a diverted pipe.

● Rated load per pipe diameter and installation angle

Model name	Pipe diameter	Rated load per installation angle (N)			KFI Certificate No.
		45°	60°	90°	
ND-CP-32	32A	3,145	3,852	4,448	Beotim 18-19
ND-CP-40	40A				
ND-CP-50	50A				
ND-CP-65	65A				
ND-CP-80	80A				
ND-CP-100	100A				

ND-E

● Installation Standards

1) The end head on a branch pipe should be fixed so that there is no excessive movement in the vertical and horizontal directions.
2) The hanger to be installed on a branch pipe shall be installed according to the Fire Safety Standard for Sprinklers, Article 8, paragraph 13.
3) The installation position of a branch pipe sway brace support shall be within 0.6 m from the last hanger.
4) If the length of a hanger installed between a branch pipe and ceiling is 150 mm or less and the branch pipe is fixed by a hanger that is installed at less than 45 degrees from the vertical direction, it is possible not to install a head fixture.

● ND-81

Swivel Attachment

● ND-82 (25A~50A)

Adjustable Band Hanger

● ND-83

Surge Restrainer

ND-84 (Beam Structure Attachment)

〈For branch pipe end fixing〉

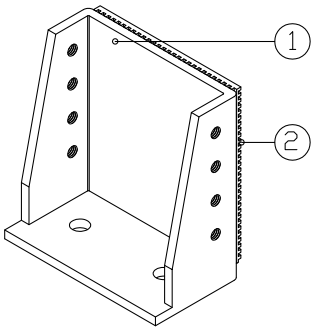
● Features

A beam structure attachment is used to attach a seismic system to a beam structure.
Mainly used when a seismic anchor cannot be used or welding is not allowed.

- **Material** : Rolled steel
- **Applicable specification** : 10mm ~32mm

Seismic Stopper

NSS-12

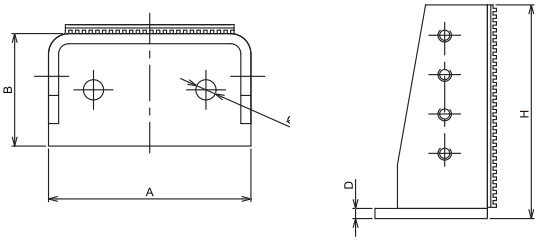


Features

This product is a stopper that prevents movement in the event of an earthquake. To prevent moving of the product in the event of an earthquake, the product is installed at least 6 mm away from the target equipment. Such a gap will allow the product to not have an influence on the anti-vibration capabilities of the equipment under normal circumstances.
It has a simple structure and few limitations in installation, giving it the advantage of being easily applied and installed on nearly all equipment.

Product components

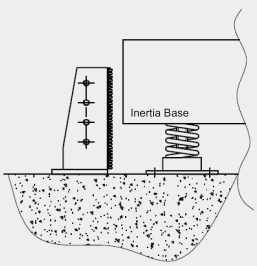
No.	Name	Materia
1	Lower Housing	Hot Rolled Carbon Steel Sheet
2	Rubber Pad	NR



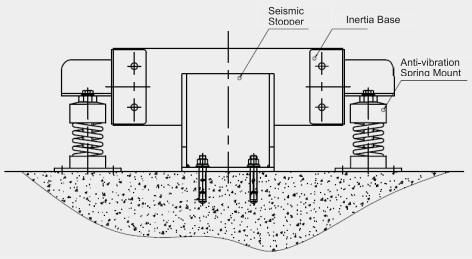
Instruction and Installation Manual

The seismic stopper must be installed according to the anti-vibration design standards of the firefighting facility and installation instructions of the manufacturer. The anchor must be installed vertical to a flat concrete surface. After drilling a hole that matches the anchor specification, make sure to remove all dust and debris from the hole. Use a dedicated punch and hammer for anchors to expand the cap inside, and make sure that installation is securely conducted. (Non-specification anchors should be used after contacting the manufacturer.) Install the stopper so that the movement stopper surface does not come in contact with the inertia base. The movement prevention stopper only limits horizontal displacements, not vertical. Stopper height cannot be adjusted according to equipment. Only the specified stopper height can be applied.

① Select the stopper type according to the height of the inertia base and equipment capacity



② Install the seismic stopper at a distance from the equipment where it does not come in contact during normal operation

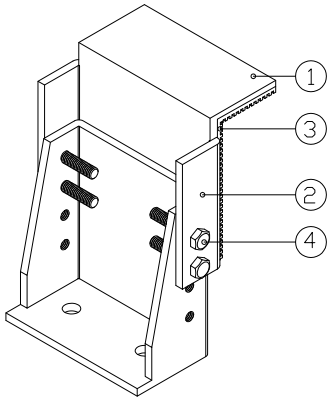


DIMENSION & SELECTION GUIDE BY LOADS

TYPE	Application Load (kgf)	Dimension(mm)				
		A	B	C	H	Ød
NSS-12-500	500 kgf	180	100	9	190	18
NSS-12-1000	1,000 kgf	234	100	9		

NOTE : Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

NSS-13

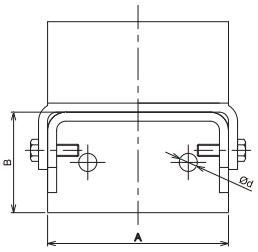


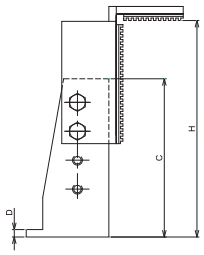
Features

This product is a stopper that prevents movement and falling in the event of an earthquake. To prevent moving of the product in the event of an earthquake, the product is installed at least 6 mm away from the target equipment. Such a gap will allow the product to not have an influence on the anti-vibration capabilities of the equipment under normal circumstances. It has a simple structure and an advantage that its size can be adjusted according to the installation site using height adjustment bolts.

Product components

No.	Name	Materia
1	Upper Housing	Hot Rolled Carbon Steel Sheet
2	Rubber Pad	NR
3	Lower Housing	Hot Rolled Carbon Steel Sheet
4	Bolt	Steel for Machine

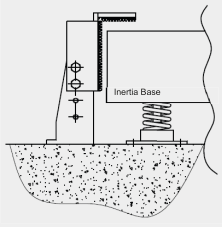




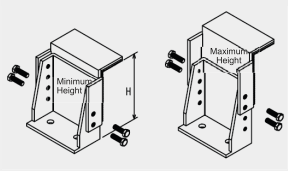
Instruction and Installation Manual

The vibration stopper must be installed according to the anti-vibration design standards of the firefighting facility and installation instructions of the manufacturer. The anchor must be installed vertical to a flat concrete surface. After drilling a hole that matches the anchor specification, make sure to remove all dust and debris from the hole. Use the dedicated punch and hammer for anchors to expand the cap inside, and make sure that installation is securely conducted. (Non-specification anchors should be used after contacting the manufacturer) Install the stopper so that the movement stopper surface does not come in contact with the inertia base. Before attaching the top to the bottom using bolts, make sure to remove all dust and debris on attachment surfaces. Stopper height can be adjusted in three levels according to the height of the inertia base. Install four bolts and make sure they are fastened properly.

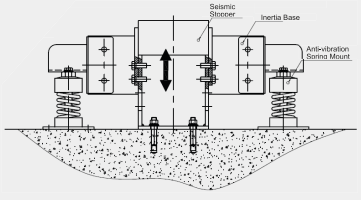
① Select the stopper type according to the height of the inertia base and equipment capacity



② Install bolts while adjusting the height of the anti-vibration stopper according to the height of the inertia base, and tighten the four bolts alternately to maintain the right and left balance (L 〉 R 〉 L 〉 R, or vice versa) / (Adjustable Stopper Heights: 262 mm, 227 mm, 192 mm)



③ Install the anti-vibration stopper at a distance from the equipment where it does not come in contact during normal operation

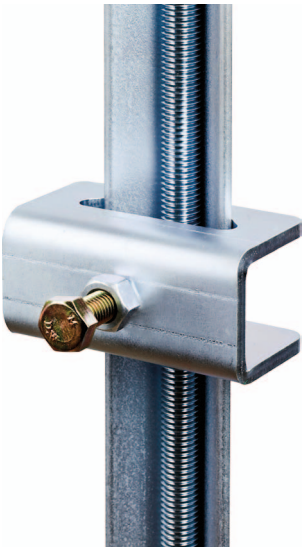


DIMENSION & SELECTION GUIDE BY LOADS

TYPE	Application Load (kgf)	Dimension(mm)					
		A	B	C	D	H	Ød
NSS-13-500	500kgf	180	100	190	262~192	18	M12xL40
NSS-13-1000	1,000kg	234	100	100			

NOTE : 1. Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.
It is possible to adjust height H according to base height.
2. The product picture above may differ from the actual product.

NSS-20
Seismic Rod

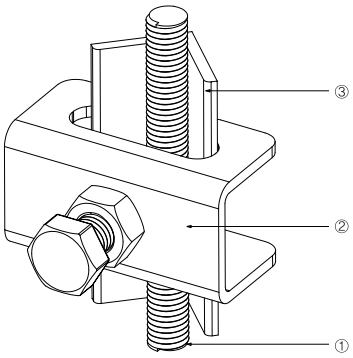


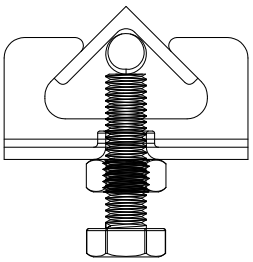
Features

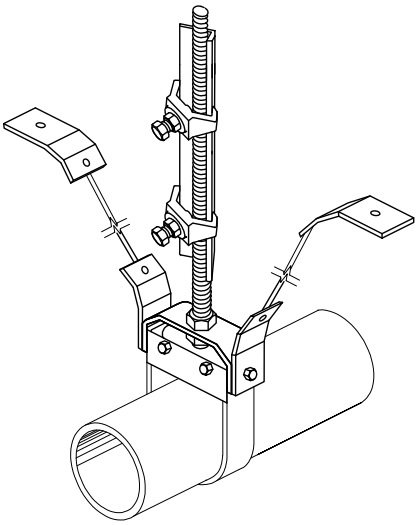
The system is used to fix a member to a full thread bolt using a stiffener to prevent the buckling of the hanger rod and to enhance stiffness when hanging duct or pipe from a ceiling using the bolt.
The system consists of a full thread bolt, fixing clamp and rod stiffener.

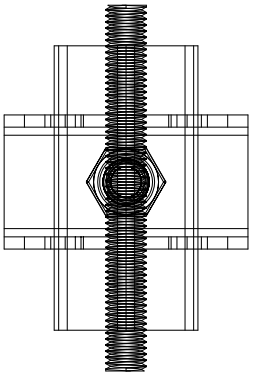
Product components

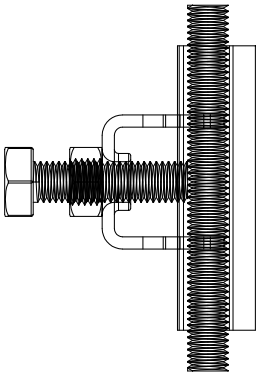
No.	Name	Material	Specification
1	Hanger rod	SS400	KS D 3504
2	Clamp	SS400	KS D 3504
3	Rod Stiffener	SS400	KS D 3504











DIMENSION & SELECTION GUIDE BY LOADS

TYPE	Rod Stiffener Size	Hanger Rod Size
NSS-20-A	25 x 25 x 3T	3/8", 1/2", 5/8"
NSS-20-B	40 x 40 x 5T	3/4", 7/8", 1 1/8"

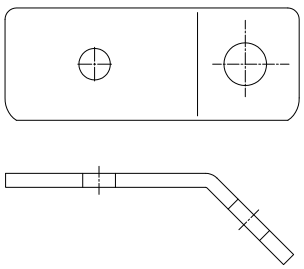
NOTE: Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

NSS-30

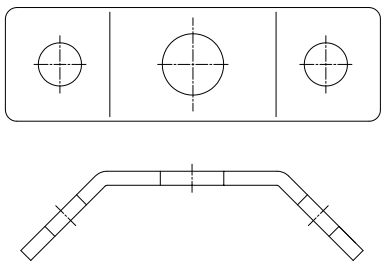
Seismic Cable

Features

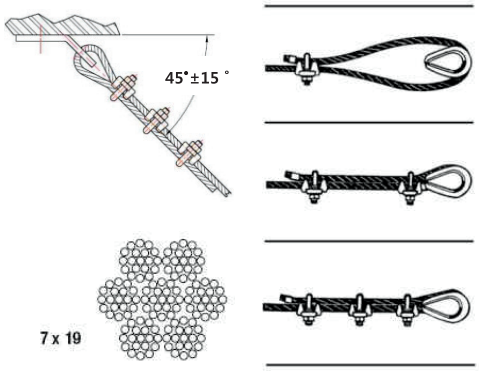
The system can prevent the excessive deformation of duct or pipe in case of earthquake by hanging duct or pipe using wire rope.
The system consists of a plated wire rope, wire clip, thimble, shackle and bracket.



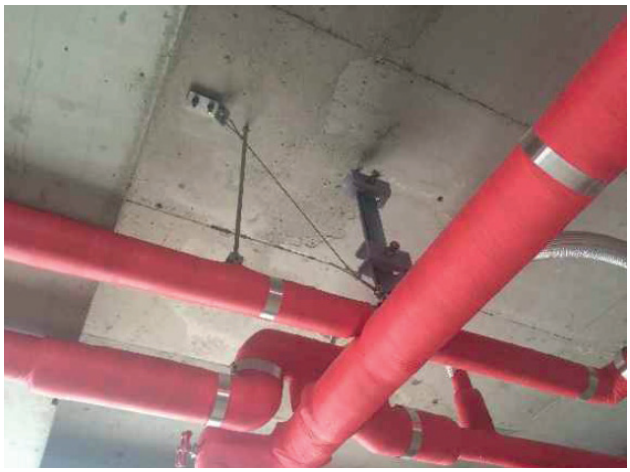
Adapter for structure attachment



Adapter for pipe attachment



Picture of site installation



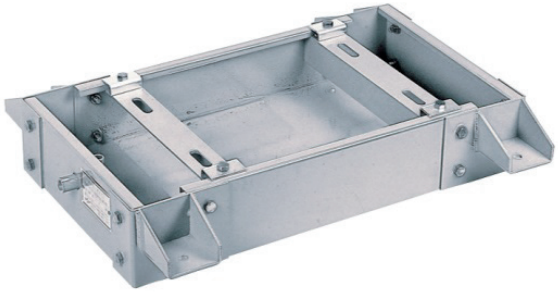
DIMENSION & SELECTION GUIDE BY LOADS

TYPE	Cable Diameter(mm)	Cable Length(m)	Max Calbe Tension(kgf)
NSS-30-A	3	2	450
NSS-30-B	5	2	950
NSS-30-C	6	2	1500

NOTE: Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

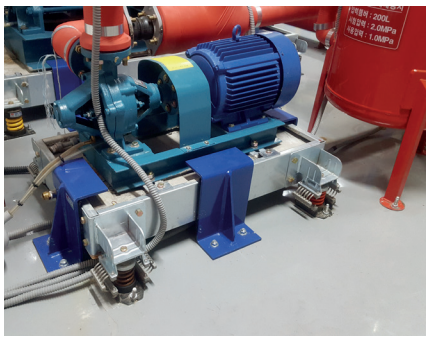
SIB-SB

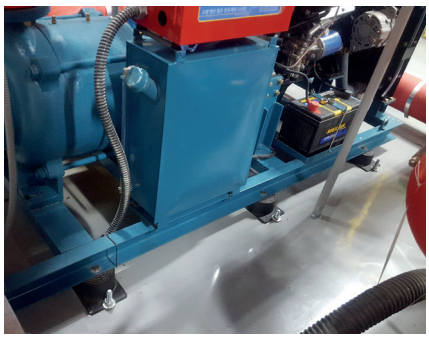
Seismic Inertia Base

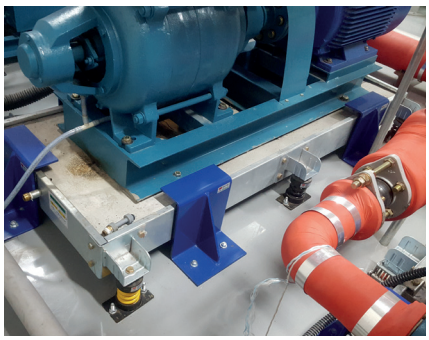


- Features

The inertia base is designed to block vibration that happens when running a pump and to minimize dynamic displacement by dynamic force that happens at the time of rapid load change such as on/off using concrete load. The inertia base consists of a base in the shape of a C-channel or ⊏-channel, a support fixture (ㄱ angle) to which a pump and motor can be easily assembled, a bracket to attach a mount and a bottom plate for reinforcement. The height (H) of the inertia bracket is designed to be at least 150 mm and varies depending on the horsepower of the motor.

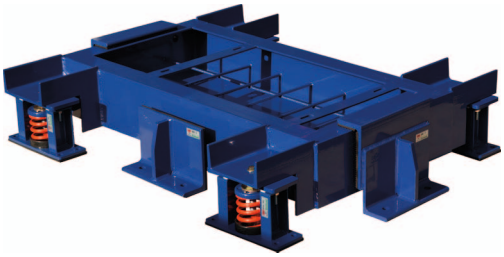






SB-SERISE

Seismic Base

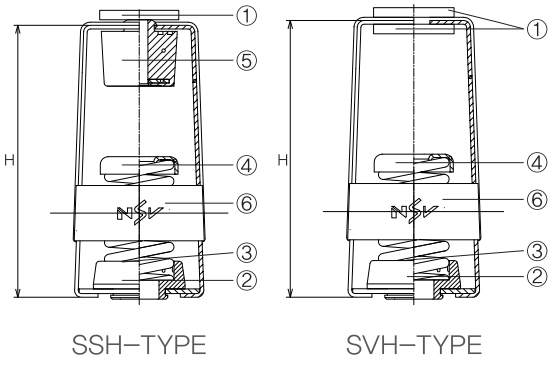


- Features

The structure base is a support fixture made of a ⊏-channel, support fixture to which equipment can be easily assembled, and a bracket to attach a mount. The height (H) of the structure base is designed to be at least 150 mm and varies depending on the capacity of equipment.

SSH/SVH

Restrained Spring Hanger (Deflection: 25mm)



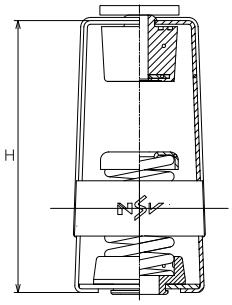
SSH–TYPE SVH–TYPE

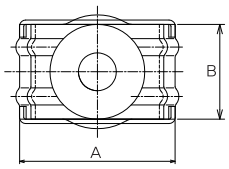
Features

An SSH/SVH is a restrained spring hanger with a unit to restrict vertical movement, and is designed to prevent system damage or deformation so that vertical displacement that can happen due to running equipment is prevented.
A restrain washer prevents drop out of a spring and maintains the reliability of a system if an external load such as an earthquake is applied.

Product components

No.	Name	Material	Specification
1	Restraint Washer	CR	KS M 6617
2	Spring Seat	CR	KS M 6617
3	Spring Cap	SS400	KS D 3503
4	Coil Spring	SUP9	KS B 2402
		HSW3	KS B 2403
5	Housing Fixture	CR	KS M 6617
6	Hanger Housing	SS400	KS D 3503





Application

• Where vibration isolation performance and seismic performance are required at the same time, such as a ceiling fan or pipe

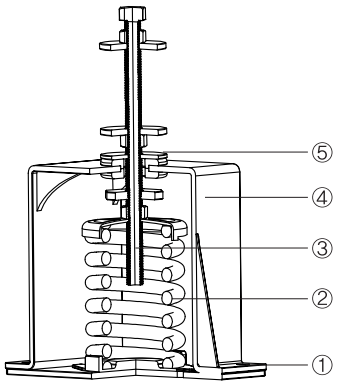
DIMENSION & SELECTION GUIDE BY LOADS

TYPE	Rated load (kgf)	Spring constant (kgf/mm)	Displacement (mm)	Color	Dimension(㎜)			
					A(SSH/SVH)	B(SSH/SVH)	C(SSH/SVH)	Level Bolt
SSH/SVH–A–10	10	0.4	25	Pink	82/70	60/60	172/135	M10
SSH/SVH–A–25	25	1.0	25	Yellow				
SSH/SVH–A–50	50	2.0	25	Red				
SSH/SVH–A–75	75	3.0	25	Black				
SSH/SVH–A–100	100	4.0	25	Blue				
SSH/SVH–B–150	150	6.0	25	Brown	103/96	79/80	215/170	M12
SSH/SVH–B–200	200	8.0	25	White				
SSH/SVH–B–300	300	12.0	25	Orange				
SSH/SVH–B–400	400	16.0	25	Pink				
SSH–C–500	500	20.0	25	Green	118	100	243	M16
SSH–C–600	600	24.0	25	Blue				
SSH–C–750	750	30.0	25	Black				
SSH–C–1000	1000	40.0	25	Yellow				

NOTE: Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

SFSA2

Restrained Spring Mount (Deflection: 25mm)

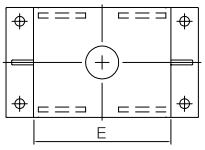


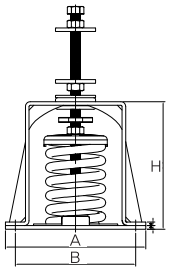
Features

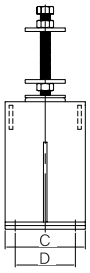
SFSA2 improves the conjunction method of an upper house to prevent breakaway of springs when an external load is applied. In a normal state, a spring mount provides vibration isolation, but upper housing integrated with lower housing serves for the prevention of spring breakaway when an external load is applied. To prevent a direct collision of an adjusting bolt and housing, a rubber bushing is used in the product.

Product components

No.	Name	Material	Specification
1	Lower Housing	SS400	KS D 3504
2	Coil Spring	SS400	KS M 6617
3	Leveling Bolt	SUP9	KS B 2402
		HSW3	KS B 2403
4	Upper Housing	SS400	KS B 1002
5	Rubber bushing	CR	KS D 3504







Application

- For vibration and seismic isolation of a standing pipe
- For high efficiency vibration and seismic isolation of a pump (ground floor)
- For high efficiency vibration and seismic of isolation equipment where silence is required

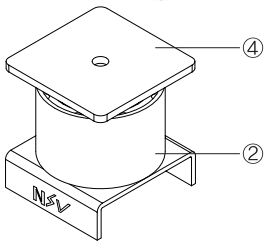
DIMENSION & SELECTION GUIDE BY LOADS

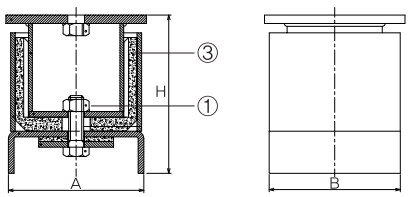
TYPE	Rated load (kgf)	Spring constant (kgf/mm)	Displacement (mm)	Color	Dimension(mm)						
					A	B	C	D	E	H	G
SFSA2-A-50	50	1.0	50	Red	180	235	6	280	140	230	90
SFSA2-A-100	100	2.0		Blue							
SFSA2-A-150	150	3.0		Brown							
SFSA2-A-200	200	4.0		White							
SFSA2-A-300	300	6.0		Orange							
SFSA2-B-400	400	8.0	50	Pink	220	285	6	320	180	270	130
SFSA2-B-500	500	10.0		Green							
SFSA2-B-600	600	12.0		Blue							
SFSA2-B-750	750	15.0		Black							
SFSA2-C-1000	1,000	20.0	50	Yellow	250	310	9	350	200	300	150
SFSA2-C-1200	1,200	24.0		Red							
SFSA2-C-1800	1,800	36.0		Blue							
SFSA2-D-2400	2,400	48.0	50	Brown	290	345	12	390	240	340	190
SFSA2-D-3200	3,200	64.0		White							
SFSA2-D-4000	4,000	80.0		Orange							

NOTE: Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

SRPA

Seismic Rubber Mount





● Features

The mount is used as a guide by inserting a high-elastic resilient element inside a steel house if the purpose is to reduce stress due to thermal expansion that occurs between floors at the time of expansion and contraction, and as an anchor if the purpose is to isolate structure-borne noise in horizontal and vertical directions due to pressure change of fluid. The anchor and guide can reduce noise transfer but do not have enough elasticity to isolate vibration, so a spring isolated riser system is used to isolate vibration.

● Product components

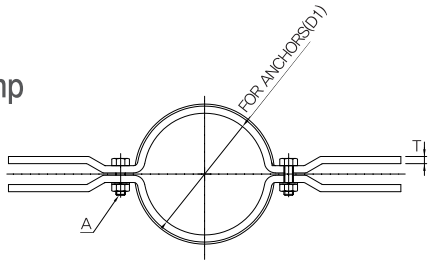
No.	Name	Material	Specification
1	Connection Bolt	SS400	KS B 1002
2	Lower Housing	SS400	KS D 3503
3	Resilient Element	CR	KS M 6617
4	Upper Housing	SPCD	KS D 3512

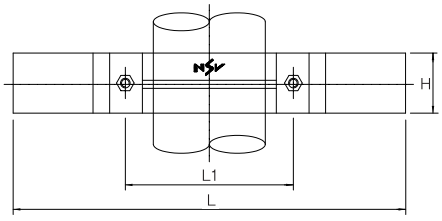
● DIMENSION & SELECTION GUIDE BY LOADS

TYPE	Capacity(kgf)	Displacement (mm)	Dimension(mm)			
			A	B	H	Setting Bolt
SRPA-75	250	3	75	75	100	M12
SRPA-200	1500	5	108	100	140	M16
SRPA-350	6000	7	150	140	160	M16
SRPA-600	14000	7	230	220	230	M20
SRPA-800	22000	9	280	270	360	M24

SPC

Seismic Clamp



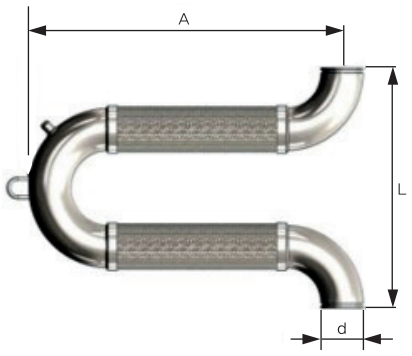


● Max. permissible seismic force per clamp specification

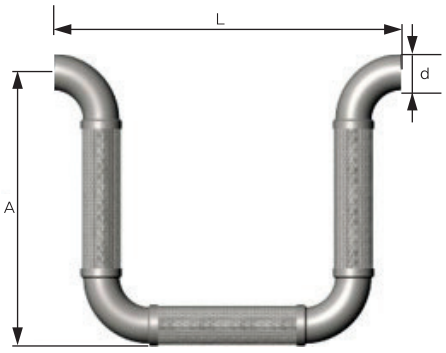
TYPE	Dimension(mm)						Color
	Total length (L)	L1	D1(In dia.)	T	H	A	
SPC-Φ50	450	105	Φ60.5	6.0	50	M10	11.1
SPC-Φ65	450	125	Φ76.3	6.0	50	M10	
SPC-Φ80	450	137	Φ89.1	6.0	50	M10	
SPC-Φ100	550	171	Φ114.3	9.0	75	M12	15.8
SPC-Φ125	550	197	Φ139.8	9.0	75	M12	
SPC-Φ150	550	230	Φ165.2	9.0	75	M12	
SPC-Φ200	650	281	Φ216.3	9.0	75	M12	

NOTE: Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

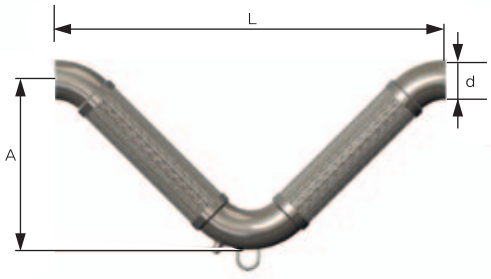
NVC-65
Loop Flex



NVC-65U



NVC-65W



NVC-65V

Features

A loop flex is a very important pipe accessory and is used to protect important fire-fighting equipment such as sprinklers from dangerous factors such as earthquakes.
A loop flex provides flexibility to pipes and protects pipes by absorbing movement of all axes (X, Y, Z).
A loop flex provides excellent seismic performance and is used to prevent the deformation of pipes due to thermal expansion as well as breakage and deformation of pipes due to the differential settlement of a building.

Application

- Applicable fluid: Heating, fire-fighting and so on
- Max. pressure: 20 Kg/cm^2
- Applicable displacement: One- to three-dimensional displacement
- Max. temperature: 600℃
- Elasticity: 50 – 100 mm (X, Y, Z axis)
- Applicable material: Steel pipe, STS, copper tube
- Connection method: Flange type, welding type, thread type, groove type

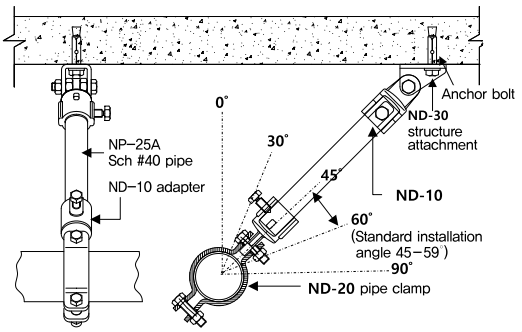
TYPE	d (mm)	Movements(±) 50 mm (X,Y,Z)		Movements(±) 100 mm (X,Y,Z)	
		A (mm)	L (mm)	A (mm)	L (mm)
NVC-65W(25A)	33.7	380	520	500	640
NVC-65W(32A)	42.4	440	620	550	740
NVC-65W(40A)	48.3	470	670	600	800
NVC-65W(50A)	60.3	540	770	690	920
NVC-65W(65A)	76.1	600	870	750	1010
NVC-65W(80A)	88.9	680	980	830	1120
NVC-65W(100A)	114.3	800	1210	980	1380
NVC-65W(125A)	139.7	1010	1520	1250	1770
NVC-65W(150A)	168.3	1100	1690	1330	1940
NVC-65W(200A)	219.1	1300	2100	1550	2360

TYPE	d (mm)	Movements(±) 50 mm (X,Y,Z)		Movements(±) 100 mm (X,Y,Z)	
		A (mm)	L (mm)	A (mm)	L (mm)
NVC-65U(25A)	33.7	370	155	500	225
NVC-65U(32A)	42.4	400	190	530	225
NVC-65U(40A)	48.3	430	230	580	295
NVC-65U(50A)	60.3	490	310	630	325
NVC-65U(65A)	76.1	550	380	710	405
NVC-65U(80A)	88.9	600	460	760	460
NVC-65U(100A)	114.3	730	620	890	620
NVC-65U(125A)	139.7	830	780	1020	780
NVC-65U(150A)	168.3	960	920	1170	920
NVC-65U(200A)	219.1	1240	1230	1470	1240

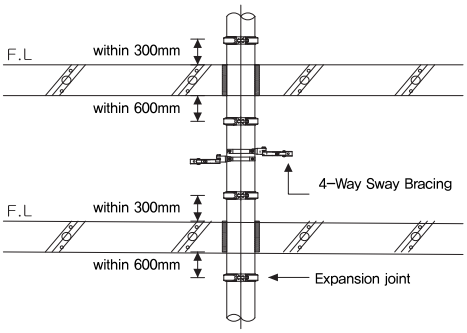
TYPE	d (mm)	Movements(±) 50 mm (X,Y,Z)		Movements(±) 100 mm (X,Y,Z)	
		A (mm)	L (mm)	A (mm)	L (mm)
NVC-65V(25A)	33.7	370	155	500	225
NVC-65V(32A)	42.4	400	190	530	225
NVC-65V(40A)	48.3	430	230	580	295
NVC-65V(50A)	60.3	490	310	630	325
NVC-65V(65A)	76.1	550	380	710	405
NVC-65V(80A)	88.9	600	460	760	460
NVC-65V(100A)	114.3	730	620	890	620
NVC-65V(125A)	139.7	830	780	1020	780
NVC-65V(150A)	168.3	960	920	1170	920
NVC-65V(200A)	219.1	1240	1230	1470	1240

NOTE: Specifications and dimensions may be changed without prior notice for the enhancement of product performance and quality.

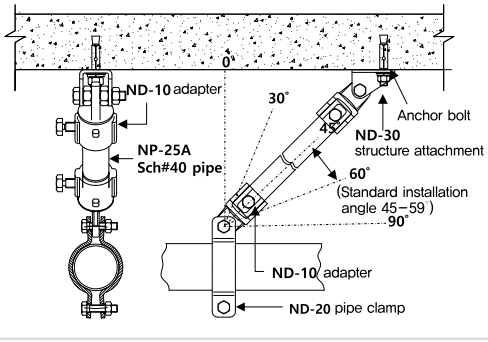
● Lateral sway brace



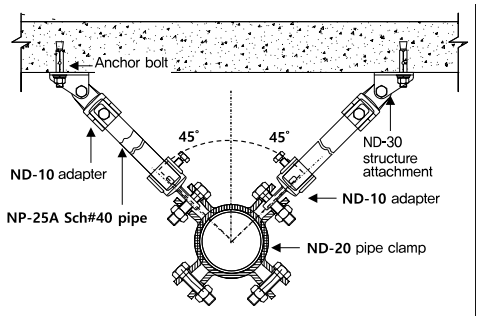
● 4–way riser piping



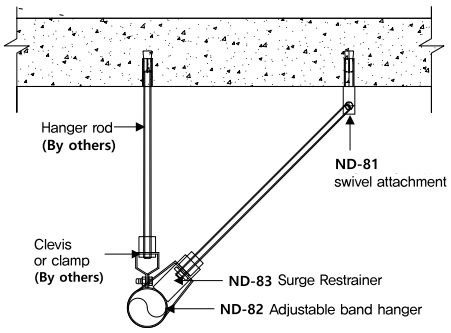
● Longitudinal sway brace



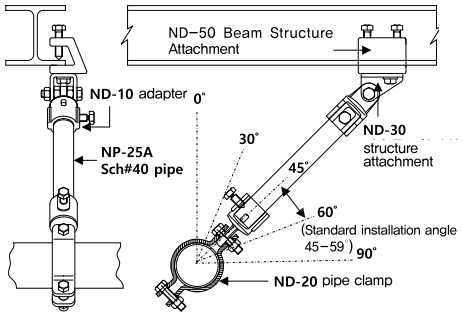
● 4–way riser piping sway brace



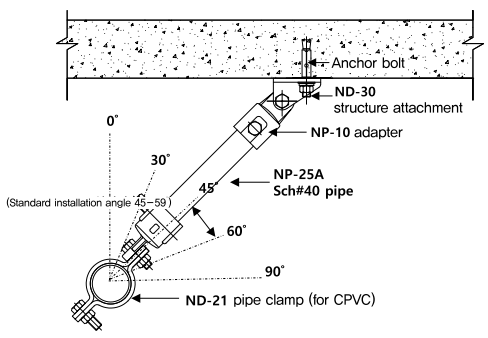
● Branch pipe sway fixture



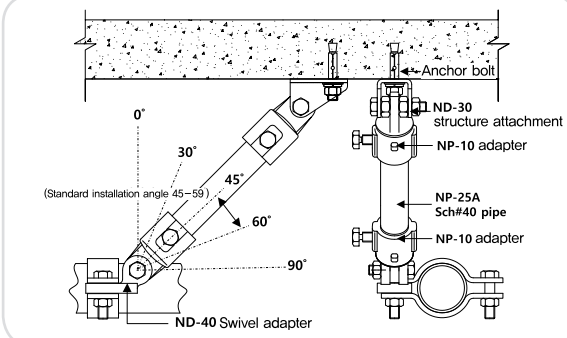
● Beam structure attachment



● CPVC lateral sway brace



● Swivel longitudinal sway brace for low height ceiling space



KFI CERTIFICATE

Certificate No. 201700939

KFI

CERTIFICATE of KFI ACCREDITATION

Applicant : YOON EUN JOONG

Company : NSV CO., LTD

Address : 547 Aenggogae-ro, Namdong-gu, Incheon, Republic of Korea

This is to certify that the following item has been KFI accredited in accordance with the provisions of Article 7, clause 1 of the KFI Certification Standard.

1. **Item** Sway Brace Device
2. **Type** Rigid, Lateral&Longitudinal, NPS 50,65,80,100,125,150,200, Rated Load [7,117N(NPS 50~100), 8,963N(NPS 125~200)], Installation Angle (30~90)°
3. **Type Approval No.** 버팀17-38
4. **Limitation**

Kwon, Soon Kyung
President

Date : 13. Sept. 2017

Korea Fire Institute

Certificate No. 201800321

KFI

CERTIFICATE of KFI ACCREDITATION

Applicant : YOON EUN JOONG

Company : NSV CO., LTD

Address : 547 Aenggogae-ro, Namdong-gu, Incheon, Republic of Korea

This is to certify that the following item has been KFI accredited in accordance with the provisions of Article 7, clause 1 of the KFI Certification Standard.

1. **Item** Sway Brace Device
2. **Type** Rigid, Lateral&Longitudinal, NPS 50,65,80,100,125,150,200, Rated Load [7,117N(NPS 50~100), 8,963N(NPS 125~200)], Installation Angle (30~90)°
3. **Type Approval No.** 버팀18-20
4. **Limitation**

Kwon, Soon Kyung
President

Date : 10. Apr. 2018

Korea Fire Institute

Certificate No. 201800484

KFI

CERTIFICATE of KFI ACCREDITATION

Applicant : YOON EUN JOONG

Company : NSV CO., LTD

Address : 547 Aenggogae-ro, Namdong-gu, Incheon, Republic of Korea

This is to certify that the following item has been KFI accredited in accordance with the provisions of Article 7, clause 1 of the KFI Certification Standard.

1. **Item** Sway Brace Device
2. **Type** Rigid, Lateral&Longitudinal, NPS 32,40, Rated Load 4,448N, Installation Angle (30~90)°
3. **Type Approval No.** 버팀18-34
4. **Limitation**

Kwon, Soon Kyung
President

Date : 05. Jun. 2018

Korea Fire Institute

Certificate No. 201800485

KFI

CERTIFICATE of KFI ACCREDITATION

Applicant : YOON EUN JOONG

Company : NSV CO., LTD

Address : 547 Aenggogae-ro, Namdong-gu, Incheon, Republic of Korea

This is to certify that the following item has been KFI accredited in accordance with the provisions of Article 7, clause 1 of the KFI Certification Standard.

1. **Item** Sway Brace Device
2. **Type** Rigid, Longitudinal, NPS (40~100), Rated Load 4,448N, Installation Angle (45~90)°
3. **Type Approval No.** 버팀18-35
4. **Limitation**

Kwon, Soon Kyung
President

Date : 05. Jun. 2018

Korea Fire Institut

CERTIFICATE OF COMPLIANCE

Certificate Number	20181226-EX27945
Report Reference	EX27945-20181226
Issue Date	2018-DECEMBER-26
Issued to:	NSV CO LTD 547, Aenggogae-ro Namdong-gu Incheon 21691 KOREA
This certificate confirms that representative samples of	SWAY-BRACE DEVICES, RIGID TYPE FOR SPRINKLER SYSTEMS Models ND-10A/ ND-20, ND-30A and ND-50. Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 203A, Sway Brace Devices for Sprinkler System Piping.
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

Seismic Bracing Calculations (4Way)

PROJECT : - Contractor : - Version : rev.0

Address : - Piping purpose : H/SP Floor : - Date : 19. 00. 00.

Brace Information

Area No :	4Way
Length of brace (m) :	8m
Diameter of brace (mm) :	25A
Type of brace :	Sch. 40
Angle of brace (°) :	45°
Lest radius of gyration (R,mm) :	10.7
Maximum length of brace (L,mm) :	2140
Maximum length for L/R	200
Maximum load (ASD, kgf) :	594

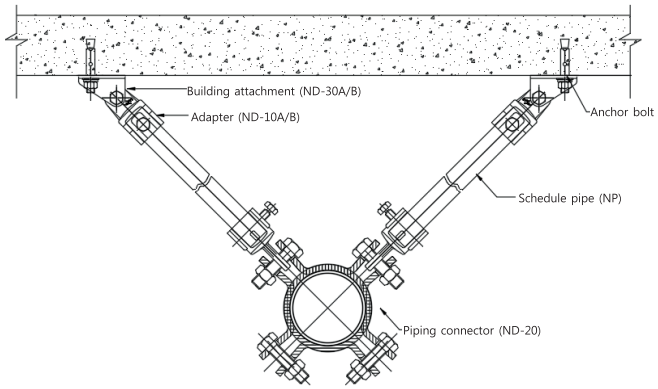
Fastener Information

Support structure :	Concrete
Anchor Bolt	
Anchor Bolt type :	FAZⅡK
Anchor Bolt size :	M12
Anchor length (mm) :	50
Permissible tension load :	622
Permissible shear load :	1786
Anchor Bolt Quantity :	1

Seismic Brace Attachments

	Item	Maximum load (ASD, kgf)
Seismic brace	ND-4W- 100A	513
Anchor Bolt	FAZⅡK (Permissible tension load	622
	FAZⅡK (Permissible shear load)	1786

Detail — Seismic Bracing (4Way)



Sprinkler System Load Calculation (Fpw = Wp X 0.5) — Cp = 0.5

Item	Diameter	Type	Length (m)	Weight per m	Weight
Main	100A	KS D 3507	8m	21 kg/m	168
				W_p (S.F 15%)	193.2 kg
				F_{pw}	96.6 kg

Result

1. Maximum F_{pw} :		96.6 kg
2.Maximum load of brace (kgf) :		594 kgf
3. Maximum load of seismic brace (kgf) :	ND-4W-100	513 kgf
4. Maximum load of anchor (kgf) :	1)FAZⅡK (Permissible tension load)	622.4 kgf
	2)FAZⅡK (Permissible shear load)	1786 kgf

96.6 kg ≤ 513 kg O.K

Note.

1. The designed seismic force is calculated based on the establishment of the Seismic Design Criteria for Firefighting Facilities, Notification No. 2015-138 of the Ministry of Public Safety and Security of Korea.
2. The horizontal load of pipes acting on the brace affected zone was calculated according to the "Zone of Influence Method" of NFPA-13.
3. The above calculation was made using the permissible load value in allowable stress design (ASD).

Tel : (02)598-1988, Fax : (02)598-1989
Homepage : http://www.nsv.co.kr
E-Mail : nsv@chol.com

NSV Seismic Stopper Calculations

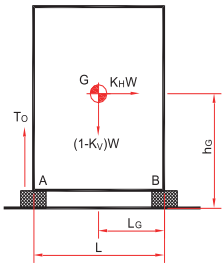
Project : _ Contractor : _ - Version : rev.0

Address : _ Floor : _ Date : 19. 00. 00

1. Equipment specification

TYPE	Pump	NO.	FP-1	SERVICE	Indoor and outdoor fire extinguishing	WEIGHT	2508 kg	Horizontal seismic	0.5 g
FLOOR	Machine room			CAPACITY	-	FORM	Multistage turbine	Vertical seismic	0.25 g

2. Calculation of design seismic force and pullout force



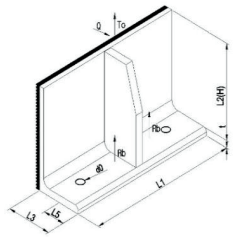
$$\text{If } T_0 \le 0,\ \frac{h_g}{L_g} \le \frac{(1-K_v)}{K_H}$$

$$\text{If } T_0 > 0,\ \frac{h_g}{L_g} > \frac{(1-K_v)}{K_H}$$

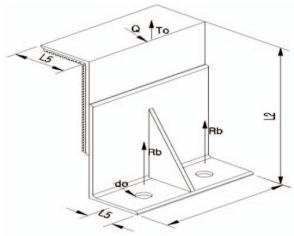
	Long side	Short side
Total weight(W)	2507.5 kg	
Safe load(15%Factor)	2883.625 kg	
Horizontal seismic force(F_H) (0.5w)	1441.8125 kg	
Vertical seismic(F_V) (0.25w)	720.90625 kg	
Height of center(h_G) / (unit : cm)	25	25
Length(L) / (unit : cm)	180	65
Length(L_G) / (unit : cm)	90	33
Tension load(T_O)	-527	-881

※ When pullout force (To) ≤ 0, an anti-movement type is applied since no pullout force is generated, but when To> 0, an anti-movement and anti-flip type is applied since pullout force is generated on the anti-vibration material.

3. Seismic restraint



NSS-10 STOPPER



NSS-11 STOPPER

STOPPER DETAIL

STOPPER ITEM		SYMBOL	UNIT	Long side	Short side
Bolt tension load		Rb	kgf	-441	-263
Stopper type		-	-	NSS-10	NSS-10
Stopper quantity		Ns	EA	1	1
Stopper horizontal load		-	kgf	1,442	1,442
Stopper model		-	-	NSS-10-2000	NSS-10-2000
Stopper horizontal load (EA)		-	kgf	2,000	2,000
The total number of stopper		N_T	EA	2	2
Satisfaction		-	-	Satisfied	Satisfied
ANCHOR ITEM		**SYMBOL**	**UNIT**	**Long side**	**Short side**
Anchor bolt type		-	-	FAZII	FAZII
Anchor bolt specification/M		-	-	M16 /85 mm or more	M16 /85 mm or more
Specification	Tension load (EA)	-	kgf	1,367	1,367
	Shear load (EA)	-	kgf	3,204	3,204
Anchor bolt quantity		-	EA	4	4
Satisfaction		-	-	O.K	O.K

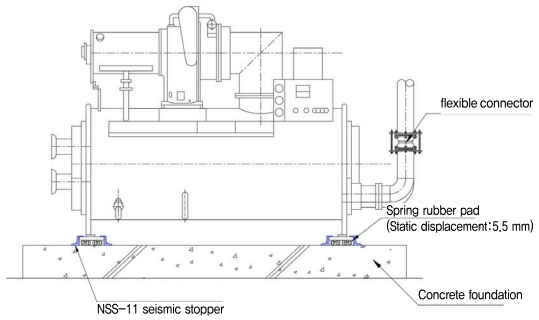
Note.

1. The above design seismic force is calculated based on the Korean Building Code (KBC2009).
2. When pullout force (To) ≤ 0, an anti-movement type is applied since no pullout force is generated, but when To> 0, an anti-movement and anti-flip type is applied since pullout force is generated on the anti-vibration material.
3. The rib plate of the seismic stopper is selected according to the capacity.

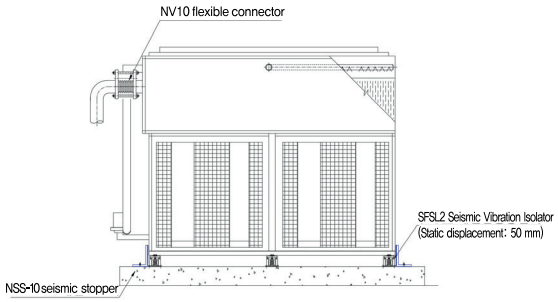
NSV ISO9001/ISO14001 주식회사 엔에스브이 Noise, Shock & Vibration Control
Tel : (02)598-1988, Fax : (02)598-1989
Homepage : http://www.nsv.kr
E-Mail : nsv@nsv.kr

Detail Installation Diagram (Equipment Seismic)

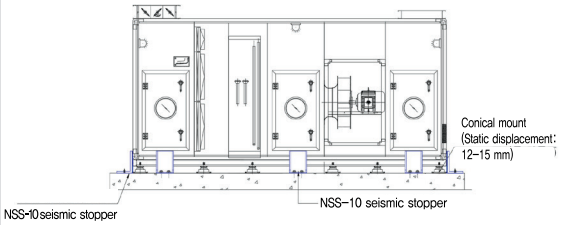
● Refrigeration machine



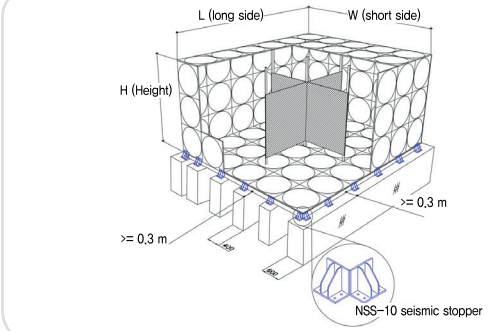
● Cooling tower



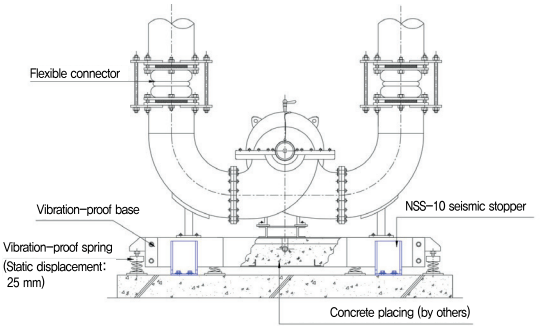
● Air conditioning unit



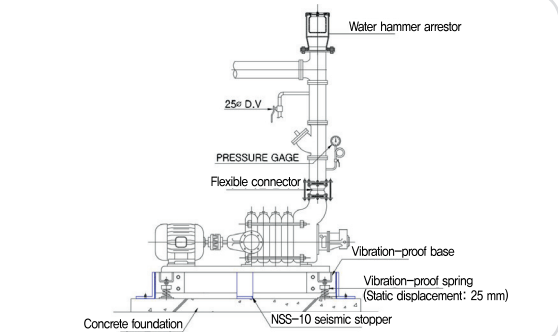
● Water tank



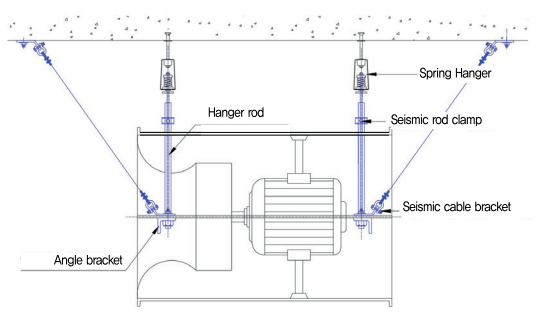
● Double suction pump



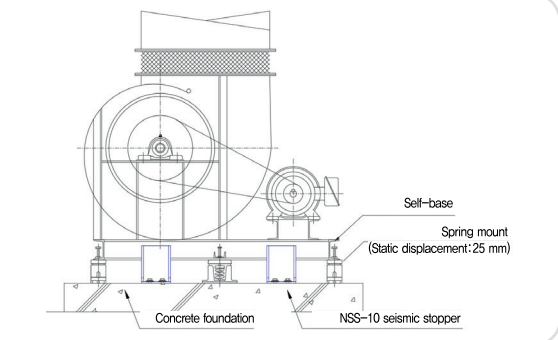
● Fire pump



● In-line fan



● Sirocco fan

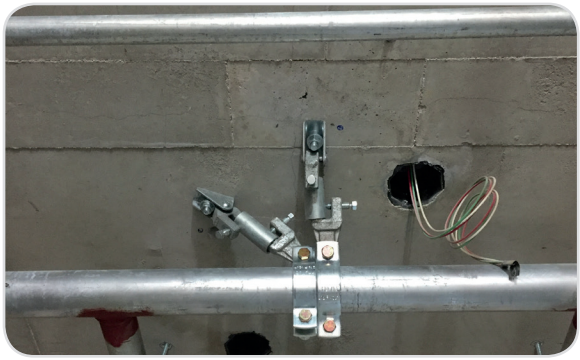


● Lateral Sway Bracing

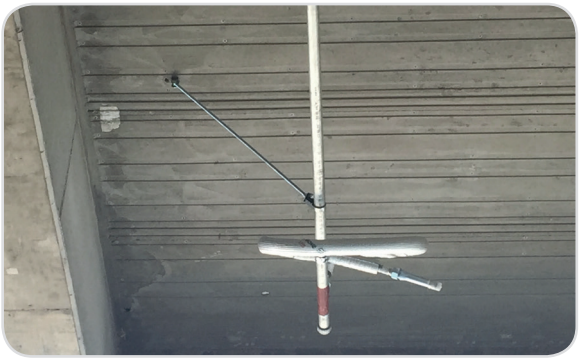
● 4-way Riser Sway Bracing

● Longitudinal Sway Bracing

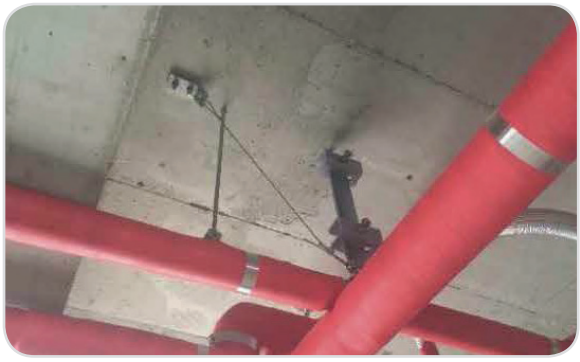
● Horizontal 4-way Sway Bracing



● Branch pipe Sway Bracing



● Seismic Wire System



● 4-way Riser Sway Bracing
(floor installation type)

● 4-way Riser Sway Bracing
(floor installation type)