HIBUILDAM

Hydraulic vibration damper HIBUILDAM

SENQCIA
Chains & Building Solutions

SENQCIA CORPORATION

HI-BUILDAM

Key to symbols

Please fully understand the symbols below before reading the rest of the catalog.

Caution : This symbol indicates content which, if ignored, can lead to incorrect handling that could result injury and equipment damage.

Warning : This symbol indicates content which, if ignored, can lead to incorrect handling that could result in death or serious injury.

Caution
- Please handle as a machinery and prevent shock.
- Please do not disassemble, repair or modify.
- Please do not put heavy objects on the product.

Please contact us if equipment is damaged, leaking oil or malfunctioning.

Difference between earthquake proof, base isolation and response control

【Earthquake proof 】

A structure built to withstand earthquakes up to severe magnitude. Interior damage may not be prevented.

【Base isolation】

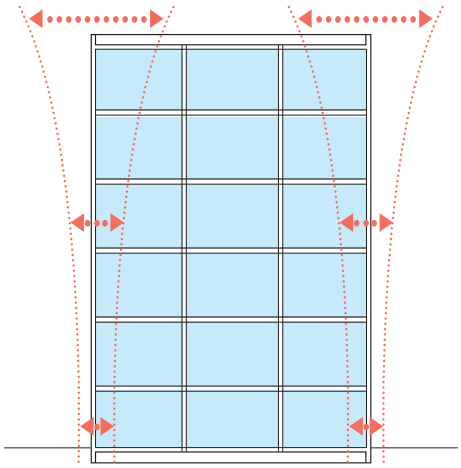
Structure uses horizontally elastic isolation devices between ground base and building structure. By lengthening the natural period and slowing vibration reduces damage to the inside of the structure.

【Response control】

Structure uses vibration dampening devices to reduce damage to the structure. Most effective against a wide range of magnitude and irregular period of earthquakes.

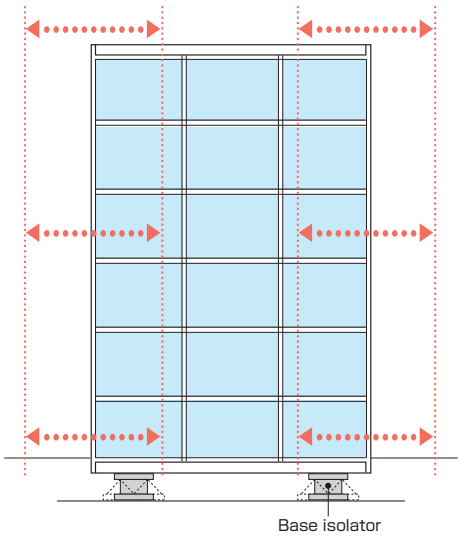
Earthquake proof

- Withstand vibration
- Strong vibration



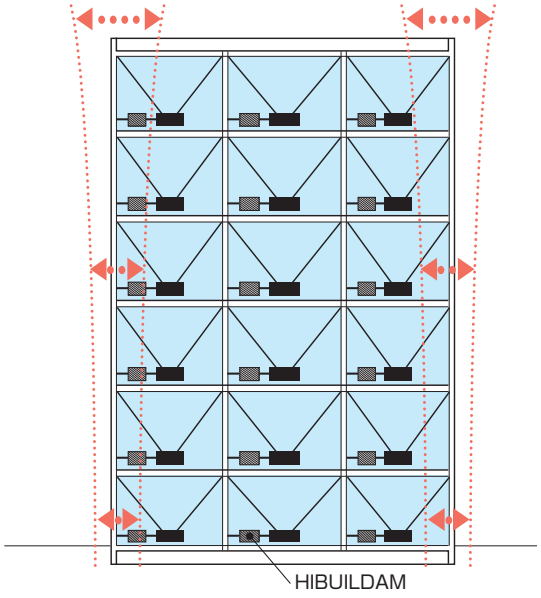
Base isolation

- Isolate from vibration
- Slow and large vibration



Response control

- Control vibration
- Reduce vibration

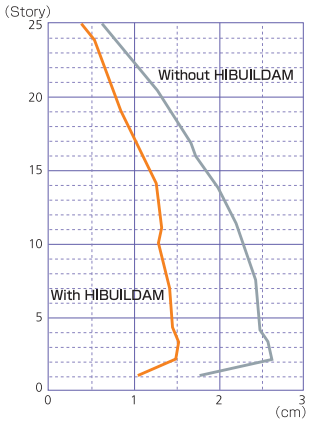


Effect by HIBUILDAM

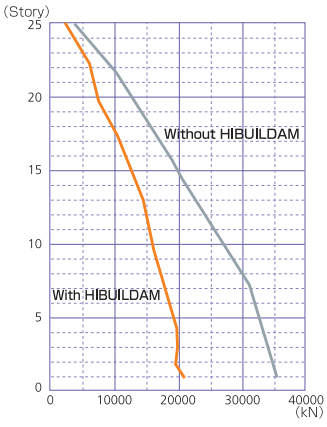
HIBUILDAM reduces both story drift angle and shear force by up to 35-45%

(25 story-Building)

Story drift angle



Shear force



Hydraulic vibration damper HIBUILDAM

HIBUILDAM is a passive hydraulic vibration controlling device which uses fluid resistance of oil to absorb building vibration.
HIBUILDAM absorbs the vibration caused by large earthquakes or strong wind and have been widely applied from super high to low buildings. Improving earthquake protection and dwelling ability.

Product lineups

Types	Series of products	Product views
Basic type	500kN 1000kN 1500kN 2000kN	 Relief valves and other parts are built in a cylinder.
Bracing type	500kN 1000kN 1500kN 2000kN	 Combined type of HIBUILDAM and bracing.
Wall stud type	500kN “HIBUILDAM Stud*”	 Best suited shape for wall stud and small footprint.

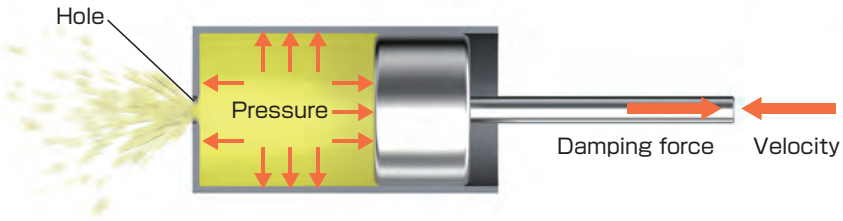
*HIBUILDAM Stud”is a name of Wall stud type HIBUILDAM.

Operating principle

Operating principle 1 —Damping force—

The smaller the hole or the higher the velocity, the higher the pressure generated to operate the damping force.

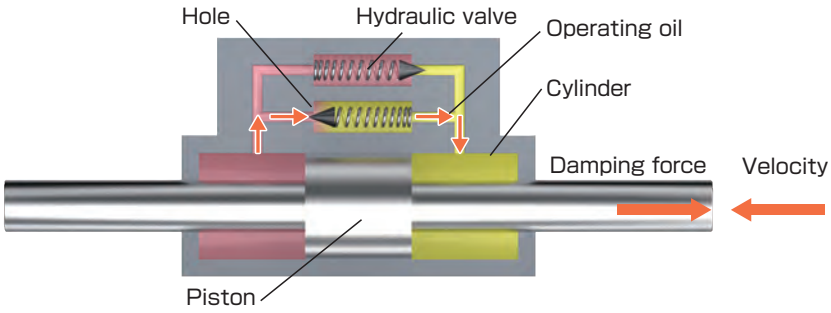
Principle of damping force



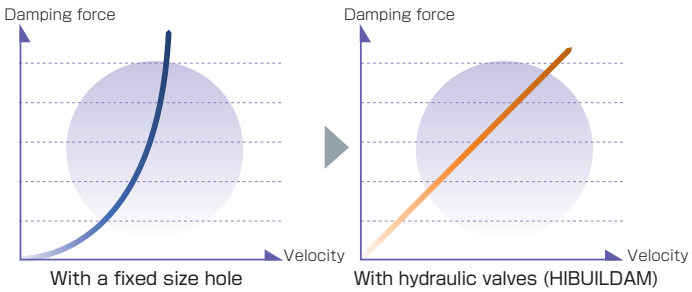
Operating principle 2 —HIBUILDAM—

HIBUILDAM has hydraulic valves which open depending on the pressure of the oil to suppress excessive damping force and linearise damping force-velocity curve.

Principle of operating



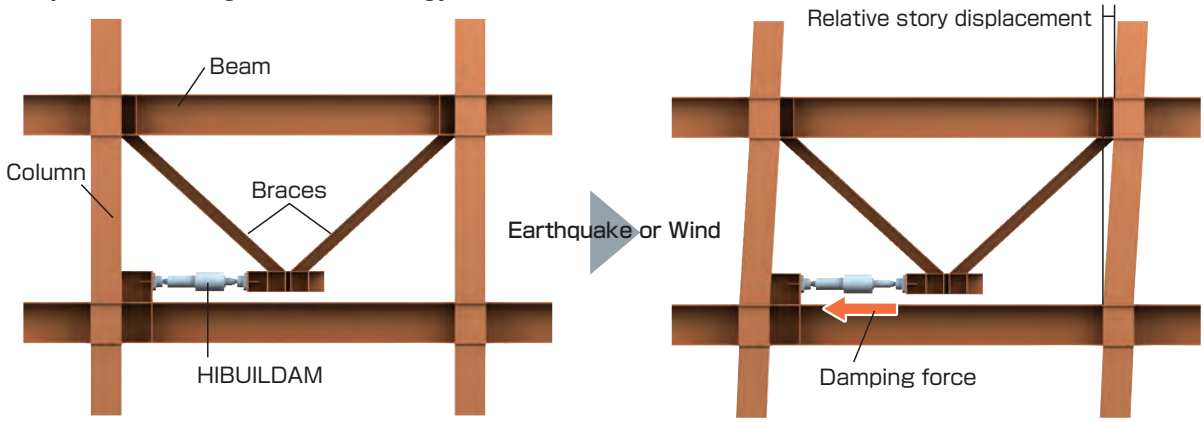
Damping force — Velocity



Operating principle 3 —Absorbing vibrational energy—

HIBUILDAM activates through braces or wall studs to absorb vibration energy to reduce quake. Vibration energy absorbed by HIBUILDAM is converted to heat through the action of operating oil.

Principle of absorbing vibrational energy



Characteristics

①Bilinearised damping force-velocity curve suppresses excessive force to the building in big earthquakes.

②Steady performance in temperature variation and excitation frequency variation.(Ref: page 10)

③Minimising backlash allows stable damping performance in small amplitude vibration.

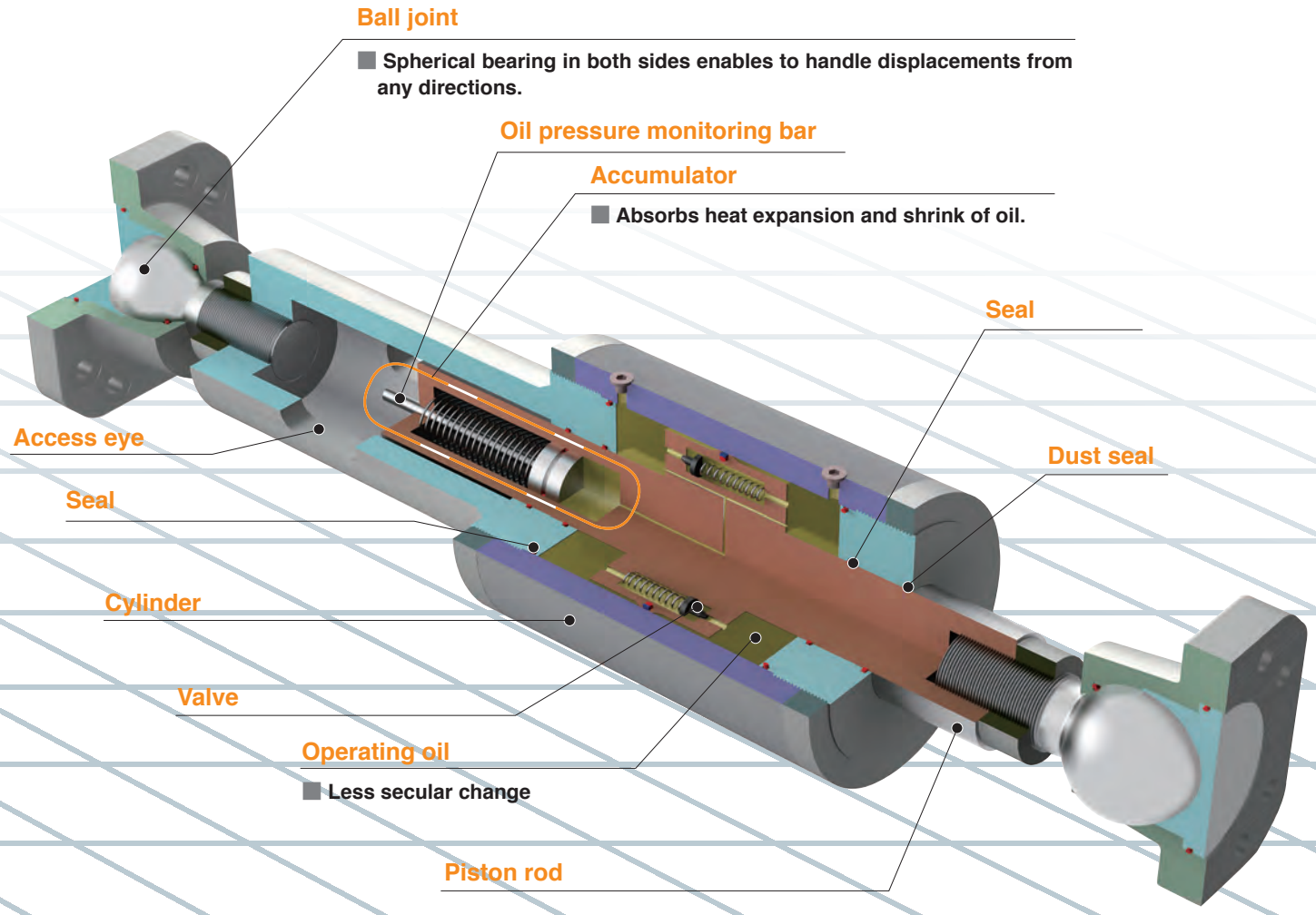
④Excellent durability, features long lasting seals and high quality oil.

⑤Easy to install with high strength bolts.

⑥Oil pressure monitoring bar to check oil level. *Optional

⑦Ball joints follow the in-plane and out-of-plane displacements.

Structure



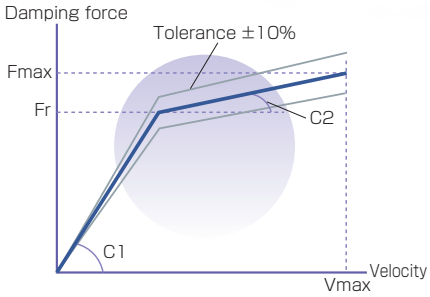
⚠ **Caution** ● Foreign objects on piston rod may cause damage to dust seal.

Standard products

Model number

H 2 0 2 P 1 2 1 5

- Maximum velocity （150mm/sec）
- Stroke （120mm {One side stroke ±60mm}）
- Passive hydraulic vibration damper
- Product lineup 2：Basic type
  4：Bracing type
  5：Wall stud type
- Maximum damping force （2000kN）



Model	Maximum damping force Fmax (kN)	Relief load Fr (kN)	Maximum velocity Vmax (mm/sec)	First damping coefficient C1 (kN・sec/mm)	Second damping coefficient C2 (kN・sec/mm)
500kN Series H052P H054P H055P	500	400	150	7.5	1.03
				10	0.91
				12.5	0.85
				15	0.81
				17.5	0.79
			300	7.5	0.41
				10	0.38
				12.5	0.37
				15	0.37
				17.5	0.36
1000kN Series H102P H104P	1000	800	150	15	2.07
				20	1.82
				25	1.69
				30	1.62
				35	1.57
			300	15	0.81
				20	0.77
				25	0.75
				30	0.73
				35	0.72
1500kN Series H152P H154P	1500	1200	150	22.5	3.10
				30	2.73
				37.5	2.54
				45	2.43
				52.5	2.36
			300	22.5	1.22
				30	1.15
				37.5	1.12
				45	1.10
				52.5	1.08
2000kN Series H202P H204P	2000	1600	150	30	4.14
				40	3.64
				50	3.39
				60	3.24
				70	3.15
			300	30	1.62
				40	1.54
				50	1.49
				60	1.46
				70	1.44

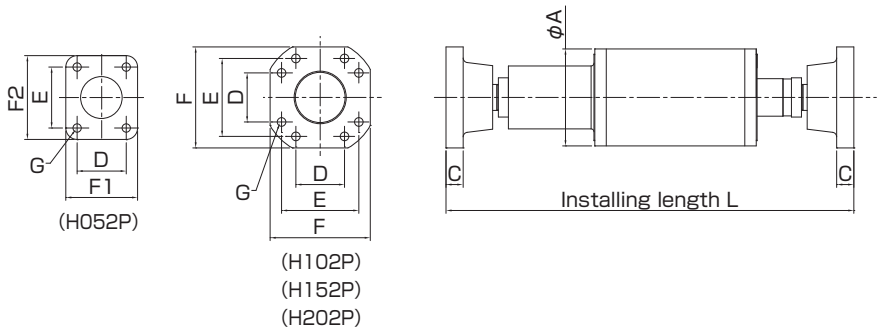
● Please contact us for custom made products.
● Stiffness of products is listed in size chart.

⚠ Warning ● Product specifications must be followed.

Product sizes

Basic type

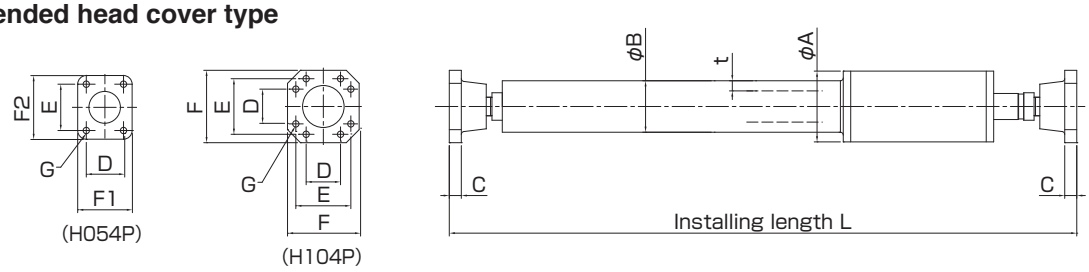
Figure 1



Bracing type

Extended head cover type

Figure 2



Bracing type

Figure 3

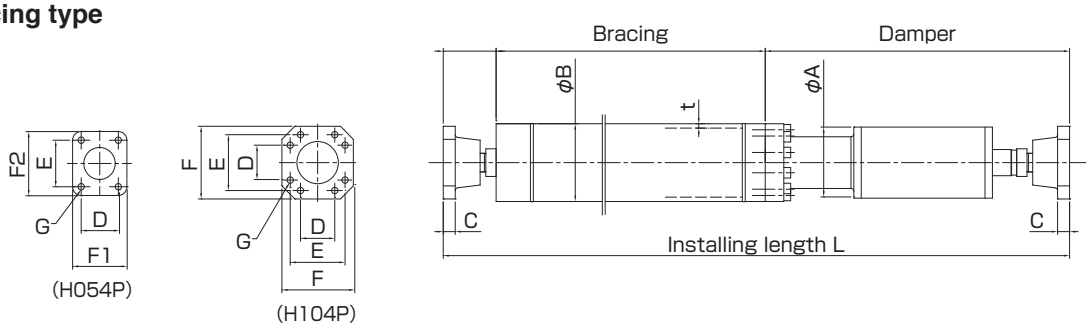
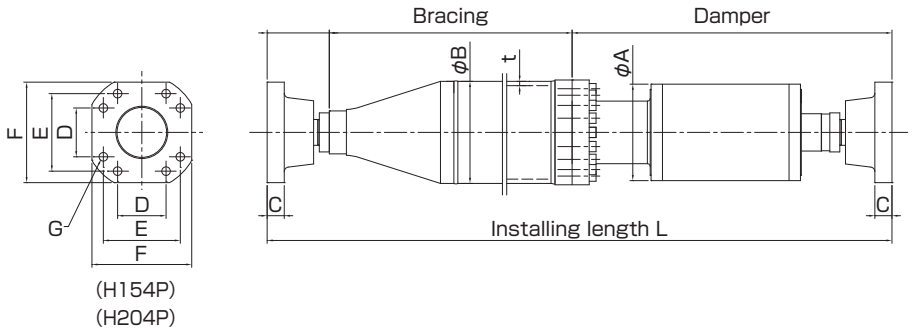
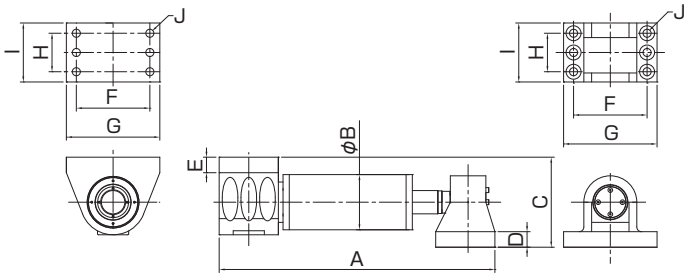


Figure 4



Wall stud type（HIBUILDAM Stud）

Figure 5



Size of basic type and bracing type〔Figure 1 - 4〕

(mm)

Model	St	Installing length L*1	φ A	C	D	E	F	G*2	Stiffness*3 (kN/mm)	Weight*4 (kg)
H052P H054P	± 60	1060	177.8	32	130	160	F1：190 F2：220	4-φ22 (M20)	145	130
	± 80	1160							120	140
	±100	1255							100	145
	±120	1370							85	155
H102P H104P	± 60	1250	244.5	42	120	192	250	8-φ22 (M20)	285	275
	± 80	1345							235	285
	±100	1480							200	300
	±120	1560							170	310
H152P H154P	± 60	1340	315	60	170	270	350	8-φ26 (M24)	450	520
	± 80	1425							350	535
	±100	1520							295	550
	±120	1620							255	570
H202P H204P	± 60	1340	336	60	170	270	350	8-φ30 (M27)	500	560
	± 80	1425							405	580
	±100	1520							350	600
	±120	1620							300	620

*1 Basic type
*2 Bolt diameter
*3 Tolerance interval -10% or more
*4 Basic type

Bracing type weight and stiffness

(mm)

Model	St	Installing length L	Type	φB (Thickness t)	Stiffness calculating formula (kN/mm)	Weight calculating formula (kg)
H054P	± 60	L ≦ 3800	Extended head cover type 〔Figure 2〕	127 (18)	$18.0\times10^7/(145L+109\times10^4)$	79.5 + 0.048L
	± 80				$14.9\times10^7/(120L+110\times10^4)$	84.5 + 0.048L
	±100				$12.4\times10^7/(100L+111\times10^4)$	85.0 + 0.048L
	±120				$10.5\times10^7/(85L+112\times10^4)$	89.5 + 0.048L
	± 60	3800 < L ≦ 7000	Bracing type 〔Figure 3〕	216.3 (8.2)	$15.9\times10^7/(145L+93.9\times10^4)$	142 + 0.042L
	± 80				$13.2\times10^7/(120L+95.3\times10^4)$	144 + 0.042L
	±100				$11.0\times10^7/(100L+96.6\times10^4)$	147 + 0.042L
	±120				$9.34\times10^7/(85L+97.5\times10^4)$	152 + 0.042L
H104P	± 60	L ≦ 3800	Extended head cover type 〔Figure 2〕	177.8 (25)	$69.5\times10^7/(285L+208\times10^4)$	158 + 0.094L
	± 80				$57.3\times10^7/(235L+212\times10^4)$	159 + 0.094L
	±100				$48.8\times10^7/(200L+214\times10^4)$	161 + 0.094L
	±120				$41.5\times10^7/(170L+217\times10^4)$	164 + 0.094L
	± 60	3800 < L ≦ 6000	Bracing type 〔Figure 3〕	267.4 (9.3)	$44.1\times10^7/(285L+118\times10^4)$	319 + 0.059L
	± 80				$36.3\times10^7/(235L+122\times10^4)$	322 + 0.059L
	±100				$30.9\times10^7/(200L+123\times10^4)$	333 + 0.059L
	±120				$26.3\times10^7/(170L+126\times10^4)$	337 + 0.059L
	± 60	6000 < L ≦ 7000		267.4 (12.7)	$59.4\times10^7/(285L+172\times10^4)$	286 + 0.080L
	± 80				$49.0\times10^7/(235L+176\times10^4)$	287 + 0.080L
	±100				$41.6\times10^7/(200L+177\times10^4)$	295 + 0.080L
	±120				$35.4\times10^7/(170L+180\times10^4)$	297 + 0.080L
H154P	± 60	L ≦ 6000	Bracing type 〔Figure 4〕	318.5 (10.3)	$92.0\times10^7/(450L+144\times10^4)$	540 + 0.078L
	± 80				$71.5\times10^7/(350L+155\times10^4)$	549 + 0.078L
	±100				$60.3\times10^7/(295L+160\times10^4)$	560 + 0.078L
	±120				$52.1\times10^7/(255L+163\times10^4)$	572 + 0.078L
	± 60	6000 < L ≦ 7000		318.5 (12.7)	$113\times10^7/(450L+190\times10^4)$	506 + 0.096L
	± 80				$87.5\times10^7/(350L+200\times10^4)$	514 + 0.096L
	±100				$73.8\times10^7/(295L+205\times10^4)$	522 + 0.096L
	±120				$63.8\times10^7/(255L+209\times10^4)$	533 + 0.096L
H204P	± 60	L ≦ 5000	Bracing type 〔Figure 4〕	355.6 (11.1)	$123\times10^7/(500L+179\times10^4)$	579 + 0.094L
	± 80				$99.7\times10^7/(405L+189\times10^4)$	588 + 0.094L
	±100				$86.2\times10^7/(350L+193\times10^4)$	599 + 0.094L
	±120				$73.9\times10^7/(300L+198\times10^4)$	611 + 0.094L
	± 60	5000 < L ≦ 6000		355.6 (12.7)	$140\times10^7/(500L+213\times10^4)$	540 + 0.11L
	± 80				$114\times10^7/(405L+223\times10^4)$	548 + 0.11L
	±100				$98.2\times10^7/(350L+227\times10^4)$	557 + 0.11L
	±120				$84.1\times10^7/(300L+232\times10^4)$	568 + 0.11L
	± 60	6000 < L ≦ 7000		355.6 (16)	$175\times10^7/(500L+283\times10^4)$	531 + 0.13L
	± 80				$142\times10^7/(405L+292\times10^4)$	537 + 0.13L
	±100				$122\times10^7/(350L+297\times10^4)$	544 + 0.13L
	±120				$105\times10^7/(300L+301\times10^4)$	552 + 0.13L

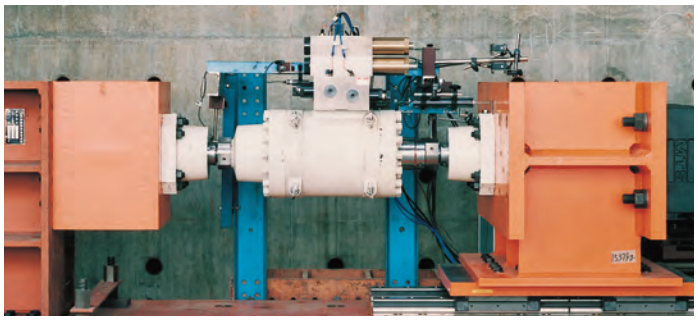
Wall stud type〔Figure 5〕

(mm)

Model	St	Installing length A	φ B	C	D	E	F	G	H	I	J*1	Stiffness*3 (kN/mm)	Weight (kg)
H055P	±60	885	177.8	290	50	50	236	300	124	190	6-φ26 (M24*2)	105	210

*1 Bolt diameter
*2 Extra high strength bolts required
*3 Tolerance interval -10% or more

Performance inspection

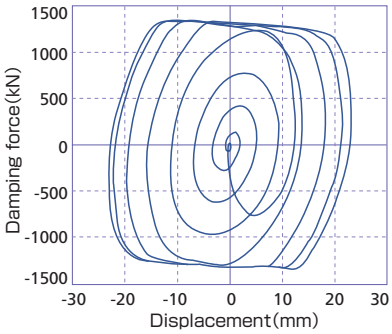


Damping performance in earthquake, random quake and wind vibration

1500kN Series

1. Earthquake
sinusoidal wave 0.3Hz

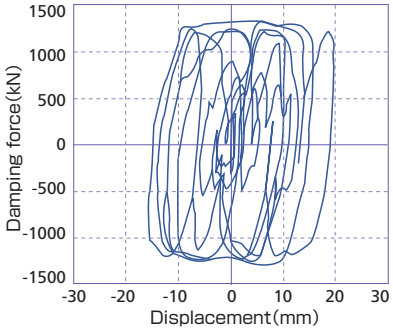
Provides stable performance during high velocity event, relief valve suppresses excessive damping force.



1500kN Series

2. Random force

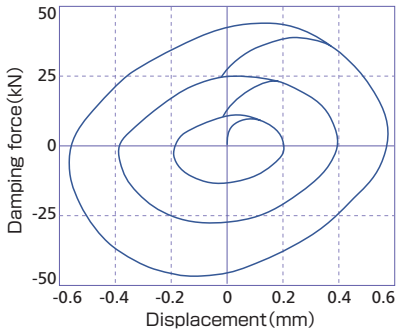
Stable performance with random forces.



2000kN Series

3. Small amplitude vibration (wind vibration)
sinusoidal wave 0.3Hz

Excellent performance with wind caused vibration amplitude.

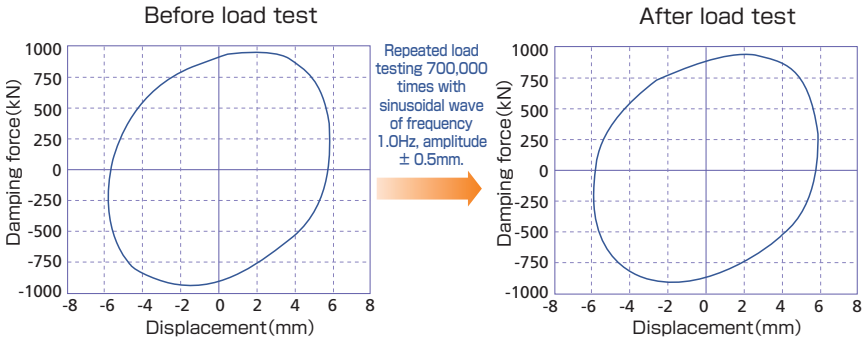


Endurance

Stable performance after 700,000 load tests!

【Specimen】

- **1500kN Series**

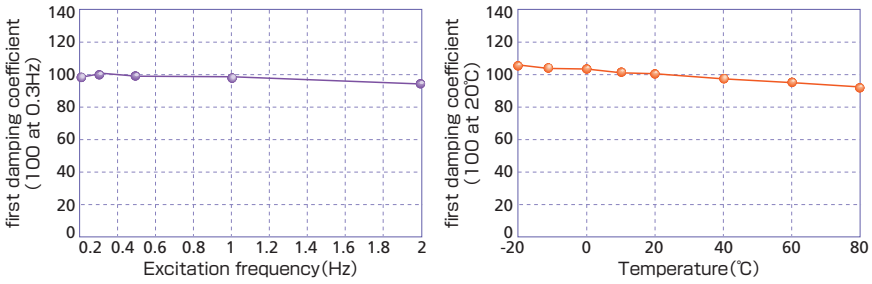


Stable performance in temperature variation and excitation freguency variation

Stable operation through a wide range of ambient temperature and excitation frequency variation.

【Specimen】

- **2000kN Series**



Installation

Basic type

Renovation

Bracing type

Wall stud type（HIBUILDAM Stud）

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