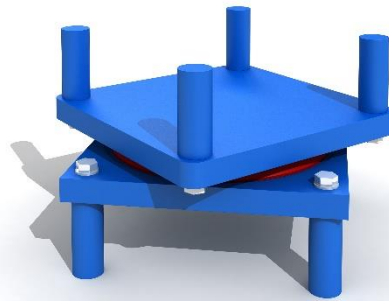


# Disc Bearing





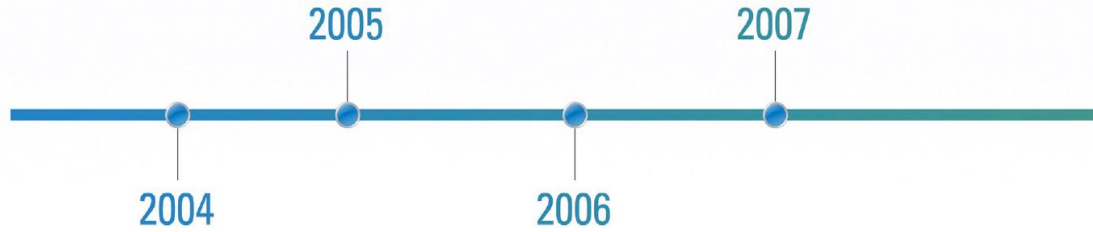
- 04. Registered as a venture-backed company (cert. No. 051123031-1-00557)
- 04. Registered a patent No. 0484564 for 'Seismic retrofit integrated elastic bridge bearing' (A,R,B)
- 07. Selected as a member of 'Industry-Academic-Research Institution Joint Technology Development Consortium' by the Small and Medium Business Administration
- 12. Registered a patent No. 0538410 for 'Girder continuation system and its construction method'

- 01. Selected as an excellent enterprise by Industrial Bank of Korea
- 05. Participated in KINTEX "ROTREX International Road Exposition"
- 05. Registered a patent No. 0722220 for 'Bridge earthquake-resistance system for port support'
- 06. Technical tie-up with Softelec, Japan
- 07. Made a technical agreement with Dongbang Engineering Co., Ltd
- 07. Selected as KIBO's "A+Member"
- 07. Registered a patent No. 10-0741718 for 'Pre-stressed friction-reducing shear key'
- 08. Selected as INNOBIZ Enterprise (A class) by Seoul Regional Small & Medium Business Administration
- 12. Completed Anseong Factory

## History

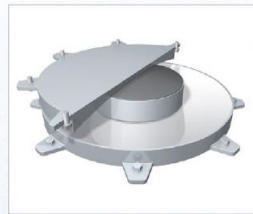
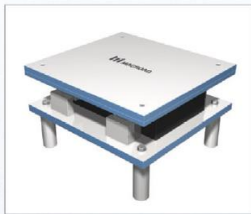
# 2004

The Macroad story begins...



- 07. Founded Macroad Co., Ltd
- 08. Obtained construction company license (Structure Maintenance and Repair)
- 08. Registered a factory in Anseong-si
- 11. Registered a patent for 'Expansion joint replacement method for concrete-preserving maintenance'
- 11. Increased capital to 520 million Won
- 12. Obtained construction company license (metal structure installation)

- 04. Obtained ISO certification (ISO9001:2000, ISO14001:2004)
- 04. Established Technology Research Center
- 10. Registered a patent No. 10-0643015 for 'Spherical shoe enabling maintenance and repair'





- 03. Registered a patent No. 10-0891464 for 'A soundproof type of a front separation exchange'
- 05. Awarded 'Prize of Commissioner of Korean Intellectual Property Office' on the 44th Invention Day
- 05. Entered into Technical Agreement Eden Technology, Italy
- 05. Selected as 'Transferred Technology Development Project' by Small & Medium Business Administration
- 06. Participated in COEX 'International Environmental Technology Competition'
- 07. Possessed a patent right for 'Non-point Pollutants Reduction Device' and started the related business
- 07. Seismic retrofit integrated elastic bridge bearing (A,R,B) certified with GEON-Mark by Korea Conformity Laboratories

- 08. Participated in Songdo CONVEBSIA 'The 7th Incheon International Environmental Technology Competition'
- 09. Seismic retrofit integrated elastic bridge bearing(A,R,B) certified as new technology available for construction by Korea Land and Housing Corporation
- 09. Participated in Songdo CONVEBSIA 'ROTREX 2009 International Road Exposition'
- 09. Entered into Exclusive License Agreement on Industrial Property Right of KR Co., Ltd
- 10. Awarded 'Prize of Commissioner of Small & Medium Business Administration' and Seismic retrofit integrated elastic bridge bearing'(A,R,B) appointed as an excellent product by Public Procurement Service

2009

2008

2010

2011

2012

...and our journey continues

- 01. Selected as 'Promising Small and Medium Business' by Industrial Bank of Korea
- 02. Registered a patent No. 10-0808855 for 'Shock-absorbing finger joint for preventing bridge pounding'
- 04. Appointed as NET (New Excellent Technology) No. 552 'Replacement of rail joint with finger joint using partial concrete removal (CF-R method)'
- 04. Transferred a patent right for 'Deodorization equipment' and started environmental business
- 06. Extended venture enterprise registration (KIBO cert. No.: 20080104846)
- 10. Won 'Minister of Knowledge Economy Award' at the 2008 Korea Business Contest
- 12. Increased capital to 890 million Won
- 12. Obtained 'Performance Certificate' for 'Seismic retrofit integrated elastic bridge bearing' (A,R,B)

- 04. Selected as Company for 'Informatizaion Supporting Project' by Small & Medium Business Administration
- 04. Selected as a company for military service exemption of special researchers
- 06. Extended venture enterprise registration (KIBO cert. No. 20090104949)
- 06. Possessed technology for suspended load removal device
- 07. Extended INNOBIZ Enterprise registration
- 10. Registered Hwaseong Factory

- 01. Entered into a technical agreement with FIP INDUSTRIAL S.P.A, Italy
- 01. Registered Seismic retrofit integrated elastic bridge bearing'(A,R,B) as 'Procurement Material' in Public Procurement Service
- 03. Awarded 'Prize of Commissioner of Seoul Regional National Tax Service' on 2011 Tax Payment Day
- 07. Registered a patent for 'Lead Vibration Isolation Device with improved Vibration Isolation Performance' (L, R, B)
- 08. Obtained KS Mark Certificate for Seismic retrofit integrated elastic bridge bearing'(A,R,B) from Korea Standards Association
- 11. Registered 'High functional spherical bearing' as a new technology in Korea Rail Network-Authority'



## Company outline

MACROAD

<b>Name</b>	Macroad co., ltd.
<b>C E O</b>	Eun-chul, Choi
<b>Establishment</b>	1 <sup>st</sup> July 2004
<b>Sales</b>	18,300,000,000 won (yr2017) (\$17,428,570)
<b>Employees</b>	53
<b>Address</b>	<p>[Head Office / No.1 Factory] 340-28, Namsadangro, Bogae-myeon, Anseong-si, Gyeonggi-do, KOREA TEL.+82.31.677.3780 FAX. +82.31.677.3788</p> <p>[No.2 Factory] 129-45, 365, Sinnamro, Namyang-eup, Hwaseong-si, Gyeonggi-do, KOREA TEL.+82.31.684.9975 FAX.+82.31.684.1173</p> <p>[Seoul Office / Technical Research Institute] F5, Eoeun Bldg. 125, Saemalro, Songpa- gu, Seoul, KOREA TEL.+82.2.407.3780 FAX. +82.2.407.3782</p>
<b>Award</b>	<p>Award from knowledge Economy Minister</p> <p>Award from the Korean Intellectual Property Office</p> <p>Award from Small and Medium Business Administration</p> <p>Award from Seoul Regional National Tax service, etc</p>

### Business area

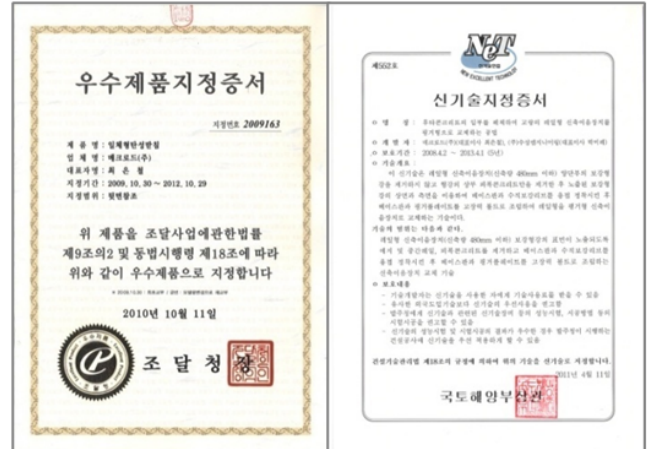
#### ▶ Construction business

: Bridge bearing, Building base isolation system (BearingDamper, STU), Expansion joint, Sound proof wall, Guard rail, Exterior

#### ▶ Environmental business

: Non-point source treatment,  
Drainage system

## Technical certification



Venture company certification, Innovation business grade A, New excellent technology certification, Korea Industrial standards certification, Procurement excellent product certification, Excellent performance certification etc.

Industrial  
Property

Patent 65

Trade mark right 8

Design registration 144



# Disc Bearing

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## DISK BEARING OVERVIEW

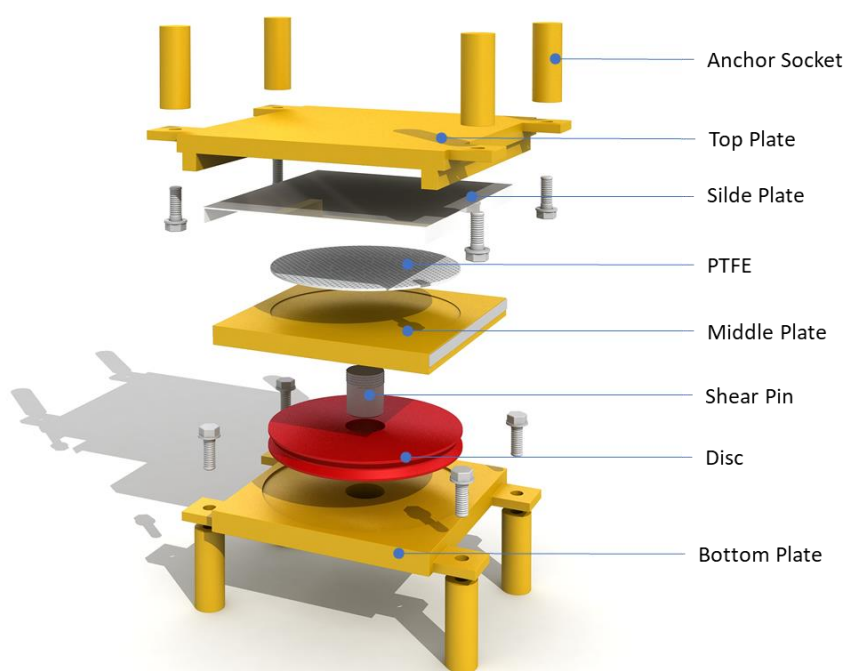
The disk bearings support the upper load of the bridge, was improved by applying polyurethane to facilitate rotation movement, and can safely accommodate all vertical and horizontal loads and rotation of the upper structure, to significantly improve durability caused by leakage and damage of rubber plates.

The main components of the disc bearing are the disk and horizontal restraint device that can safely accommodate the upper load of the structure and rotation by external horizontal loads such as wind and earthquake.

The PTFE and stainless plate are the main components of Free bearings & Guide bearings to facilitate the expansion and contraction of the upper structure.

## Guided Bearing

### Major lements



### Designation & Materials

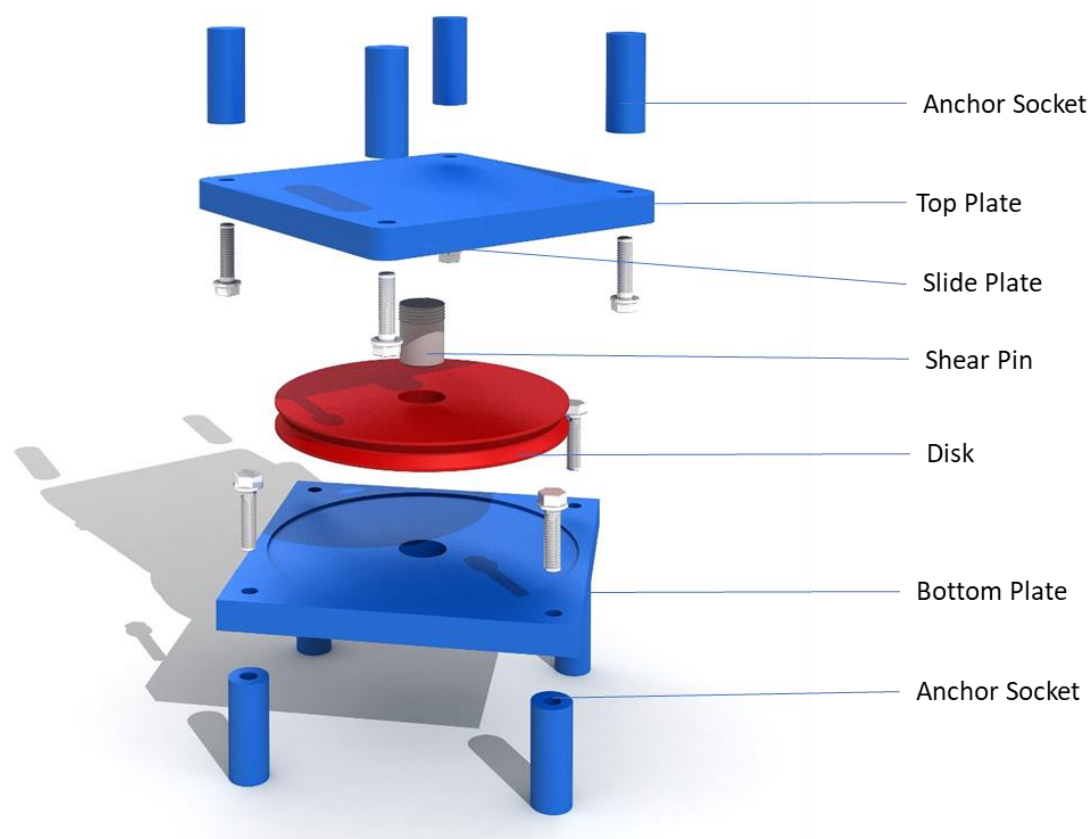
- Top Plate (SM490)
- Guide bar (SM490)
- Slide plate (STS316)
- PTFE
- Middle Plate (SM490)
- DISK (Polyurethane)
- Shear Pin (High Strength Pin)
- Bottom Plate (SM490)
- Anchor Socket (SS400)
- Anchor Bolt

# Disc Bearing

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## Fixed Bearing

### Major Elements



### Designation & Materials

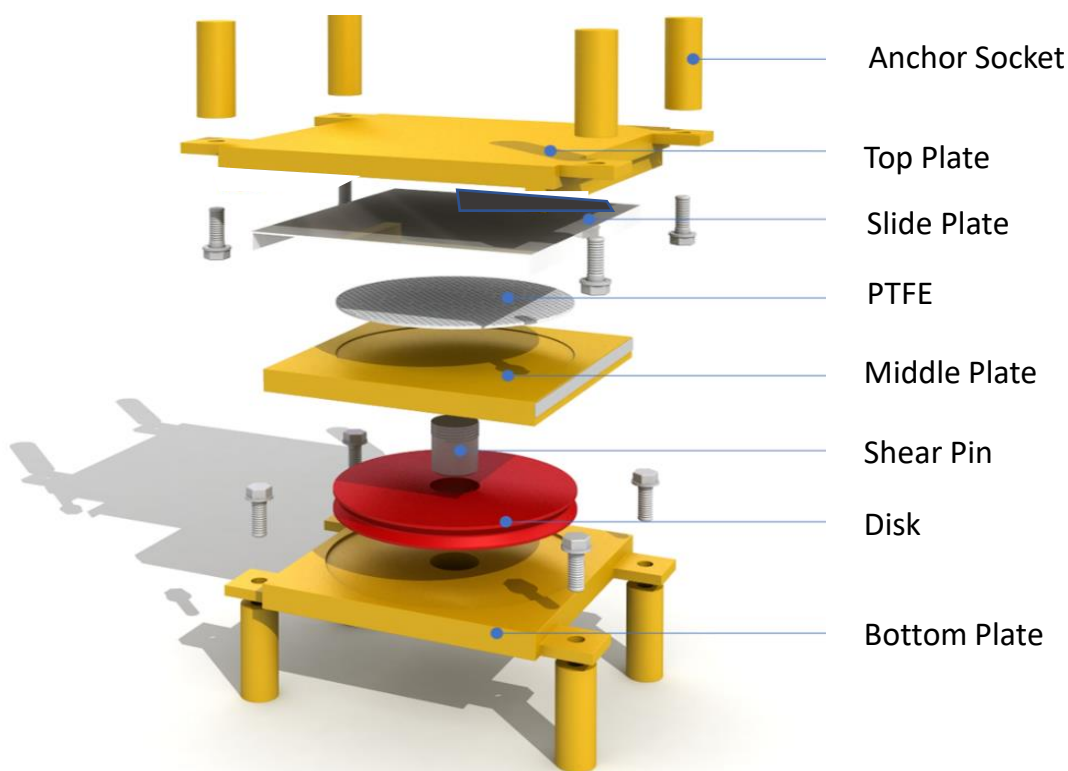
- Top Plate (SM490)
- Slide plate (STS316)
- DISK (Polyurethane)
- Shear Pin (High Strength Pin)
- Bottom Plate (SM490)
- Anchor Socket (SS400)
- Anchor Bolt

# Disc Bearing

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## Multi Bearing

### Major lements



### Designation & Materials

- Top Plate (SM490)
- Guide bar (SM490)
- Slide plate (STS316)
- PTFE
- Middle Plate (SM490)
- DISK (Polyurethane)
- Shear Pin (High Strength Pin)
- Bottom Plate (SM490)
- Anchor Socket (SS400)
- Anchor Bolt

## Disc Bearing

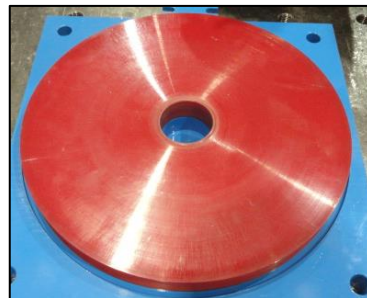
MACROAD

### The structural role of the major elements

#### ■ Polyurethane Disk

Supporting the upper load of the structure and accommodating rotational deformation it is a device. The allowable compressive stress is 35Mpa, which is about twice that of general bridge bearings. High compression, high elasticity, high strength polyurethane.

It is possible to minimize the size of the support by applying a disk. There is little environmental impact by corrosive factors such as chemicals.



#### ■ Shear Restriction Mechanism

It is a device that transmits the load in the horizontal direction. It is a high-strength special steel pin. It is welded or bolted to the middle plate of the disk support to strengthen the structural stability of the support. The cross section is determined to sufficiently resist the shear force considered when designing the disk bearing, and the same cross section resists shear in all directions.

#### ■ PTFE

It has sufficient sliding performance with low friction characteristics with a coefficient of friction ( $\mu$ ) of 0.02 to sufficiently accommodate the amount of movement caused by the temperature expansion and contraction of the upper structure.

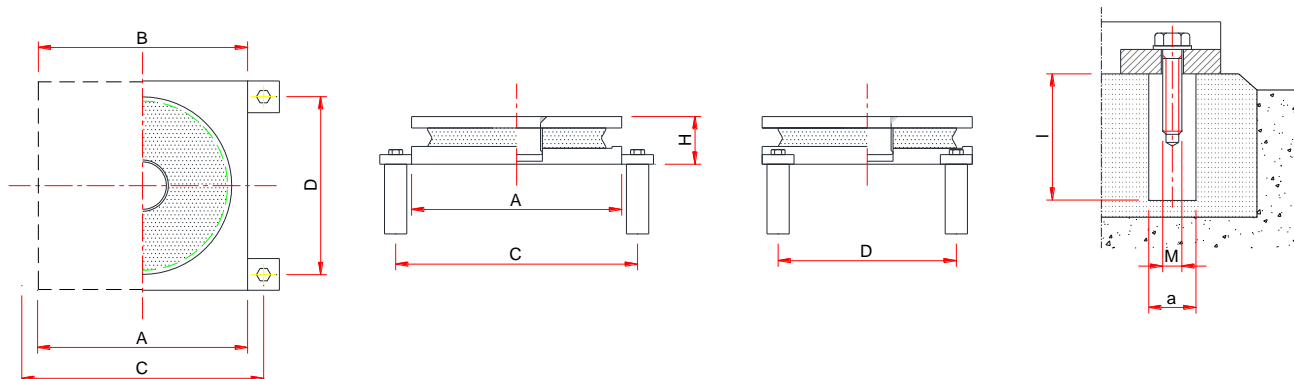
This is a function that prevents QKECLA from using most fluororesin plates. Lubricating oil flows between the fluororesin plates and stainless plates to induce smoother sliding.

#### ■ Guide Bar

It is a device that limits the movement direction of the superstructure, that is, movement in the throttle direction or movement in the direction perpendicular to the throttle axis. The material is SM490 or equivalent steel.

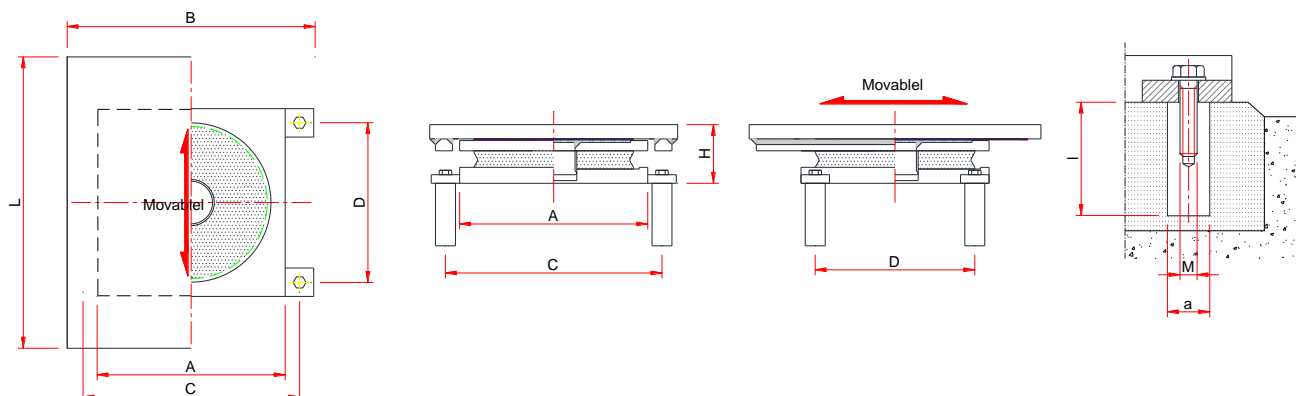


## Design Specification – Fixed Bearing



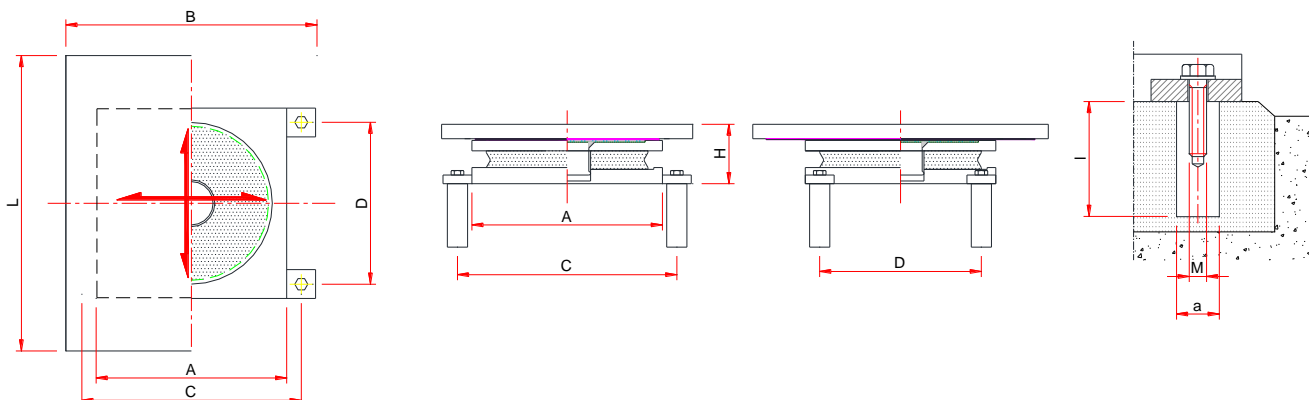
Model		V (kN)	H (kN)	Rot. (rad)	Bearing Dimension(mm)					Anchor Dim.(mm)			
					A	B	C	D	H	M	a	l	n
MDB 50	F10	500	50	0.02	220	220	270	170	59	16	40	110	4
MDB 75	F10	750	75	0.02	240	240	290	190	60	16	40	110	4
MDB 100	F10	1000	100	0.02	260	260	310	210	63	16	40	110	4
MDB 135	F10	1350	135	0.02	290	290	340	240	68	16	40	110	4
MDB 150	F10	1500	150	0.02	300	300	350	250	70	16	40	110	4
MDB 175	F10	1750	175	0.02	330	330	380	280	74	16	40	110	4
MDB 200	F10	2000	200	0.02	350	350	400	300	79	16	40	110	4
MDB 250	F10	2500	250	0.02	380	380	430	330	85	16	40	110	4
MDB 300	F10	3000	300	0.02	410	410	470	350	91	20	50	110	4
MDB 350	F10	3500	350	0.02	440	440	500	380	100	20	50	120	4
MDB 400	F10	4000	400	0.02	470	470	530	410	105	20	50	150	4
MDB 450	F10	4500	450	0.02	500	500	570	430	112	24	60	120	4
MDB 500	F10	5000	500	0.02	530	530	600	460	117	24	60	150	4
MDB 550	F10	5500	550	0.02	550	550	620	480	121	24	60	150	4
MDB 600	F10	6000	600	0.02	580	580	665	495	128	30	75	150	4
MDB 650	F10	6500	650	0.02	610	610	695	525	134	30	75	150	4
MDB 700	F10	7000	700	0.02	630	630	715	545	139	30	75	150	4
MDB 750	F10	7500	750	0.02	660	660	745	575	142	30	75	180	4
MDB 800	F10	8000	800	0.02	690	690	775	605	149	30	75	180	4
MDB 850	F10	8500	850	0.02	700	700	785	615	151	30	75	180	4
MDB 900	F10	9000	900	0.02	730	730	815	645	156	30	75	200	4
MDB 950	F10	9500	950	0.02	750	750	850	650	158	36	90	180	4
MDB 1000	F10	10000	1000	0.02	770	770	870	670	161	36	90	180	4
MDB 1100	F10	11000	1100	0.02	810	810	910	710	171	36	90	220	4
MDB 1200	F10	12000	1200	0.02	850	850	950	750	177	36	90	220	4
MDB 1300	F10	13000	1300	0.02	880	880	980	780	183	36	90	250	4
MDB 1400	F10	14000	1400	0.02	910	910	1035	785	190	42	105	220	4
MDB 1500	F10	15000	1500	0.02	950	950	1075	825	197	42	105	250	4

## Design Specification – Guided Bearing



Model		V	H	Rot.	Mov.	Bearing Dimension(mm)						Anchor Dim.(mm)			
		(kN)	(kN)	(rad)	(mm)	A	B	L	C	D	H	M	a	l	n
MDB 50	U10	500	50	0.02	±50	210	300	320	260	160	81	16	40	110	4
MDB 75	U10	750	75	0.02	±50	240	320	350	290	190	85	16	40	110	4
MDB 100	U10	1000	100	0.02	±50	260	340	370	310	210	87	16	40	110	4
MDB 135	U10	1350	135	0.02	±50	290	370	400	340	240	92	16	40	110	4
MDB 150	U10	1500	150	0.02	±50	300	390	410	350	250	95	16	40	110	4
MDB 175	U10	1750	175	0.02	±50	320	410	430	370	270	98	16	40	110	4
MDB 200	U10	2000	200	0.02	±50	350	430	460	400	300	103	16	40	110	4
MDB 250	U10	2500	250	0.02	±50	380	470	490	430	330	111	16	40	110	4
MDB 300	U10	3000	300	0.02	±50	410	500	520	470	350	117	20	50	110	4
MDB 350	U10	3500	350	0.02	±50	440	530	550	500	380	128	20	50	120	4
MDB 400	U10	4000	400	0.02	±50	470	560	580	530	410	135	20	50	150	4
MDB 450	U10	4500	450	0.02	±50	490	580	600	550	430	140	24	60	120	4
MDB 500	U10	5000	500	0.02	±50	530	620	640	600	460	153	24	60	150	4
MDB 550	U10	5500	550	0.02	±50	560	650	670	630	490	158	24	60	150	4
MDB 600	U10	6000	600	0.02	±50	590	670	700	675	505	167	30	75	150	4
MDB 650	U10	6500	650	0.02	±50	600	690	710	685	515	171	30	75	150	4
MDB 700	U10	7000	700	0.02	±50	620	710	730	705	535	177	30	75	150	4
MDB 750	U10	7500	750	0.02	±50	650	740	760	735	565	183	30	75	180	4
MDB 800	U10	8000	800	0.02	±50	670	760	780	755	585	187	30	75	180	4
MDB 850	U10	8500	850	0.02	±50	710	810	820	795	625	199	30	75	180	4
MDB 900	U10	9000	900	0.02	±50	730	830	840	815	645	207	30	75	200	4
MDB 950	U10	9500	950	0.02	±50	750	850	860	850	650	210	36	90	180	4
MDB 1000	U10	10000	1000	0.02	±50	770	870	880	870	670	215	36	90	180	4
MDB 1100	U10	11000	1100	0.02	±50	810	920	1020	910	710	225	36	90	220	4
MDB 1200	U10	12000	1200	0.02	±50	850	960	1060	950	750	236	36	90	220	4
MDB 1300	U10	13000	1300	0.02	±50	870	980	1080	970	770	240	36	90	250	4
MDB 1400	U10	14000	1400	0.02	±50	920	1030	1130	1045	795	256	42	105	220	4
MDB 1500	U10	15000	1500	0.02	±50	950	1070	1160	1075	825	263	42	105	250	4

## Design Specification – Multi Bearing



Model		V	H	Rot.	Mov.	Bearing Dim.(mm)						Anchor Dim.(mm)			
		(kN)	(kN)	(rad)	(mm)	A	B	L	C	D	H	M	a	l	n
MDB 50	M	500	25	0.02	±50	230	300	330	270	170	87	16	40	80	4
MDB 75	M	750	37.5	0.02	±50	240	320	350	290	190	90	16	40	110	4
MDB 100	M	1000	50	0.02	±50	260	340	370	310	210	93	16	40	110	4
MDB 135	M	1350	67.5	0.02	±50	290	370	400	340	240	98	16	40	110	4
MDB 150	M	1500	75	0.02	±50	300	380	410	350	250	100	16	40	110	4
MDB 175	M	1750	87.5	0.02	±50	320	400	430	370	270	103	16	40	110	4
MDB 200	M	2000	100	0.02	±50	340	420	450	390	290	106	16	40	110	4
MDB 250	M	2500	125	0.02	±50	380	460	490	430	330	115	16	40	110	4
MDB 300	M	3000	150	0.02	±50	410	490	520	460	360	124	16	40	110	4
MDB 350	M	3500	175	0.02	±50	440	520	550	500	380	132	20	50	110	4
MDB 400	M	4000	200	0.02	±50	470	550	580	530	410	141	20	50	110	4
MDB 450	M	4500	225	0.02	±50	500	580	610	560	440	148	20	50	110	4
MDB 500	M	5000	250	0.02	±50	520	600	630	580	460	155	20	50	110	4
MDB 550	M	5500	275	0.02	±50	560	640	670	630	490	166	24	60	110	4
MDB 600	M	6000	300	0.02	±50	580	660	690	650	510	171	24	60	110	4
MDB 650	M	6500	325	0.02	±50	610	690	720	680	540	180	24	60	110	4
MDB 700	M	7000	350	0.02	±50	640	720	750	710	570	185	24	60	110	4
MDB 750	M	7500	375	0.02	±50	660	740	770	730	590	194	24	60	110	4
MDB 800	M	8000	400	0.02	±50	680	760	790	765	595	199	30	75	110	4
MDB 850	M	8500	425	0.02	±50	700	780	810	785	615	204	30	75	110	4
MDB 900	M	9000	450	0.02	±50	720	800	830	805	635	210	30	75	110	4
MDB 950	M	9500	475	0.02	±50	740	820	850	825	655	215	30	75	110	4
MDB 1000	M	10000	500	0.02	±50	760	840	870	845	675	221	30	75	120	4
MDB 1100	M	11000	550	0.02	±50	800	880	910	885	715	232	30	75	120	4
MDB 1200	M	12000	600	0.02	±50	840	920	950	925	755	240	30	75	150	4
MDB 1300	M	13000	650	0.02	±50	870	950	980	970	770	251	36	90	120	4
MDB 1400	M	14000	700	0.02	±50	910	990	1020	1010	810	260	36	90	150	4
MDB 1500	M	15000	750	0.02	±50	940	1020	1050	1040	840	269	36	90	150	4

# Factory (An sung, Hwa sung)

MACROAD

## Factory 1 <An sung>



## Factory 2 <Hwa sung>





Head office/1 Factory | 340-28, Namsadangro, Bogae-myeon, Anseong-si, Gyeonggi-do, KOREA  
Seoul office/Lab | Eoeun Bldg, 5<sup>th</sup> Fl, Saemalro 125, Songpa-gu, Seoul, Korea  
2 Factory | 129-45, Sinnamro 365beon-gil, Namyang-eup, Hwaseong-si,  
Gyeonggi-do, Korea

TEL +82.31.677.3780 FAX +82.31.677.3788  
TEL +82.2.407.3780~1 FAX +82.2.407.3782  
TEL +82.31.684.9975 FAX +82.31.684.1173

[www.macroad.co.kr](http://www.macroad.co.kr)