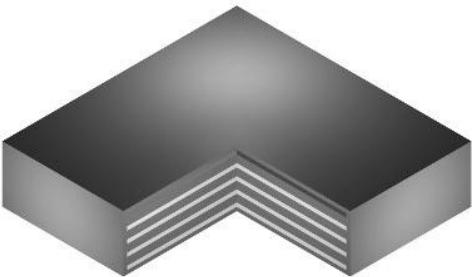


elastomeric bearings

**MK4**  
Innovative Solutions







MK4 Elastomeric Bearings are deformable structural components constructed partially or wholly from elastomer. They are essentially designed to transmit vertical loads and accommodate movements between a bridge and its supporting structure simultaneously, especially for:

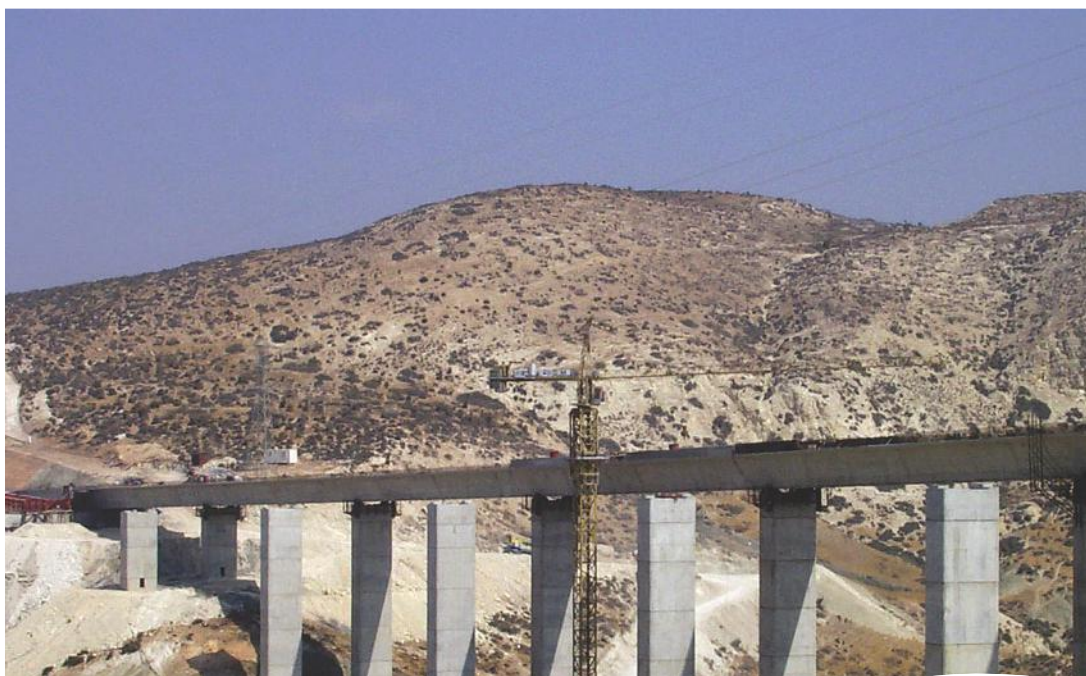
- transmission of vertical load;
- horizontal displacement in all directions;
- rotation of the bearing surfaces about all axes;
- accommodation of transition horizontal forces with or without additional fixings.

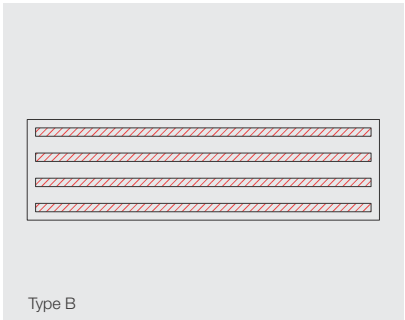
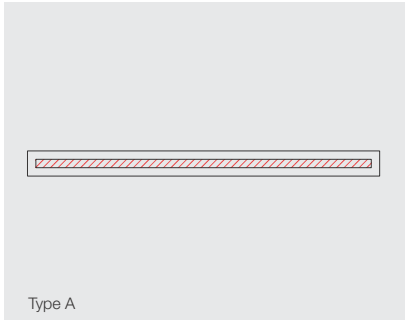
The bearings comprise a block of vulcanized elastomer that may be reinforced with one or more steel plates. In addition to any internal reinforcement, bearings may have external steel load plates bonded to the upper or lower elastomer layers or both.

MK4's Technical Department has engineers with the relevant expertise and experience to assist with the selection of the appropriate bearing for a given application as well as providing the best solution for the client's specific problems.

Since we recognize the importance of simplicity, clarity and ease of use, we emphasize that we can offer both: the simple standardized series of products and also highly sophisticated customized solutions for specific problems.

This brochure is intended to provide a quick and expedient reference and guide for designers, engineers and contractors alike.





Elastomeric bearings are equipped with several vulcanized steel plates in order that internal lateral contraction will be prevented. The result is that load carrying capacity increases, resilience is reduced, while lateral displacement and distortion of the adjacent structural elements can be compensated by the bearing. Reinforced elastomeric bearings are of simple construction, do not require maintenance and are corrosion proof. They have a long service life, even under extremely onerous environmental conditions.

## Bearings fully covered with Elastomer

### Non Anchored Types

Reinforced elastomeric bearings are designed in accordance with loads to be absorbed and displacement and distortion movements to be expected. Allowable surface contact pressures must be taken into account, as well as the resulting bearing reaction forces, movements and installation tolerances:

Contact area	Admissible Pressure Nmax	Required Pressure Nmin
< 50.000 mm <sup>2</sup>	10,0 N/mm <sup>2</sup>	3,0 N/mm <sup>2</sup>
< 120.000 mm <sup>2</sup>	12,5 N/mm <sup>2</sup>	3,0 N/mm <sup>2</sup>
> 120.000 mm <sup>2</sup>	15,0 N/mm <sup>2</sup>	5,0 N/mm <sup>2</sup>

Table 1

The rubber cover is generally 2,5 mm on top and bottom surfaces and 5-6 mm laterally. The number and thickness of layers is defined by the required translation and rotation. Therefore they are different for each bearing and are given in page 6.

- Type A:** Laminated bearings fully covered with elastomer comprising only one steel reinforcing plate (former Type 1)
- Type B:** Laminated bearings fully covered with elastomer comprising a minimum of two steel reinforcing plates (former Type 1)





## Bearings with outer Steel Plates

### Anchored Types

Whenever the minimum surface contact pressures falls below 3 N/mm<sup>2</sup> the following bearings should be used. All these bearings are provided with external steel plates (see page 6).

#### Bearings with outer steel plates and anchorages

These bearings are especially useful where traction and high horizontal forces are to be transmitted. The anchoring of these bearings is effected by dowels or bolts.

**Type C(1):** Laminated bearings with outer steel plates and bolts (former Type 2a).

Especially for use with cast-in-situ beams with occasional, temporary and irregular traction forces. These bearings are non-replaceable.

**Type C(2):** Laminated bearings with outer steel plates, anchor-plates and dowels (former Type 2b).

Especially for use with steel beams with occasional, temporary and irregular traction forces. These bearings are replaceable.

**Type C(3):** Laminated bearings with outer steel plates, anchor-plates and shear-keys (former Type 4).

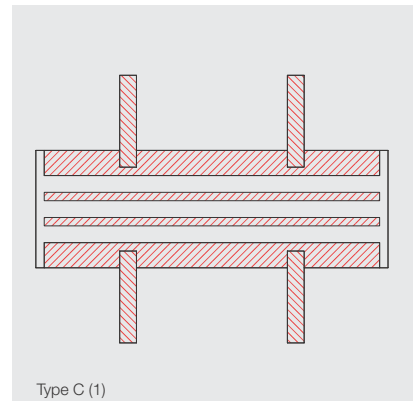
These bearings are especially useful in case of large movements but small loads. They are replaceable.

#### Bearings with profiled outer steel plates

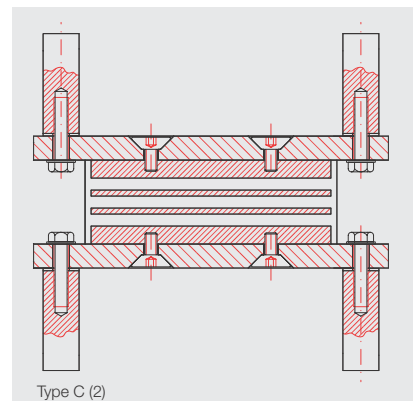
**Type C(4):** Laminated bearings with profiled outer steel plates (former Type 5).

These bearings can be utilized on a variety of structures. The anchoring is effected by increased friction between substructure and bearing by the dowel-like action of the vulcanized bonded chequered or channelled plates on the mortar bed. They are designed for both cast-in-situ concrete and precast concrete elements.

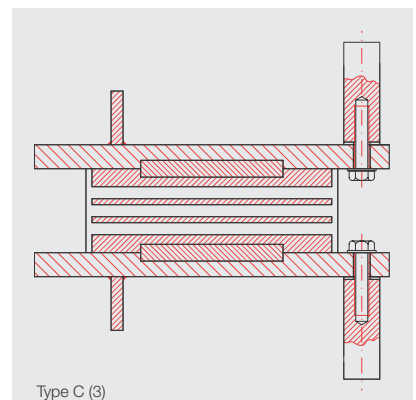
These bearings are non-replaceable.



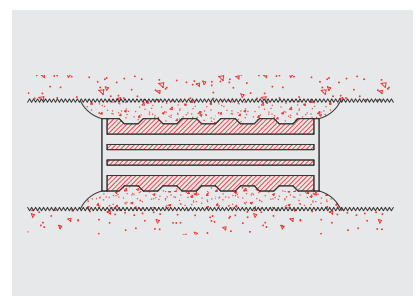
Type C (1)



Type C (2)



Type C (3)



## Low-Friction Sliding Bearings

Since the deformation capacity relates to the geometrical form of the bearings, there is the facility to allow for larger movements by adding a sliding surface in combination with a PTFE surface and stainless steel. MK4 sliding bearings consist of a reinforced elastomeric bearing with a sliding system, including optional horizontal force absorption. Also here the combination of all available basic types is possible.

**Type D:** Type B with PTFE sheet bonded to the elastomer.

**Type E:** Type C with one outer plate bonded to the elastomer and PTFE sheet recessed in the steel.

## Plain Pad Bearings and Strip Bearings

Non-reinforced elastomeric bearings also absorb displacements and distortions, but only to a limited extent due to their reduced thickness and size, compared with reinforced elastomeric bearings. They are especially useful for loads upto 100-150 kN.

These bearings can be produced in any desired size upto 1000 mm in length.

**Type F:** Plain pad bearings and strip bearings.

## Guided Elastomeric Bearings

Combined vertical loads and horizontal forces can be transferred with side restraints. For major horizontal forced, as they occur in large bridge spans, it is more appropriate to use horizontal guided bearings. They transfer these horizontal forces independently into the substructure.

Horizontal guided bearings transfer loads in both longitudinal and transverse directions.

**Type G:** Guided Elastomeric Bearings.



Type D



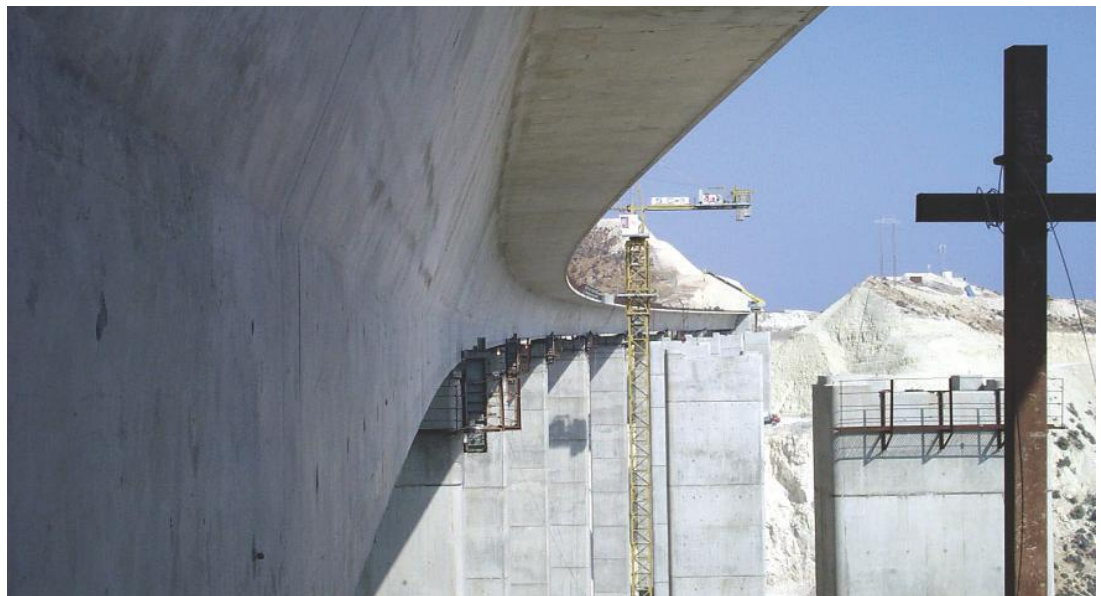
Type E



Type F



Type G

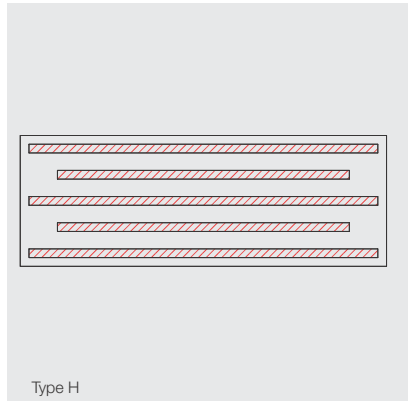


## High Rotation Bearings

In the case of large rotations, all the above basic types can be manufactured with alternate internal steel-plates reduced in plan size so as to offer less resistance to rotations.

The thickness of the elastomeric layers and of the steel-plates is identical to the standard bearing types.

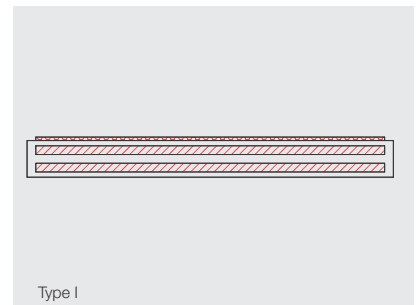
**Type H:** High rotation bearings.



## ILM Bearing Pads

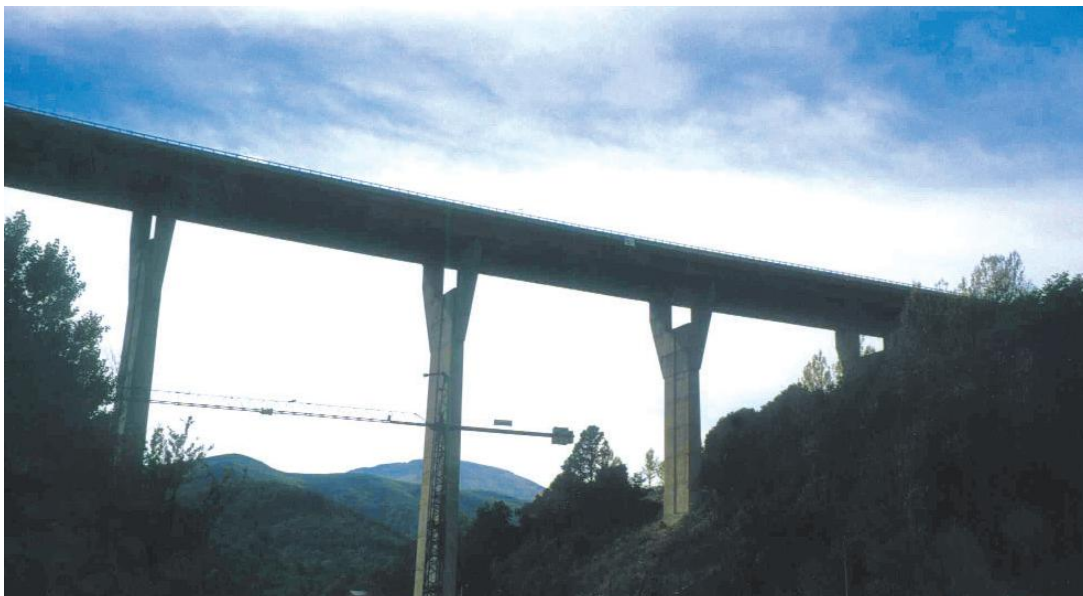
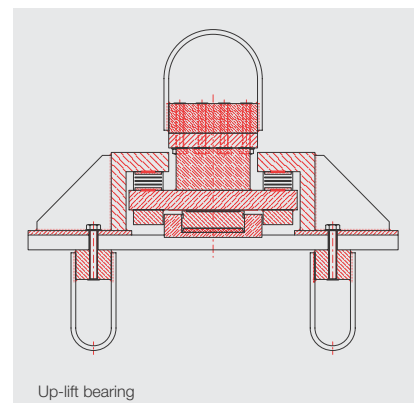
Incremental launching for bridges combines the advantage of on-site concreting with prefabricated elements. MK4's special launching pads are for use with the incremental launching method of construction and other techniques of sliding bridges. They can be supplied in various formats.

**Type I:** ILM Bearing Pads



## Special Bearings

MK4's Technical Department is also well equipped and willing to provide customized solutions to specific problems.



			NON-ANCHORED TYPES			ANCHORED TYPES								
			A, B				C(1), C(2), C(3)			C(4)				
Admissible load	Dimension	No. of layers	Admissible displacement +/-	Height	Effective elastomer thickness	Admissible displacement +/-	Total Height excl. anchor plates	Total Height incl. anchor plates	Total Height	Effective elastomer thickness	Anchorage for Types C(2), C(3)	Admissible rotation		
V	a*b; D	n	W	d	T	W	d	d	d	T		<input type="checkbox"/>	<input type="radio"/>	
MN	mm	-	mm	mm	mm	mm	mm	mm	mm	mm		rad/ 1000		
0,10 0,15	100x100	1	7	14	10	-	-	-	-	-	4 Bolts M12 with Dowels 30x30x150	4		
		2	11	21	15	7	42	72	32	10		8		
		3	14	28	20	11	49	79	39	15		12		
		4	16	35	25	14	56	86	46	20		16		
		5	18	42	30	16	63	93	53	25		20		
		6	-	-	-	18	70	100	60	30		24		
0,30	150x200	1	7	14	10	-	-	-	-	-	4 Bolts M16 with Dowels 40x40x200	3		
		2	11	21	15	7	42	72	32	10		6		
		3	14	28	20	11	49	79	39	15		9		
		4	18	35	25	14	56	86	46	20		12		
		5	21	42	30	18	63	93	53	25		15		
		6	23	49	35	21	70	100	60	30		18		
		7	25	56	40	23	77	107	67	35		21		
		8	27	63	45	25	84	114	74	40		24		
		9	28	70	50	27	91	121	81	45		27		
		10	-	-	-	28	98	128	88	50		30		
0,31 0,63 0,75 1,00	ø 200 200x250 200x300 200x400	1	9	19	13	-	-	-	-	-	4 Bolts M16 with Dowels 40x40x200	3		
		2	15	30	21	11	49	79	39	16		6		
		3	20	41	29	17	60	90	50	24		9		
		4	26	52	37	22	71	101	61	32		12		
		5	30	63	45	28	82	112	72	40		15		
		6	34	74	53	32	93	123	83	48		18		
		7	36	85	61	35	104	134	94	56		21		
		8	-	-	-	37	115	145	105	64		24		
0,6 1,3	ø 250 250x400	1	9	19	13	-	-	-	-	-	4 Bolts M16 with Dowels 40x40x200	3		
		2	15	30	21	11	49	79	39	16		5		
		3	20	41	29	17	60	90	50	24		8		
		4	26	52	37	22	71	101	61	32		10		
		5	32	63	45	28	82	112	72	40		13		
		6	37	74	53	34	93	123	83	48		15		
		7	40	85	61	38	104	134	94	56		18		
		8	43	96	69	41	115	145	105	64		20		
		9	46	107	77	44	126	156	116	72		23		
		10	-	-	-	46	137	167	127	80		25		
0,9 1,8	ø 300 300x400	1	9	19	13	-	-	-	-	-	4 Bolts M16 with Dowels 40x40x200	2		
		2	15	30	21	11	49	79	39	16		4		
		3	20	41	29	17	60	90	50	24		6		
		4	26	52	37	22	71	101	61	32		8		
		5	32	63	45	28	82	112	72	40		10		
		6	37	74	53	34	93	123	83	48		12		
		7	43	85	61	39	104	134	94	56		14		
		8	46	96	69	44	115	145	105	64		16		
		9	50	107	77	48	126	156	116	72		18		
		10	52	118	85	51	137	167	127	80		20		
		11	55	129	93	53	148	178	138	88		22		
		12	-	-	-	56	159	189	149	96		24		
1,2	350	1	11	24	16	-	-	-	-	-	4 Bolts M16 with Dowels 40x40x200	-		
		2	19	39	27	15	56	86	46	22		4		
		3	27	54	38	23	71	101	61	33		8		
		4	34	69	49	31	86	116	76	44		12		
		5	42	84	60	39	101	131	91	55		16		
		6	50	99	71	46	116	146	106	66		20		
		7	55	114	82	52	131	161	121	77		24		
		8	59	129	93	57	146	176	136	88		28		
		9	63	144	104	61	161	191	151	99		32		
		10	66	159	115	64	176	206	166	110		36		
2,4	350x450	3	27	54	38	23	81	121	61	33	4 Bolts M16 with Dowels 40x40x200	8		
		4	34	69	49	31	96	136	76	44		10		
		5	42	84	60	39	111	151	91	55		13		
		6	50	99	71	46	126	166	106	66		15		
		7	55	114	82	52	141	181	121	77		18		
		8	59	129	93	57	156	196	136	88		20		
		9	63	144	104	61	171	211	151	99		23		
		10	66	159	115	64	186	226	166	110		25		
1,9 3,0	ø 400 400x500	3	27	54	38	23	81	121	61	33	4 Bolts M20 with Dowels 50x50x250	6		
		4	34	69	49	31	96	136	76	44		8		
		5	42	84	60	39	111	151	91	55		10		
		6	50	99	71	46	126	166	106	66		12		
		7	57	114	82	54	141	181	121	77		14		
		8	62	129	93	60	156	196	136	88		16		
		9	67	144	104	65	171	211	151	99		18		
		10	70	159	115	69	186	226	166	110		20		
		11	74	174	126	72	201	241	181	121		22		
		12	-	-	-	75	216	256	196	132		24		





			NON-ANCHORED TYPES			ANCHORED TYPES							
			B					C(1), C(2), C(3)	C(4)				
Admissible load	Dimension	No. of layers	Admissible displacement +/-	Total Height	Effective elastomer thickness	Admissible displacement +/-	Total Height excl. anchor plates	Total Height incl. anchor plates	Total Height	Effective elastomer thickness	Anchorage for Types C(2), C(3)	Admissible rotation	
V	a*b; D	n	W	d	T	W	d	d	d	T		<input type="checkbox"/>	<input type="radio"/>
MN	mm	-	mm	mm	mm	mm	mm	mm	mm	mm		rad/ 1000	
2,4 4,1	ø 450 450x600	3	27	54	38	23	81	121	61	33	4 Bolts M20 with Dowels 50x50x250	6	9
		4	34	69	49	31	96	136	76	44		8	12
		5	42	84	60	39	111	151	91	55		10	15
		6	50	99	71	46	126	166	106	66		12	18
		7	57	114	82	54	141	181	121	77		14	21
		8	65	129	93	62	156	196	136	88		16	24
		9	70	144	104	67	171	211	151	99		18	27
		10	74	159	115	72	186	226	166	110		20	30
		11	78	174	126	76	201	241	181	121		22	33
		12	82	189	137	80	216	256	196	132		24	36
		13	85	204	148	83	231	271	211	143		26	39
2,9 3,6 4,5	ø 500 ø 550 500x600	3	27	54	38	23	81	121	61	33	4 Bolts M20 with Dowels 50x50x250	6	6
		4	34	69	49	31	96	136	76	44		8	8
		5	42	84	60	39	111	151	91	55		10	10
		6	50	99	71	46	126	166	106	66		12	12
		7	57	114	82	54	141	181	121	77		14	14
		8	65	129	93	62	156	196	136	88		16	16
		9	72	144	104	69	171	211	151	99		18	18
		10	77	159	115	75	186	226	166	110		20	20
		11	82	174	126	80	201	241	181	121		22	22
		12	86	189	137	84	216	256	196	132		24	24
		13	89	204	148	88	231	271	211	143		26	26
		14	93	219	159	91	246	286	226	154		28	28
		15	-	-	-	94	261	301	241	165		30	30
4,2 5,0 6,3	ø 600 ø 650 600x700	3	35	70	50	32	95	135	75	45	4 Bolts M20 with Dowels 50x50x250	6	6
		4	46	90	65	42	115	155	95	60		8	8
		5	56	110	80	53	135	175	115	75		10	10
		6	67	130	95	63	155	195	135	90		12	12
		7	77	150	110	74	175	215	155	105		14	14
		8	86	170	125	84	195	235	175	120		16	16
		9	93	190	140	91	215	255	195	135		18	18
		10	99	210	155	98	235	275	215	150		20	20
		11	105	230	170	103	255	295	235	165		22	22
		12	109	250	185	108	275	315	255	180		24	24
		13	113	270	200	112	295	335	275	195		26	26
5,8 6,6 8,4	ø 700 ø 750 700x800	3	35	70	50	32	95	135	75	45	4 Bolts M24 with Dowels 60x60x300	6	6
		4	46	90	65	42	115	155	95	60		8	8
		5	56	110	80	53	135	175	115	75		10	10
		6	67	130	95	63	155	195	135	90		12	12
		7	77	150	110	74	175	215	155	105		14	14
		8	88	170	125	84	195	235	175	120		16	16
		9	98	190	140	95	215	255	195	135		18	18
		10	105	210	155	103	235	275	215	150		20	20
		11	112	230	170	110	255	295	235	165		22	22
		12	118	250	185	116	275	315	255	180		24	24
		13	123	270	200	121	295	335	275	195		26	26
		14	127	290	215	126	315	355	295	210		28	28
		15	131	310	230	130	335	375	315	225		30	30
7,5 8,5 9,6	ø 800 ø 850 800x800	3	41	79	59	38	104	144	84	54	4 Bolts M24 with Dowels 60x60x300	6	6
		4	54	102	77	50	127	167	107	72		8	8
		5	67	125	95	63	150	190	130	90		10	10
		6	79	148	113	76	173	213	153	108		12	12
		7	92	171	131	88	196	236	176	126		14	14
		8	104	194	149	101	219	259	199	144		16	16
		9	115	217	167	113	242	282	222	162		18	18
		10	124	240	185	122	265	305	245	180		20	20
		11	131	263	203	129	288	328	268	198		22	22
		12	138	286	221	136	311	351	291	216		24	24
		13	144	309	239	142	334	374	314	234		26	26
		14	149	332	257	147	357	397	337	252		28	28
9,5 12,0	ø 900 900x900	3	41	79	59	38	104	144	84	54	4 Bolts M24 with Dowels 60x60x300	5	5
		4	54	102	77	50	127	167	107	72		6	6
		5	67	125	95	63	150	190	130	90		8	8
		6	79	148	113	76	173	213	153	108		9	9
		7	92	171	131	88	196	236	176	126		11	11
		8	104	194	149	101	219	259	199	144		12	12
		9	117	217	167	113	242	282	222	162		14	14
		10	128	240	185	126	265	305	245	180		15	15
		11	137	263	203	135	288	328	268	198		17	17
		12	145	286	221	143	311	351	291	216		18	18
		13	152	309	239	150	334	374	314	234		20	20
		14	158	332	257	156	357	397	337	252		21	21
		15	163	355	275	162	380	420	360	270		23	23
		16	168	378	293	167	403	443	383	288		24	24

## Quality Control

UNE-EN-ISO 9001



EMPRESA CERTIFICADA

MK4 and all their sub-suppliers are subject to a strict quality-control system as a part of the ISO 9001/EN 29002 certification.

The quality of the MK4 bearing production is continuously monitored by independent testing laboratories and internal quality control complies with established international standards.

Quality control procedures and other verifications are applied throughout the production phase for:

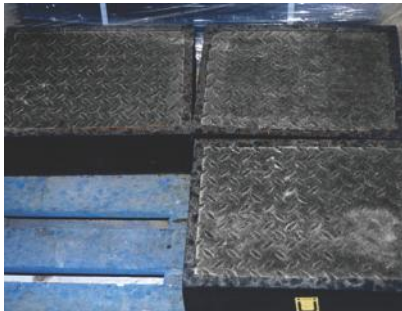
- materials;
- workmanship;
- finished product;

to ensure that the components satisfy the relevant standards.

If required, load tests on finished bearings can be performed both in-house and externally at official testing laboratories.

Furthermore, all elastomeric bearings can be, if required, manufactured under the control of Technical University Munich and are entitled to display TUM-sticker or under French standards (NF-sticker).

In addition, MK4 engineers are available to provide technical advice relative to quality standards of the interfaces, bearing installation, cement joint forming, bearing plinth design, etc. .





Professional installation is the unconditional prerequisite for optimum use and service life of the bearings.

Elastomeric bearings are sensitive to rough handling during construction operations. They should therefore be treated carefully during transportation, assembly and installation.

Handling and installation of bearings should only be carried out by qualified personnel whose knowledge and experience are well proven.

Generally bearings should be installed horizontally on an intermediate bed of mortar which serves as a levelling course.

It must be taken into account that, due to its type of deformation, elastomeric material will not be suitable if it is restrained laterally.

Care should be taken to keep the bearing clean and protected to avoid damage by grout or concrete and to ensure that it can be replaced without difficulty if required. Suitable preventative measures should also be taken to ensure that the bearings do not come into contact with grease, solvents or similar materials.

If required, MK4 can submit a technical manual which contains a detailed description of the installation process.





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