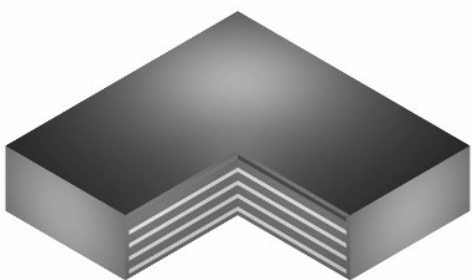




elastomeric bearings







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

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

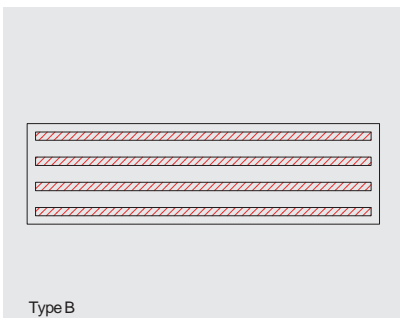
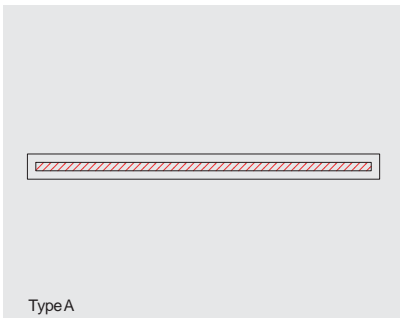
placement and
account, as well

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^2 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).

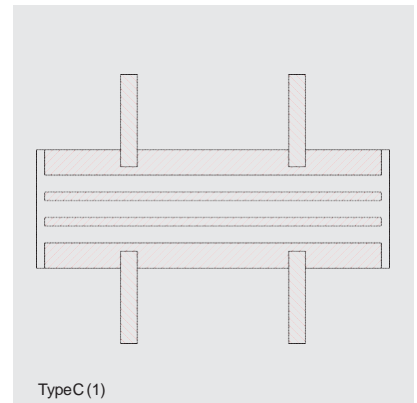
These bearings are especially useful in case of large movements but small loads. They are replaceable.

Bearings with profiled outer steel plates

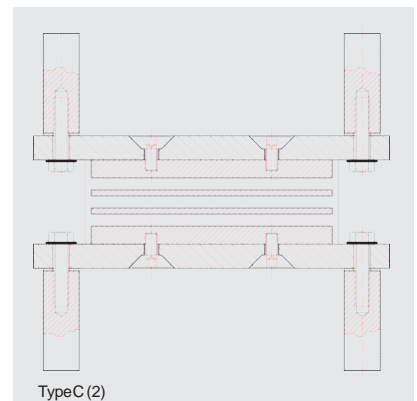
Type C(4): Laminated bearings with profiled outer steel plates (former Type 5).

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.

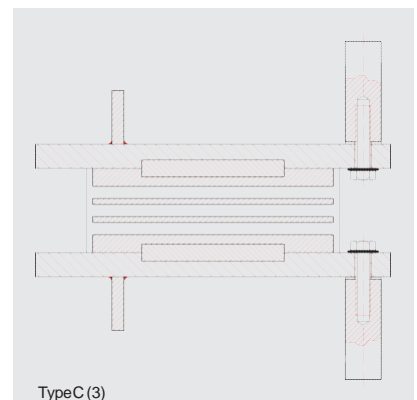
These bearings are non-replaceable.



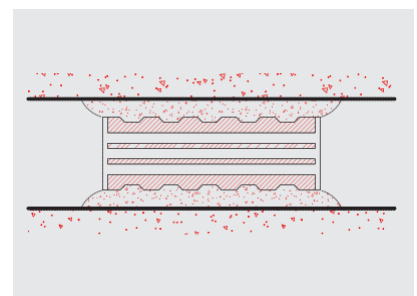
Type C(1)

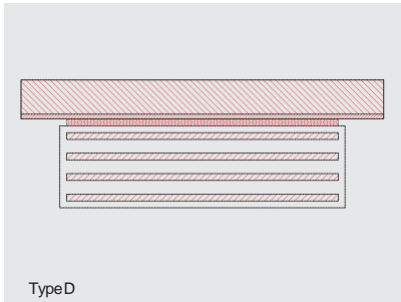


Type C(2)



Type C(3)



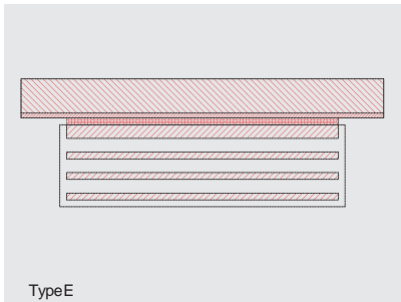


Low-Friction Sliding Bearings

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.

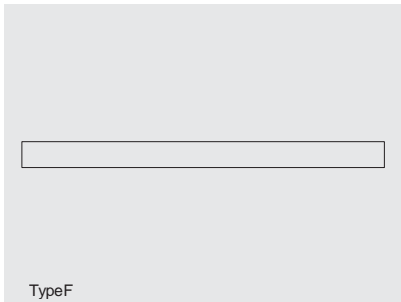


Plain Pad Bearings and Strip Bearings

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 up to 100-150 kN.

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

Type F: Plain pad bearings and strip bearings.

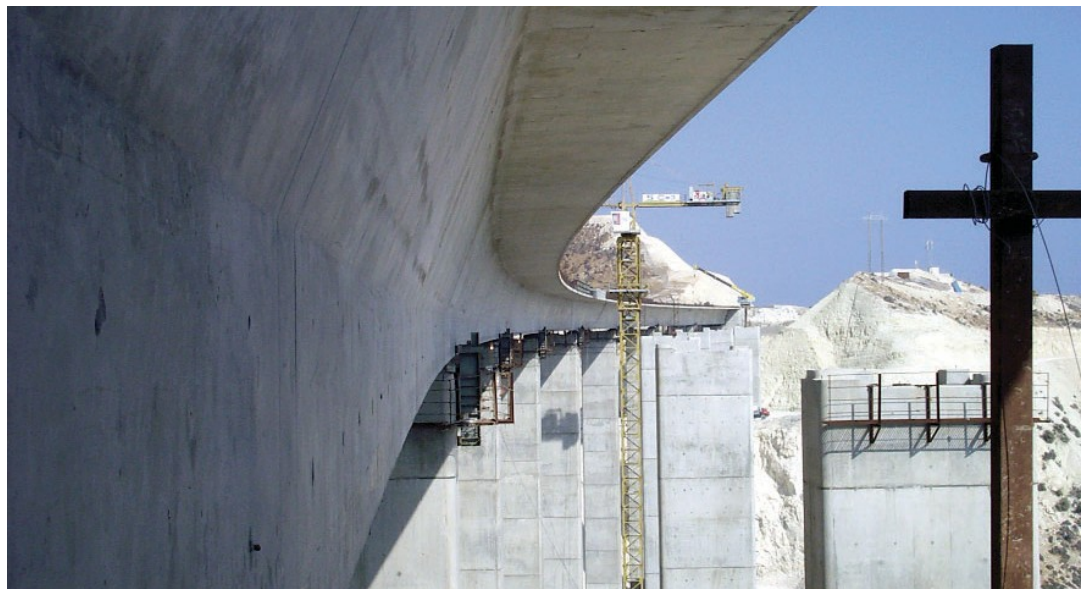
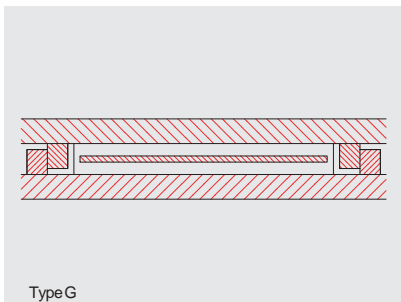


Guided Elastomeric Bearings

Combined vertical loads and horizontal forces can be transferred with side restraints. For major horizontal forces, 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.



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.

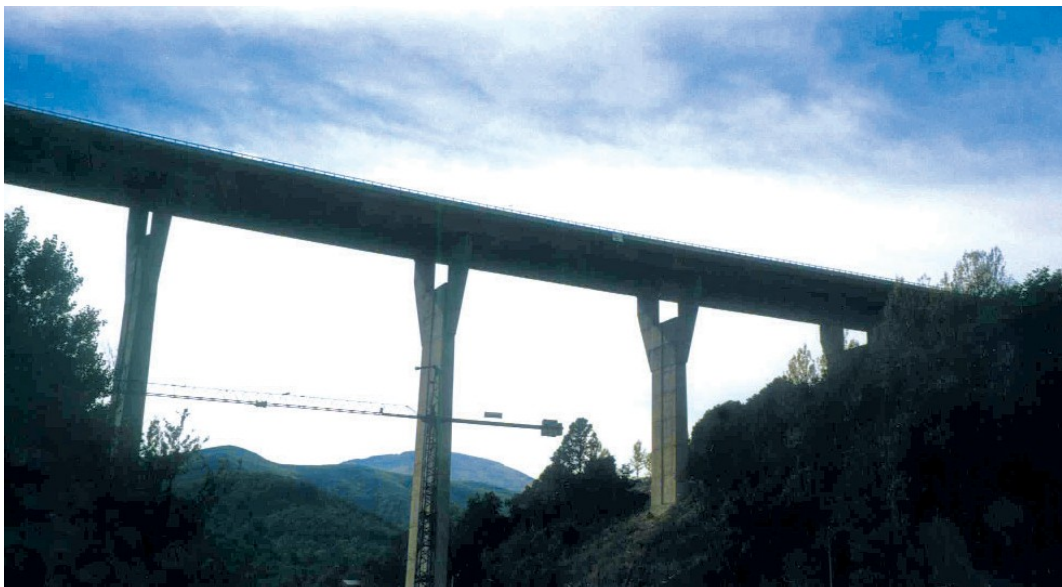
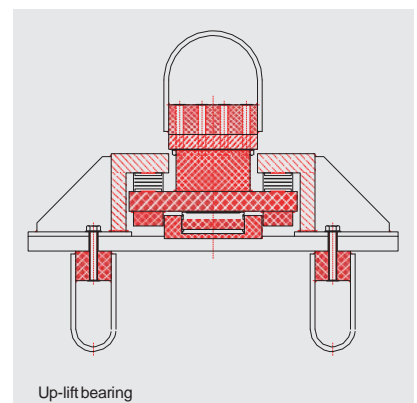
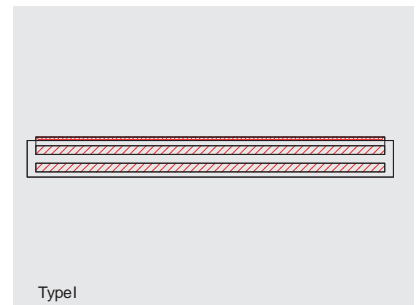
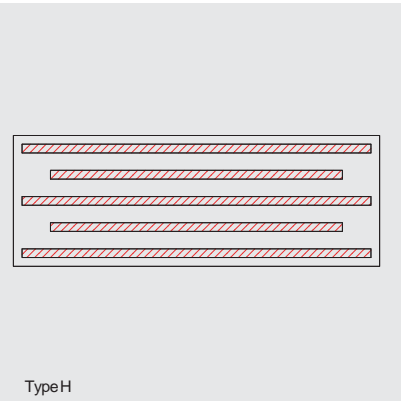
ILM Bearing Pads

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 V	Dimension a*b; D	No. of layers n	Admissible displacement +/- W	Height d	Effective elastomer thickness T	Admissible displacement +/- W	Total Height excl. anchor plates d	Total Height incl. anchor plates d	Total Height d	Effective elastomer thickness T	Anchorage for Types C(2), C(3)	Admissible rotation				
												□	○			
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	4		
		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	4		
		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	3		
		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	9
				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 V	Dimension a*b; D	No. of layers n	Admissible displacement +/- W	Total Height d	Effective elastomer thickness T	Admissible displacement +/- W	Total Height excl. anchor plates d	Total Height incl. anchor plates d	Total Height d	Effective elastomer thickness T	Anchorage for Types C(2), C(3)	Admissible rotation				
												mm	mm	mm	mm	mm
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				

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:

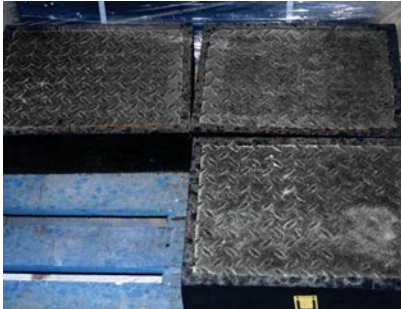
- materials;
- workmanship;
- finished product;

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.



