POLIROL

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Production of structural bearings and bridge expansion joints

PRODUCT CATALOGUE

CONTENTS

1. POLIROL Ltd GENERAL INFO

Polirol Ltd is established in 1990 in Zagreb, Croatia

During 1991 **Polirol** begins preparing for structural elastomeric and pot bearings production and in 1993 it acquires product certificates. During the years that follow, Polirol becomes leading structural bearings producer in Croatia, and in 1997 it starts producing bridge equipment for bridges on foreign markets (mostly BiH).

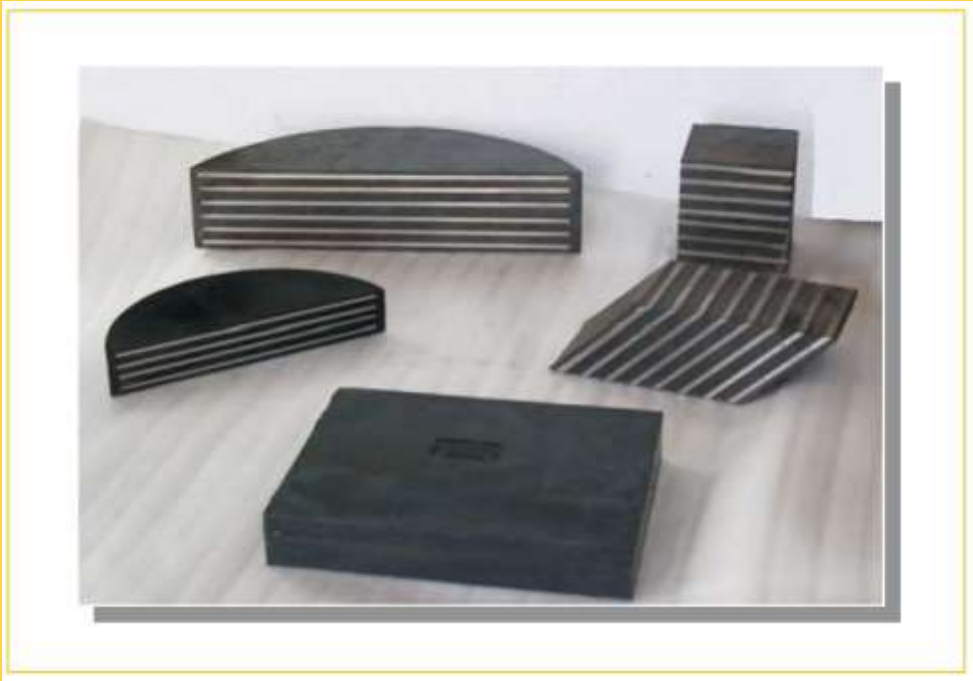
In year 2001 **Polirol** expands production assortment also to bridge expansion joints, which are entirely produced in Zagreb factory.

In year 2005 **Polirol** starts with wind/noise barriers production, which expands bridge equipment assortment of the company.

Successful cooperation with Civil engineering faculty in Zagreb and IGH institute in Zagreb, started during early days of 1990, has up to now evolved into mutual trust through external quality control, certification, technical approval issuing, testing and consulting.
Also, during year 2010, Polirol products have been CE marked by notified body - TZUS Praha, as well as ISO 9001 certificate.

Polirol has made good reputation with all major contractors in Croatia, such as: VIADUKT, HIDROELEKTRA, INDUSTROGRADNJA, TEHNIKA, KONSTRUKTOR-INŽENJERING, as well as U.S. contractor BECHTEL, which was involved in construction of ZAGREB-SPLIT Motorway. In cooperation with above mentioned, and also many more contractors, a respectable referent list of structures using Polirol equipment was created.

2. ELASTOMERIC STRUCTURAL BEARINGS CATALOGUE



ELASTOMERIC BEARINGS

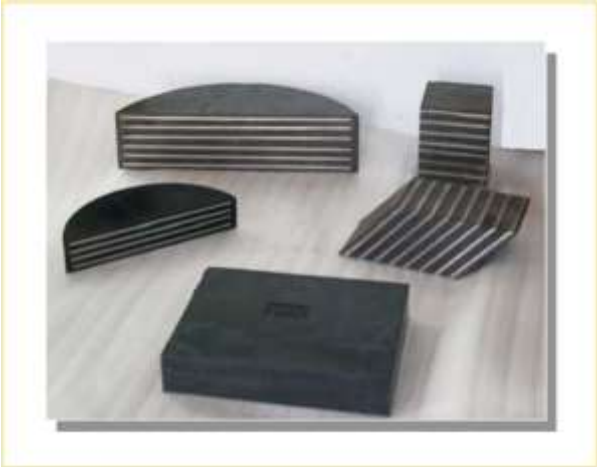
Description of product anf the application area

Elastomeric bearings are deformable elements used for the transfer of the load from one structural part to another. With comparatively low cost of production and easy installation, they are most commonly used in bridge and building construction and industrial facilities. They can be reinforced (AEL) and non-reinforced (NEL).
AEL bearings contain high-density steel sheet reinforcement, which is unified by the process of thermal vulcanization with the elastomeric material layers (elastomeres). Steel sheets are protected with elastomere on all sides and thus they are protected against corrosion.
Elastomeres are produced from natural rubber or synthetic chloroprene rubber, which is age-resistant against the influence of the weather conditions.
Elastomeric bearings are produced in compliance with the quality requirements set forth in the EN 1337-3 standard, as well as in the ISO-standards.
External quality control and certification is being done by IGH Institute from Zagreb and TSUS Praha.
They can be used within the temperature range of - 30° C (243K) to +50° C (323K). However, short-term influence of temperatures up to +70° C (343K) can be tolerated.

Elastomeric bearings allow:
- **simultaneous shifting in two perpendicular directions**
- **simultaneous rotations in three perpendicular planes**
- **acceptance of vertical (nominal) loads**
- **acceptance of horizontal loads**

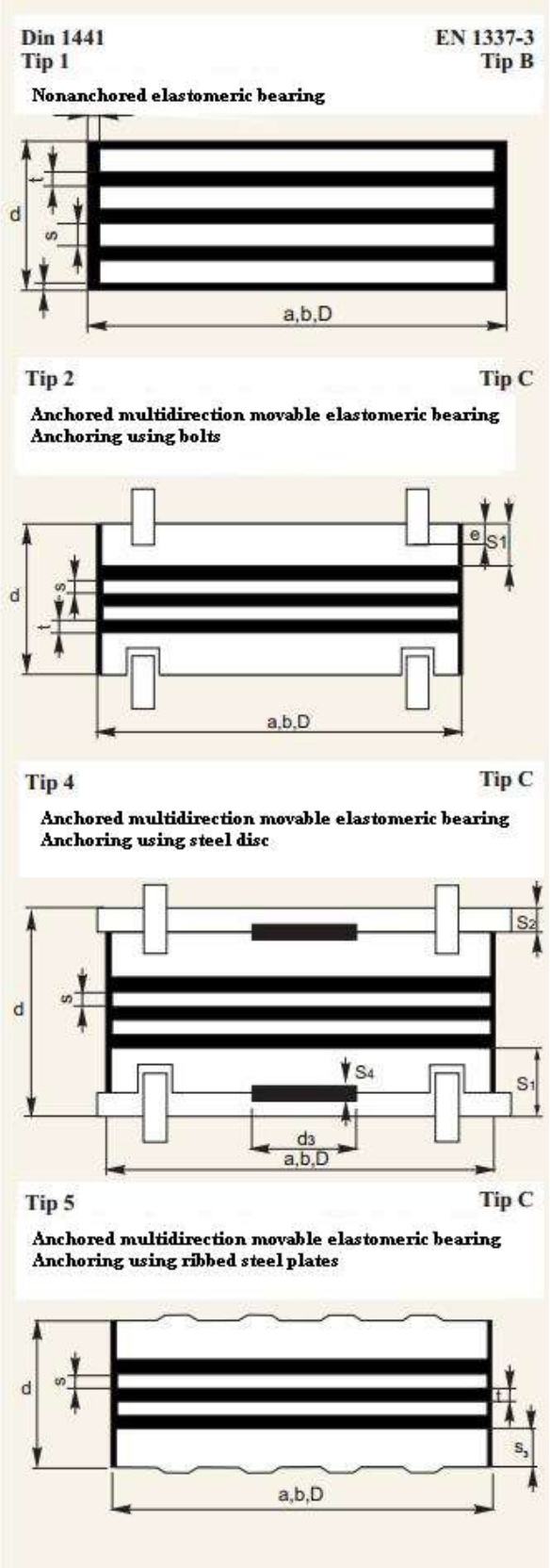
Building structural elements can generally rest on elastomeric bearings only, with no need for fixed bearings. In relation to conventional bearings, elastomeric ones can result in considerable savings due to their easy installation and low cost maintenance.

Form and dimensions



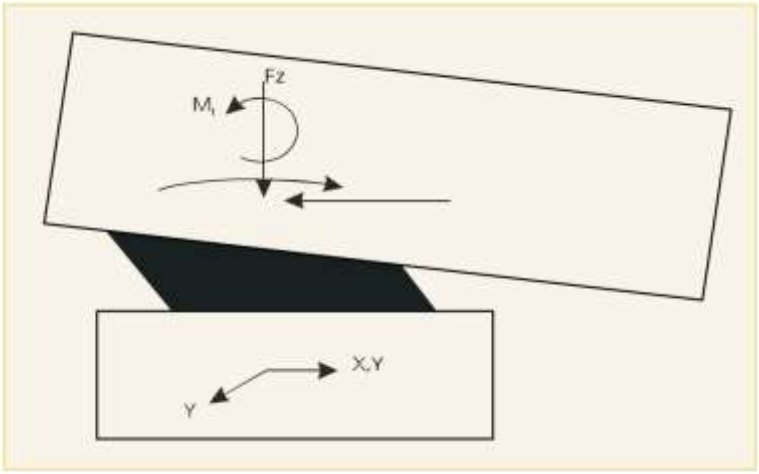
Reinforced and non-reinforced Polirol elastomeric bearings are generally square or round. Production of other shapes is possible on request. Reinforced Polirol bearings are produced in standard sizes shown in Table 2.

On special request they can also be produced in different sizes; in these cases, the elastomere layer and the steel sheet thickness would match the closest, by area smaller bearing, of the standard size.



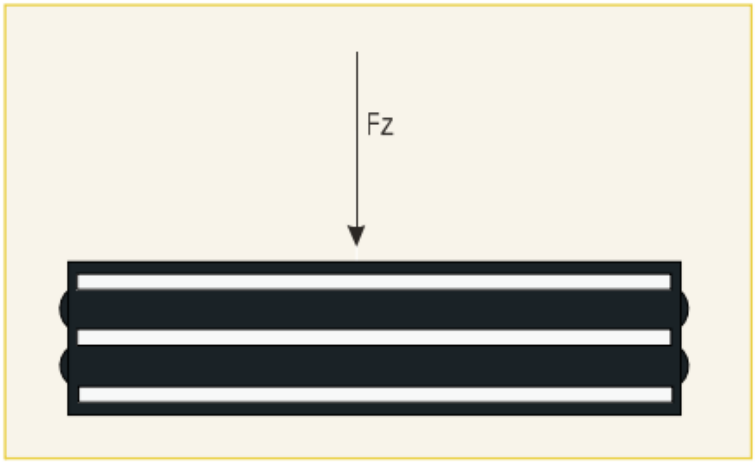
Load bearing capacity and movements

During usage, the elastomeric bearing is influenced by the normal loads (F_z), shear loads (H_x, H_y) and bending torque (M_x, M_y).



Normal allowed pressure and movements of AEL standard formats are given in Table 3.

Vertical loads



Reinforced polirol elastomeric bearings can bare vertical normal loads up to 12.000 kN, shown in Table 2. For interim values, the load is defined based on the tolerated centric pressure σ_d of the closest small bearing format

$$\sigma_d = \frac{Fz}{A}$$

Normal allowed pressure of AEL standard formats according to DIN 4141 are given in Table 3. Safety factor for short-term actions is >10.

Lowest centrical pressure is determined based on the anti-skid safety.

$\sigma_{mind} \geq 3$ N/mm^2 for bearing dimensions up to 350 × 400 mm,

$\sigma_{mind} \geq 5$ N/mm^2 for bearings larger than 350 × 400 mm

or the minimal safety anti-skid coefficient.

$$\gamma_{min} = \frac{\sigma_{min} \times f_{min}}{G_{min} \times \tan\gamma_{max}} \geq 1{,}5$$

where:

σ_{min} - min normal pressure [MPa]

f_{min} - minimal anti-skid coefficient

For the concrete-elastomere contact:

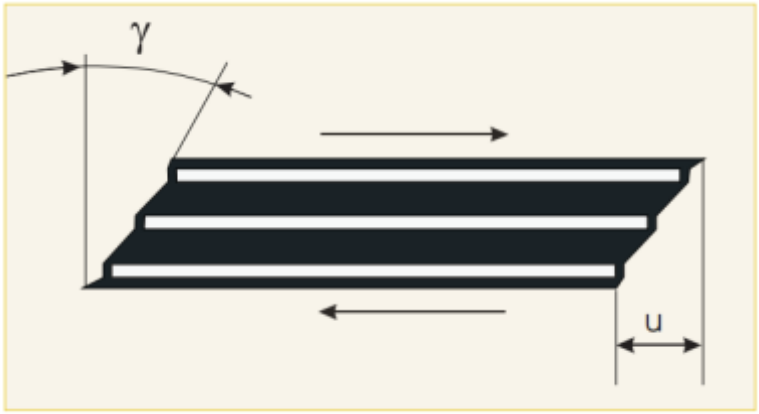
$$f_{min} = 0{,}2 + \frac{0{,}4}{\sigma_v}$$

G_{min} - min shear modulus

$\tan\gamma_{max}$ - max shear deformation

σ_v - min specific pressure

Shear loads and deformation



Allowed shear deformations are:

$\tan\gamma_d = 0,7$ za $0,1a < T < 0,2a$

$\tan\gamma_d = 0,9$ za $0,2a < T < 0,3a$

$$\tan\gamma = \frac{u}{T}$$

u = horizontal movement

T = elastomere thickness

Shear deformations in multiple directions should be added up as vectors. Building movements parallel to the bearing plane are determined in accordance with the technical rules.
Horizontal forces caused by imposed bearing shear deformations, if they are statically unfavorable, will be taken into consideration during structure calculations.
If additional shear deformations appear at low temperatures (e.g. because of movable loads), special structural check is performed. The value of G = 2 N/mm^2 should be assumed for elastomeric bearings at the temperature of + 30°C, of 60 + 5 Shore hardness.

Horizontal forces caused by imposed shear deformations are:

$$H_1 = tan\,\gamma_1 \times A \times G$$

A - bearing plan area
G - shear modulus

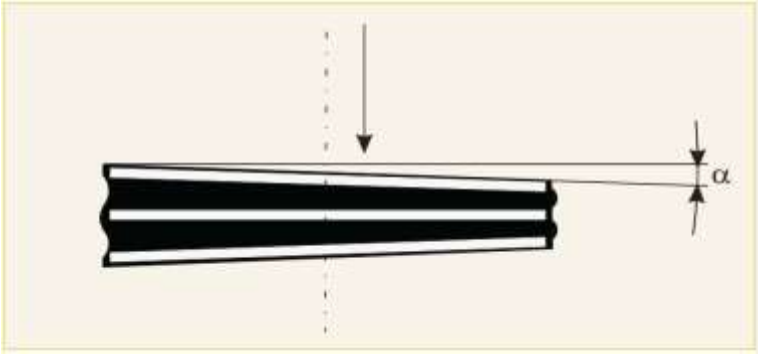
Short term shear deformations caused by external load are:

$$\tan\gamma_2 = \frac{H_2}{A \times G}$$

total shear deformitions must be:

$\tan\gamma_1 + \tan\gamma_2 < \tan\gamma_d$

Rotation



Elastomeric bearings rotation is determined based on the structure skew. The allowed bearing rotation angles are given in Table 2, and the values per elastomere layers are given in Table 3. The allowed rotation angle determination criteria are defined based on the request that the bearings should be lifted at edges, i.e. that the excentrical force should be located within the transversal section core. For interim values, skew angle allowed for the closest larger side of the standard size bearing providing the same elastomere layer thickness is valid.
With bearing rotation, the following calculation elements must be taken into consideration in case their influence is statically unfavorable:

For square bearings:

$$M = \frac{a^5 \times b \times G \times \alpha}{50 \times t^3 \times n}$$

For round bearings:

$$M = \frac{D^6 \times G \times \alpha}{100 \times t^3 \times n}$$

where:

a - side of bearing perpendiculat to rotation angle axis for rectangular bearings
b - side of bearing parallel to rotation angle axis for rectangular bearings
D - diameter for round bearings
t - elastomer layer thickness
a - rotation angle per single elastomer layer

Design

Structures resting on elastomeric bearings should always be solved as flexible, statically undefined systems, taking into consideration deformable bearing characteristics. The bearing sizes are determined through an iterative procedure according to the sizing flow diagram.

At the beginning, a rough calculation of force distribution and structural deformities is performed. Based on this preliminary calculation, sizes of elastomeric bearings are chosen, and a detailed static and dynamic structural calculation is done. The static and dynamic structural calculation is the basis for the bearing sizing data. This data also determines and controls the following values:

- maximum pressure
- skid safety
- bearing height
- stability of the shear deformation
- reinforcement plates thickness
- bearing rotation

The above-mentioned procedure is repeated in order to choose the bearing size, and according to the complexity of the calculation for the new forces and torques.

Installation

In order to prevent unwanted prestressing of the bearings, the adjacent areas must be parallel, straight and perpendicular to the constant load resulting force. This is why there is a leveling layer foreseen between the bearing and the structural part below (e.g. 2 – 3cm thick mortar).
The bearing contact surfaces and the structure should be horizontal, i.e. inclined so that there are no shear deformations on bearings under the weight or dead load (e.g. earth material pressure).
The bearings should be positioned so that they can be easily replaced (possibility of structure lifting by hydraulic press should be allowed for).

Placement of two or more bearings consecutively in a longitudinal direction on one support is not allowed. Bearings of various sizes can not be placed next to each other because of different rigidity. Usage of Polirol elastomeric bearings together with other bearing types is allowed only if bearings of the same type are used on a single support. Welding on plate bearings with anchoring is not allowed. If the contact surface below or above the bearing is damaged, it should be reconstructed by casting so that dowels and a steel plate of min. 20 mm is placed to the side, which is being cast.

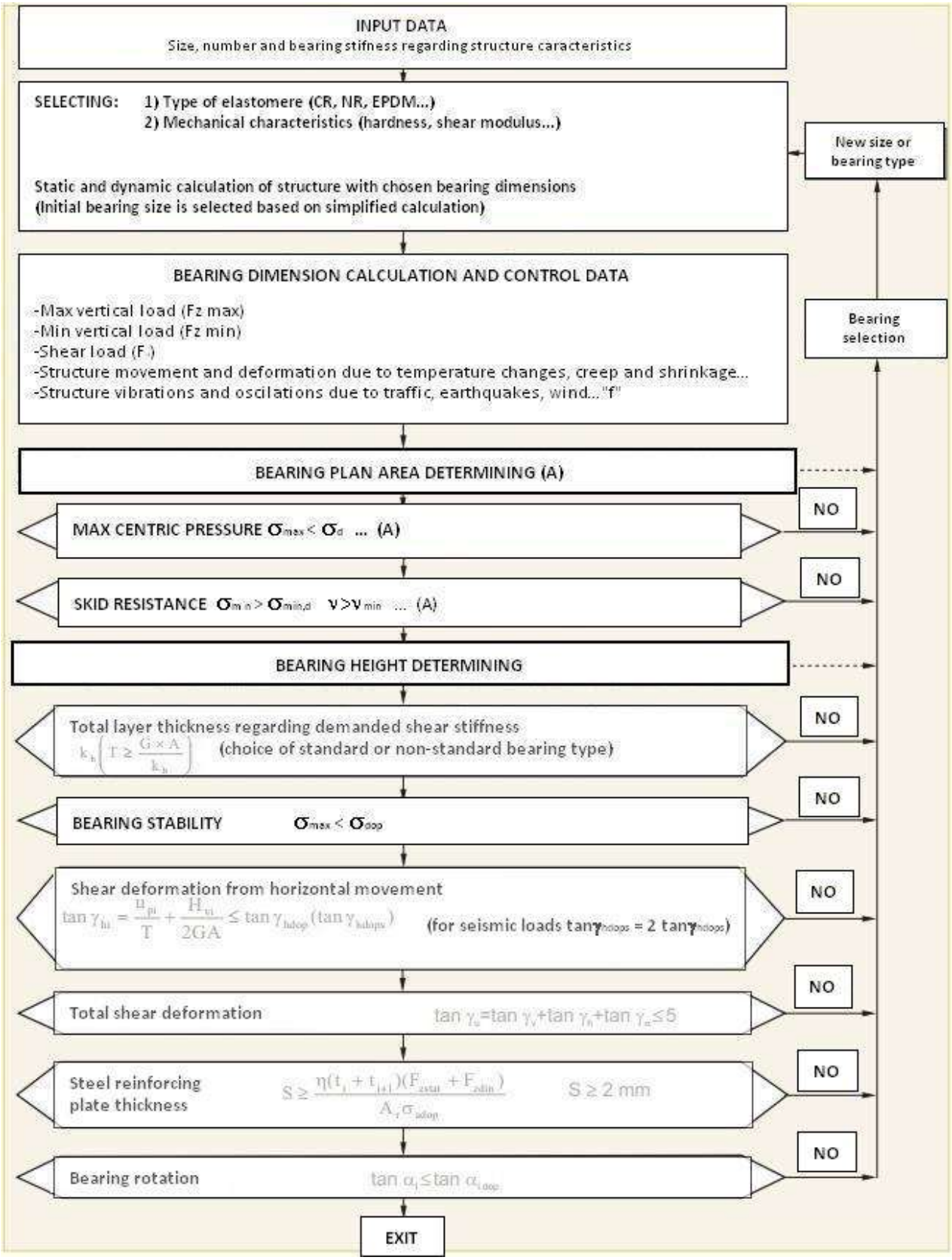
The dowels are removed after the material has hardened.

The adequate protection measures should ensure that the bearings do not come into contact with grease, dissolvent etc, and especially not with stale grease.
Elements on surfaces adjacent to the bearings should be structurally performed in such a way that they can resist the foreseen loads without any damaging or local deformations.
If during installation preset bearings are required, the presetting is always done by the bearing producer. Presetting should be performed in such a way that the bearings cannot be deformed before they are placed into function, and that they are secure during transportation.
The sizes of the bearings should be such hat no further presetting is required on site. Additional changes are allowed only if they are performed by and under the responsibility of the experts who represent the bearing experts.
With regard to the required presetting, the bearing parts should be interconnected so that they are in their designed place and shape at the beginning of their functional life. The bearing producer must provide sub-structures needed for that. If the bearings must be transported in parts, they should be assembled on site by the experts provided or educated by the producer.

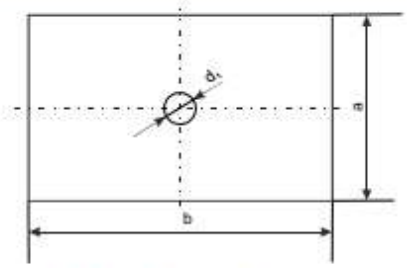
Table 1

Elastomeric bearing size	Bearing type	Mark	Unit of measurement	100x100 to 200x400 Ø200	250x400 to 300x400 Ø250 to Ø350	350x450 to 500x600 Ø400 to Ø550	Ø600 Ø650	600x700 700x800 Ø700 to Ø900	800x800 900x900
				[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Number of anchors	2,4	-	kom	1	2	4	6	6	6
Anchor length	2,4	l	mm	120	120	150	150	150	150
Anchor diameter	2,4	d_1	mm	20	20	30	30	40	40
Outer bearing plate	2,4	S_1	mm	15	15	20	20	20	20
Outer anchor plate	4	S_2	mm	15	15	20	20	20	20
Plate thickness	4	S_4	mm	10	10	10	10	10	10
Plate diameter	4	d_3	mm	60	80	190	380	380	380
Anchoring depth	2	e	mm	12	12	15	15	15	15
Plate thickness	5	S_3	mm	10	10	10	10	10	10

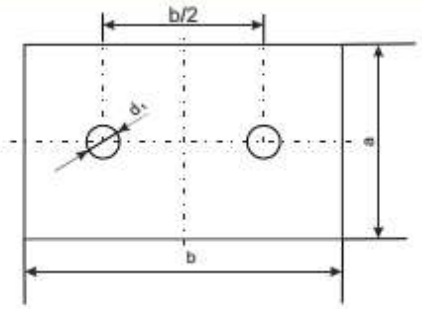
AEL bearing sizing flow chart for static and dynamic loads



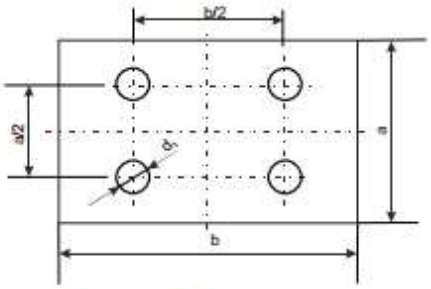
Anchoring disposition for elastomeric bearings type 2 and type 4
(type C acc. to EN 1337-3)



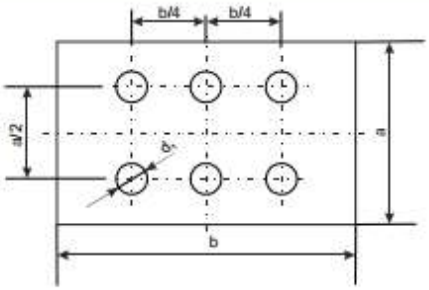
100×100 - 200×400



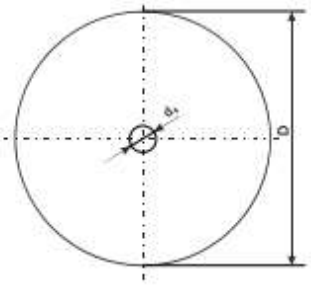
250×400 - 300×400



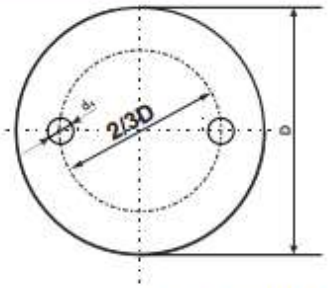
350×450 - 500×600



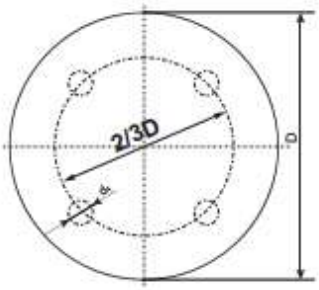
600×700 - 900×900



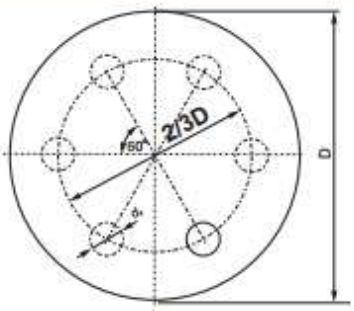
D 250



D = 250 - D =350



D = 400 - D = 500



D = 600 - D = 900

AEL BEARINGS

Table 2

Width x length, diameter	Permissible load	Visina ležaja				Elastomere thickness		Number of elastomere layers	Elastomere thickness	Steel plate thickness	Permissible movement		Permissible rotation angle			
		Tip 1	Tip 2	Tip 4	Tip 5	Tip 1	Tip 2,4,5				Type 1	Type 2,4,5				
a x b, D	Fz	d				T		n	t	s	V=±		n, α			
[mm]	[kN]	[mm]				[mm]		kom	[mm]	[mm]	[mm]		‰			
100 x 100 100 x 150 100 x 200	100 150 200	14				10	5	1	5	2	7,0		4,0	3,0	5,0	
		21	42	72	32	15	10	2	5	2	10,5	7,0	8,0	6,0	10,0	
		28	49	79	39	20	15	3	5	2	14,0	10,5	12,0	9,0	15,0	
		35	56	86	46	25	20	4	5	2	16,3	14,0	16,0	12,0	20,0	
		42	63	93	53	30	25	5	5	2	18,0	16,3	20,0	15,0	25,0	
			70	100	60	35	30	6	5	2	19,3	18,0	24,0	18,0	30,0	
150 x 200	300	14				10	5	1	5	2	7,0	3,5	3,0	3,0	4,0	
		21	42	72	32	15	10	2	5	2	10,5	7,0	6,0	6,0	8,0	
		28	49	79	39	20	15	3	5	2	14,0	10,5	9,0	9,0	13,0	
		35	56	86	46	25	20	4	5	2	17,5	14,0	12,0	12,0	17,0	
		42	63	93	53	30	25	5	5	2	21,0	17,5	15,0	15,0	21,0	
		49	70	100	60	35	30	6	5	2	23,3	21,0	18,0	18,0	25,0	
		56	77	107	67	40	35	7	5	2	25,3	23,3	21,0	21,0	29,0	
		63	84	114	74	45	40	8	5	2	27,0	25,3	24,0	24,0	33,0	
			91	121	81	50	45	9	5	2	28,3	27,0	27,0	27,0	37,0	
200 x 250 200 x 300 Φ 200	1000	19			28	13	8	1	8	3	9,1	5,6	3,0	2,5	4,0	4,0
		30	49	79	39	21	16	2	8	3	14,7	11,2	6,0	5,0	8,0	8,0
		41	60	90	50	29	24	3	8	3	20,3	16,8	9,0	7,5	12,0	12,0
		52	71	101	61	37	32	4	8	3	25,9	22,4	12,0	10,0	16,0	16,0
		63	82	112	72	45	40	5	8	3	30,4	28,0	15,0	12,5	20,0	20,0
		74	93	123	83	53	48	6	8	3	33,7	31,7	18,0	15,0	24,0	24,0
		85	104	134	94	61	56	7	8	3	36,3	34,7	21,0	17,5	28,0	28,0
200 x 400	1000	19	38	68	28	13	8	1	8	3	9,1	5,6	3,0	1,2	4,0	
		30	49	79	39	21	16	2	8	3	14,7	11,2	6,0	2,4	8,0	
		41	60	90	50	29	24	3	8	3	20,3	16,8	9,0	3,6	12,0	
		52	71	101	61	37	32	4	8	3	25,9	22,4	12,0	4,8	16,0	
		63	82	112	72	45	40	5	8	3	30,4	28,0	15,0	6,0	20,0	
		74	93	123	83	53	48	6	8	3	33,7	31,7	18,0	7,2	24,0	
		85	104	134	94	61	56	7	8	3	36,3	34,7	21,0	8,4	28,0	
250 X 400 Φ 250	1250 613	19	38	68	28	13	8	1	8	3	9,1	5,6	2,5	1,2	3,0	4,0
		30	49	79	39	21	16	2	8	3	14,7	11,2	5,0	2,4	5,0	8,0
		41	60	90	50	29	24	3	8	3	20,3	16,8	7,5	3,6	8,0	12,0
		52	71	101	61	37	32	4	8	3	25,9	22,4	10,0	4,8	10,0	16,0
		63	82	112	72	45	40	5	8	3	31,5	28,0	12,5	6,0	13,0	20,0
		74	93	123	83	53	48	6	8	3	36,5	33,6	15,0	7,2	16,0	24,0
		85	104	134	94	61	56	7	8	3	40,0	37,9	17,5	8,4	18,0	28,0
		96	115	145	105	69	64	8	8	3	43,1	41,2	20,0	9,6	21,0	32,0
		107	126	156	116	77	72	9	8	3	45,6	44,1	22,5	10,8	23,0	36,0

Width x length, diameter	Permissible load	Visina ležaja				Elastomere thickness		Number of elastomere layers	Elastomere thickness	Steel plate thickness	Permissible movement		Permissible rotation angle			
		Tip 1	Tip 2	Tip 4	Tip 5	Tip 1	Tip 2,4,5				Type 1	Type 2,4,5				
a x b, D	Fz	d				T		n	t	s	V=±		n, α			
[mm]	[kN]	[mm]				[mm]		kom	[mm]	[mm]	[mm]		‰			
300 X 400 Φ 300	1800 883	19	38	68	28	13	8	1	8	3	9,1	5,6	2,0	1,2	2,0	3,0
		30	49	79	39	21	16	2	8	3	14,7	11,2	4,0	2,4	4,0	6,0
		41	60	90	50	29	24	3	8	3	20,3	16,8	6,0	3,6	7,0	9,0
		52	71	101	61	37	32	4	8	3	25,9	22,4	8,0	4,8	9,0	12,0
		63	82	112	72	45	40	5	8	3	31,5	28,0	10,0	6,0	11,0	15,0
		74	93	123	83	53	48	6	8	3	37,1	33,6	12,0	7,2	13,0	18,0
		85	104	134	94	61	56	7	8	3	42,5	39,2	14,0	8,4	15,0	21,0
		96	115	145	105	69	64	8	8	3	46,2	43,9	16,0	9,6	18,0	24,0
		107	126	156	116	77	72	9	8	3	49,5	47,5	18,0	10,8	20,0	27,0
		118	137	167	127	85	80	10	8	3	52,4	50,7	20,0	12,0	22,0	30,0
		129	148	178	138	93	88	11	8	3	54,9	53,4	22,0	13,2	24,0	33,0
Φ 350	1202	24				16	11	1	11	4	11,2					4,0
		39	56	86	46	27	22	2	11	4	18,9	15,4				8,0
		54	71	101	61	38	33	3	11	4	26,6	23,1				12,0
		69	86	116	76	49	44	4	11	4	34,3	30,8				16,0
		84	101	131	91	60	55	5	11	4	42,0	38,5				20,0
		99	116	146	106	71	66	6	11	4	49,5	46,2				24,0
		114	131	161	121	82	77	7	11	4	54,6	52,4				28,0
		129	146	176	136	93	88	8	11	4	59,0	57,1				32,0
		144	161	191	151	104	99	9	11	4	62,7	61,1				36,0
350 X 450	2360	24				16		1	11	4	11,2	0,0	2,5	2,0	3,0	
		39	66	106	46	27	22	2	11	4	18,9	15,4	5,0	4,0	6,0	
		54	81	121	61	38	33	3	11	4	26,6	23,1	7,5	6,0	9,0	
		69	96	136	76	49	44	4	11	4	34,3	30,8	10,0	8,0	12,0	
		84	111	151	91	60	55	5	11	4	42,0	38,5	12,5	10,0	15,0	
		99	126	166	106	71	66	6	11	4	49,5	46,2	15,0	12,0	19,0	
		114	141	181	121	82	77	7	11	4	54,6	52,4	17,5	14,0	22,0	
		129	156	196	136	93	88	8	11	4	59,0	57,1	20,0	16,0	26,0	
		144	171	211	151	104	99	9	11	4	62,7	61,1	22,5	18,0	29,0	
		159	186	226	166	115	110	10	11	4	65,7	64,4				
		174	201	241	181	126	121	11	11	4	68,0	67,1				
400 X 500 Φ 400	3000 1885	24	51	91	31	16	11	1	11	4	11,2	7,7	2,0	1,5	2,0	3,0
		39	66	106	46	27	22	2	11	4	18,9	15,4	4,0	3,0	5,0	6,0
		54	81	121	61	38	33	3	11	4	26,6	23,1	6,0	4,5	8,0	9,0
		69	96	136	76	49	44	4	11	4	34,3	30,8	8,0	6,0	10,0	12,0
		84	111	151	91	60	55	5	11	4	42,0	38,5	10,0	7,5	13,0	15,0
		99	126	166	106	71	66	6	11	4	49,7	46,2	12,0	9,0	15,0	18,0
		114	141	181	121	82	77	7	11	4	57,0	53,9	14,0	10,5	18,0	21,0
		129	156	196	136	93	88	8	11	4	62,1	59,8	16,0	12,0	20,0	24,0
		144	171	211	151	104	99	9	11	4	66,6	64,6	18,0	13,5	22,0	27,0
		159	186	226	166	115	110	10	11	4	70,4	68,8	20,0	15,0	24,0	30,0
			201	241	181	126	121	11	11	4		72,3	22,0	17,0		

Width x length, diameter	Permissible load	Visina ležaja				Elastomere thickness		Number of elastomere layers	Elastomere thickness	Steel plate thickness	Permissible movement		Permissible rotation angle			
		Tip 1	Tip 2	Tip 4	Tip 5	Tip 1	Tip 2,4,5				Type 1	Type 2,4,5				
a x b, D	Fz	d				T		n	t	s	V=±		n, α			
[mm]	[kN]	[mm]				[mm]		kom	[mm]	[mm]	[mm]		‰			
450 X 600 Φ 450	4050 2385	24				16		1	11	4	11,2		2,0	1,2	2,0	3,0
		39	66	106	46	27	22	2	11	4	18,9	15,4	4,0	2,4	4,0	6,0
		54	81	121	61	38	33	3	11	4	26,6	23,1	6,0	3,6	7,0	9,0
		69	96	136	76	49	44	4	11	4	34,3	30,8	8,0	4,8	9,0	12,0
		84	111	151	91	60	55	5	11	4	42,0	38,5	10,0	6,0	11,0	15,0
		99	126	166	106	71	66	6	11	4	49,7	46,2	12,0	7,2	13,0	18,0
		114	141	181	121	82	77	7	11	4	57,4	53,9	14,0	8,4	15,0	21,0
		129	156	196	136	93	88	8	11	4	64,5	61,6	16,0	9,6	18,0	24,0
		144	171	211	151	104	99	9	11	4	69,6	67,3	18,0	10,8	20,0	27,0
		159	186	226	166	115	110	10	11	4	74,1	72,1	20,0	12,0	22,0	30,0
		174	201	241	181	126	121	11	11	4	78,1	76,4	22,0	13,2	24,0	33,0
			216	256	196		132	12	11	4		80,1	24,0	14,4	26,0	36,0
500 X 600 Φ 500 Φ 550	4500 2945 3562	24				16		1	11	4	11,2	0,0	2,0	1,2	2,0	2,0
		39	66	106	46	27	22	2	11	4	18,9	15,4	4,0	2,4	4,0	4,0
		54	81	121	61	38	33	3	11	4	26,6	23,1	6,0	3,6	7,0	6,0
		69	96	136	76	49	44	4	11	4	34,3	30,8	8,0	4,8	9,0	8,0
		84	111	151	91	60	55	5	11	4	42,0	38,5	10,0	6,0	11,0	10,0
		99	126	166	106	71	66	6	11	4	49,7	46,2	12,0	7,2	13,0	12,0
		114	141	181	121	82	77	7	11	4	57,4	53,9	14,0	8,4	15,0	14,0
		129	156	196	136	93	88	8	11	4	65,1	61,6	16,0	9,6	18,0	16,0
		144	171	211	151	104	99	9	11	4	72,0	69,3	18,0	10,8	20,0	18,0
		159	186	226	166	115	110	10	11	4	77,1	74,8	20,0	12,0	22,0	20,0
		174	201	241	181	126	121	11	11	4	81,6	79,6	22,0	13,2	24,0	22,0
		189	216	256	196	137	132	12	11	4	85,8	84,0	24,0	14,4	26,0	24,0
		204	231	271	211	148	143	13	11	4	89,4	87,8	26,0	15,6	29,0	26,0
600 X 700 Φ 600 Φ 650	6300 4240 4977	30				20		1	15	5	14,0		2,0	1,5	3,0	2,0
		50	75	115	55	35	30	2	15	5	24,5	21,0	4,0	3,0	5,0	4,0
		70	95	135	75	50	45	3	15	5	35,0	31,5	6,0	4,5	8,0	6,0
		90	115	155	95	65	60	4	15	5	45,5	42,0	8,0	6,0	10,0	8,0
		110	135	175	115	80	75	5	15	5	56,0	52,5	10,0	7,5	13,0	10,0
		130	155	195	135	95	90	6	15	5	66,5	63,0	12,0	9,0	16,0	12,0
		150	175	215	155	110	105	7	15	5	77,0	73,5	14,0	10,5	18,0	14,0
		170	195	235	175	125	120	8	15	5	86,5	84,0	16,0	12,0	21,0	16,0
		190	215	255	195	140	135	9	15	5	93,3	91,1	18,0	13,5	23,0	18,0
		210	235	275	215	155	150	10	15	5	99,5	97,5	20,0	15,0	25,0	20,0
		230	255	295	235	170	165	11	15	5	104,8	103,1	22,0	16,5	28,0	22,0
			275	315	255		180	12	15	5		108,0	24,0	18,0	30,0	24,0

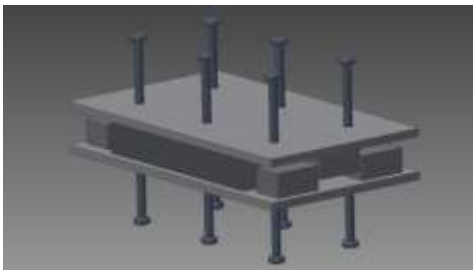
Width x length, diameter	Permissible load	Visina ležaja				Elastomere thickness		Number of elastomere layers	Elastomere thickness	Steel plate thickness	Permissible movement		Permissible rotation angle			
		Tip 1	Tip 2	Tip 4	Tip 5	Tip 1	Tip 2,4,5				Type 1	Type 2,4,5				
a x b, D	Fz	d				T		n	t	s	V=±		n, α			
[mm]	[kN]	[mm]				[mm]		kom	[mm]	[mm]	[mm]		‰			
700 x 800 Φ 700 Φ 750	8400 5772 6625	30	55	95	35	20	15	1	15	5	14,0	10,5	2,0	1,2	2,0	2,0
		50	75	115	55	35	30	2	15	5	24,5	21,0	4,0	2,4	5,0	4,0
		70	95	135	75	50	45	3	15	5	35,0	31,5	6,0	3,6	7,0	6,0
		90	115	155	95	65	60	4	15	5	45,5	42,0	8,0	4,8	9,0	8,0
		110	135	175	115	80	75	5	15	5	56,0	52,5	10,0	6,0	11,0	10,0
		130	155	195	135	95	90	6	15	5	66,5	63,0	12,0	7,2	13,0	12,0
		150	175	215	155	110	105	7	15	5	77,0	73,5	14,0	8,4	15,0	14,0
		170	195	235	175	125	120	8	15	5	87,5	84,0	16,0	9,6	18,0	16,0
		190	215	255	195	140	135	9	15	5	98,0	94,5	18,0	10,8	21,0	18,0
		210	235	275	215	155	150	10	15	5	105,2	102,9	20,0	12,0	23,0	20,0
		230	255	295	235	170	165	11	15	5	111,7	109,6	22,0	13,2	25,0	22,0
		250	275	315	255	185	180	12	15	5	117,6	115,7	24,0	14,4	28,0	24,0
		270	295	335	275	200	195	13	15	5	122,9	121,2	26,0	15,6	30,0	26,0
			315	355	295		210	14	15	5		126,0	28,0	16,8	32,0	28,0
800 x 800 Φ 800	9600 7536	33				23		1	18	5	16,1		2,0	2,0	3,0	2,0
		56	81	121	61	41	36	2	18	5	28,7	25,2	4,0	4,0	6,0	4,0
		79	104	144	84	59	54	3	18	5	41,3	37,8	6,0	6,0	8,0	6,0
		102	127	167	107	77	72	4	18	5	53,9	50,4	8,0	8,0	11,0	8,0
		125	150	190	130	95	90	5	18	5	66,5	63,0	10,0	10,0	14,0	10,0
		148	173	213	153	113	108	6	18	5	79,1	75,6	12,0	12,0	17,0	12,0
		171	196	236	176	131	126	7	18	5	91,7	88,2	14,0	14,0	20,0	14,0
		194	219	259	199	149	144	8	18	5	104,3	100,8	16,0	16,0	22,0	16,0
		217	242	282	222	167	162	9	18	5	115,4	113,0	18,0	18,0	25,0	18,0
		240	265	305	245	185	180	10	18	5	123,7	121,5	20,0	20,0	28,0	20,0
		263	288	328	268	203	198	11	18	5	131,2	129,2	22,0	22,0	31,0	22,0
		286	311	351	291	221	216	12	18	5	137,8	136,1	24,0	24,0	34,0	24,0
		309	334	374	314	239	234	13	18	5	143,7	142,2	26,0	26,0	36,0	26,0
900 x 900 Φ 900 Φ 850	12150 8538 8507	33				23		1	18	5	16,1	0,0	1,5	1,5	2,0	2,0
		56	81	121	61	41	36	2	18	5	28,7	25,2	3,0	3,0	4,0	3,0
		79	104	144	84	59	54	3	18	5	41,3	37,8	4,5	4,5	6,0	5,0
		102	127	167	107	77	72	4	18	5	53,9	50,4	6,0	6,0	8,0	6,0
		125	150	190	130	95	90	5	18	5	66,5	63,0	7,5	7,5	11,0	8,0
		148	173	213	153	113	108	6	18	5	79,1	75,6	9,0	9,0	13,0	9,0
		171	196	236	176	131	126	7	18	5	91,7	88,2	10,5	10,5	15,0	11,0
		194	219	259	199	149	144	8	18	5	104,3	100,8	12,0	12,0	17,0	12,0
		217	242	282	222	167	162	9	18	5	116,9	113,4	13,5	13,5	19,0	14,0
		240	265	305	245	185	180	10	18	5	128,5	126,0	15,0	15,0	21,0	15,0
		263	288	328	268	203	198	11	18	5	136,9	134,6	16,5	16,5	23,0	17,0
		286	311	351	291	221	216	12	18	5	144,6	142,6	18,0	18,0	25,0	18,0
		309	334	374	314	239	234	13	18	5	151,6	149,8	19,5	19,5	27,0	20,0
		332	357	397	337	257	252	14	18	5	157,9	156,2	21,0	21,0	29,0	21,0
		355	380	420	360	275	270	15	18	5	163,5	162,0	22,5	22,5	32,0	23,0

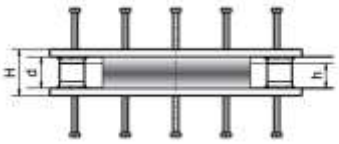
Permissible pressure and rotation angle

Table 3

Base area	Elastomere layer thickness	Permissible mean pressure	Permissible rotation angle per elastomere layer		
			Paralel to larger edge of base	Paralel to smaller edge of base	Diagonally with respect to the base edges
[mm]	[mm]	[N/mm^2]	[arc.]	[arc.]	[arc.]
100x100	5	10,0	0,0040	0,0040	0,0057
100x150	5	10,0	0,0040	0,0030	0,0050
150x200	5	10,0	0,0030	0,0030	0,0042
200x250	8	12,5	0,0030	0,0025	0,0039
200x300	8	12,5	0,0030	0,0020	0,0036
200x400	8	12,5	0,0030	0,0012	0,0032
250x400	8	12,5	0,0025	0,0012	0,0028
300x400	8	15,0	0,0020	0,0012	0,0023
350x450	11	15,0	0,0025	0,0020	0,0032
400x500	11	15,0	0,0020	0,0015	0,0025
450x600	11	15,0	0,0020	0,0012	0,0023
500x600	11	15,0	0,0020	0,0012	0,0023
600x700	15	15,0	0,0020	0,0015	0,0025
700x800	15	15,0	0,0020	0,0012	0,0023
800x800	18	15,0	0,0020	0,0020	0,0028
900x900	18	15,0	0,0015	0,0015	0,0021
Ø200	8	10,0		0,0040	
Ø250	8	12,5		0,0040	
Ø300	8	12,5		0,0030	
Ø350	11	12,5		0,0040	
Ø400	11	15,0		0,0030	
Ø450	11	15,0		0,0030	
Ø500	11	15,0		0,0020	
Ø600	15	15,0		0,0020	
Ø700	15	15,0		0,0020	
Ø800	18	15,0		0,0020	
Ø900	18	15,0		0,0015	

AEL WITH MOVEMENT RESTRAINT DEVICE
Fixed in the longitudinal direction AEL-a (type 1.2 acc. to EN 1337-1)





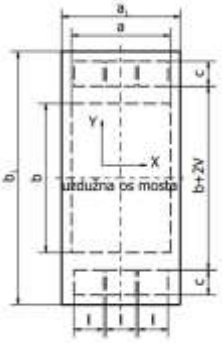
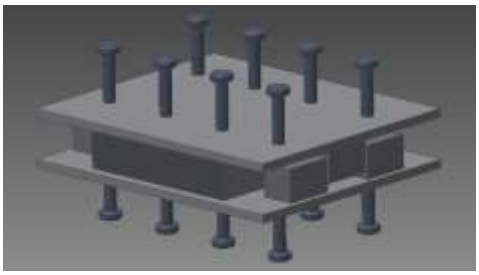


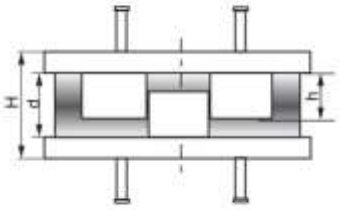
Table 4

Bearing dimensions		Permissible horizontal load	Restraining device dimensions			Number of anchors
a x b, Φ	d	H_{dozv}	Anchor plate dimension	Guide dimension		Φ22
			a_1 x b_1	c x l	h	n
mm	mm	kN	mm	mm	mm	pcs
150 x 200	21	172	190 x 345	40 x 50	15	4
	28	200	190 x 350	40 x 50	20	
	35	180	190 x 355	40 x 50	25	
	42	160	190 x 365	40 x 50	30	
	49	144	190 x 370	40 x 50	35	
	56	132	190 x 375	40 x 50	40	
	63	140	190 x 395	50 x 50	45	
200 x 300	30	230	240 x 470	50 x 60	25	6
	41	264	240 x 485	50 x 60	30	
	52	228	240 x 495	50 x 60	40	
	63	204	240 x 505	50 x 60	45	
	74	204	240 x 530	60 x 60	55	
	85	182	240 x 535	60 x 60	65	
300 x 400	30	289	340 x 590	60 x 90	25	6
	41	319	340 x 605	60 x 90	30	
	52	388	340 x 615	60 x 90	40	
	63	35	340 x 625	60 x 90	45	
	74	318	340 x 635	60 x 90	55	
	85	288	340 x 645	60 x 90	65	
	96	264	340 x 655	60 x 90	70	
	107	242	340 x 660	60 x 90	80	
	118	224	340 x 665	60 x 90	85	

Bearing dimensions		Permissible horizontal load	Restraining device dimensions			Number of anchors
a x b, Φ	d	H_{dozv}	Anchor plate dimension	Guide dimension		Φ22
			a_1 x b_1	c x l	h	n
mm	mm	kN	mm	mm	mm	pcs
400 x 500	54	576	440 x 755	80 x 120	40	10
	69	518	440 x 770	80 x 120	50	
	84	468	440 x 785	80 x 120	60	
	99	422	440 x 800	80 x 120	75	
	114	384	440 x 815	80 x 120	85	
	129	350	440 x 825	80 x 120	95	
	144	322	440 x 835	80 x 120	105	
	159	296	440 x 845	80 x 120	115	
500 x 600	54	580	540 x 855	80 x 150	40	12
	69	642	540 x 870	80 x 150	50	
	84	588	540 x 885	80 x 150	60	
	99	538	540 x 900	80 x 150	75	
	114	494	540 x 915	80 x 150	85	
	129	454	540 x 935	80 x 150	95	
	144	420	540 x 945	80 x 150	105	
	159	388	540 x 955	80 x 150	115	
	174	512	540 x 1005	100 x 150	125	
	189	386	540 x 1015	100 x 150	135	
	204	362	540 x 1020	100 x 150	145	
600 x 700	70	738	640 x 970	80 x 175	50	12
	90	666	640 x 995	80 x 175	65	
	110	600	640 x 1015	80 x 175	80	
	130	540	640 x 1035	80 x 175	95	
	150	504	640 x 1055	80 x 175	110	
	170	504	640 x 1115	100 x 175	125	
	190	462	640 x 1130	100 x 175	135	
	210	628	640 x 1140	100 x 175	150	
	230	396	640 x 1150	100 x 175	165	
Φ 900 900 x 900	79	1078	940 x 1225	100 x 250	60	16
	102	994	940 x 1250	100 x 250	75	
	125	910	940 x 1275	100 x 250	90	
	148	834	940 x 1300	100 x 250	110	
	171	766	940 x 1325	100 x 250	125	
	194	704	940 x 1350	100 x 250	140	
	217	802	940 x 1375	100 x 250	155	
	240	746	940 x 1400	100 x 250	175	
	263	698	940 x 1415	100 x 250	190	
	286	654	940 x 1430	100 x 250	205	
	309	614	940 x 1445	100 x 250	220	
	332	598	940 x 1460	100 x 250	240	

AEL WITH MOVEMENT RESTRAINT DEVICE
Fixed in transversal direction AEL-b (type 1.2 acc. to EN 1337-1)





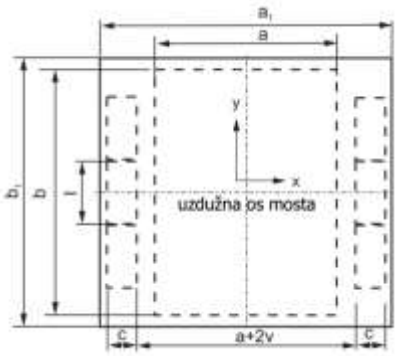


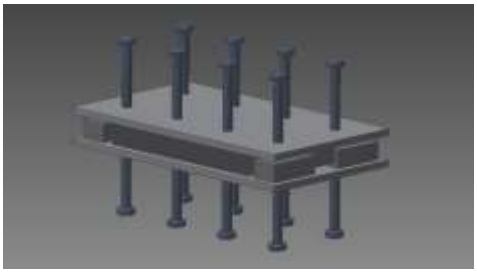
Table 5

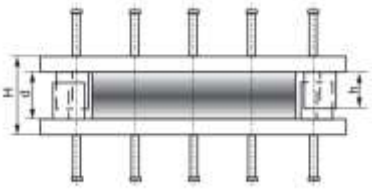
Bearing dimensions		Permissible horizontal load	Restraininf device dimensions			Number of anchors
a x b, Φ	d	H_{dozv}	Anchor plate dimension	Guide dimension		Φ22
			a_1 x b_1	c x l	h	n
mm	mm	kN	mm	mm	mm	pcs
150 x 200	21	172	295 x 240	40 x 50	15	4
	28	200	300 x 240	40 x 50	20	
	35	180	305 x 240	40 x 50	25	
	42	160	315 x 240	40 x 50	30	
	49	144	320 x 240	40 x 50	35	
	56	132	325 x 240	40 x 50	40	
	63	140	345 x 240	50 x 50	45	
200 x 300	30	230	370 x 340	50 x 60	25	6
	41	264	385 x 340	50 x 60	30	
	52	228	395 x 340	50 x 60	40	
	63	204	405 x 340	50 x 60	45	
	74	204	430 x 340	60 x 60	55	
	85	182	435 x 340	60 x 60	65	
300 x 400	30	289	490 x 440	60 x 90	25	6
	41	319	505 x 440	60 x 90	30	
	52	388	515 x 440	60 x 90	40	
	63	35	525 x 440	60 x 90	45	
	74	318	535 x 440	60 x 90	55	
	85	288	545 x 440	60 x 90	65	
	96	264	555 x 440	60 x 90	70	
	107	242	560 x 440	60 x 90	80	
	118	224	565 x 440	60 x 90	85	

Bearing dimensions		Permissible horizontal load	Restraininf device dimensions			Number of anchors
a x b, Φ	d	H_{dozv}	Anchor plate dimension	Guide dimension		Φ22
			a_1 x b_1	c x l	h	n
mm	mm	kN	mm	mm	mm	pcs
400 x 500	54	576	655 x 540	80 120	40	10
	69	518	670 x 540	80 x 120	50	
	84	468	685 x 540	80 x 120	60	
	99	422	700 x 540	80 x 120	75	
	114	384	715 x 540	80 x 120	85	
	129	350	725 x 540	80 x 120	95	
	144	322	735 x 540	80 x 120	105	
	159	296	745 x 540	80 x 120	115	
500 x 600	54	580	755 x 640	80 x 150	40	12
	69	642	770 x 640	80 x 150	50	
	84	588	785 x 640	80 x 150	60	
	99	538	800 x 640	80 x 150	75	
	114	494	815 x 640	80 x 150	85	
	129	454	835 x 640	80 x 150	95	
	144	420	845 x 640	80 x 150	105	
	159	388	855 x 640	80 x 150	115	
	174	512	905 x 640	100 x 150	125	
	189	386	915 x 640	100 x 150	135	
	204	362	920 x 640	100 x 150	145	
600 x 700	70	738	870 x 740	80 x 175	50	12
	90	666	895 x 740	80 x 175	65	
	110	600	915 x 740	80 x 175	80	
	130	540	935 x 740	80 x 175	95	
	150	504	955 x 740	80 x 175	110	
	170	504	1015 x 740	100 x 175	125	
	190	462	1030 x 740	100 x 175	135	
	210	628	1040 x 740	100 x 175	150	
	230	396	1050 x 740	100 x 175	165	
Φ 900 900 x 900	79	1078	1225 x 940	100 x 250	60	16
	102	994	1250 x 940	100 x 250	75	
	125	910	1275 x 940	100 x 250	90	
	148	834	1300 x 940	100 x 250	110	
	171	766	1325 x 940	100 x 250	125	
	194	704	1350 x 940	100 x 250	140	
	217	802	1375 x 940	100 x 250	155	
	240	746	1400 x 940	100 x 250	175	
	263	698	1415 x 940	100 x 250	190	
	286	654	1430 x 940	100 x 250	205	
	309	614	1445 x 940	100 x 250	220	
	332	598	1460 x 940	100 x 250	240	

AEL WITH MOVEMENT RESTRAINT DEVICE

Fixed in longitudinal and transversal direction AEL-f (type 1.6 acc.to EN 1337-1)





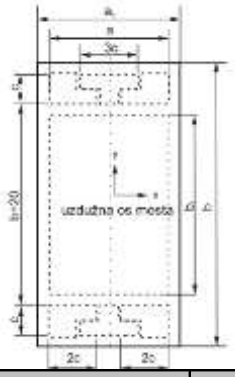


Table 6

Bearing dimensions		Permissible horizontal load	Restraining device dimensions			Number of anchors
a x b, Φ	d	H_{dozv}	Anchor plate dimensions	Guide dimensions		Φ22
			a_1 x b_1	c	h	n
mm	mm	kN	mm	mm	mm	pcs
150 x 200	21	172	190 x 310	30	15	4
	28	200	190 x 310	30	20	
	35	180	190 x 310	30	25	
	42	160	190 x 310	30	30	
	49	144	190 x 310	30	35	
	56	132	190 x 310	30	40	
	63	140	190 x 310	30	45	
200 x 300	30	230	240 x 430	40	25	6
	41	264	240 x 430	40	30	
	52	228	240 x 430	40	40	
	63	204	240 x 430	40	45	
	74	204	240 x 430	40	55	
	85	182	240 x 430	40	65	
300 x 400	30	289	340 x 570	60	25	6
	41	319	340 x 570	60	30	
	52	388	340 x 570	60	40	
	63	35	340 x 570	60	45	
	74	318	340 x 570	60	55	
	85	288	340 x 570	60	65	
	96	264	340 x 570	60	70	
	107	242	340 x 570	60	80	
	118	224	340 x 570	60	85	

Bearing dimensions		Permissible horizontal load	Restraining device dimensions			Number of anchors
a x b, Φ	d	H_{dozv}	Anchor plate dimensions	Guide dimensions		Φ22
			a_1 x b_1	c	h	n
mm	mm	kN	mm	mm	mm	pcs
400 x 500	54	576	440 x 710	80	40	10
	69	518	440 x 710	80	50	
	84	468	440 x 710	80	60	
	99	422	440 x 710	80	75	
	114	384	440 x 710	80	85	
	129	350	440 x 710	80	95	
	144	322	440 x 710	80	105	
	159	296	440 x 710	80	115	
500 x 600	54	580	540 x 850	100	40	12
	69	642	540 x 850	100	50	
	84	588	540 x 850	100	60	
	99	538	540 x 850	100	75	
	114	494	540 x 850	100	85	
	129	454	540 x 850	100	95	
	144	420	540 x 850	100	105	
	159	388	540 x 850	100	115	
	174	512	540 x 850	100	125	
	189	386	540 x 850	100	135	
	204	362	540 x 850	100	145	
600 x 700	70	738	640 x 990	120	50	12
	90	666	640 x 990	120	65	
	110	600	640 x 990	120	80	
	130	540	640 x 990	120	95	
	150	504	640 x 990	120	110	
	170	504	640 x 990	120	125	
	190	462	640 x 990	120	135	
	210	628	640 x 990	120	150	
	230	396	640 x 990	120	165	
Φ 900 900 x 900	79	1078	940 x 1310	180	60	16
	102	994	940 x 1310	180	75	
	125	910	940 x 1310	180	90	
	148	834	940 x 1310	180	110	
	171	766	940 x 1310	180	125	
	194	704	940 x 1310	180	140	
	217	802	940 x 1310	180	155	
	240	746	940 x 1310	180	175	
	263	698	940 x 1310	180	190	
	286	654	940 x 1310	180	205	
	309	614	940 x 1310	180	220	
	332	598	940 x 1310	180	240	

Institut IGH d.d.

IGH Cert

POTVRDA O SUKLADNOSTI

1/05-ZGP-1446

U skladu sa Zakonom o građevnim proizvodima („Narodne novine" br. 86/08), Pravilnikom o ocjenjivanju sukladnosti, ispravama o sukladnosti i označavanju građevnih proizvoda („Narodne novine" br. 103/08, 147/09, 87/10 i 124/11) i Tehničkim propisom za čelične konstrukcije - Prilog E („Narodne novine" br. 112/08, 125/10), utvrđeno je da su građevni proizvodi

POLIROL - Elastomerni ležajevi

tipovi A, B, B/C, C, D i F od smjese prirodne gume NR, oznake smjese 40523

bez vodoravnih kliznih dijelova, za učinkovitu radnu temperaturu pri temperaturnom rasponu od -40° do +50° i prikazani u zgradama i inženjerskim građevinama gdje su zahtjevi na pojedine ležajeve kritični

koje je na tržište stavio:

POLIROL d.o.o.
Remetinečka cesta 7, HR-10000 Zagreb

i koji su proizvedeni u tvornici:

POLIROL d.o.o.
Remetinečka cesta 7, HR-10000 Zagreb

proizvođač podvrgao tvorničkoj kontroli proizvodnje i daljnjem ispitivanju uzoraka uzetih u tvornici u skladu s propisanim planom ispitivanja i da je prijavljenu tijelu Institut IGH, d.d. proveo vrednovanje početnog ispitivanja tipa odgovarajućih značajki proizvoda, početni pregled tvornice i tvorničke kontrole proizvodnje i da provodi stalni nadzor, ocjenjivanje i odobravanje tvorničke kontrole proizvodnje.

Ovom se potvrdom potvrđuje da su prinijenjene sve odredbe koje se odnose na potvrđivanje sukladnosti za sustav 1 i svojstva opisana u dodatku ZA norme

HRN EN 1337-3:2005

i da proizvod ispunjava sve zahtjeve.

Ova je potvrda prvi puta izdana 4. lipnja 2012. i ima važnost sve dok se stanje ne promijene uvjeti utvrđeni u navedenim tehničkim specifikacijama, uvjeti proizvodnje u tvornici ili uvjeti tvorničke kontrole proizvodnje.

OD 11/246-011

Odgovorna osoba:
mr.sc. Zdravko Barišić, dipl.ing.stroj.

Zagreb, 4. lipnja 2012.

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague

EC CERTIFIKAT SUKLADNOSTI

Br. 1020-CPD-090-022096

U skladu s Direktivom 89/106/EEC Vijeća Europskih Zajednica od 21. Decembra 1988 o usklađivanju zakona, pravilnika i administrativnih odredaba Zemalja Članica, koje se odnose na građevne proizvode (Direktiva za građevinske proizvode – CPD), izmijenjena Direktivom 93/68/EEC Vijeća Europskih Zajednica od 22. Jula 1993, utvrđeno je da je građevni proizvod:

Proizvod

Konstrukcijski ležajevi

Verzija: Elastomerni ležajevi / tip: EL

tip: **A** – lamelirani ležajevi potpuno prekriveni elastomerom, koji se sastoje od samo jedne čelične armaturne ploče; tip: **B** – lamelirani ležajevi potpuno prekriveni elastomerom, koji se sastoje od barem dvije čelične armaturne ploče; tip: **C** – lamelirani ležajevi s vanjskim čeličnim pločama (profilirane i omogućavaju sklizanje) i tip: **F** – nearmirani elastomerni ležajevi i brtveni ležajevi

koje na tržište stavlja:

POLIROL d.o.o.
Br.: 90002867
Adresa: Remetinečka cesta 7, 10000 Zagreb, Hrvatska

i koji su proizvedeni u tvornici:

POLIROL d.o.o.
Br.: 90002867
Adresa: Remetinečka cesta 7, 10000 Zagreb, Hrvatska

podvrgnuti tvorničkoj kontroli proizvodnje od strane proizvođača, kao i daljnjem ispitivanju uzoraka uzetih u tvornici u skladu s propisanim planom ispitivanja i da je ovlašteno tijelo:

1020 – Tehnički i ispitni institut za građevinarstvo Prag

provelo početno ispitivanje tipa proizvoda za mjerodavna svojstva proizvoda, početni pregled proizvodnog pogona i tvorničke kontrole kvalitete i provodi stalni nadzor, ocjenu i odobrenje tvorničke kontrole kvalitete.
Ovaj certifikat potvrđuje da su sve odredbe koje se odnose na potvrđivanje sukladnosti i svojstva opisana u normi

EN 1337-3:2005

primijenjeni i da proizvod ispunjava sve propisane zahtjeve.

Ovaj certifikat je prvi puta izdan 12. August 2009. godine i ostaje važeći sve dok se stanje ne promijene uvjeti propisani harmoniziranim tehničkim specifikacijama, uvjeti proizvodnje u tvornici ili uvjeti same tvorničke kontrole proizvodnje.

Ing. Jiří Studnička
Zamjenik rediteja Državnog Tijela

Prag, 12. August 2009

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague

EC CERTIFIKAT SUKLADNOSTI

Br. 1020-CPD-090-022990

U skladu s Direktivom 89/106/EEC Vijeća Europskih Zajednica od 21. Decembra 1988 o usklađivanju zakona, pravilnika i administrativnih odredaba Zemalja Članica, koje se odnose na građevne proizvode (Direktiva za građevinske proizvode – CPD), izmijenjena Direktivom 93/68/EEC Vijeća Europskih Zajednica od 22. Jula 1993, utvrđeno je da je građevni proizvod:

Proizvod

Konstrukcijski ležajevi

Verzija: Elastomerni ležajevi

Tip: **D** – lamelirani ležajevi potpuno prekriveni elastomerom, koji se sastoje od barem dvije čelične armaturne ploče s PTFE pločom vezanom za elastomer

koje na tržište stavlja:

POLIROL d.o.o.
Br.: 90002867
Adresa: Remetinečka cesta 7, 10000 Zagreb, Hrvatska

i koji su proizvedeni u tvornici:

POLIROL d.o.o.
Br.: 90002867
Adresa: Remetinečka cesta 7, 10000 Zagreb, Hrvatska

podvrgnuti tvorničkoj kontroli proizvodnje od strane proizvođača, kao i daljnjem ispitivanju uzoraka uzetih u tvornici u skladu s propisanim planom ispitivanja i da je ovlašteno tijelo:

1020 – Tehnički i ispitni institut za građevinarstvo Prag

provelo početno ispitivanje tipa proizvoda za mjerodavna svojstva proizvoda, početni pregled proizvodnog pogona i tvorničke kontrole kvalitete i provodi stalni nadzor, ocjenu i odobrenje tvorničke kontrole kvalitete.
Ovaj certifikat potvrđuje da su sve odredbe koje se odnose na potvrđivanje sukladnosti i svojstva opisana u normi

EN 1337-3:2005

primijenjeni i da proizvod ispunjava sve propisane zahtjeve.

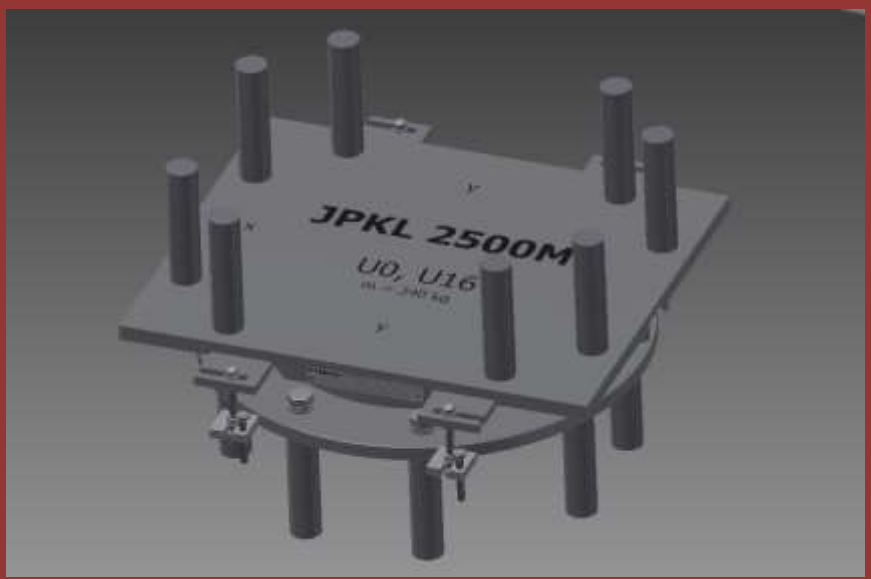
Ovaj certifikat je prvi puta izdan 12. Februara 2010. godine i ostaje važeći sve dok se stanje ne promijene uvjeti propisani harmoniziranim tehničkim specifikacijama, uvjeti proizvodnje u tvornici ili uvjeti same tvorničke kontrole proizvodnje.

Ing. Jiří Studnička
Zamjenik rediteja Državnog Tijela

Prag, 12. Februar 2010

3. STRUCTURAL POT BEARINGS CATALOGUE

POT BEARINGS



Usage of flexible material in a rigid pot for transfer of normal load with the possibility of rotation has been known for ages. This knowledge became increasingly significant after a high-quality and long-lasting elastomeric material has been invented.
A pot bearing consists of a round steel pot with a level bottom, and a non-reinforced elastomeric bearing placed on top of it. The gap between the pot and the piston is sealed with an elastic soft rubber seal. Elastomeric elements allow soft transfer of load from the upper to the lower structural parts.

Standard deformable non-reinforced elastomeric bearing, placed in a rigid steel pot significantly increases its bearing capacity during the influence of vertical load, due to prevention of horizontal deformation.

It is known that the normal allowed stressing of a standard non-reinforced elastomeric bearings is CT_d < 5 MPa (acc. to DIN 4141), and of the elastomeric plate in a pot bearing is ~25 MPa. Elastomeric material closed in a pot behaves like a rigid fluid in a hydraulic press. That is why good sealing is essential. In the slot at the edge of the elastomeric bearing there is a round seal made of carbon filled PTFE or brass. The deformability of the elastomere makes the cover rotation possible, so the pot bearings belong to the group of universally rotational (joint, fixed) bearings. Except rotation, pot bearings in combination with the PTFE sliding plate allow structural movements, so they belong to the group of universally rotational shift bearings. The advantages of these bearings in comparison to classical steel and joint bearings are their significantly lower weight and height, with identical bearing capacity and lower maintenance costs.

FIXED POT BEARINGS (NL)

APLICATION SCOPE

In the introductory part we emphasized the possibility of inclining the cover towards the pot in all directions. The fixed pot bearings scope of usage covers the applications in which heavy steel spot-rotational bearings were previously used. A special characteristic of the pot bearings is their ability to take large loads, and equal distribution of the pressure on the base. Additionally, stability with regard to the rubber aging is achieved, since the elastomeric plate in a pot with a cover is fully protected against all UV and ozone influences. The elastomere type and the structure of the rubber compound have been designed to ensure high resistance to ozone and other common atmospheric impacts. Pot bearings can be used in the temperature range from -40°C (243K) to +70°C (343K).

VERTICAL LOAD

elastomeric pad

Vertical load is transferred by means of an elastomeric pad closed on all sides, which, under the conditions, behaves as resistant liquid and transfers the pressure equally on all sides. The maximum allowed normal load on the elastomeric plate is 25 MPa

steel pot

The steel ring sizes are determined from the internal hydrostatic pressure in the rubber. The bottom of the pot is not taken into account in calculation. The junction size between the ring and the pot bottom are determined by the shear force and the torque from the internal hydrostatic pressure.

HORIZONTAL LOAD

Horizontal load is transferred from the upper to the lower bearing part through the pot ring. It can be assumed that the horizontal load is distributed on the half of the scope in a parabolic form. The welding dimensions between the ring and the pot bottom are determined by the shear force and the torques caused by the horizontal forces

ROTATION

Because of the structure bending above the bearing, the upper part of the bearing is rotated in relation to the lower part, and the pressure on the elastomeric pad is not equal. The rotation causes torque.

The torque caused by the horizontal forces is taken into account when calculating the pressure on the bearing base. When transferring horizontal forces from the bearing onto the concrete base, the friction coefficient μ=0,5 (for steel superstructure μ=0,2) should be taken into account. The friction force is taken as the most unfavorable combination ($F_t=\mu V_{min}$).

v=1,5 is taken as the anti-sliding security factor. If the resulting horizontal forces cannot be compensated by friction, the bearings must be anchored.

With bearings exposed to seismic loads, as well as for bearings for railway bridges, friction coefficient is μ=0.

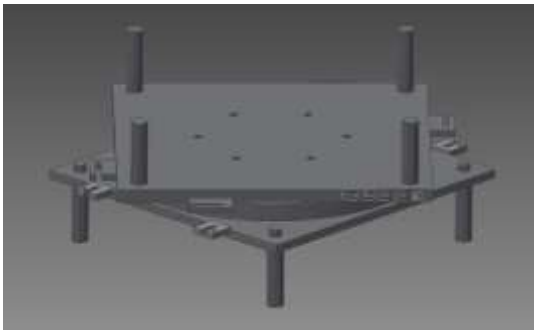
INSTALLATION

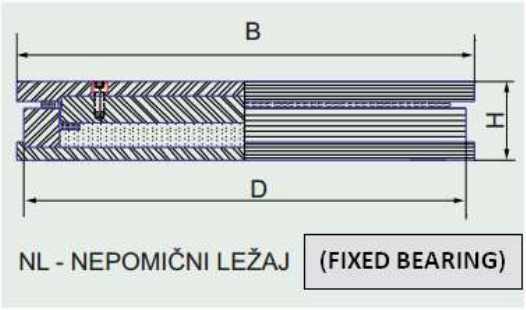
When installing pot bearings, the concrete above and below the bearing should have a high-density value of σ ≥ 45 MPa, and the base sizing should be performed with the pressure of 26 MPa.

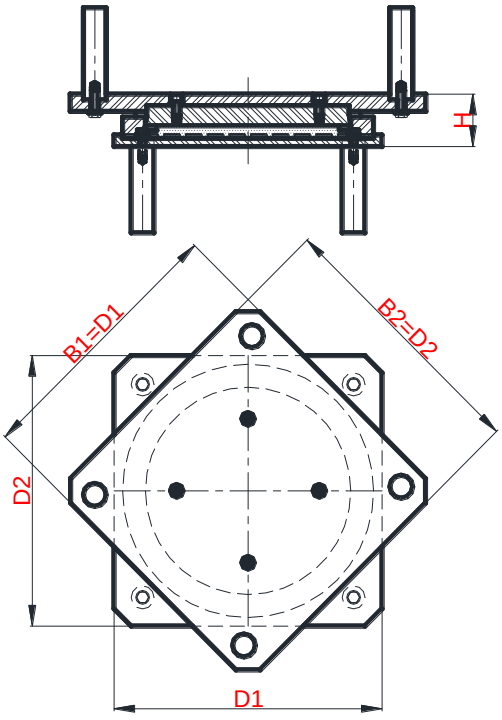
The bearings are fixed with four symmetrically arranged bolts on the lower plate. The bolts should first be cast into concrete, and after the installation is complete, the bolt is reinforced with nuts. At the end of the process, the bearing is cast into diluted cement mortar. If the foreseen horizontal forces can be taken by friction, anchoring can be omitted. If there is no anchoring, the bearings are placed on the cement mortar bed. The cover is connected to the pot with regulating bolts, which are to be removed after the installation. Fixed pot bearings are produced in standard sizes shown in Table 1, with possibility of producing other variations, nonstandard pot bearings, if neccessary.

FIXED BEARING 2.1 (NL)

Bearing type	Load (kN)	Height H (mm)	Bearing plate width $D_1=D_2$ (mm)	Mass (kg)
NL 1000	1000	70	270	37
NL 1500	1500	75	320	52
NL 2000	2000	80	360	64
NL 2500	2500	85	400	85
NL 3000	3000	90	430	95
NL 3500	3500	92	460	115
NL 4000	4000	94	490	125
NL 4500	4500	98	530	150
NL 5000	5000	101	550	161
NL 5500	5500	104	580	182
NL 6000	6000	106	600	202
NL 6500	6500	110	630	230
NL 7000	7000	112	650	250
NL 7500	7500	114	670	265
NL 8000	8000	116	690	278
NL 8500	8500	120	710	300
NL 9000	9000	124	730	330
NL 9500	9500	128	750	360
NL 10000	10000	131	770	388
NL 12000	12000	139	840	475
NL 14000	14000	150	910	610
NL 16000	16000	158	970	725
NL 18000	18000	168	1030	875
NL 20000	20000	175	1090	1100
NL 22000	22000	183	1140	1300
NL 24000	24000	190	1190	1400
NL 26000	26000	198	1240	1550
NL 28000	28000	203	1280	1700
NL 30000	30000	210	1300	1900







The bearings are typically produced with the following parameters **tgα =0,01** and mean surface pressure of **26 Mpa**.

V_{min} = 0,5 V_{max}, horizontal bearing capacity is **F_H=0,1 V_{max}.**

For larger pressures and movements, bearing dimensions can be determined according to special order.

SLIDING POT BEARINGS (JPKL, SPKL)

GENERAL

Pot bearings combined with a steel sliding plate and PTFE sliding plate can be **single-side** movable (JPKL) and universally movable (SPKL) bearings. On the bottom of the steel pot there is an elastomeric plate. At the edges of the rubber plate there is a carbon filled PTFE or brass seal. The rubber plate has a cover. The gap between the pot and the cover is sealed with an elastic rubber seal. On the upper surface of the cover, there is a PTFE sliding plate with pockets filled with the lubrification agent. The upper sliding plate slides on the upper surface of the PTFE plate. The sliding surface is made of stainless steel with surface roughness ≤1 µm.
The sliding surfaces and the other functionally important parts are dust-protected with a ribbed rubber cladding. Sliding pot bearings are fixed in the same way as the fixed pot bearings, by anchor bolts in the lower plate. On the upper sliding plate there are openings for the narrow anchor bolts used for fixing to the upper structure part

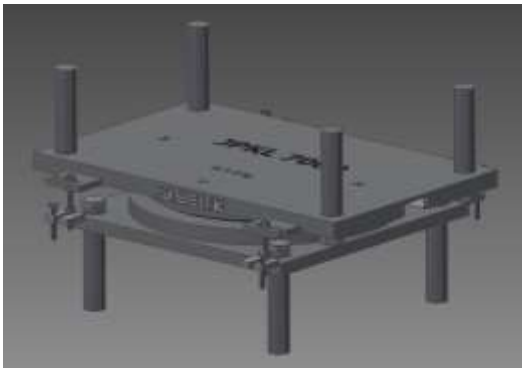
INSTALLATION

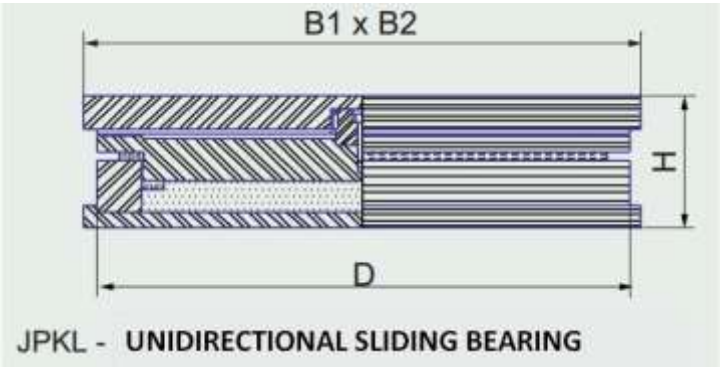
A unidirectional sliding bearing is produced by installing a single-direction guide to the sliding plate of a multidirectional sliding bearing. Sliding pot bearings are applicable in complex bridge structure solutions. Sliding pot bearings are characterized by low height and weight in comparison to classical steel movable bearings, and also by low friction when sliding, and easy and low control and maintenance. The bearings are designed in such way that the wear and tear parts can be easily replaced. By factory settings, they are set to a desired shift value. During installation, four bolts are used to level the bearing in desired height and slope. The installation order is the same as with pot bearings. After installing the bearing and loading it with superstructure, fixing bolts and levelling bolts are to be removed from the bearing to enable it's function. With universally movable bearings, where the friction force on the bearing-base junction is 1,5 times stronger than the horizontal force, the anchoring procedure can be omitted

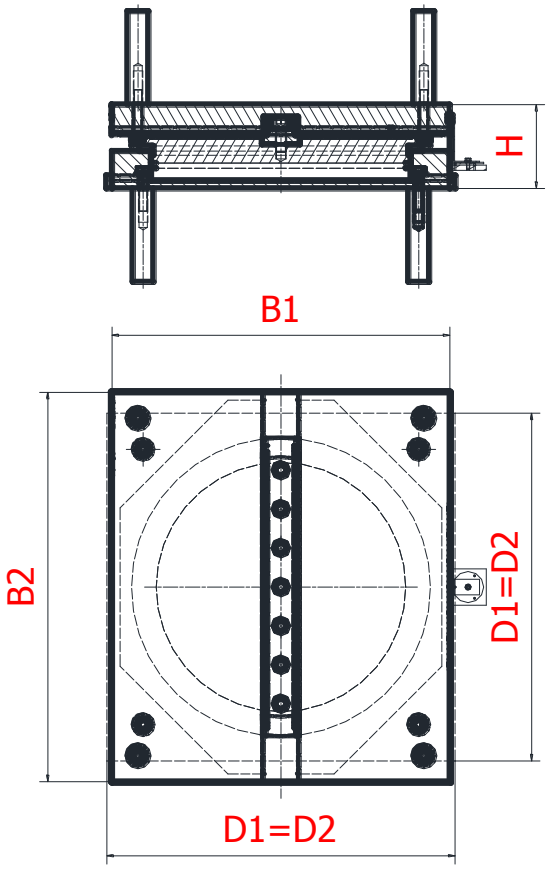
BEARING MARKING

Factory assembled bearings are labeled according to their type and function.
Beside standard label acc. to EN 1337-1, containing producer's name, also year of manufacturing, serial number, type, bearing capacity and movement capacity are stated. All these labels are clear and permanently visible, and part of them is aditionaly placed on top of the bearing.
For sliding bearings, on the top of bearing is also stated the customer, weight of the bearing, position in structure, movement direction and movement capacity.

UNIDIRECTIONAL SLIDING POT BEARING (JPKL)







UNIDIRECTIONAL SLIDING POT BEARING (JPKL)

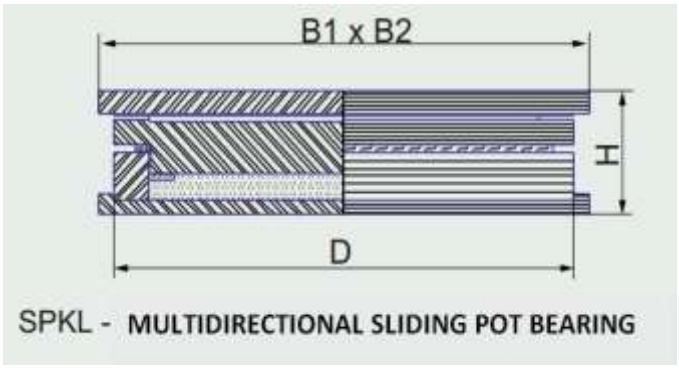
				e_x=±50		e_x=±100		e_x=±150	
Bearing type	Load (kN)	Height H (mm)	Width B_1 (mm)	Width B_2 (mm)	Mass (kg)	Width B_2 (mm)	Mass (kg)	Width B_2 (mm)	Mass (kg)
JPKL 1000	1000	117	300	400	115	500	125	600	140
JPKL 1500	1500	120	350	450	130	550	150	650	170
JPKL 2000	2000	123	400	500	160	600	170	700	190
JPKL 2500	2500	126	420	520	180	620	200	720	230
JPKL 3000	3000	129	450	550	200	650	220	750	250
JPKL 3500	3500	133	500	600	240	700	260	800	280
JPKL 4000	4000	136	520	620	280	720	300	820	300
JPKL 4500	4500	141	560	660	310	760	340	860	370
JPKL 5000	5000	145	580	680	350	780	380	880	400
JPKL 5500	5500	147	600	700	370	800	410	900	450
JPKL 6000	6000	149	620	720	400	820	450	920	500
JPKL 6500	6500	153	650	750	420	850	470	950	520
JPKL 7000	7000	156	670	770	450	870	500	970	550
JPKL 7500	7500	159	700	800	500	900	550	1000	600
JPKL 8000	8000	162	720	820	550	920	600	1020	650
JPKL 8500	8500	166	730	830	570	930	620	1030	680
JPKL 9000	9000	169	750	850	600	950	650	1050	720
JPKL 9500	9500	172	770	870	650	970	700	1070	780
JPKL 10000	10000	175	800	900	700	1000	780	1100	820
JPKL 12000	12000	186	880	980	910	1080	950	1180	1050
JPKL 14000	14000	195	950	1050	1000	1150	1100	1250	1200
JPKL 16000	16000	203	1000	1100	1250	1200	1350	1300	1450
JPKL 18000	18000	217	1050	1150	1500	1250	1600	1350	1700
JPKL 20000	20000	226	1110	1210	1700	1310	1800	1410	1900
JPKL 22000	22000	236	1180	1280	1900	1380	2150	1480	2250
JPKL 24000	24000	243	1220	1320	2200	1420	2350	1520	2500
JPKL 26000	26000	250	1260	1360	2500	1460	2600	1560	2800
JPKL 28000	28000	263	1320	1420	2900	1520	3050	1620	3200
JPKL 30000	30000	270	1360	1460	3200	1560	3350	1660	3500

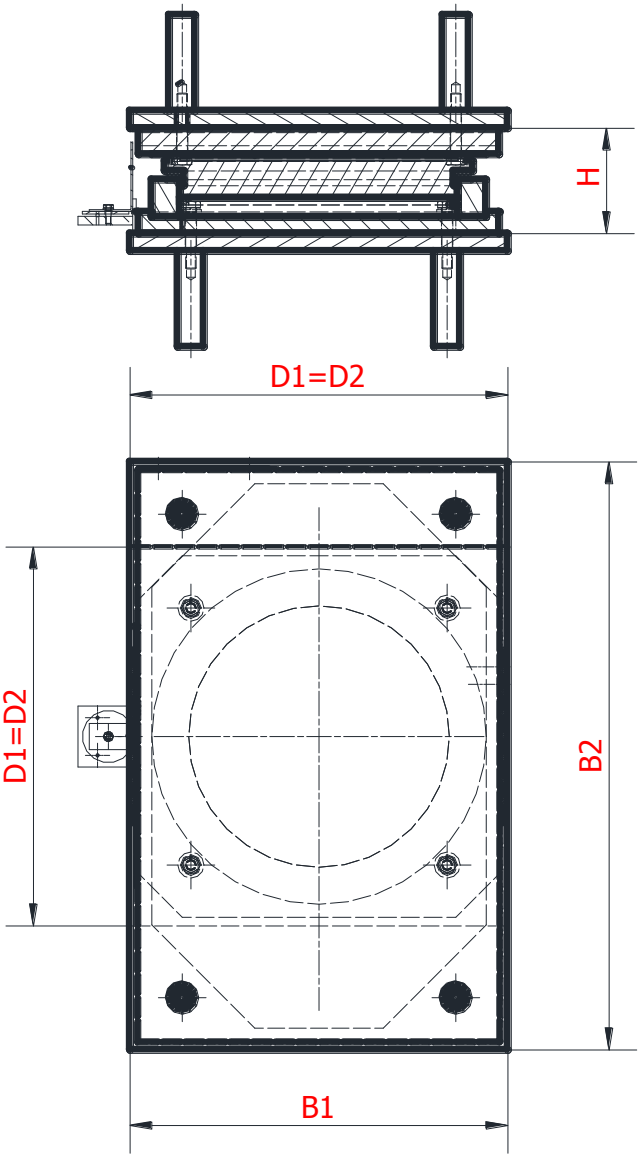
The bearings are typically produced with the following parameters **tgα =0,01**, mean surface pressure of **26 Mpa** and one direction movement of **e=±50 mm** to **e=±150 mm**

V_{min} = 0,5 V_{max}, horizontal bearing capacity is **F_H=0,1 V_{max}**.

For larger pressures and movements, bearing dimensions can be determined according to special order.

MULTIDIRECTIONAL SLIDING POT BEARING (SPKL)





MULTIDIRECTIONAL SLIDING POT BEARING (SPKL)

				e_x=±50		e_x=±100		e_x=±150	
Bearing type	Load (kN)	Height H (mm)	Width B_1 (mm)	Width B_2 (mm)	Mass (kg)	Width B_2 (mm)	Mass (kg)	Width B_2 (mm)	Mass (kg)
SPKL 1000	1000	100	270	370	75	470	90	570	100
SPKL 1500	1500	104	320	420	100	520	120	620	135
SPKL 2000	2000	107	360	460	120	560	135	660	150
SPKL 2500	2500	110	390	490	140	590	150	690	170
SPKL 3000	3000	113	420	520	160	620	175	720	190
SPKL 3500	3500	117	450	550	180	650	200	750	230
SPKL 4000	4000	120	480	580	200	680	230	780	250
SPKL 4500	4500	125	510	610	230	710	260	810	280
SPKL 5000	5000	129	530	630	260	730	280	830	310
SPKL 5500	5500	131	550	650	280	750	320	850	350
SPKL 6000	6000	133	570	670	300	770	340	870	370
SPKL 6500	6500	136	590	690	325	790	370	890	400
SPKL 7000	7000	138	610	710	350	810	390	910	425
SPKL 7500	7500	141	630	730	380	830	420	930	470
SPKL 8000	8000	144	650	750	400	850	450	950	500
SPKL 8500	8500	148	670	770	440	870	480	970	530
SPKL 9000	9000	151	680	780	470	880	510	980	560
SPKL 9500	9500	154	690	790	500	890	540	990	590
SPKL 10000	10000	156	710	810	530	910	570	1010	620
SPKL 12000	12000	174	790	900	720	1000	780	1100	850
SPKL 14000	14000	182	840	950	840	1050	910	1150	990
SPKL 16000	16000	190	930	1030	1000	1130	1080	1230	1150
SPKL 18000	18000	199	980	1080	1150	1180	1250	1280	1350
SPKL 20000	20000	208	1050	1150	1350	1250	145	1350	1550
SPKL 22000	22000	219	1100	1200	1550	1300	1680	1400	1780
SPKL 24000	24000	224	1150	1250	1700	1350	1800	1450	1900
SPKL 26000	26000	231	1200	1300	1900	1400	2000	1500	2150
SPKL 28000	28000	240	1230	1330	2150	1430	2300	1530	1400
SPKL 30000	30000	246	1280	1380	2350	1480	2500	1580	1650

The bearings are typically produced with the following parameters **tgα =0,01** mean surface pressure of **26 MPa** and one direction movement of **e= 50 mm** do **e= 150 mm**. Total movement in perpendicular direction is **10 mm**.

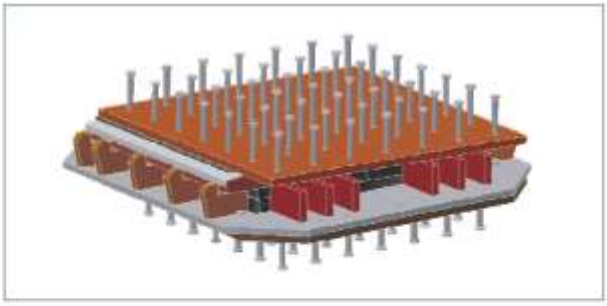
V_{min} = 0,5 V_{max}, horizontal bearing capacity is **F_H=0,1 V_{max}.**

For larger pressures and movements, bearing dimensions can be determined according to special order.

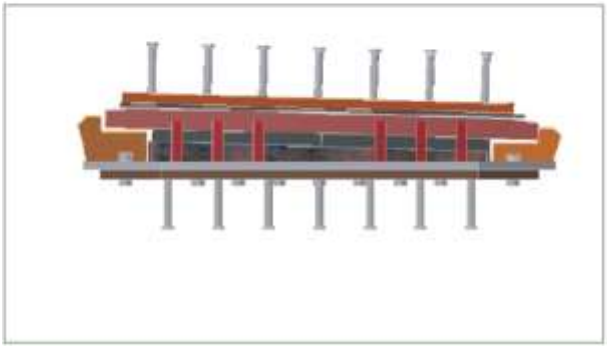
SPECIAL BEARINGS

INCREMENTAL LAUNCH BEARINGS

Bridge construction using massive heavy scaffolding has been replaced by incremental launch technology; using tacts expanding whole bridge precast span or even more.
On one side of construction site, on preparation station, whole bridge span is precast and progressively launched using hydraulic presses over pillars of future bridge.



For incremental launch procedure, special "temporary" bearings are produced, which with their design and sliding surfaces (inox-PTFE) enable launching procedure with minimal friction factor.



After whole bridge structure has been launched, using special hydraulic lifts, bridge structure is lifted and temporary bearings are replaced with permanent structural bearings.
POLIROL incremental launch "temporary" bearings have been used for incremental launching of following bridges in Croatia and BiH Federation:

Vijaduct „Hreljin" (span 41.5 m; length 545 m)
Vijaduct „Rašćane" (span 33 m; length 627 m)
Vijaduct „Šare" (span 33 m; length 402 m)
Vijaduct „Kuk" (span 61.5 m; length 369 m)
Bridge „No 3" (span 43,0 m, length 497 m)
„Bosna" bridge (span 36,0 m, length 418 m)

Advantages of incremental launch building technology:

- Reducing cost of building
- Replacement of heavy, expensive scaffolds
- No heavy cargo lifting to structure
- Shorter construction period

Institut IGH d.d.

IGH Cert

POTVRDA O SUKLADNOSTI

1/05-ZGP-1428

U skladu sa Zakonom o građevnim proizvodima („Narodne novine" br. 86/08), Pravilnikom o ocjenjivanju sukladnosti, ispravama o sukladnosti i označavanju građevnih proizvoda („Narodne novine" br. 103/08, 147/08, 87/10 i 129/11) i Tehničkim propisom za čelične konstrukcije - Prilog E („Narodne novine" br. 112/08, 125/10), utvrđeno je da su građevni proizvodi

Lončasti ležajevi tipovi NL, JPKL i SPKL

s elastomernim uloškom izrađenim od smjese prirodne gume NR, oznake smjese 40523, s unutarnjom brtvom od PTFE punjenom ugljikom

za učinkovitu nosivu nanjenu pri temperaturnom rasponu od -40°C do +50°C kao pomični i nepomični ležajevi, za primjenu u zgradama i inženjerskim građevinama gdje su zahtjevi na pojedine ležajeve kritični

koje je na tržište stavio:

POLIROL d.o.o.,
Remetinečka cesta 7, HR-10 000 Zagreb

i koji su proizvedeni u tvornici:

POLIROL d.o.o.,
Remetinečka cesta 7, HR-10 000 Zagreb

proizvođač podvrgao tvorničkoj kontroli proizvodnje i daljnjem ispitivanju uzoraka uzetih u tvornici u skladu s propisanim planom ispitivanja i da je prijavljeno tijelo Institut IGH, d.d. provelo vrednovanje početnog ispitivanja tipa odgovarajućih značajki proizvoda, početni pregled tvornice i tvorničke kontrole proizvodnje i da provodi stalni nadzor, ocjenjivanje i odobravanje tvorničke kontrole proizvodnje.

Ovom se potvrdom potvrđuje da su primjenjene sve odredbe koje se odnose na potvrđivanje sukladnosti za sustav 1 i svojstva opisana u dodatku ZA norme

HRN EN 1337-5:2005

i da proizvod ispunjava sve zahtjeve.

Ova je potvrda prvi puta izdana 10. veljače 2012. i ima valjanost sve dok se značno ne promijene uvjeti utvrđeni u navedenim tehničkim specifikacijama, uvjeti proizvodnje u tvornici ili uvjeti tvorničke kontrole proizvodnje.

OD 11/247-011

Odgovorna osoba:

mr.sc. Zdravko Barišić, dipl.ing.stroj.

Zagreb, 10. veljače 2012.

Institut IGH d.d.

IGH Cert

POTVRDA O SUKLADNOSTI

1/05-ZGP-1582

U skladu sa Zakonom o građevnim proizvodima („Narodne novine" br. 86/08), Pravilnikom o ocjenjivanju sukladnosti, ispravama o sukladnosti i označavanju građevnih proizvoda („Narodne novine" br. 103/08, 147/08, 87/10 i 129/11) i Tehničkim propisom za čelične konstrukcije - Prilog E („Narodne novine" br. 112/08, 125/10), utvrđeno je da su građevni proizvodi

Lončasti ležajevi tipovi NL, JPKL i SPKL

s elastomernim uloškom izrađenim od smjese prirodne gume NR, oznake smjese 40523, s unutarnjom brtvom od mjedi CuZn37

za učinkovitu nosivu nanjenu pri temperaturnom rasponu od -40°C do +50°C kao pomični i nepomični ležajevi, za primjenu u zgradama i inženjerskim građevinama gdje su zahtjevi na pojedine ležajeve kritični

koje je na tržište stavio:

POLIROL d.o.o.,
Remetinečka cesta 7, HR-10 000 Zagreb

i koji su proizvedeni u tvornici:

POLIROL d.o.o.,
Remetinečka cesta 7, HR-10 000 Zagreb

proizvođač podvrgao tvorničkoj kontroli proizvodnje i daljnjem ispitivanju uzoraka uzetih u tvornici u skladu s propisanim planom ispitivanja i da je prijavljeno tijelo Institut IGH, d.d. provelo vrednovanje početnog ispitivanja tipa odgovarajućih značajki proizvoda, početni pregled tvornice i tvorničke kontrole proizvodnje i da provodi stalni nadzor, ocjenjivanje i odobravanje tvorničke kontrole proizvodnje.

Ovom se potvrdom potvrđuje da su primjenjene sve odredbe koje se odnose na potvrđivanje sukladnosti za sustav 1 i svojstva opisana u dodatku ZA norme

HRN EN 1337-5:2005

i da proizvod ispunjava sve zahtjeve.

Ova je potvrda prvi puta izdana 29. listopada 2012. i ima valjanost sve dok se značno ne promijene uvjeti utvrđeni u navedenim tehničkim specifikacijama, uvjeti proizvodnje u tvornici ili uvjeti tvorničke kontrole proizvodnje.

OD 11/256-011

Odgovorna osoba:

mr.sc. Zdravko Barišić, dipl.ing.stroj.

Zagreb, 29. listopada 2012.

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague

EC CERTIFIKAT SUKLADNOSTI

Br. 1020-CPD-090-022992

U skladu s Direktivom 89/106/EEC Vijeća Europskih Zajednica od 21. Decembra 1988 o usklađivanju zakona, pravilnika i administrativnih odredaba Zamalja Članica, koje se odnose na građevne proizvode (Direktiva za građevinske proizvode – CPD), izmijenjena Direktivom 93/68/EEC Vijeća Europskih Zajednica od 22. Iula 1993, utvrđeno je da je građevni proizvod:

Proizvod

Konstrukcijski ležajevi

Verzija: Lončasti ležajevi

Tipovi: **NL** – nepomični, **JPKL** – jednosmjerno pomični i **SPKL** – svestrano pomični

koje na tržište stavlja:

POLIROL d.o.o.
Ident.: 90002807
Adresa: Remetinečka cesta 7, 10000 Zagreb, Hrvatska

i koji su proizvedeni u tvornici:

POLIROL d.o.o.
Ident.: 90002807
Adresa: Remetinečka cesta 7, 10000 Zagreb, Hrvatska

podvrgnuti tvorničkoj kontroli proizvodnje od strane proizvođača, kao i daljnjem ispitivanju uzoraka uzetih u tvornici u skladu s propisanim planom ispitivanja i da je ovlašteno tijelo

1020 – Tehnički i ispitni institut za građevinarstvo Prag

proveło početno ispitivanje tipa proizvoda za mjerodavna svojstva proizvoda, početni pregled proizvodnog pogona i tvorničke kontrole kvalitete i provodi stalni nadzor, ocjenu i odobrenje tvorničke kontrole kvalitete.
Ovaj certifikat potvrđuje da su sve odredbe koje se odnose na potvrđivanje sukladnosti i svojstva opisana u normi

EN 1337-5:2005

primjenjeni i da proizvod ispunjava sve propisane zahtjeve.

Ovaj certifikat je prvi puta izdan 16. Februara 2010. godine i ostaje važeći sve dok se znatno ne promijene uvjeti propisani harmoniziranim tehničkim specifikacijama, uvjeti proizvodnje u tvornici ili uvjeti same tvorničke kontrole proizvodnje.

Ing. Jiří Studnička

Prag, 16. Februar 2010

4. POLIDIL TYPE EXPANSION JOINTS CATALOGUE

POLIDIL

MAT EXPANSION JOINTS

POLIDIL GENERAL INFO

Polidil is elastomeric segment expansion joint system designed for bridges, roads and ramps, designed and developed in cooperation with certification body Institute IGH from Zagreb, who provided quality control during the production and testing stages, and issued quality certificates, and Croatian technical approval for Polidil expansion joints.

BASIC PRODUCT FEATURES

- ✓ 1100 mm long elements
- ✓ assembly using only bolts
- ✓ better fitness to structure with different thicknesses (44 mm, 55 mm, 60 mm, 84 mm)
- ✓ easy installation
- ✓ simplified maintenence (partial replacement possibility)
- ✓ guaranted watertightness
- ✓ can withhold all movements as result of :
  - temperature imposed structure deformations
  - load imposed angular deformations and rotations

POLIDIL joint system ensures the load bearing ability for traffic loads and watertightness of movable joints within the scope of 50-165 mm. That is why four types of Polidil expansion joints are produced:

POLIDIL 50 - total movement 51 mm (±25,5 mm)

POLIDIL 75 - total movement 75 mm (±37,5 mm)

POLIDIL 100 - total movement 101 mm (±50,5 mm)

POLIDIL 165 - v 165 mm (±82,5 mm)

The choice of expansion joint depends on the total expected movements, temperature changes, rotation, bearing deviations, braking forces etc.

In relation to the other expansion joint types, POLIDIL system is significantly improved in the transfer from the pavement to the footpath.

Namely, special parts are produced in the factory according to the accurate surwey measurement. They correspond to the bridge geometry precisely (profile and inclination). This enables the engineers to avoid rough cover plates on most of inclined bridges.

DESIGN CONCEPT

In bridge design, there is a watertightness requirement in order to protect the structure against corrosion caused by surface waters contaminated with salt and various chemicals. Full hydroisolation covering is needed across all expansion joints. The expansion joints must be able to resist the following:

1. Traffic load
2. Cumulative movements due to:
   - shrinking and expanding
   - expandings and contractions from temperature deformations of structure
   - rotation caused by structural bending under loads
   - elastic shortening of structure due to shrinkige and creep

Through bridge monitoring engineers have determined that water leaking occures through damages on expansion joints. Therefor european guidelines ETAG 032-5 recommend that this type of expansion joint is to be aditionaly hydroisolated by adding flexible membrane.

In order to meet this requirement, Polirol is equiped with neoprene menbrane benieth expansion joint, which, aided with drenaige pipe guides excess of water from bridge.

POLIDIL BRIDGE EXPANSION JOINTS

The design of the Polidil bridge expansion joints is so robust that they can withold all traffic loads required in the bridge design. Low expansion and contraction resistance was achieved by neoprene shear deformation, which minimizes the transfer of the load through bolts fixing the junction to the structure. Corrugated aluminum road surface provides a durable and long-lasting surface. Polidil system of continuous joints provides a permanent waterproofing and drivability of the surface across movable joints between 51mm and 165mm.

The required dimension is chosen from the list according to total expected movements, taking into consideration various factors such as temperature, rotation, shrinking, bearing deformations, breaking loads and elastic contraction.

Significant development with regard to other expansion systems was achieved by prefabricated parts exactly following the profile and the inclination of the bridge. These parts are produced by joining under the required angle, and welding into an aluminum road surface and steel reinforcement grid. This eliminates the need for rough cover plates on most inclined bridges.

Polidil expansion joints are placed 3-5mm below the upper line of the bridge transversal section. In this way, they are protected against impact by random traffic loads and impacts from snowplouhg.

MATERIALS

POLIDIL is a state of the art elastomeric system of joints developed for bridges, ramps and roads. It was designed as a long-lasting and durable system to take heavy traffic loads.
The latest enhancement in connection to the transfer devices of this generic type is the integration of an aluminum plate to the driving part of the device. It is resistant to wear, tear and UV influences, which significantly prolongs its life cycle.

SKID RESISTANCE

Resistance to sliding is achieved by integration of corrugated aluminum HD plate. This reduces the big rubber surface exposed to traffic. Side drainage grooves on the transfer device enable the surface water to drain quickly.

DELAMINATION AND BENDING RESISTANCE

Aluminum plates are „V“ shaped and thus asured to prevent delamination and increasing bending resistance. Steel corner reinforcement is made os S235JR or better steel and thus forms reinforcement of expansion joint segment structure.

REDUCED CONTACT PRESSURE

Approx. 40% larger adhesion area in comparison to similar products significantly reduces the transfer of unwanted pressure to the structure and minimizes the tendency for lasting plastic deformation when the device is stretched during the winter

STEADY DRIVING

The entire structure (Transfer from asphalt to neoprene, aluminum, neoprene...) ensures steady and safe traffic.

EASY INSTALLATION

During the installation of the device, the expansion and the constriction force are significantly reduced with regard to adjustments to temperature changes.

RELIABILITY

The production material ensures the reliability of the device. It is neoprene, produced according to european guidelines ETAG 032-5,, defining the following parameters:

- elastomere density
- elastomere hardness
- tensile strength
- elongation at break
- otpornost na paranje
- compression set
- resistance to ageing
- resistance to chemical/deicing agents
- ozone resistance
- resistance to hot bitumen

KERBSTONES AND CONVEXITY

Custom-made expansion joint elements, i.e. the transfer from the road to footpath, are welded under specified angle, in order to follow the bridge inclination precisely.

INSTALLATION HEIGHTS

It is recommended to install the transfer devices 3-5 mm beneath the asphalt level, since the experience has shown that the asphalt erosion would expose the device to wear and tear in the long run, and especially to damage caused by snow plowing.

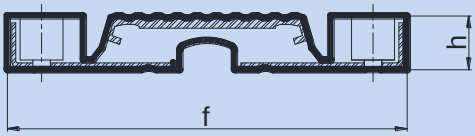
POLIDIL EXPANSION JOINT MECHANICAL CHARACTERISTICS

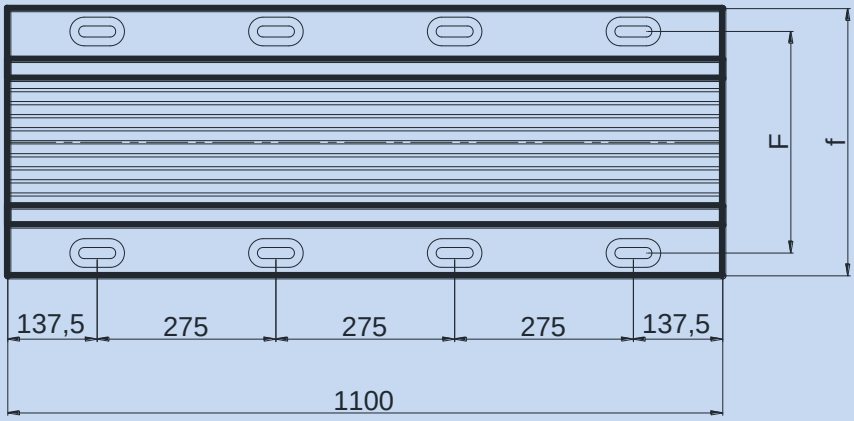
POLIDIL type	50	75	100	165
Total movement (mm)	51	75	101	165
Forces required for contraction and extension od expansion joint (kN/m)	22,5	43	28	35

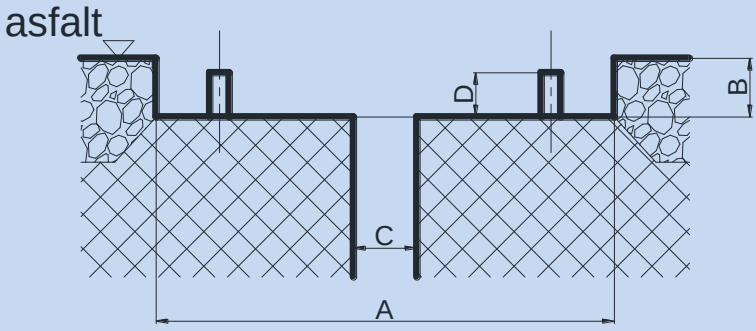
POLIDIL INSTALLATION SPECIFICATIONS

POLIDIL	type	50	75	100	165
Unit length	mm	1100	1100	1100	1100
Number of bolts per unit	pcs	8	8	8	8
Threaded rod MKT VA-A diameter	mm	12	16	20	24
Threaded rod MKT VA-A length	mm	140	160	200	24
Drilled hole in base diameter	mm	14	18	24	28
Drilled hole in base depth	mm	110	125	160	160
Length of bolt above base level	mm	25	30	35	40
Chemical anchor diameter	mm	12	16	20	24
Washer diameter	mm	26	40	50	52
Washer thickness	mm	3	4	6	6
Nut height	mm	10	16	15,5	19
Nut spanner size	mm	19	24	30	35,5
Nut prestressing torque	Nm	54	88	115	136
Neoprene membrane		1x295xL	1x445xL	1x630xL	1x770xL
Sealant	lit/m'	0,25	0,31	0,42	0,52
Degreasing spray	lit/m'	0,15	0,20	0,25	0,35
Filler for bolt holes	lit/m'	0,50	0,90	1,80	2,90
MATERIJAL ZA PODLOGU PO m' NAPRAVE					
Epoxy impregnation	kg	0,15	0,25	0,29	0,32
Levelling mortar (for 10 mm thickness)	kg	8	12	15	17
Expansion joint - asphalt filler (width acc to sketsh)	kg	10	24	27	38

POLIDIL EXPANSION JOINTS PHISICAL CHARACTERISTICS

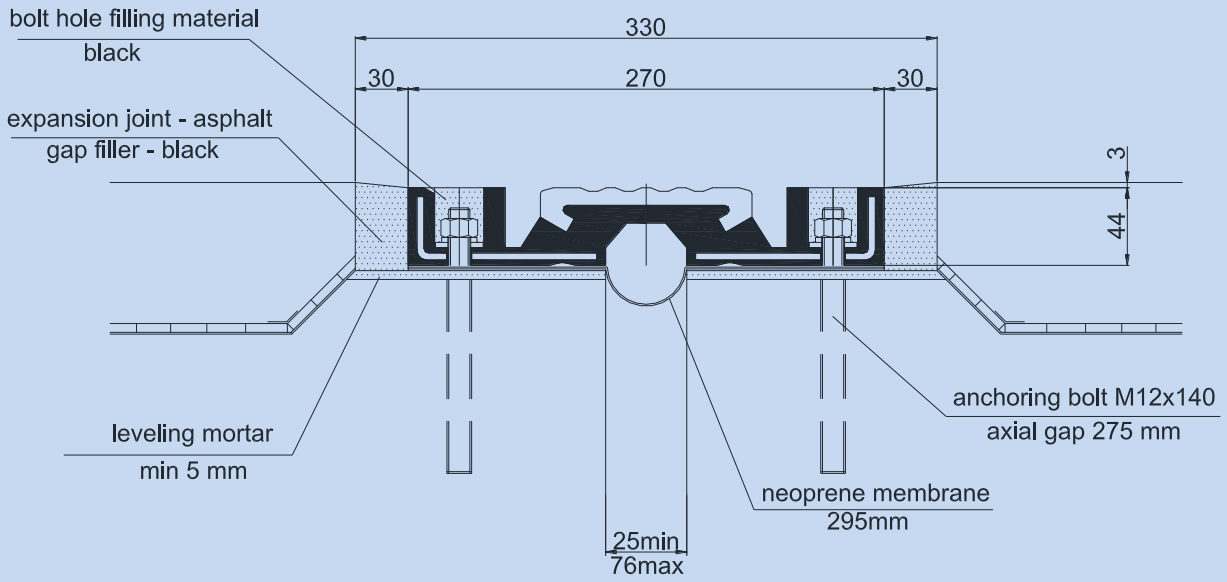




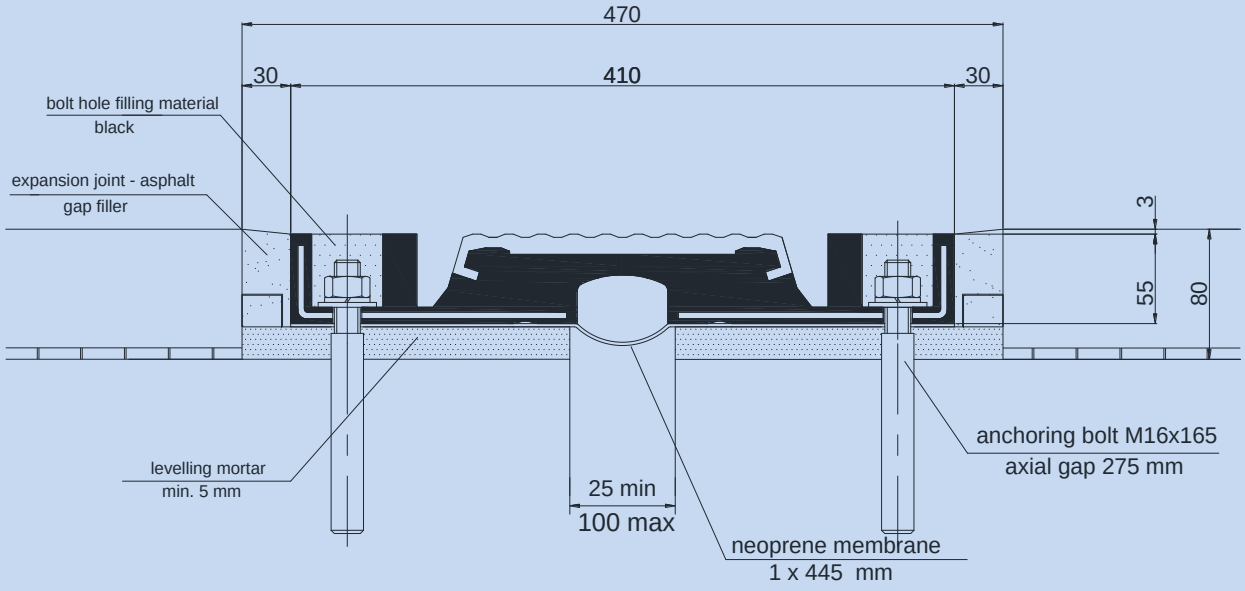


POLIDIL dimensions							Area required for instalation				
Type	Total movement	Length L	Width f	Height h	Bolt axes F	Weight piece	A	B	C		D
									min	max	
	mm	mm	mm	mm	mm	kg	mm	mm	mm	mm	mm
50	51	1100	270	44	212	24	330	49	25	76	25
75	75	1100	410	55	340	42	470	59	35	110	30
100	101	1100	580	60	492	61	640	64	25	126	35
165	165	1100	710	84	614	98	770	90	38	203	40

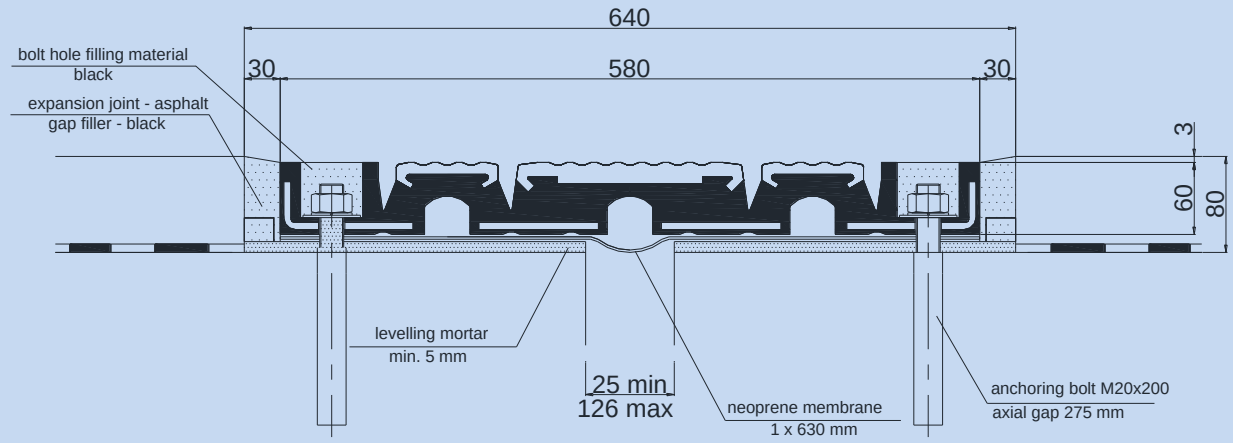
POLIDIL 50 - total movement 51 mm



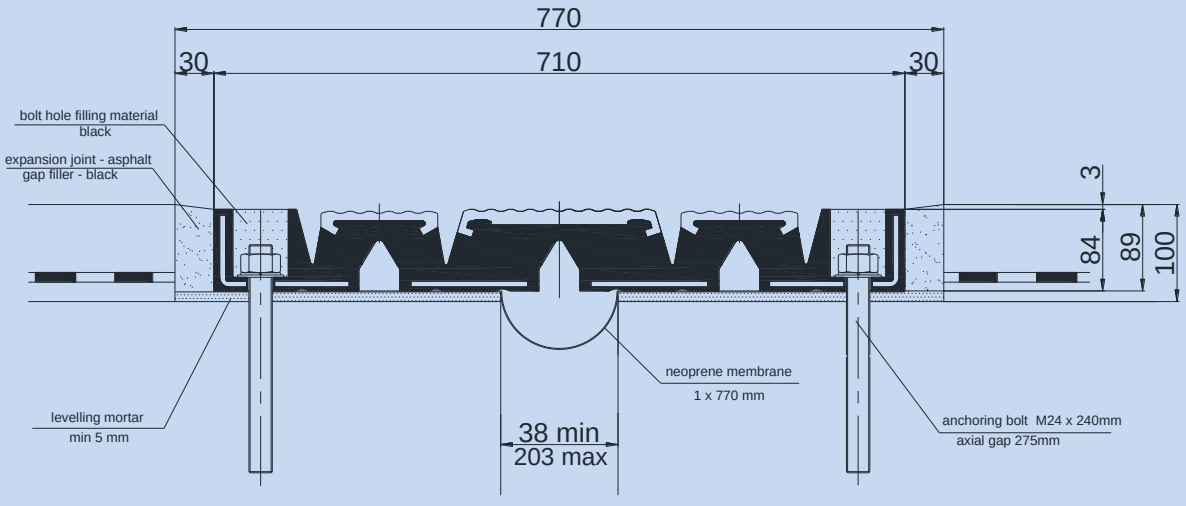
POLIDIL 75 - total movement 75 mm



POLIDIL 100 - total movement 101 mm

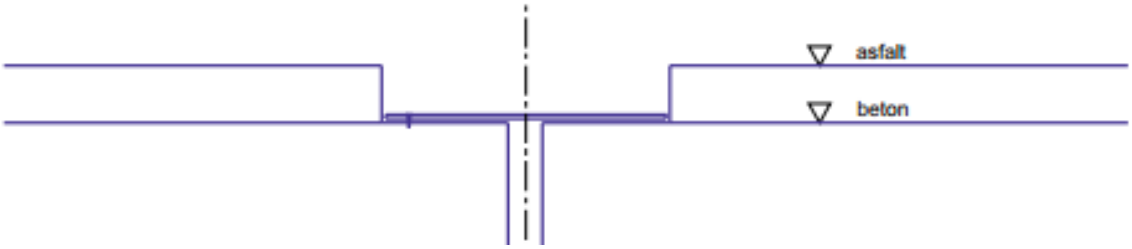


POLIDIL 165 - total movement 165 mm

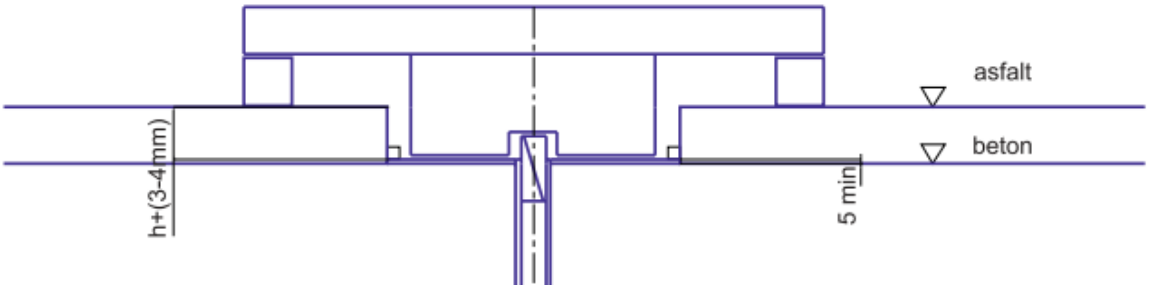


INSTALLATION

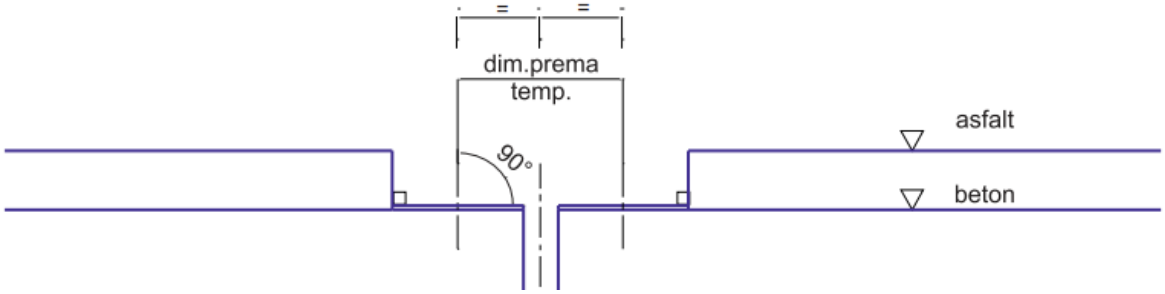
1. Asphalt removal at the required width and depth (according to type of Polidil)



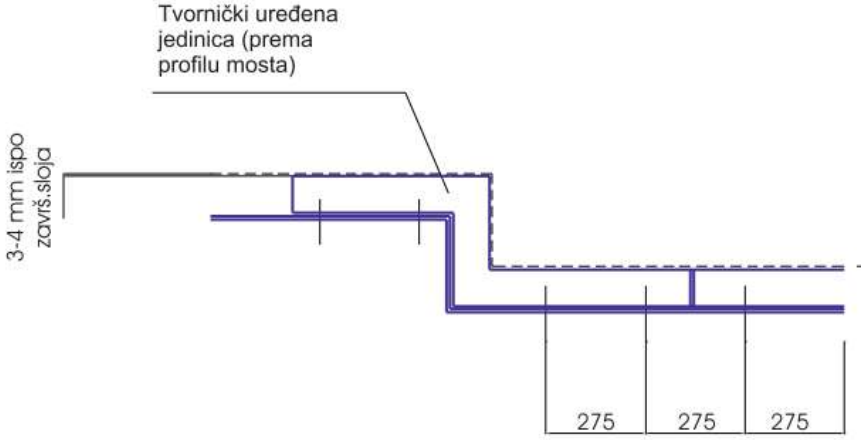
2. Base levelling using 3k epoxy mortar - thickness minimum 5 mm



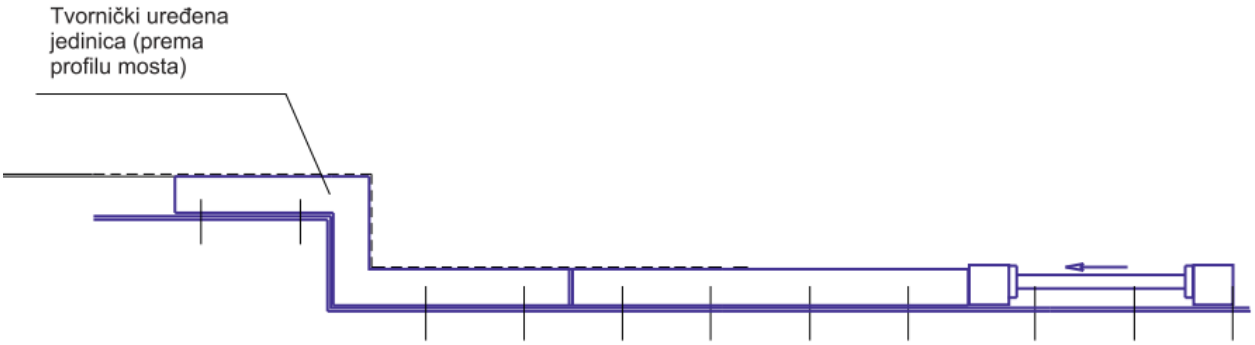
3. Hole drilling and installation of chemical anchored bolts (according to Polidil type and current temperature)



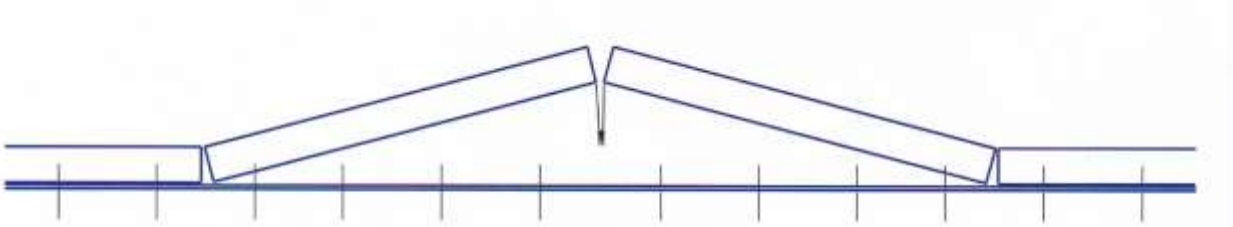
4. Installation od „custom made“ units on both kerbstone positions (manufactured according to bridge cross-section profile)



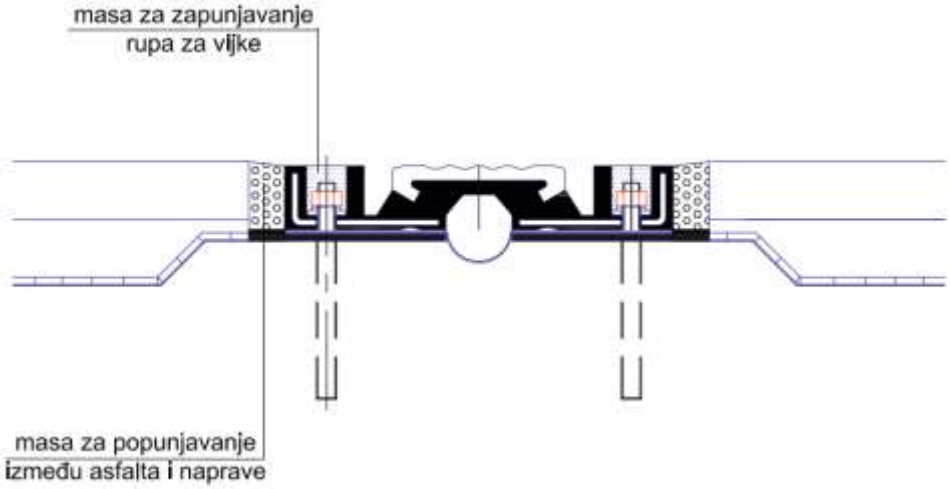
5. Installation of Polidil units (110 mm) on both sides of cross-section



6. Installation of final pair of Polidil units



7. Gap between expansion joint and aspfalt and bolt hole filling



SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET
ZAVOD ZA TEHNIČKU MEHANIKU
UNIVERSITY OF ZAGREB, FACULTY OF CIVIL ENGINEERING
DEPARTMENT FOR ENGINEERING MECHANICS
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Produženje

TEHNIČKOG DOPUŠTENJA

Broj dopuštenja	:	**TD – 180-50/11**
Naručitelj i proizvođač	:	**POLIROL d.o.o.** **Remetinečka cesta 7** **10000 Zagreb** **Hrvatska**
Vrste i tipovi proizvoda	:	**Elastomerne prijelazne naprave POLIDIL (PD)** **PD 50, PD 75, PD 100 i PD 165**
Vrijedi do	:	**1. siječnja 2016.**

Tehničko dopuštenje usklađeno je sa:
- Smjernicom 89/106/EEC od 21. prosinca 1988. g. i dopunjeno Smjernicom 93/68/EEC od 22. srpnja 1993. g.
- Zakonom o gradnji (NN br. 175/03).

Tehničko dopuštenje gore navedenih proizvoda odobrava se na temelju provedenog ispitivanja prijelaznih naprava tipa POLIDIL u Laboratoriju za ispitivanje konstrukcija na Građevinskom fakultetu u Zagrebu (Izvješće o ispitivanju br. 180-46/11).

Svi tipovi POLIROL elastomernih prijelaznih naprava proračunavaju se, proizvode, kontroliraju i nadziru u skladu sa Smjernicom za europska tehnička dopuštenja za prijelazne naprave ETAG n°32 (Guideline for European Technical Approval of Expansion Joints for Road Bridges).

Tehničko dopuštenje prema hrvatskom propisu (NN 175/2003) vrijedi 5 godina.

Izradio:

Prof.dr.sc. Želimir Šimunić

Predstojnik Zavoda za tehničku mehaniku:

Prof.dr.sc. Mladen Meštrović

GRAĐEVINSKI FAKULTET
ZAVOD ZA TEHNIČKU MEHANIKU
ZAGREB, Ul. fra A. Kačića Miošića 26

5. POLISTEEL TYPE EXPANSION JOINT CATALOGUE

POLISTEEL

EXPANSION JOINTS

MADE FROM HOT EXTRUDED STEEL PROFILES WITHOUT WELDING ON SEAL SECTION

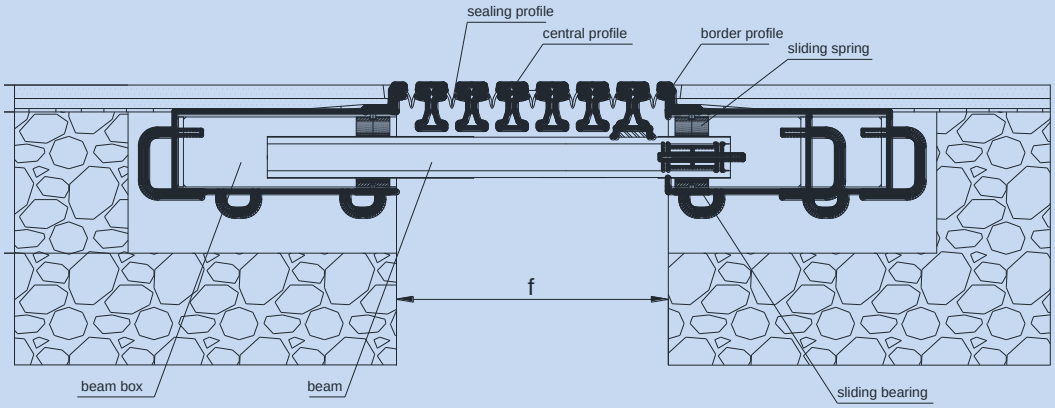
MODULAR EXPANSION JOINT PRINCIPLE

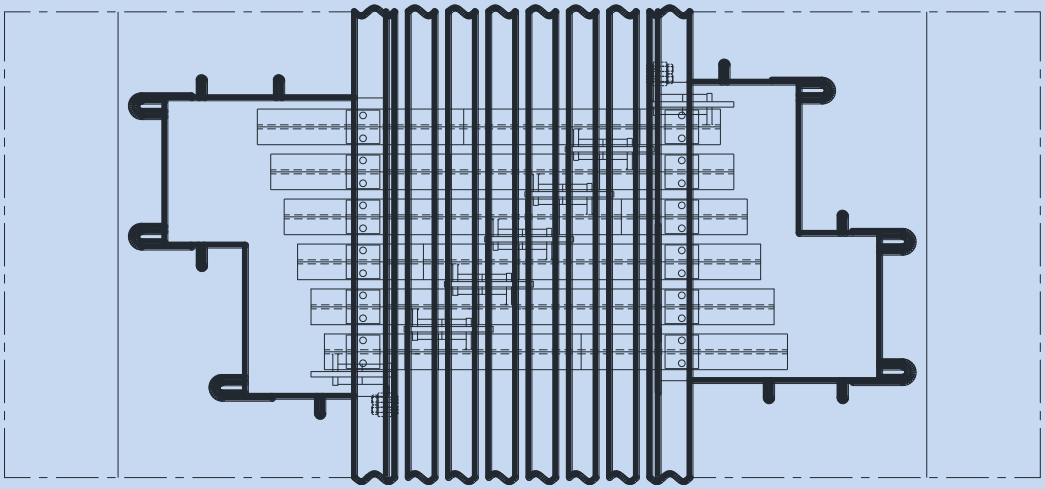
Several lamels divide the stretching/contracting part of the span assembly and the bridge supports into individual sections, which allow safe and comfortable driving, and are waterproof. Durable structure with no noise and a long life cycle are the result of a highly developed POLISTEEL design.

MAIN ADVANTAGES OF POLISTEEL MODULAR EXPANSION JOINTS

- Movements and rotations are possible in all three directions, i.e. axes
- All parts of the POLISTEEL lamel joints consist of high-quality materials, and are produced under a cutting-edge quality assurance system according to european guideline ETAG 032-8 and ISO 9001:2008, and are successfully tested to traffic loads wear, watertightness and fatigue.
- Due to the fact that welded joints on critical areas are avoided, the POLISTEEL modular joints achieve durable rigidness. All steel profiles are produced by hot extrusion procedure and made of material S355J2+N.
- All parts exposed to wear are replaceable
- **POLISTEEL** modular joints do not contain unconnected or movable steel parts sensitive to frequent load changes. The moves and the rotations are transferred only between the PTFE and stainless steel, and through elastomeric parts and synthetic materials.
- Thanks to elastic bearings, impacts and vibrations are dampened, which enables broader movements in the vertical direction, and vertical shift and rotation.
- POLISTEEL modular joint has elastic control of the section width. On one hand, this control prolongs the life of the whole structure, since it helps dampen the impulsive traffic. On the other hand, this elastic control can efficiently prevent the structural damage when one of the sections is "blocked" (e.g. by foreign bodies).

Types, movements and dimensions





TYPE	EXP. JOINT WIDTH				WEIGHT
	f_0	f_5	f_{65}	f_{80}	
	mm	mm	mm	mm	kg/m'
PS 80	50	55	115	130	70
PS160	130	140	260	290	200
PS 240	210	225	405	450	290
PS 320	290	310	550	610	400
PS 400	370	395	695	770	530
PS 480	450	480	840	930	680
PS 560	530	565	985	1090	830

MAIN FEATURES

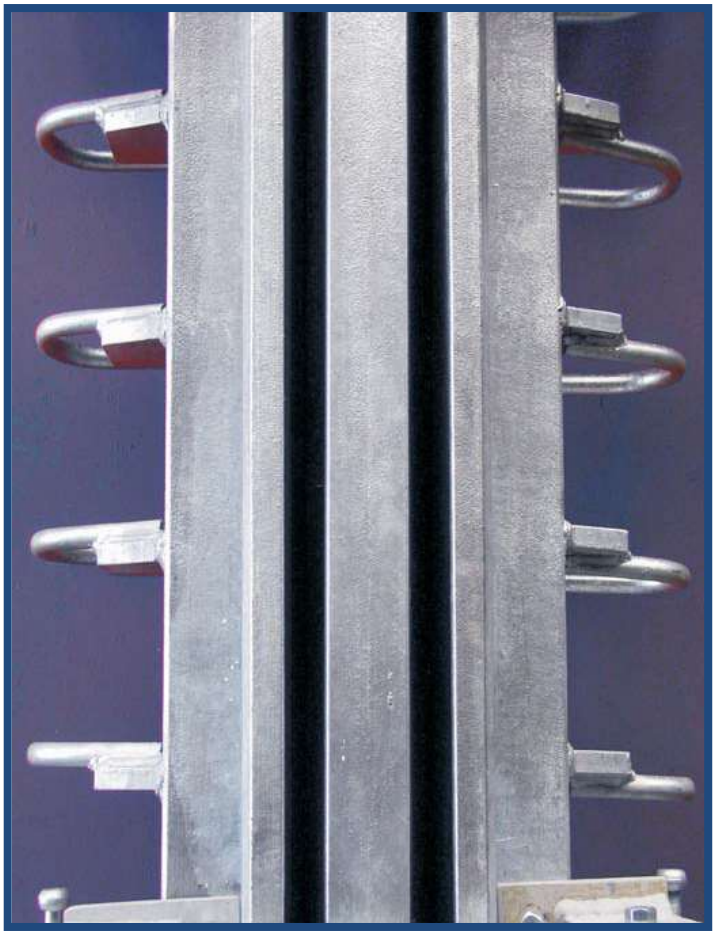
Standard types of Polisteel are sorted by the number of elastomeric waterproof seal profiles. They have a modular structure and starts with the type PS 80 with one elastomeric waterproof sealing profile. A sketch of a modular joint PS 560 with seven waterproof elastomeric seal profiles is shown in the previous page. The stressing paths are determined by the planned functional scope of the waterproof seal profile. If, for instance, the planned functional scope of the waterproof elastomeric seal profile is 80 mm, then the stressing path in modular joint PS 560 - 7 × 80 is 560 mm.
The width of the joint f is changed with the joint movement. The steel profiles touch at the minimum joint width f_{min}. According to the planned default data, the gap between the steel profiles at 65, 70 or 80 mm is opened at the maximum joint width f_{max}. As examples in the given table, joint widths are stated depending on the width of an individual joint (f_0, f_5, f_{65}, f_{80})

MOVEMENT

Modular expansion joints allow movements in all three directions (u_x, u_y, u_z), and rotation around all three axes. Thanks to flexible bearings and dampenings, movements of modules and beams are possible in thperpendicular direction, (e_y) as well in the vertical direction (u_z) of the bridge.

PRINCIPLE OF ELASTICITY - RIGIDNESS IN EXPLOITATION

In order to assure longer life of modular expansion joint, it is necessary to avoid dynamic loads, which are significantly reduced by the system of springs and shock-absorbers. This protects the joints, as well as the adjacent building parts, and significantly prolongs their life.



INCLINED EXPANSION JOINTS

If the bridge movement direction at the joint is not under the angle of 90 degrees, modular expansion joints are designed to allow such movement. Modular expansion joints can be arranged in an inclined way with regard to the bridge axis.
Warning: the movement direction must not necessarily be identical with the bridge axis.

MATERIALS AND CORROSION PROTECTION

Main components and materials of Polisteel modular expansion joints:

- Steel profiles and beams (S355J2+N)
- EPDM or CR rubber sealing profiles
- Elastomere bearings and dumpers
- Syntetic material sliding bearings (PTFE)
- Stainless steel 1.4401 or 1.4404 sliding plates

All environment exposed steel elements are corrosipn protected to grade C4 or C5 according to EN 12944-5 eg.:

- Sandblasting SA 2,5 or higher
- Basic Zn rich epoxy layer 60 µm
- Basic epoxy layer 120-160 µm
- Finishing polyurethane layer 60 µm

UKUPNO 240-320 µm

On customer's demand, other types of corrosion protection are available.

TESTING AND CERTIFICATION

Independent test and certification bodyes (GF Zagreb and IGH Zagreb) have determined quality of whole **Polisteel** expansion joint system according to, at the tame valid regulations.
The latest tests and controls are conducted according to european guidelines ETAG 032-8 and were done in institutes in Croatia (Institute IGH Zagreb) and Chech republic (TZUS Praha).

Following tests have been conducted:

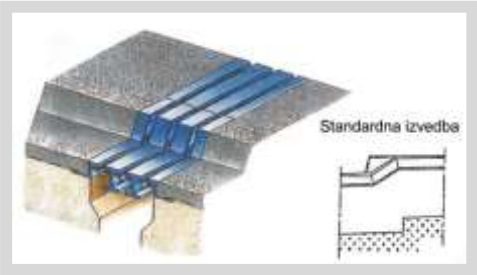
- movement capacity
- mechanical resistance to traffic loads
- resistance to fatigue (dynamic loads)
- resistance to agressive environmental influence
- watertightness

EXPANSION JOINT INSTALLATION GAPS

The size of the openings is determined by the engineer in the planning stage. The opening dimensions in the structure must be checked and corrected, if needed, before installation.

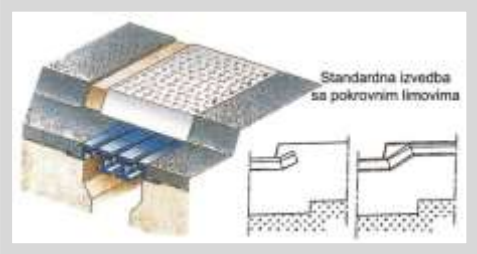
THE BORDER LINE AND FOOTPATH

The border line of modular expansion joint follows the bridge cross section contour and is made of welded bolts (specially shaped elements) or the corresponding cover sheets.



FRRONT SIDE COVER

The front side is covered with sheets. Covering can be done in single or double layer sheets.



MOVEMENT MANAGEMENT

Elastomeric springs together with the seal profiles coordinate steel profiles, as well as the whole system. In such a way, the stressing path is divided to individual sections, and the braking /movement forces are flexibly dampened and transferred.

The forces transferred through control boxes to the side structure can have the following limit values:

- max. 10 KN per control box in the horizontal direction
- max. 18 KN per control box in the vertical direction.

Additionally, the flexible control system prevents the joint damage in case some of the gaps are blocked, e.g. due to foreign bodies (stones, and other) between steel profiles.

REINFORCEMENT LAYOUT

Reinforcement fixing should be done in compliance with the reinforced concrete structural rules. Anchor nodes on the side profile are generally arranged under 90 degrees in relation to the modular joint. Structure reinforcement is thus done in parallel with the anchor nodes. Additional reinforcement should be installed under the beam controll boxes. In order to ensure smooth transfer of the load for the duration of the joint life, Polirol recommends the following minimum reinforcements for the adjacent structural parts:

- ✓ Longitudinal reinforcement: at least Ø16 mm / 250 mm
- ✓ Transversal reinforcement: at least Ø16 mm (3 or 5 bars to connect anchors of the joint ti structure reinforcement)
- ✓ Aditional reinforcement: if necessary to rigidly fix expansion joint to structure

ASSEMBLY AND TRANSPORT

Modular expansion joints are manufactured and shop-assembled in Zagreb factory. They can be transported to the installation site as single building elements up to 20 m in length. They are placed in the opening by means of cranes.

INSTALLATION AND PRESETTING

Prior to installation, width and adjustment should be checked. The modular joint is then precisely measured in height on both side profiles, and fixed by welding to structural reinforcement, so it has its movement tolerance even before the concrete is cast. Generally, lamel joints should be placed only by trained skilfull personnel.

INSTALLATION AFTER PAVING

Whenever possible, it is recommended that the modular joints are installed only after the road pavement is done. For that purpose, the slots/joint openings are first filled with lean concrete. Asphalt can afterwards be installed smoothly. The opening in the lean concrete or asphalt is then cut out and modular joint is installed. The advantage of the installation at a later stage is primarily that the joint can be precisely adjusted to the road level. This enhances the driving features, reduces the impacts, and prolongs the life of both the joint and the pavement.

FORMWORK AND CONCRETE CASTING

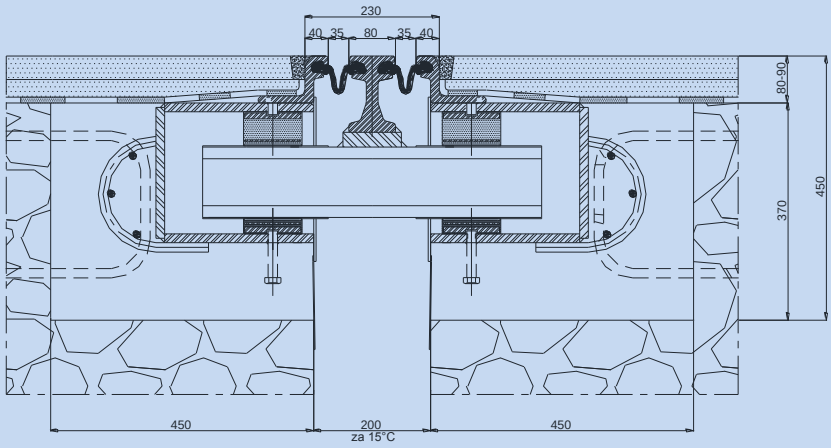
Custom steel sheets are installed on edge profiles supported on the slot edges. They should contact structure concrete and prevent concrete leakage, excess openings are filled with mortar. High density concrete is then carefully cast into the moist opening (C 30/37 or better). The concrete must not penetrate into the beam/controll boxes!

USAGE AND MAINTENANCE

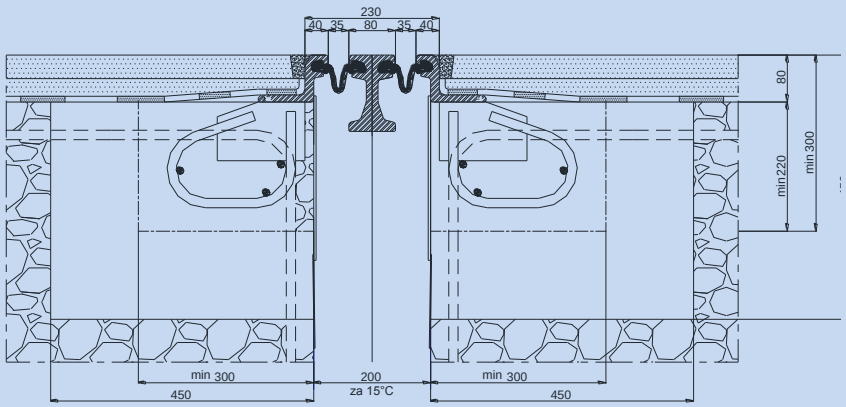
In the planned circumstances, modular joint does not require special maintenance due to water self-cleaning effect. That is why inspections can be reduced to regular bridge damage controls, during which, foreign bodies inside steel profiles should be removed (stones and similar). In order to detect and remove the possible damage, two joint inspections annually are recommended.
All consumable parts can be quickly and easily replaced by means of simple tools

POLISTEEL 160 (±80 mm) - Instalation sketches

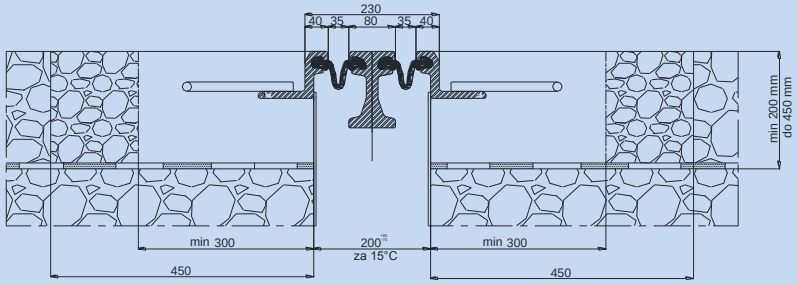
EXPANSION JOINT - POLISTEEL 160
total movement 160 mm (+/- 80 mm)
BEAM BOX CROSS SECTION



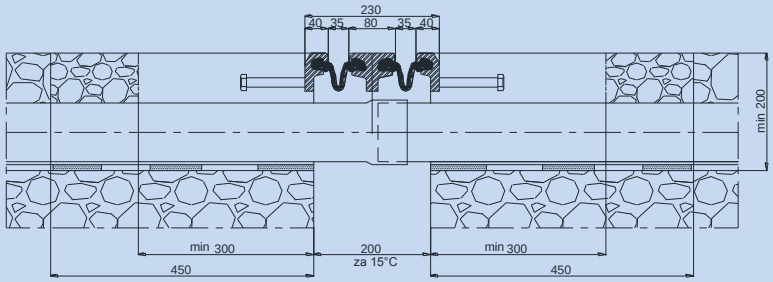
EXPANSION JOINT - POLISTEEL 160
total movement 160 mm (+/- 80 mm)
TYPICAL CROSS SECTION



EXPANSION JOINT - POLISTEEL 160
total movement 160 mm (+/- 80 mm)
FOOTPATH CROSS SECTION



EXPANSION JOINT - POLISTEEL 160
total movement 160 mm (+/- 80 mm)
FOOTPATH CROSS SECTION
HEIGHT REDUCTION DUE TO INSTALLATIONS



6. POLIFINGER TYPE EXPANSION JOINT CATALOGUE

POLIFINGER

EXPANSION JOINTS

DESIGN CONCEPT

Basic purpose of expansion joints is to enable undisturbed movements of bridge spans related to abutments of bridge (two dilated parts of structure), while bridging the gap between them in order to ensure smooth flow of traffic.

By filling gaps between two dilated structures, expansion joints should ensure:

- secure load transfer to substructure
- solid components structure and fatigue resistance
- low wear
- continuous adaptation versus deformation
- watertightness
- usage of materials resistant to ageing, corrosion and wear
- durability and easy maintenance

EXPANSION JOINT DESCRIPTION

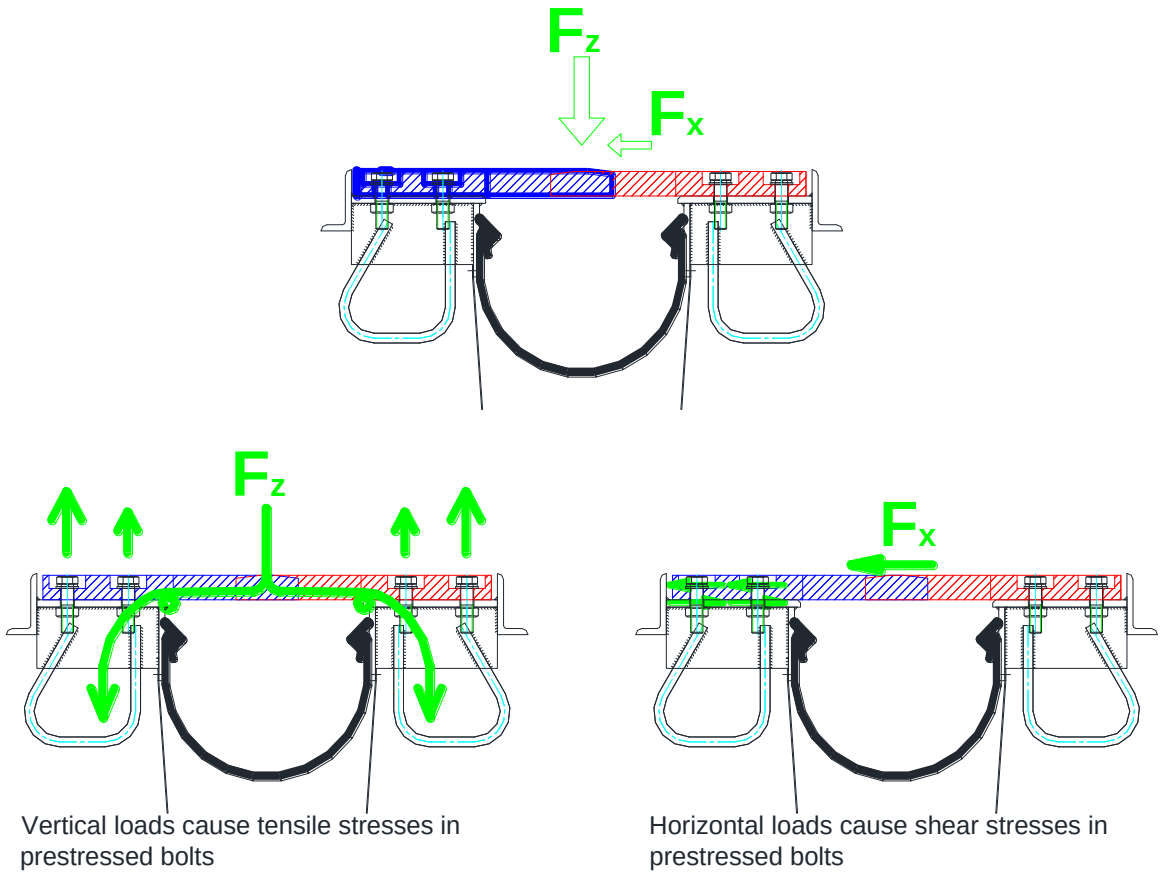
Finger type bridge expansion joints are consisted of series of finger modules, manufactured by steel molding or by machine processing of steel plates (not welding). Dimensions and weight of modules are optimized to be adequate for transport and installation.
The advantage of these modules is that they are replaceable on the building in case of damage. Steel finger modules are fastened to anchored steel substructure using HV (high value) bolts, which have very good fatigue resistance.
EPDM fiber reinforced rubber seal is installed on expansion joint by fastening to steel substructure; it ensures watertightness of expansion joint, and is replaceable in case of damage.
High quality of POLIFINGER expansion joint is guaranteed using constant factory control of all production processes and using high quality materials only.
Our corrosion protection system (2k Zn enriched epoxy basic paint + 2k epoxy basic paint + 2k polyurethane paint) ensures long-term quality corrosion protection conforming to class C5 according to EN 12944-5:2007.

ELEMENTI PRIJELAZNE NAPRAVE

ELEMENT	DESCRIPTION
STRUCTURAL ELEMENTS	
STEEL FINGER „PF“ MODULE	molded or machine processed steel S355J2+N
SUBSTRUCTURE	hot rolled steel profiles and flat steel S235JR or better
CONNECTION BETWEEN PF MODULES AND SUBSTRUCTURE	
BOLTS	DIN 6914 TZV HV 10.9 with silicon grease + washers DIN 125
BOLT NUTS	DIN 6915 TZV HV 10.9
SEALING ELEMENT	
EPDM SEAL	Fiber reinforced EPDM rubber, with high tear, ageing, salt and oils resistance
ANCHORING	
ANCHORING IN STRUCTURE	flat steel S235JR or better
STEEL ANCHORING REINFORCEMENT	reinforcing steel B500B or hot rolled S235JR
BOLT PROTECTION	rubber bolt cap NR 60 ShoreA

LOADS

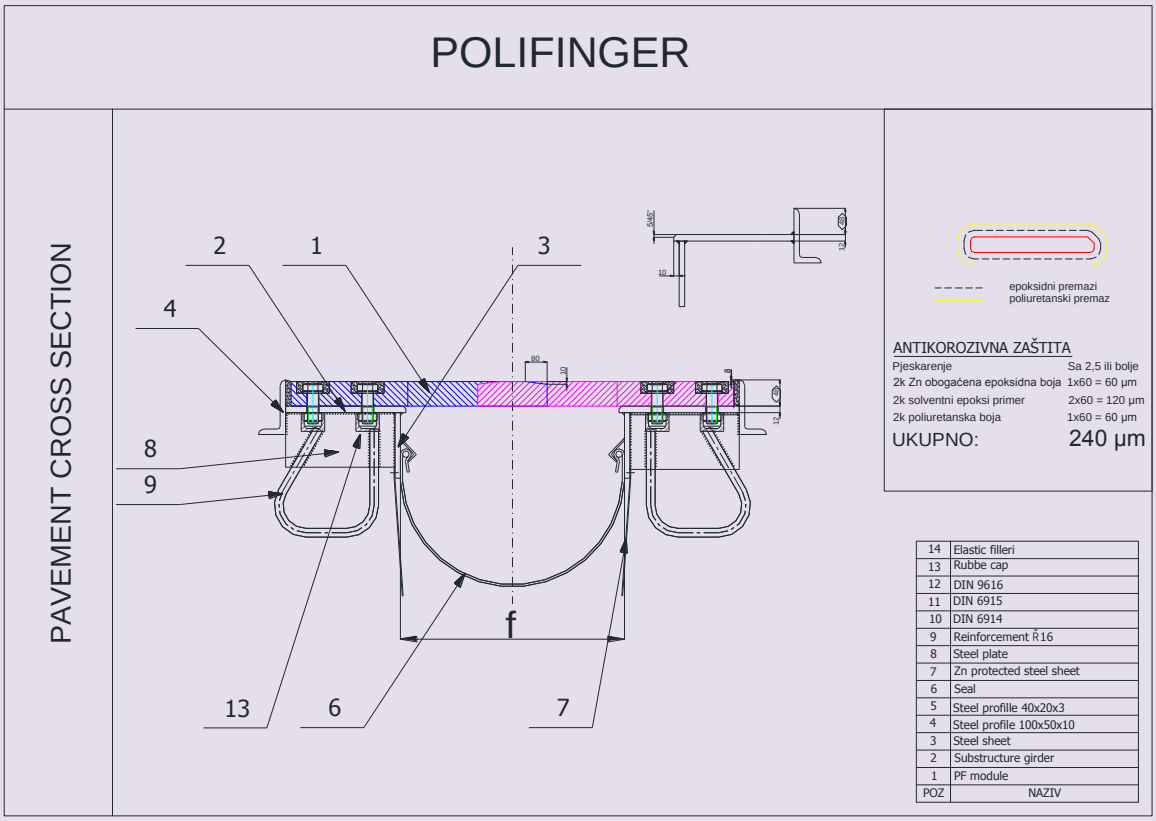
While driving over expansion joint, vehicles induce vertical and horizontal loads onto PF module, fasteners and substructure elements of expansion joint.



Because of „finger“ shaped driving surface, comfort of driving over POLIFIGER expansion is excellent. Steel surface of expansion joint is divided into relatively narrow longitudinal fingers, which on their tips have chamfering, with purpose of softening impacts of vehicle tires.

In order to prevent passing of dirt, aggressive fluids and other impurities through the expansion joint, as well as to ensure waterproofness of expansion joint, POLIFINGER expansion joint is equipped with fiber reinforced rubber seal (EPDM), which is fixed onto substructure of expansion joint.
The bond between seal and expansion joint is water proof and safe for structural elements beneath expansion joint.
Seal can be replaced easily in case of damage in few easy steps. It is not necessary to stop traffic during replacement.

TYPES, MOVEMENTS AND DIMENSIONS

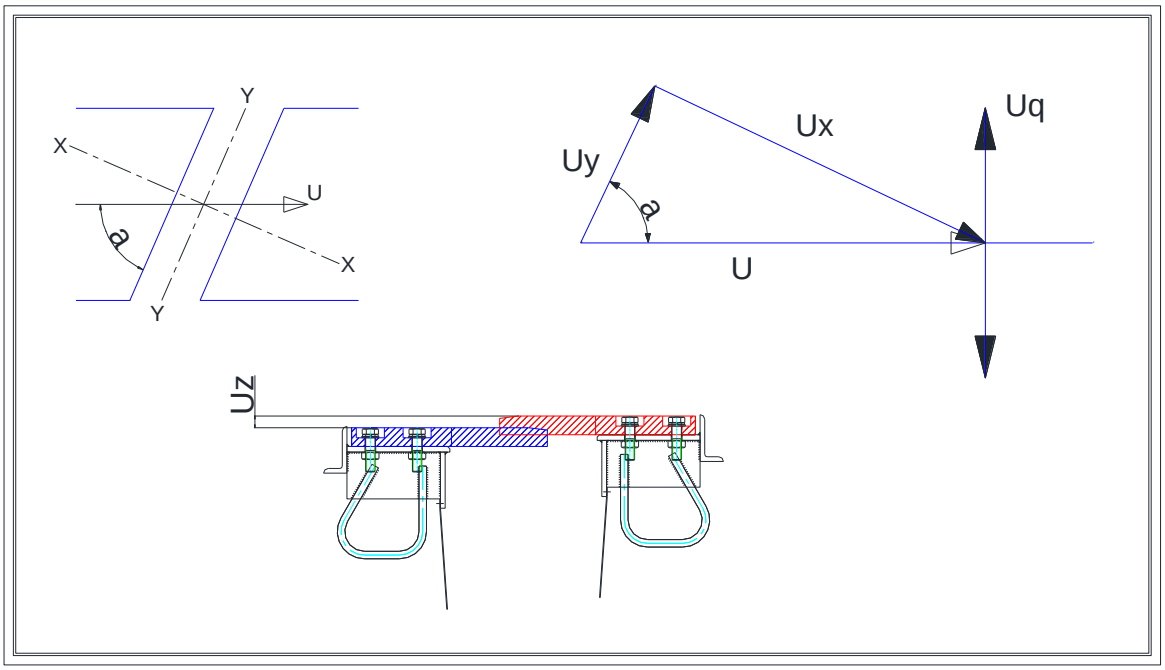


EXPANSION JOINT TYPE	MOVEMENT CAPACITY [mm]	width of dilatation f (mm)			mass (kg/m')
		f_{min}	f_{sr}	f_{max}	
PF 50	±25	80	105	130	110
PF 100	±50	135	185	235	175
PF 150	±75	185	260	335	220
PF 200	±100	235	335	435	305
PF 250	±125	285	410	535	355
PF 300	±150	335	485	635	420
PF 400	±200	435	635	835	545
PF 500	±250	535	785	1035	665
PF 600	±300	635	935	1235	790
PF 700	±350	735	1085	1435	915
PF 800	±400	835	1235	1635	1040

On special demand it is possible to produce expansion joints with other movement capacyties; in that case, module thickness, finger geometry and substructure are the same as nearest standard type of product

Total movement "U" in the main direction (longitudinal axis of building) is defined by two movement components U_x and U_y; perpendicular and parallel to expansion joint axis.

Type of the expansion joint is chosen regarding U_x component and maximum gap opening between fingers. In order to make choice easier, the most important data is shown in tabular form.



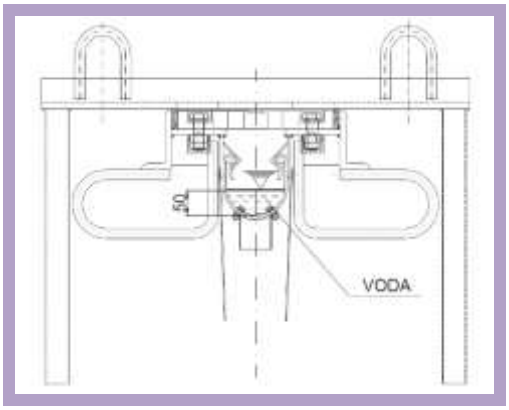
POLIFINGER prijelazne naprave		DOZVOLJENI POMACI		
		max (mm)	max (mm)	max (mm)
tip	α (°)	U_x	U_y	U_z
PF 50	45-90	±25	16	8
PF 100	45-90	±50	16	8
PF 150	45-90	±75	16	8
PF 200	45-90	±100	15	8
PF 250	45-90	±125	15	8
PF 300	45-90	±150	15	8
PF 400	45-90	±200	15	8
PF 500	45-90	±250	15	8
PF 600	45-90	±300	15	8
PF 700	45-90	±350	15	8
PF 800	45-90	±400	15	8

TESTS AND CERTIFICATION

Independent test and certification bodies (Institute IGH Zagreb) have determined quality of entire Polifinger system during developement of Polifinger expansion joint according to european guidelines ETAG 032-6.
Tests on test samples have been conducted on Institute IGH Zagreb.

The following tests have been performed:

- movement capacity
- mechanical resistance to traffic loads in exploatation
- fatigue resistance (dynamic load)
- watertightness



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igh@igh.hr, www.igh.hr
IGH Cert
NB 2477

CERTIFIKAT O STALNOSTI SVOJSTAVA

1/05-ZGP-1910

Ovaj certifikat, u skladu sa Zakonom o građevnim proizvodima („Narodne novine" br. 76/13), Pravilnikom o ocjenjivanju sukladnosti, ispravama o sukladnosti i označavanju građevnih proizvoda („Narodne novine" br. 103/08, 147/09 i 87/10, 129/11) vrijedi za građevne proizvode:

Prijelazne naprave tip POLIFINGER
tip PF50 do PF800,
s kutovima prstiju češljeva od 45^0 do 90^0 u odnosu na os dilatacije
svojstava prema tablici u prilogu ovog certifikata

koje je proizvod:

POLIROL d.o.o.,
Remetinečka cesta 7, HR-10 000 Zagreb

u proizvodnom pogonu:

POLIROL d.o.o.,
Remetinečka cesta 7, HR-10 000 Zagreb

Ovim se certifikatom potvrđuje da su primijenjene sve odredbe koje se odnose na ocjenjivanje i provjeru stalnosti svojstava i svojstva opisana u

HTD 14/001

u skladu sa sustavom 1 i da

proizvod ispunjava sve gore propisane zahtjeve.

Ovaj je certifikat prvi put izdan 21. veljače 2014. i ima valjanost do 12. veljače 2019. ili sve dok se ne promijene metode ispitivanja i/ili zahtjevi kontrole tvorničke proizvodnje obuhvaćene u hrvatskoj normi, koja se rabi za ocjenu svojstava objavljenih značajka, te dok se znatno ne izmijeni proizvod i uvjeti u proizvodnom pogonu.

OD 14/019-006

Zagreb, 21. veljače 2014.

Institut IGH d.d. Institute IGH
IGH Cert
NB 2477

PRILOG
CERTIFIKATU O STALNOSTI SVOJSTAVA

1/05-ZGP-1910

OBPOC46-02/01CP_EN_IstavljeiRev0
Stranica 1 od 2

Tablica a) Popis proizvoča i dozvoljeni pomaci - standardna izvedba

POZICIJSKA prijelazna naprava		DOZVOLJENI POMACI		

Po specijalnoj narudžbi mogu se proizvoditi i s drugačijim kapacitetima pomaka; u tom slučaju određuju se broj traprove, geometrija prstiju modula i podkonstrukcije odgovarajuću geometrijom najbližeg tipa standardnog proizvoda

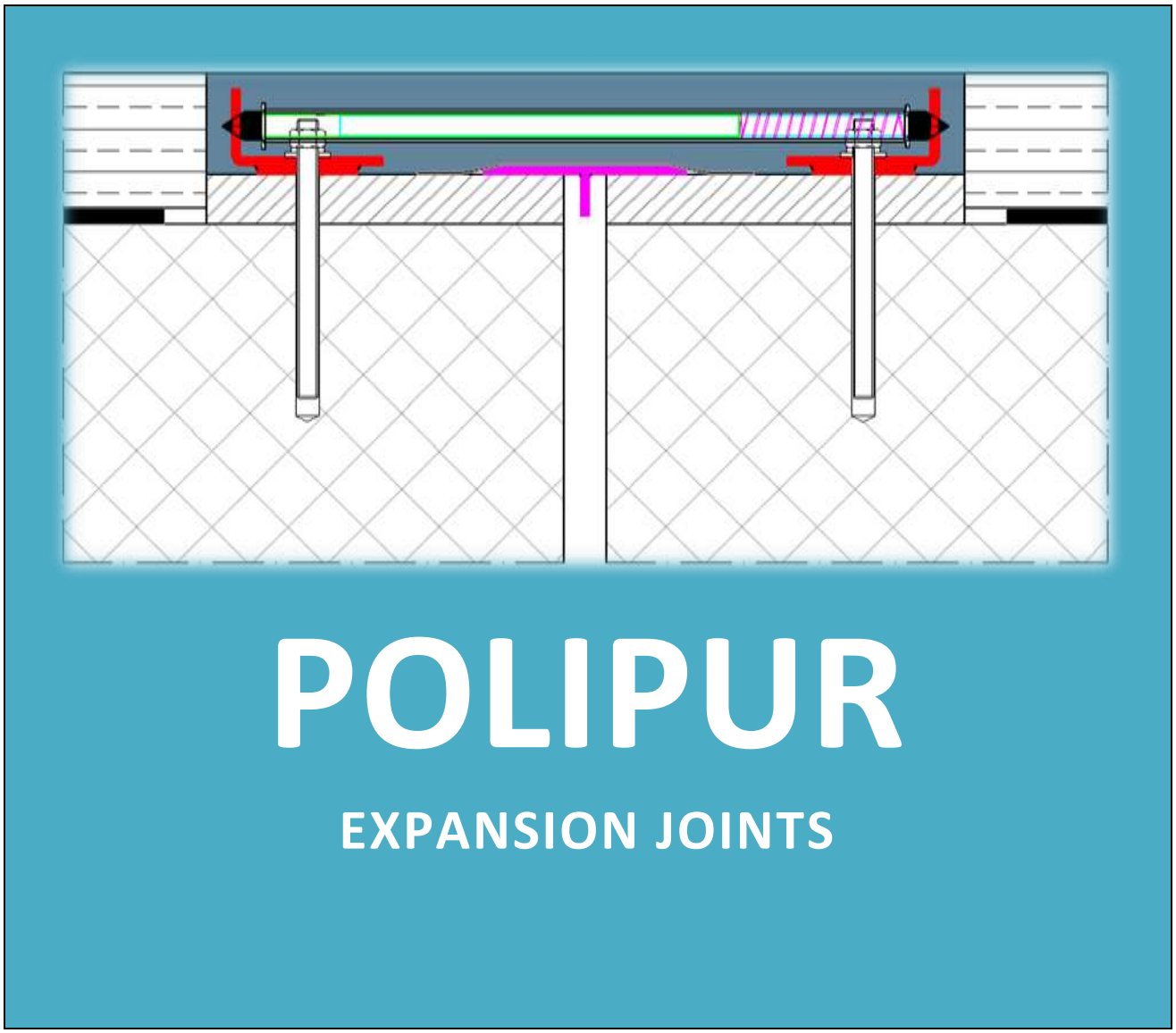
- Mehanička otpornost i stabilnost; otpornost na zamor - u skladu s HTD 14/001
- Zaštita od požara - nije primjenjivo
- Higijena, zdravlje i zaštita okoliša - POLIFINGER naprave ne otpuštaju opasne tvari u okoliš
- Sigurnost prilikom korištenja-zadovoljeni zahtjevi HTD 14/001 (nadogradnja za biciklističke iznad PF 250)
- Zaštita od buke - nije primjenjivo
- Ušteda energije i toplinska zaštita - nije primjenjivo
- PF moduli - čelik S355J2+N prema normi EN 10025-2:2004
- Čelična podkonstrukcija - čelik S235JR ili bolji prema normi EN 10025-2:2004
- Spojala - vijak + matica + podložna pločica prema EN 14399 dio 4 i 5 :2005
- EPDM brtva - ρ=1,2g/cm^3; tvrdoća 60 Sh.A; vlačna čvrstoća 7 MPa; izduljenje do loma 400%
- AKZ - razred C5 prema EN ISO 12944-5:2007

OD 14/019-006

Odgovorna osoba
mr.sc. Zdravko Barišić, dipl.ing.stroj.

Zagreb, 21. veljače 2014.

7. POLIPUR TYPE EXPANSION JOINTS CATALOGUE



DESIGN CONCEPT

Basic purpose of expansion joints is to enable undisturbed movements of bridge spans related to abutments of bridge (two dilated parts of structure), while bridging the gap between them in order to ensure smooth flow of traffic.

By filling gaps between two dilated structures, expansion joints should ensure:

- secure load transfer to substructure
- solid components structure and fatigue resistance
- low wear
- continuous adaptation versus deformation
- watertightness
- usage of materials resistant to ageing, corrosion and wear
- durability and easy maintenance

EXPANSION JOINT DESCRIPTION

POLIPUR type expansion joints are polyurethane based expansion joints made from two-compomemt self levelling polyurea matter (advanced polyurethane).
POLIPUR expansion joints enable movements up to ±60 mm.
They are ideal for bridge sanations and expansion joint repairs because they do not require installation gaps in structure.
They have high traffic vibration resistance and provide high driving comfort, not emitting noise level higher than normal noise of traffic on the pavement.

Advanced polyurethae is reinforced with steel profiles, which direst deformations into elastic area of expansion joint system, thus ensuring adhesion of polyurethane with adjacent structure, watertightness and durability of device.

Constant factory controll system for all production processes and usage of advanced polyurethane ensures high level of quality for POLIPUR expansion joints.

PU 860 advanced polyurethane, which is installed into POLIPUR joints:

- very high elasticity…700% elongation at break
- is permanently elastic – no dents or ruts from traffic load
- is installed using “cold casting procedure”, after combining two components with no heating. It has possibility of installation in segments (it is possible to flow traffic during installation)
- homogenous material, which allows deformations in all directions
- very durable, wear resistant and UV radiation resistant (with final coating TC458) and does not require maintenance of expansion joint…the principle is “install and forget, on low traffic roads

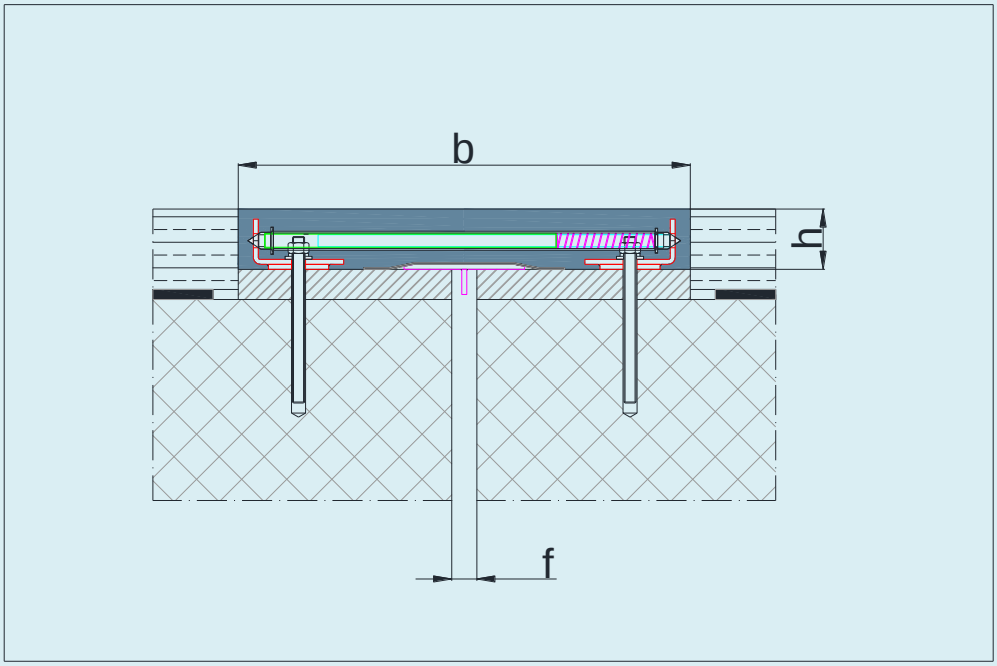
Advanced polyurethane PU 860 mechanical properties

Hardness ShoreA			75
Tensile strength	DIN 53504	MPa	15
Elongatin at break	DIN 53504	%	700
Viscosity	DIN 53515	MPA	21

POLIPUR EXPANSION JOINT ELEMENTS

ELEMENT	DESCRIPTION
FILLER	
ADVANCED POLYURETHANE	PU 860
STRUCTURAL ELEMENTS	
STABILISATION SYSTEM	telescopic seamless steel pipe S235JR and PP coating
SUBSTRUCTURE	profiled steel sheets S235JR or better
ANCHORING	
PAVEMENT ANCHORING SYSTEM	chemical anchoring VPK-SF + ASK-F + DIN 125 + DIN 934

TYPES, MOVEMENTS AND DIMENSIONS



EXPANSION JOINT TYPE	KAMOVEMENT CAPACITY [mm]	VERTICAL MOVEMENT [mm]	NOMINAL OPENING f [mm]	POLYURETHANE LAYER THICKNESS h [mm]	EXPANSION JOINT WIDTH b [mm]
PP 15	15 (+10; -5)	2,5	20	40	280
PP 30	30 (+20; -10)	2,5	20	50	350
PP 50	50 (+33; -17)	5	25	60	450
PP 60	60 (+40; -20)	5	30	60	500
PP 75	75 (+50; -25)	5	35	60	600
PP 90	90 (+60; -30)	10	40	60	750
PP 135	135 (+90; -45)	10	50	60	1100