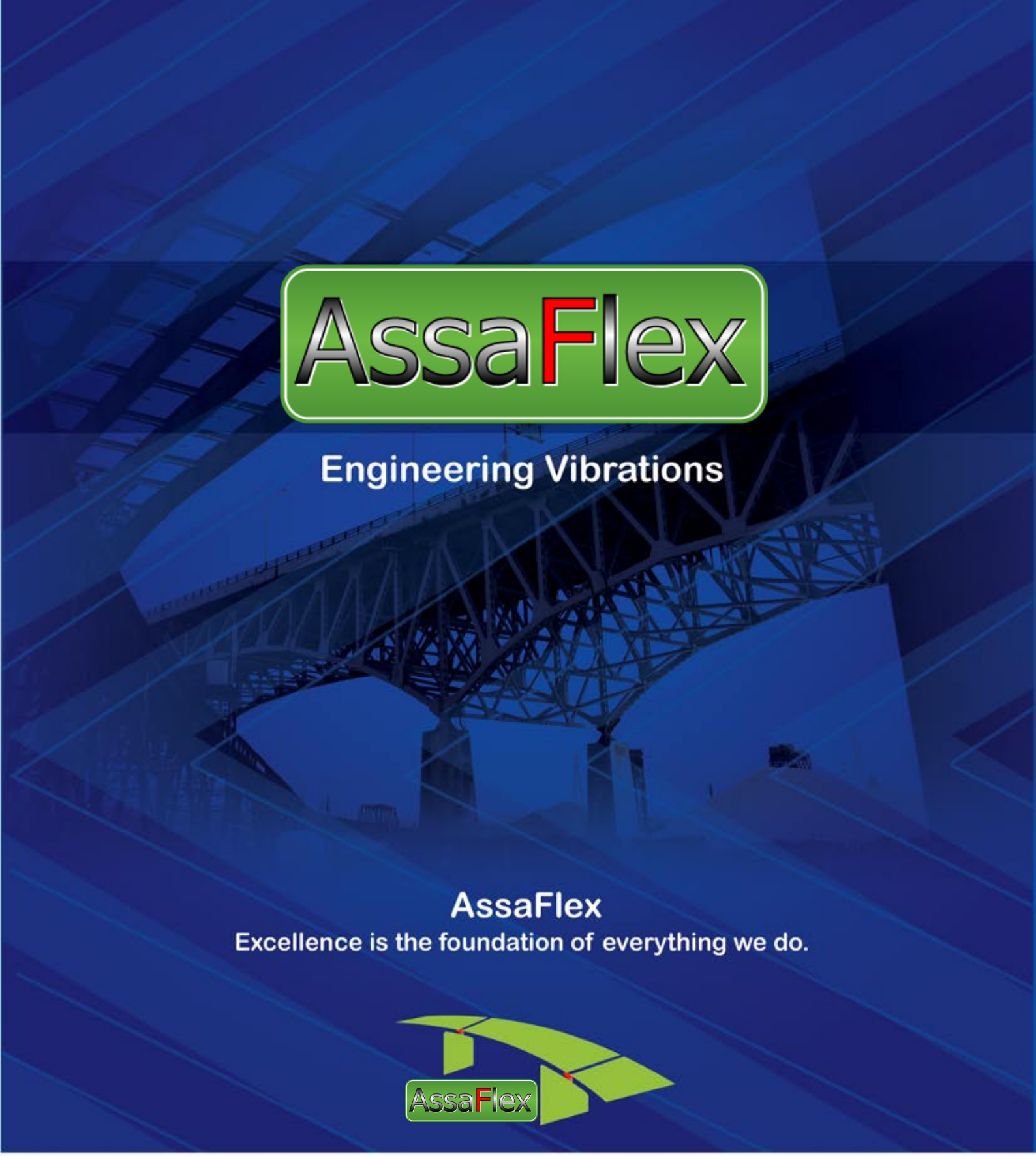
AssaFlex

Engineering Vibrations



AssaFlex

Excellence is the foundation of everything we do.

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AssaFlex UK is part of IGLOO Construction & Project Management Ltd

Registered in UK- Registration No: 7288774, VAT NO: 119516317


AssaFlex
Engineering Vibrations
2017
assaflex.co.uk
Tehran, Silk Bridge, 2010

Elastomeric Bearing Pads (Introduction):

In recent decades, elastomers have received much attention from various military, aerospace and civil engineering industries for their interesting physical properties. Due to their capabilities in vibration damping, shear deformability with low-shear modules and elastic behaviors, elastomers are considered ideal elements for application in structural supports.

Our careful assembly of raw materials, observation of best design principles and reliance on production know-how enable us to produce an optimal elastomeric support. Such an element in a structure enjoys shear deformability to tolerate displacements due to thermal variations, creeps, and types of dynamic loads. At the same time, it can tolerate applied vertical loads with no damage, and accept rotations while remaining statically intact (due to dynamic loadings on decks and decks creeps). The element can actually almost obtain its original shape after removing such loadings.

Adding this structural element to other components, such as Teflon slipping surfaces, damping devices, displacement restraining systems, mechanical anchors, and rotatable elements such as cylindrical and spherical surfaces, will provide increased capacity and range of performance controllability of the resulting system.

Introducing AssaFlex elastomeric bearing systems:

Being truly cost effective and having a wide range of applications, reinforced elastomeric bearings are nowadays the most frequent type of structural bearings.
Enjoying elastic shear deformability, rotational and vertical forces tolerability, they are a perfectly applied element in the bridges having spans of generally above 18 meters wide. Because of the above-mentioned capabilities, these parts are used both in bridges and buildings and as light dampers in replacing industrial equipment and machinery. These types of rubber parts can also operate as seismic isolation elements in small to medium earthquakes and restrain the structure from vibrating in natural frequencies. Besides, elastomeric bearings can dissipate up to maximum 6% of seismic energy and inhibit the transmission of all the energy to the structure.

Elastomeric bearings are made of rubber layers and, in most cases, sheets of steel reinforcements; the rubber layers can be made of natural or synthetic materials. As per international/local standards and regulations governing rubber bearings, the mechanical properties of an elastomer are particularly important. On the other hand, in reinforced elastomeric supports the steel layers used are chemically bonded to the upper and lower rubber sheets in the production process, using special binders. In the meantime, the proper elastomer-steel bond and the appropriate mechanical properties of the steel of the steel sheets are also important in the final performance.

Assamrof / AssaFlex elastomeric pads have been manufactured using the highest quality polymeric com-} pounds, and comply with different standards tables, including BSEN-1337-3 and AASHTO M-251. Elastomers samples made by AssaFlex are tested many times in modern domestic (Iranian) labs. They are tested at the beginning of each production cycle according to the company's internal quality control algorithms to guarantee that their mechanical properties meet all relevant standards.

AssaFlex QA system is based on international guidelines and follows ISO to ensure AssaFlex tests are carried out using approved international procedures, the in-house laboratory test results are sent to a random laboratory in the UK to confirm that the results follow those of the QA system.]
AssaFlex bearing pads are applicable for a load range of 70KN 10,000 KN which is considered to be totally comprehensive.

Valiasr Cable-Stay Bridge, Shiraz,Middle East, 2015

Design:

The table of mechanical properties of AssaFlex elastomeric bearing pads have been designed based on standard EN-1337-3. In order to calculate their mechanical properties, we, Assamrof Company, have programmed a special design software called "Assaflex Optimal Bearing", approved by Esfahan National University Technical Engineering Faculty Development Group.

The software is being registered in Iran's Informatics supreme council, this software will be put for public use in AssaFlex official website. If purchasers wish to design their requirements based on standard AASHTO – M251, they should (specifically) contact AssaFlex technical office and provide essential information on the project in question for further design processes.

The point which makes the design method adopted by AssaFlex distinctive is the simultaneous calculation of strains due to vertical, rotational and shear forces, leading to a more reliable design. This method also prevents the potential problems that can arise due to considering load effects individually. In Ex.1, more details are provided:

Example 1.

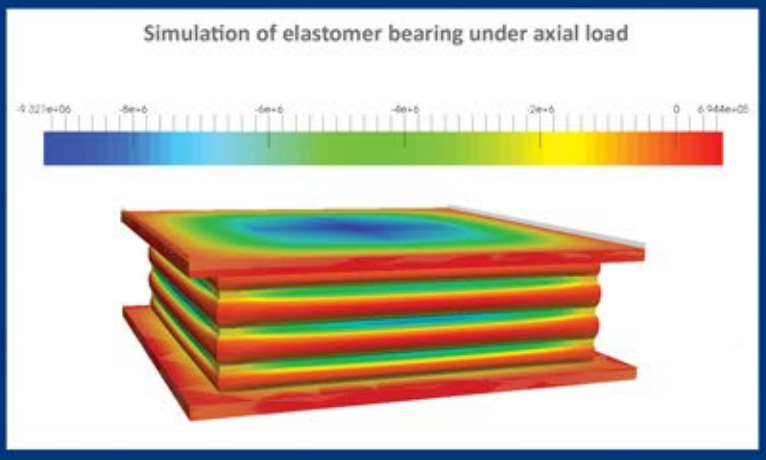
Bearing pad, code BPEN-2013, 300×900×57 mm is given because it is one of the frequently used bearings of its type. While two load figures for each bearing pad is given in the table, the one which should be compared with the design ultimate state vertical load of the bearing pad is "Maximum vertical load in full shear deflection and rotation", the value of this which is 1226 KN for BPEN-2013. The other load value is only given to provide the specialist with an intuition about the maximum load tolerability of the .bearing when no other loading effect applies, this load figure is 2459 KN for the bearing pad in the request

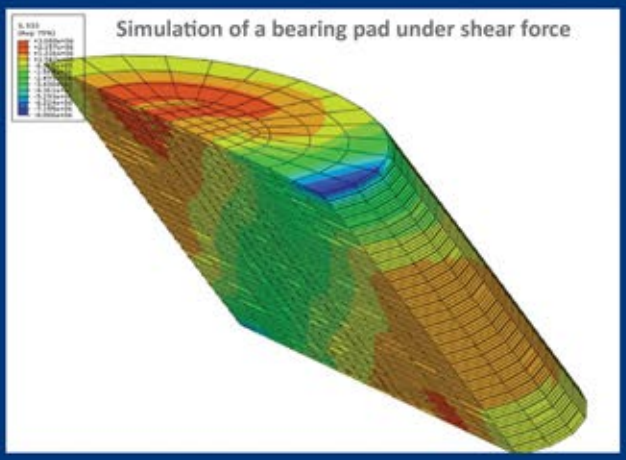
Evidently, in the above-mentioned example, 2459 KN as maximum vertical load tolerable for the bearing pad in question will distract the user of the table. For this reason, in AssaFlex elastomeric pads mechanical properties table, any of all the three parameters of maximum tolerable load, maximum permissible rotation and maximum shear displacement of the parts have been calculated and stated considering the existence of the other two factors. This information will lead the bridge designer to select a more suitable pad.

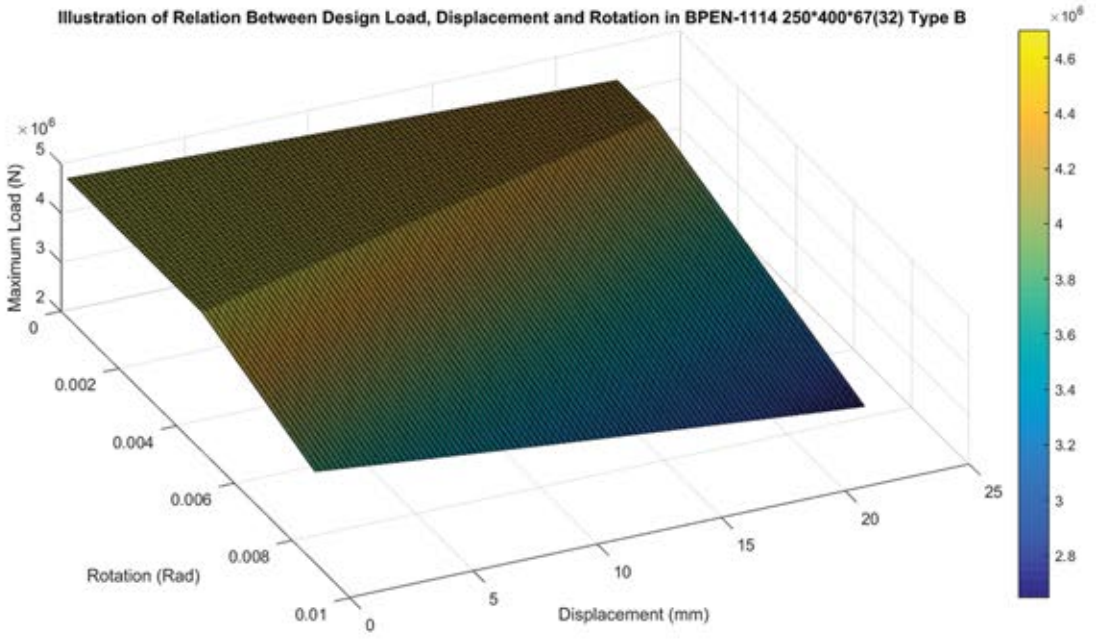
Another feature of the AssaFlex bearing design software is that enables the user to calculate the maximum vertical load tolerable by a bearing pad corresponding to any tuple of maximum displacement and maximum rotation. Normally, by having access to only a catalog of structural bearings, the structural designer will only have access to a 3-element vector of the values of maximum design load, displacement, and rotation in a support.

This applies while the user can, by using "AssaFlex Optimal/Bearing" software, have access to over 1000 such a vector. THE interesting point is that any of these 1000 vectors is in a manner an optimal point of an elastomeric bearing performance. That is the values of not any of the elements of these vectors can be added, for we will be distracted from the norms of design.

With all this information on each part with its specific dimensions and conditions, we will arrive at a procedure like Fig.1 and a diagram in Fig.2. Showing the points where an elastomeric pad lies on the border of its maximal performance. Proper application of the information which provides this procedure can, in many cases, lead to selecting the optimal and economical elastomeric pad. In this connection, please consider Example 2.







Example 2.

The conditions under which the designer needs to design a rubber pad which can tolerate final vertical load 1600 KN, final displacement 20 mm and maximum rotation 6×10 -3 rad are given. By doing with the limits stated in the Catalogue, application of a 300×500×61 mm will be the best choice.

This applies while regarding Figs 1 and 2 as an example, a 250×400×67 mm pad will also be able to tolerate a load over 1900 KN regarding the displacement and rotation in question and still lie in the standard range. This can be observed in the diagrams taken through "AssaFlex Optimal Bearing".

Selection in the form of access to 3D diagrams of a pad will provide to the specialist the possibility of selecting the support fit for requirements and optimal dimensions.

Having access to data of such a 3D graph will thus lead to the selections which are both technically suitable and the best choices in an economic sense. "AssaFlex Optimal Bearing" software uses the above-mentioned procedures to select the most optimal product.

All the information listed in the tables of elastomeric pads has been obtained using our company bearing pad design software and its compliance with the standard in question has been approved by Esfahan University.

In order to use the present tables, please consider the following points.

• Evidently, the above-mentioned table was specifically designed for Assamrof Co. elastomeric bearings, and its application elsewhere will lack any scientific back-up. There are many parameters in the design of elastomeric bearings based on standards EN-1337 which will be certainly different in the production of 2 various companies.

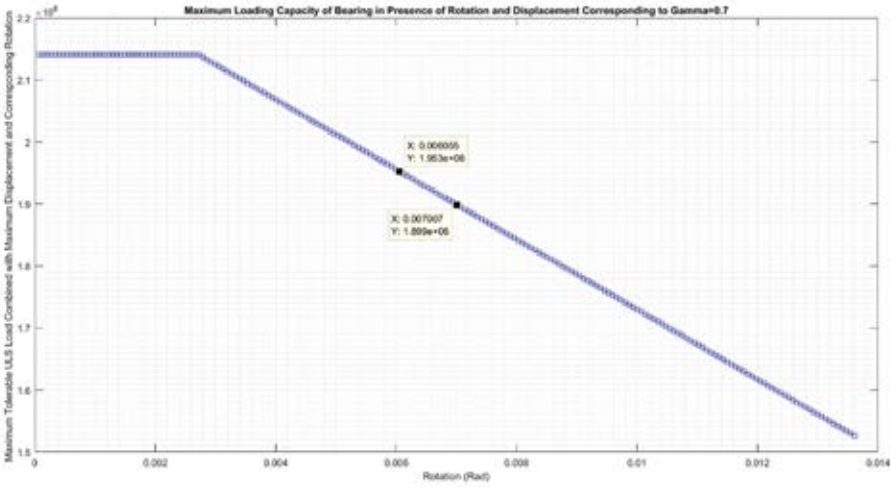


Table of Mechanical Properties of Reinforced Elastomeric Bearings (Type B)

Type: BPEN	Dimensions W x L mm	Unloaded Height of Bearing mm	Total Effective Elastomer Thickness mm	Number of Elastomer layers	Maximum Shear Deflection mm	Maximum Vertical Load(In No Shear Deflection and Rotation) KN	Maximum Vertical Load (In Full Shear Deflection and Full Rotation) KN	Minimum Vertical Load KN	Vertical Deflection mm	Rotation In Full Load & Full Shear Deflection (Across the With) Rad	Max Horizontal Force Exerted (On Structure) KN
BPEN-1012	100x150	30	16	2	11.2	83	57	41	1.70	0.060	13
BPEN-1013	100x150	41	24	3	16.8	45	45	41	1.90	0.058	13
BPEN-1022	100x200	30	16	2	11.2	129	93	54	1.60	0.055	17
BPEN-1023	100x200	41	24	3	16.8	70	70	54	1.52	0.052	17
BPEN-1032	150x200	30	16	2	11.2	383	196	81	1.20	0.020	25
BPEN-1033	150x200	41	24	3	16.8	336	191	81	1.63	0.030	25
BPEN-1034	150x200	52	32	4	22.4	252	186	81	2.10	0.038	25
BPEN-1042	150x250	30	16	2	11.2	539	284	101	1.10	0.019	31
BPEN-1043	150x250	41	24	3	16.8	473	277	101	1.54	0.028	31
BPEN-1044	150x250	52	32	4	22.4	355	270	101	2.10	0.037	31
BPEN-1052	150x300	30	16	2	11.2	702	378	121	1.02	0.018	37
BPEN-1053	150x300	41	24	3	16.8	616	368	121	1.50	0.027	37
BPEN-1054	150x300	52	32	4	22.4	462	358	121	1.94	0.035	37
BPEN-1063	200x250	41	24	3	16.8	899	445	135	1.30	0.016	41
BPEN-1064	200x250	52	32	4	22.4	865	437	135	1.65	0.022	41
BPEN-1065	200x250	63	40	5	28	689	429	135	2.10	0.026	41
BPEN-1066	200x250	74	48	6	33.6	566	421	135	2.40	0.031	41
BPEN-1073	200x300	41	24	3	16.8	1187	604	162	1.20	0.016	41
BPEN-1074	200x300	52	32	4	22.4	1143	593	162	1.60	0.021	49
BPEN-1075	200x300	63	40	5	28	910	582	162	1.95	0.025	49
BPEN-1076	200x300	74	48	6	33.6	747	570	162	2.30	0.030	49
BPEN-1083	200x350	41	24	3	16.8	1487	771	188	1.20	0.015	57
BPEN-1084	200x350	52	32	4	22.4	1432	757	188	1.55	0.020	57
BPEN-1085	200x350	63	40	5	28	1140	742	188	1.90	0.025	57
BPEN-1086	200x350	74	48	6	33.6	936	727	188	2.25	0.029	57
BPEN-1093	200x400	41	24	3	16.8	1796	944	215	1.20	0.015	65
BPEN-1094	200x400	52	32	4	22.4	1729	926	215	1.55	0.020	65
BPEN-1095	200x400	63	40	5	28	1377	908	215	1.90	0.024	65
BPEN-1096	200x400	74	48	6	33.6	1131	889	215	2.20	0.029	65

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BPEN-1103	250x300	41	24	3	16.8	1781	847	202	1.05	0.010	61
BPEN-1104	250x300	52	32	4	22.4	1738	836	202	1.35	0.014	61
BPEN-1105	250x300	63	40	5	28	1695	824	202	1.70	0.017	61
BPEN-1106	250x300	74	48	6	33.6	1437	812	202	2.00	0.020	61
BPEN-1107	250x300	85	56	7	39.2	1238	800	202	2.30	0.023	61
BPEN-1113	250x400	45	24	3	16.8	2742	1353	269	1.00	0.010	81
BPEN-1114	250x400	57	32	4	22.4	2676	1334	269	1.35	0.013	81
BPEN-1115	250x400	69	40	5	28	2610	1315	269	1.65	0.016	81
BPEN-1116	250x400	81	48	6	33.6	2254	1295	269	1.90	0.019	81
BPEN-1117	250x400	93	56	7	39.2	1907	1275	269	2.20	0.022	81
BPEN-2013	300x400	57	36	3	25.2	2459	1226	323	1.85	0.015	97
BPEN-2014	300x400	73	48	4	33.6	2280	1104	323	2.40	0.011	97
BPEN-2015	300x400	89	60	5	42	1829	1081	323	2.90	0.022	97
BPEN-2016	300x400	105	72	6	50.4	1507	1050	323	3.45	0.029	97
BPEN-2023	300x500	61	36	3	25.2	3407	1748	403	1.75	0.014	121
BPEN-2024	300x500	73	48	4	33.6	3303	1716	403	2.3	0.019	121
BPEN-2025	300x500	95	60	5	42	2812	1682	403	2.80	0.023	121
BPEN-2026	300x500	112	72	6	50.4	2297	1648	403	3.30	0.028	121
BPEN-2033	300x600	61	36	3	25.2	4397	2298	484	1.70	0.014	145
BPEN-2034	300x600	78	48	4	33.6	3750	1891	484	2.25	0.015	145
BPEN-2035	300x600	95	60	5	42	3214	2105	484	2.75	0.020	145
BPEN-2036	300x600	112	72	6	50.4	2743	1954	484	3.20	0.025	145
BPEN-2043	350x450	61	36	3	25.2	3848	1863	423	1.60	0.011	127
BPEN-2044	350x450	78	48	4	33.6	3749	1835	423	2.10	0.0152	127
BPEN-2045	350x450	95	60	5	42	3649	1807	423	2.60	0.018	127
BPEN-2046	350x450	112	72	6	50.4	3104	1778	423	3.05	0.022	127
BPEN-2047	350x450	129	84	7	58.8	2610	1749	423	3.50	0.025	127
BPEN-2054	400x500	83	48	4	33.6	5546	1635	537	1.90	0.0011	162
BPEN-2055	400x500	101	60	5	42	5419	2601	537	2.35	0.014	162
BPEN-2056	400x500	119	72	6	50.4	5292	2567	537	2.80	0.017	162
BPEN-2057	400x500	137	84	7	58.8	4500	2532	537	3.20	0.020	162
BPEN-2058	400x500	155	96	8	67.2	3868	2496	537	3.60	0.022	162

Table of Mechanical Properties of Reinforced Elastomeric Bearings (Type B)

Type: BPEN	Dimensions W x L mm	Unloaded Height of Bearing mm	Total Effective Elastomer Thickness mm	Number of Elastomer layers	Maximum Shear Deflection mm	Maximum Vertical Load(In No Shear Deflection and Rotation) KN	Maximum Vertical Load (In Full Shear Deflection and Full Rotation) KN	Minimum Vertical Load KN	Vertical Deflection mm	Rotation In Full Load & Full Shear Deflection (Across the With) Rad	Max Horizontal Force Exerted (On Structure) KN
BPEN-2064	400x600	83	48	4	33.6	7255	3513	645	1.85	0.011	194
BPEN-2065	400x600	101	60	5	42	7088	3475	645	2.30	0.014	194
BPEN-2066	400x600	119	72	6	50.4	6922	3428	645	2.70	0.017	194
BPEN-2067	400x600	137	84	7	58.8	5886	3379	645	3.10	0.019	194
BPEN-2068	400x600	155	96	8	67.2	5059	3330	645	3.50	0.022	194
BPEN-2074	450x600	83	48	4	33.6	8919	4153	725	1.75	0.009	218
BPEN-2075	450x600	101	60	5	42	8740	4107	725	2.15	0.011	218
BPEN-2076	450x600	119	72	6	50.4	8560	4060	725	2.55	0.014	218
BPEN-2077	450x600	137	84	7	58.8	8262	4013	725	2.90	0.016	218
BPEN-2078	450x600	155	96	8	67.2	7124	3964	725	3.30	0.018	218
BPEN-2079	450x600	173	108	9	75.6	6228	3915	725	3.65	0.020	218
BPEN-2084	500x600	83	48	4	33.6	10676	4774	806	1.65	0.008	241
BPEN-2085	500x600	101	60	5	42	10484	4729	806	2.00	0.009	241
BPEN-2086	500x600	119	72	6	50.4	9050	4253	806	2.40	0.009	241
BPEN-2087	500x600	137	84	7	58.8	8960	4210	806	2.75	0.011	241
BPEN-2088	500x600	155	96	8	67.2	8608	4078	806	3.10	0.013	241
BPEN-2089	500x600	173	108	9	75.6	7521	4039	806	3.45	0.015	241
BPEN-2081	500x600	191	120	10	84	6662	3990	806	3.80	0.016	241
BPEN-3014	600x600	104	64	4	44.8	10598	4743	967	2.35	0.009	290
BPEN-3015	600x600	127	80	5	56	10383	4692	967	2.95	0.012	290
BPEN-3016	600x600	150	96	6	67.2	10170	4641	967	3.50	0.014	290
BPEN-3017	600x600	173	112	7	78.4	9956	4588	967	4.00	0.016	290
BPEN-3018	600x600	196	128	8	89.6	8670	4535	967	4.55	0.018	290
BPEN-3019	600x600	219	144	9	100.8	7596	4480	967	5.05	0.020	290
BPEN-3024	600X700	109	64	4	44.8	13411	6132	1280	2.35	0.009	339
BPEN-3025	600x700	132	80	5	56	13140	6065	1280	2.90	0.011	339
BPEN-3026	600X700	157	96	6	67.2	12870	5997	1280	3.40	0.014	339
BPEN-3027	600x700	181	112	7	78.4	12599	5928	1280	3.95	0.016	339
BPEN-3028	600X700	205	128	8	89.6	10972	5858	1280	4.45	0.018	339
BPEN-3029	600x700	229	144	9	100.8	9579	5786	1280	4.90	0.020	339
BPEN-3034	700x700	109	64	4	44.8	17275	7434	1315	2.10	0.007	395
BPEN-3035	700x700	133	80	5	56	16980	7369	1315	2.65	0.009	395

Table of Mechanical Properties of Reinforced Elastomeric Bearings (Type B)

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BPEN-3036	700x700	157	96	6	67.2	16685	7304	1315	3.10	0.010	395
BPEN-3037	700x700	181	112	7	78.4	16389	7237	1315	3.60	0.012	395
BPEN-3038	700x700	205	128	8	89.6	16094	7169	1315	4.10	0.014	395
BPEN-3039	700x700	229	144	9	100.8	14715	7100	1315	4.55	0.015	395
BPEN-3031	700x700	253	160	10	112	13039	7030	1315	5.00	0.017	395
BPEN-3044	700x800	114	64	4	44.8	18173	8257	1505	2.10	0.006	451
BPEN-3045	700x800	139	80	5	56	18811	8175	1505	2.60	0.008	451
BPEN-3046	700x800	164	96	6	67.2	18449	8092	1505	3.05	0.010	451
BPEN-3047	700x800	189	112	7	78.4	18087	8008	1505	3.55	0.012	451
BPEN-3048	700x800	214	128	8	89.6	17725	7923	1505	4.00	0.014	451
BPEN-3049	700x800	239	144	9	100.8	16035	7835	1505	4.45	0.015	451
BPEN-3041	700x800	264	160	10	112	13981	7747	1505	4.90	0.017	451
BPEN-4014	800x800	130	80	4	56	18072	8122	1720	2.80	0.008	516
BPEN-4015	800x800	159	100	5	70	18334	8033	1720	3.50	0.010	516
BPEN-4016	800x800	188	120	6	84	17994	7942	1720	4.15	0.012	516
BPEN-4017	800x800	217	140	7	98	17554	7850	1720	4.75	0.014	516
BPEN-4018	800x800	246	160	8	112	16489	7756	1720	5.40	0.016	516
BPEN-4019	800x800	275	180	9	126	14154	7660	1720	6.00	0.018	516
BPEN-4011	800x800	304	200	10	140	12276	7562	1720	6.60	0.020	516
BPEN-4024	900x900	135	80	4	56	27010	10790	2175	2.60	0.006	653
BPEN-4025	900x900	165	100	5	70	26512	10683	2175	3.20	0.007	653
BPEN-4026	900x900	195	120	6	84	26014	10575	2175	3.80	0.009	653
BPEN-4027	900x900	225	140	7	98	25516	10456	2175	4.40	0.010	653
BPEN-4028	900x900	255	160	8	112	25018	10353	2175	4.95	0.011	653
BPEN-4029	900x900	285	180	9	126	23716	10239	2175	5.55	0.013	653
BPEN-4021	900x900	315	200	10	140	20674	10123	2175	6.10	0.016	653

the above-mentioned table was specifically designed for Assamrof Co. elastomeric bearings, and its application elsewhere will lack any scientific back-up. There are many parameters in the design of elastomeric bearings based on standards EN-1337 which will be certainly different in the production of 2 various companies.

ASSAMROF

Excellence is the foundation of everything we do.

Wood House Tunnel Improvement Project;

A significant project to strengthen Wood House tunnel was completed in October 2015. The three-year repair project by Leeds Council and Carillion to carry out maintenance on the Leeds inner Ring Road (A58M). Used by 80,000 vehicles a day. Effectively the work was a refurbishment and strengthening all in one. AssaFlex provided "FR Series Elastomeric Strip Bearing" based on BS 5400 part 9, which is a Structural Movement membrane. AssaFlex guaranteed a product and a team of engineers that could deliver the safety, endurance, and longevity of the tunnel for years to come.

Leeds, United Kingdom, 2015

Considerable points in the design and selection of elastomeric pads

• All the calculations relevant to Assamrof elastomeric bearings and all other computational documents notified by this company are valid only for application in related to this company products, due to the difference in the type of raw materials and production method that can lead to considerable variations in the above-mentioned parts performance. For information on shear and elastic modules of the part in question, contact our technical office.

• The Friction Coefficient in calculations is considered to be 0.3. This value can be varied where the siting material of the bearings are some material other than steel or concrete.

1. If the structure dead load is lower than the minimum load of a certain bearing pad, the friction of the elastomeric pad with the upper and lower sitting surfaces will not be sufficient to transmit the required shear force to the pad to perform shear deformation. Under such conditions, the elastomeric pad may slip and go out of its installation place. This will lead to the wear, amortization and considerable decrease in the lifetime of the of the elastomeric pad, and in the medium-term, will cause the elastomeric bearing to come out of its location and bring about irreparable damages such as the structure turning down. In order to inhibit this, mechanical fasteners such as bolts are recommended being used.

• Total Vertical Deflection of a bearing may vary minus or plus 15% of the Estimation which is given above and where this parameter is critical to the design of the structure, the stiffness of the bearing should be ascertained by tests.

• Despite the employment of specialists and practice of the most strict possible inspections at scientific centers to guarantee the accuracy of the information listed in the above mentioned table, we accept no responsibility for the presented information which is presented only for the specialist's and customers' attention and information on the specifications of the product in question.

• The displacements mentioned in Assamrof elastomeric bearing tables are possible only when they are installed at mean temperatures. Otherwise, if this element is installed at a temperature other than the mean, there will be a high possibility for buckling, relocation, instability, and rupture of the bearing pad. For more information on the importance of installation temperature, please refer to the subject mentioned in this catalog in relation to installation temperature.

• Assamrof Technical Office is at your disposal for any investigation, presentation of methods or advice.

Southern Pars Project, Oil fields of Persian Gulf, 2011


Chahchahe Dam, Khorasan, Middle East, 2012

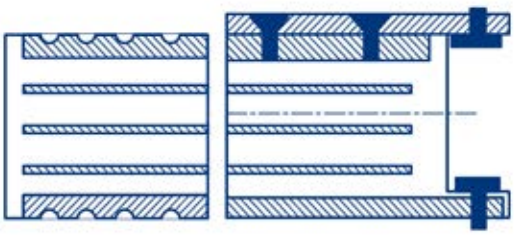
Application of rubber pads with other elements

Uncommon ranges of design axial load, design displacement or design rotation can limit the application of rubber pads as low damping base isolators. Given a certain set of conditions, sometimes no elastomeric bearing pad can be recommended to satisfy all the requirements. In such conditions, by putting together other elements beside these steel reinforced or plain elastomeric bearing pads, application of the resulting set will be possible in a very broader spectrum of conditions. These elements can include:


Sardaran-Takhte Jamshid Interchange, Shiraz, Middle East, 2013

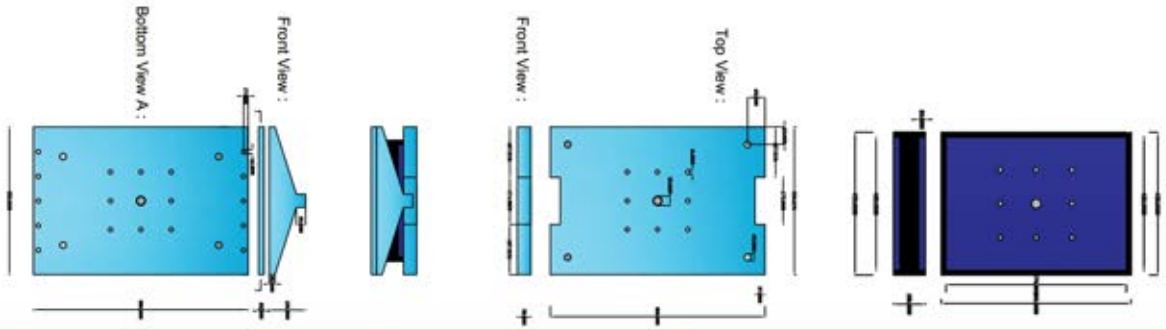
Elastomeric bearings of type C

Adding external steel plates (illustrated in the figure on the right-hand side) to provide the possibility of mechanical fastening of each bearing pad to the superstructure and substructure. As it was also referred to in the section for design, non-slippage of the bearing pad surface relative to the structure upper and lower surfaces can thus be guaranteed. This is recommended when the minimum load requirement to provide the displacement in the bearing pad does not hold. This type of supports has been designated type C complying with standard EN-1337-3.



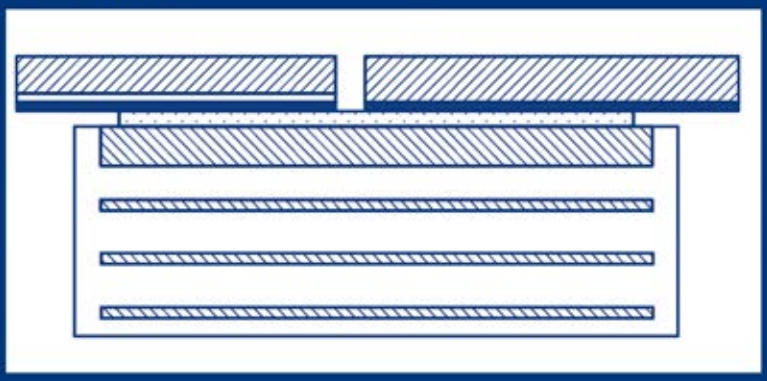
Restrained elastomeric bearings-

The fixtures designed to limit the possibility of the support displacement in one or two horizontal directions and transmission of horizontal forces .from the upper to substructure to the superstructure



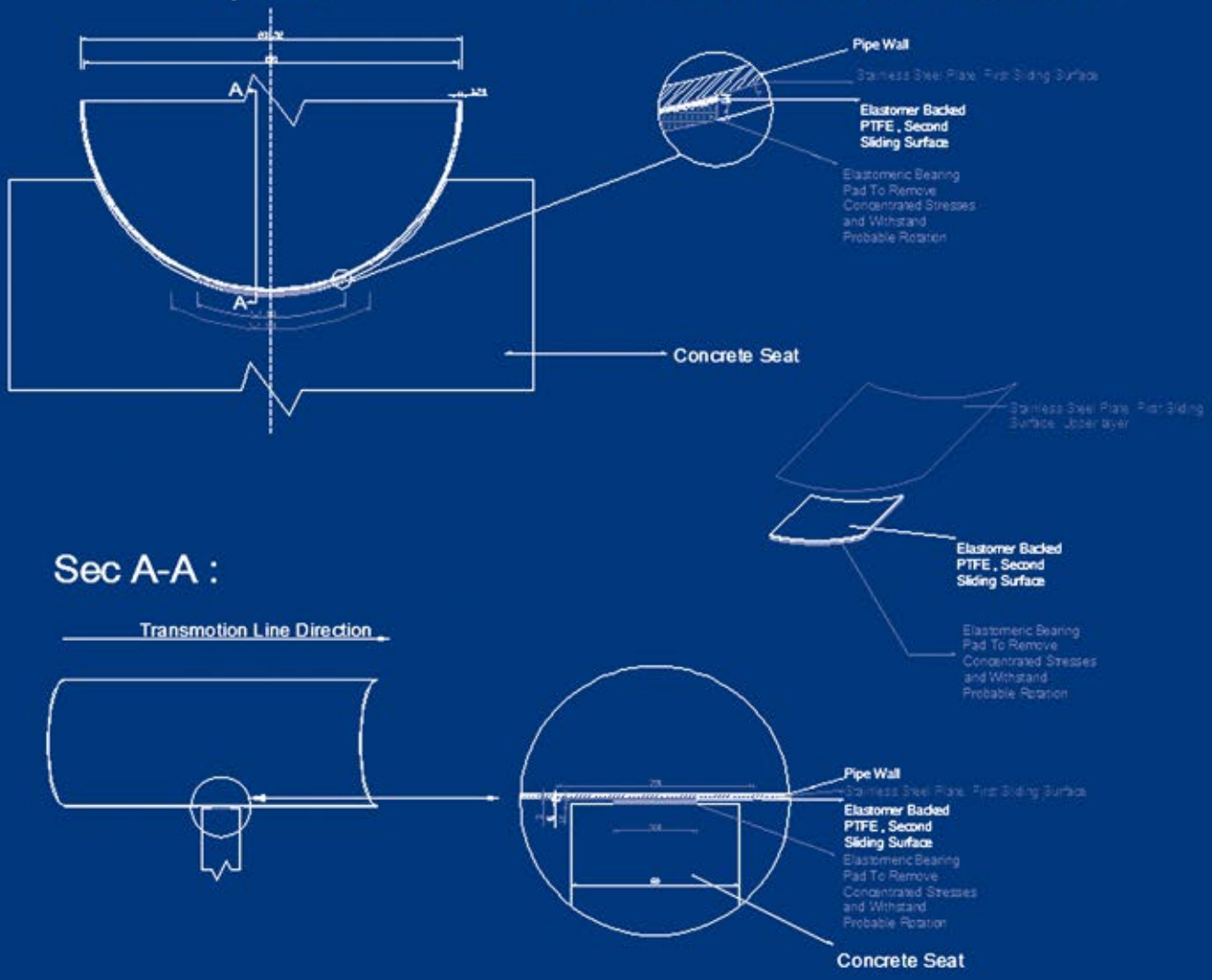
-Slipping surfaces are used to increase the displacement range of each bearing pad, and to make possible the pad's adjustment considering limitations posed by installation temperature. Application of this element beside the elastomeric pads according to the design principles based on standard EN-13373- brings the possibility to increase up to 20% of the maximum load capacity of the bearing pad under special conditions. By use of this element beside a normal bearing pad, the system will be able to withstand much more displacement, up to 10 cm above the maximum shear deflection of the bearing pad tolerates per se.

These types of bearings are much more optimal in an economic sense, compared with Pot and Spherical bearings of the same performance. This type of supports has been designated Type D and E according to standard EN- 13373-.



Symmetrical

Utilization of Type E bearing pads in transmission lines.

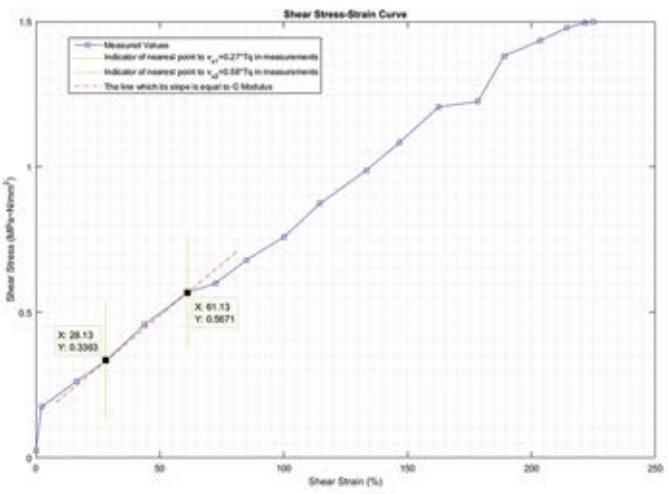


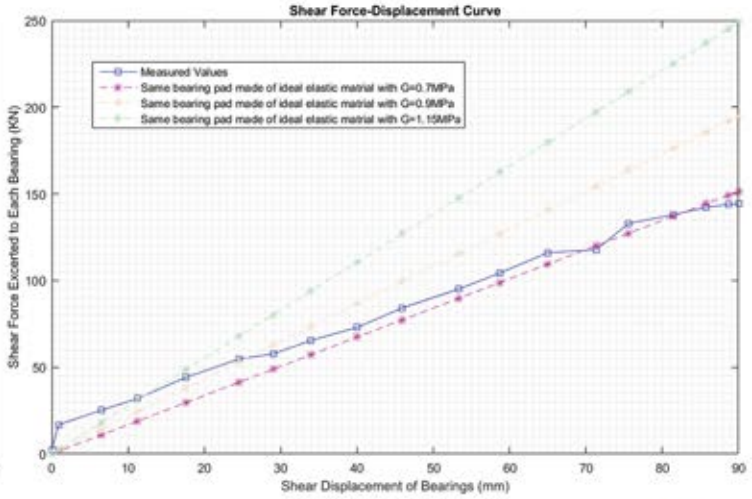
- Quality inspection tests in elastomeric bearings

Both quality control of raw materials and tests on the performance of the final product, are mainly conducted within the company's manufacturing plant or alternatively in cooperation with other accredited testing parties and UK based laboratory.

Lead Rubber Bearings

- Same size with significantly more energy dissipation
- To optimize design of structural sections and to cut costs back
- Option of adding other bearing equipment available
- Mature technology after several years of being utilized in numerous buildings and bridges
- Buy the most cost effective product, enjoying free technical service of AssaFlex





Expansion joints (Introduction)

The Assamrof Company is the first private manufacturer of Reinforced Elastomeric Expansion joints in Iran. Our expansion joint production relies on considering many technical points, taking careful mechanical calculations and working from years of experience - we've been in business since 1991. Over the years of manufacturing this product, the company has continued to optimize these types of expansion joint parts as far as possible.

AssaFlex UK's role has included involving the British Highway Agency to formally acknowledge and recognize the company's design and procedures, including installation.

Bridge expansion joints parts are responsible for some major functions which are the covering of bridge thermal gaps, generating the passable surface for types of transportation means, sealing the joint to prevent damages due to water accumulation into the structure and deformability to tolerate joints displacements due to thermal variations, shrinkage, creep and types of loading.

Regarding these functions, an expansion joint part is capable, with a proper design, of providing the possibility of a convenient transportation under the joint worst conditions (including the most open or the closest state) without measurable damage to the expansion joint part itself, or its installation materials. Therefore, all these cases have been considered to engineer an expansion joint part, its installation procedure, and required materials.

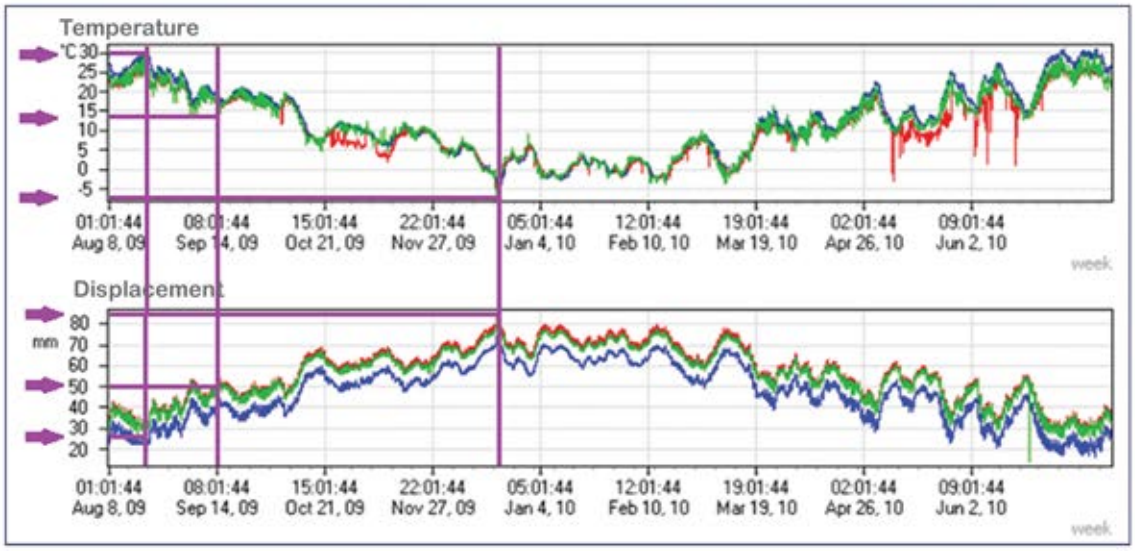
Enjoying the capabilities of in house labs, computer design and simulation teams and years of experiences in the production of reinforced elastomeric expansion joints, Assamrof Company has played a significant role in the Middle East and parts of the world on key and sensitive projects.

Technical points in the selection of expansion joints:

Calculation of maximum movement in each structural joint should be performed based on spans length, installation environment thermal range during the year, concrete shrinkage (when the bridge age is less than 5 years), concrete creep and external forces including heavy vehicles braking and the wind.

Considering installation temperature as a factor which has a significant influence on the selection of expansion joint suitable part.

The existing curvature or angle in the superstructure (in case there is a curvature in the structure, make sure to inform the company technical office about the issue to consider its effect on the expansion joint selection).



Importance of ambient temperature at installation time

As mentioned in the section for expansion joint selection technical points, installation temperature is specifically important in the selection of expansion joint size.

In this section, we have studied the situation of a joint size which has been continuously measured using a monitoring protection system during the year to illustrate the importance of this issue.

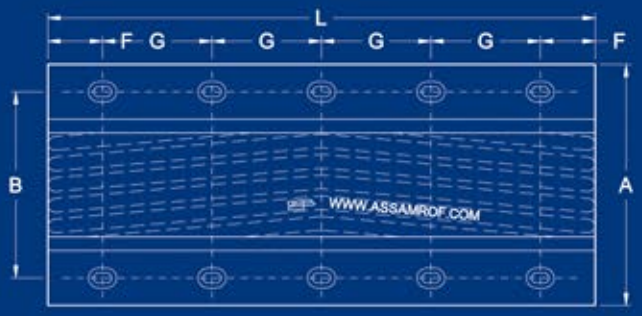
The above figures were obtained after 1 year of monitoring of a bridge expansion joints in Switzerland and during a research project. As expected, a direct relation is considerable between ambient temperature and the level of displacements occurred in the gaps.

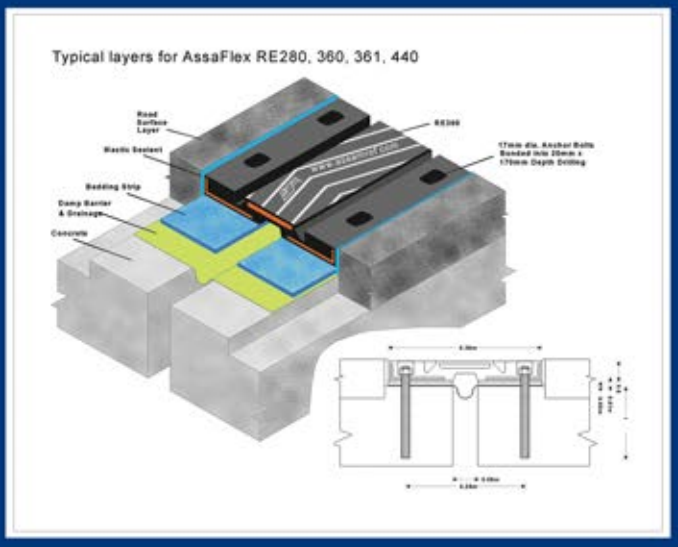
In order to illustrate the issue as much as possible, three different temperatures and corresponding gap sizes have been specified with violet color lines in the graphs. The ambient temperature range during the research time has been 8-30 . The thermal extremum points have been specified in the figure and it is observed that in one of the monitored joints, joint size has been equal to 25mm and 85mm respectively at the maximal and minimal ambient temperatures. This means as an example, in case of installing an expansion joint parts on this gap and at a maximal ambient temperature in August or January of the next year, the installed expansion joint should be able to expand about 6 cm. In this case, the selected expansion joint should have the movement capacity equal or bigger than±6 (Which is equivalent to Assamrof RE 580 In terms of displacement tolerance). This applies while by considering the installation temperature to be around mean temperature of the environment 14° (in) the joint has undergone 3.5cm of expansion until Jan. The expansion joints must have tolerated 35mm of displacement. When the joint closes in the next year, around Aug. 2010, this joint will close at most 30 mm relative to installation temperature. This means that the selection of an expansion joint part having the displaceability of 135 mm in Assamrof company table will suffice (Which is equivalent to Assamrof RE360).

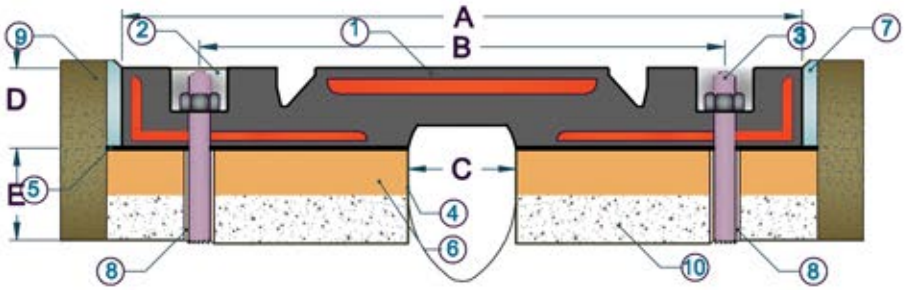
Finally, it can be said as a conclusion that installation of expansion joints parts in thermal extremum (hot or cold seasons) can easily lead to a selection of capacity of displacement, to which will lead to rupturing parts of the expansion joints and breakage and/or to stresses being applied to the bolts from the yield point causing various problems after installation.

For this reason, in case of installing expansion joints at temperatures other than the mean, AssaFlex technical office should be informed to make sure the correct product is chosen. The figure of displacements mentioned for each part in AssaFlex expansion joints table will be reliable when the part in question is installed at mean temperatures.

AssaFlex. Expansion joints tables;

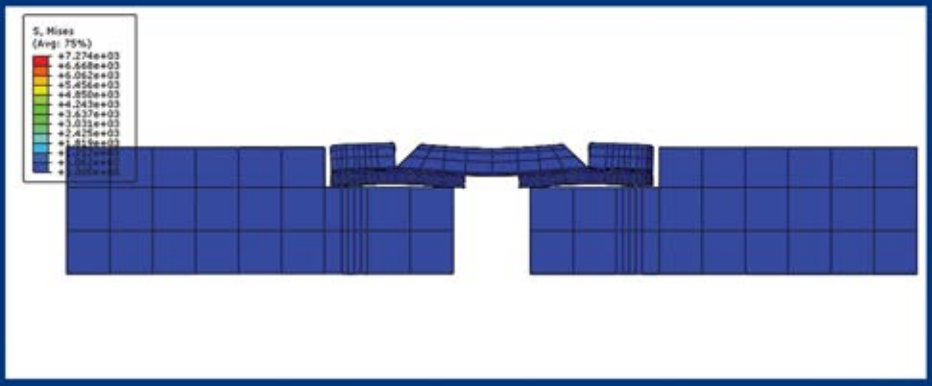


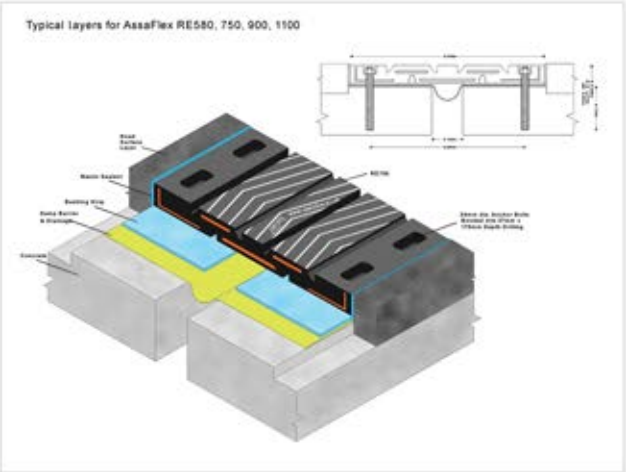


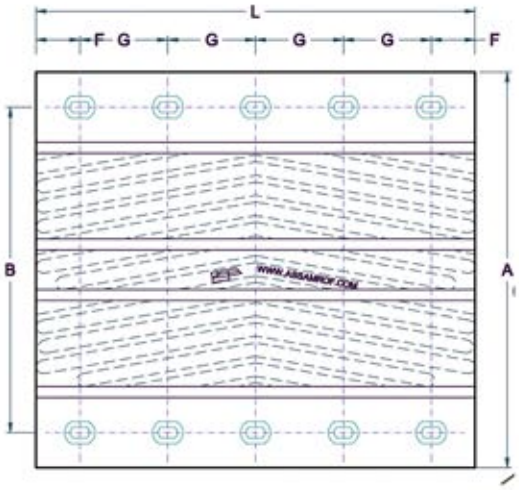


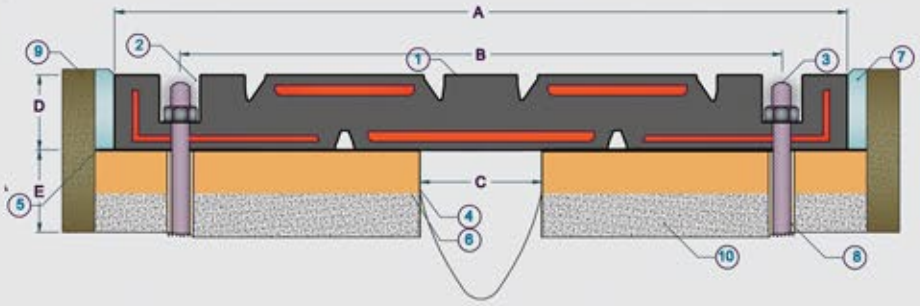
All of the dimensions are given in mm

Type	Movement (TOTAL)	A	B	C	D	E	F	G	L
RE 280	±20(50)	280	200	40	42	200	100	200	1000
RE 360	±35(70)	360	280	80	46	200	125	250	1000
RE 361	±35(70)	360	280	60	46	200	125	250	1250
RE 391	±45(90)	390	310	70	54	200	125	250	1250
RE 440	±50(100)	440	340	70	52	200	100	200	1000









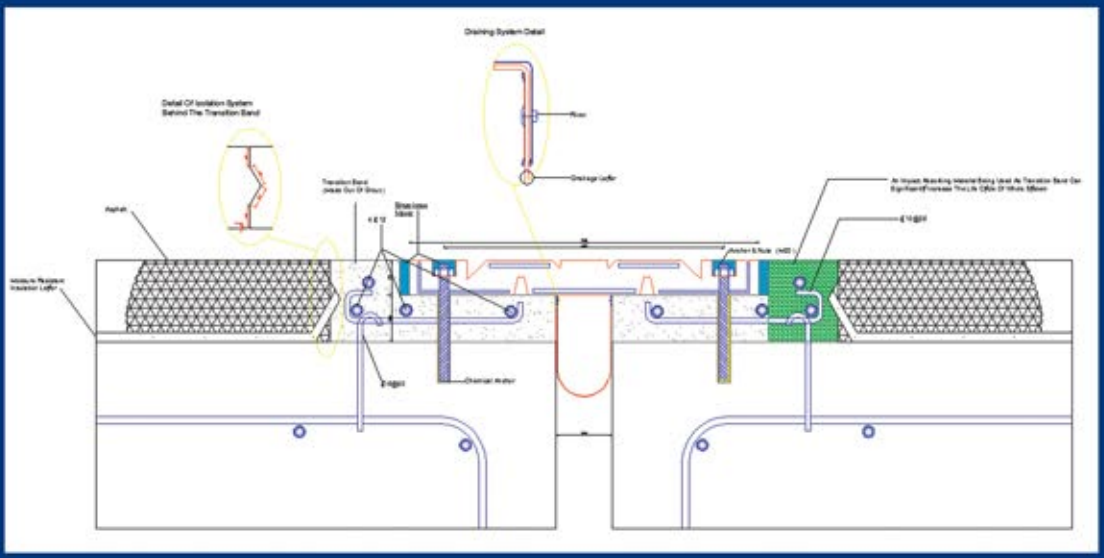
All of the dimensions are given in mm

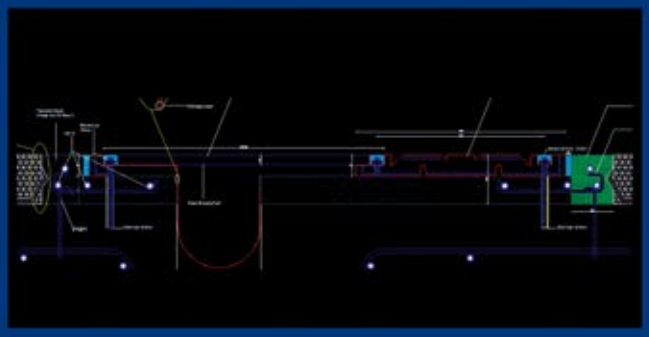
Type	Movement (TOTAL)	A	B	C	D	E	F	G	L
RE 580	± 50(100)	580	450	80	55	250	100	200	1000
RE 750	± 85(170)	750	600	120	75	250	100	200	1000
RE 900	±110(220)	900	740	150	92	250	100	200	1000
RE 1100	±160(320)	1120	940	200	110	250	100	200	1000

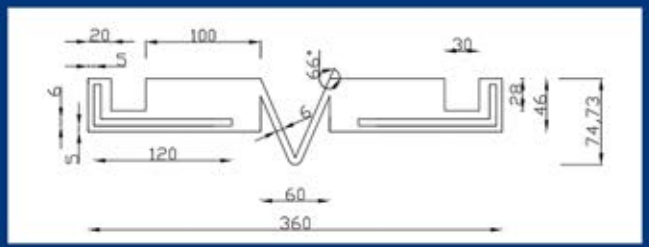
Some key characteristics:

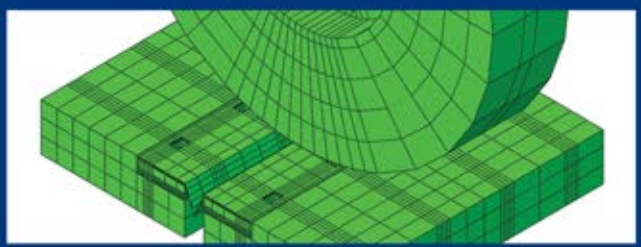
-Tolerability of a broad range of displacements of up to 320 mm
-Strengthening of the parts facilities of bonding to the structure
-Strength against thermal variations, direct sunlight, abrasion, wear and ozone
-Design with optimized dimensions in the new types

Proper installation is no less important than the expansion joints mechanical properties. A correct installation will guarantee the lasting seal of joints and smooth transition and longer lifetime for expansion joints. In a typical installation, fewer impacts are exerted to the expansion joints from vehicles wheels, the settlement of the asphalt around the expansion joints will not lead to the expansion joints i.e.; the units corners corrosion, the mechanical bolts will not come out of position because of the adequate torque applied at the time of installation, the grout transition bands will have more useful service life with suitable width, and the bolts will undergo uniform stresses due to the anchor bolt chemical applied and hence no unpredicted rupture would occur. For more information on the installation details and the principles which should be observed at the time of installation, please contact AssaFlex technical office.









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