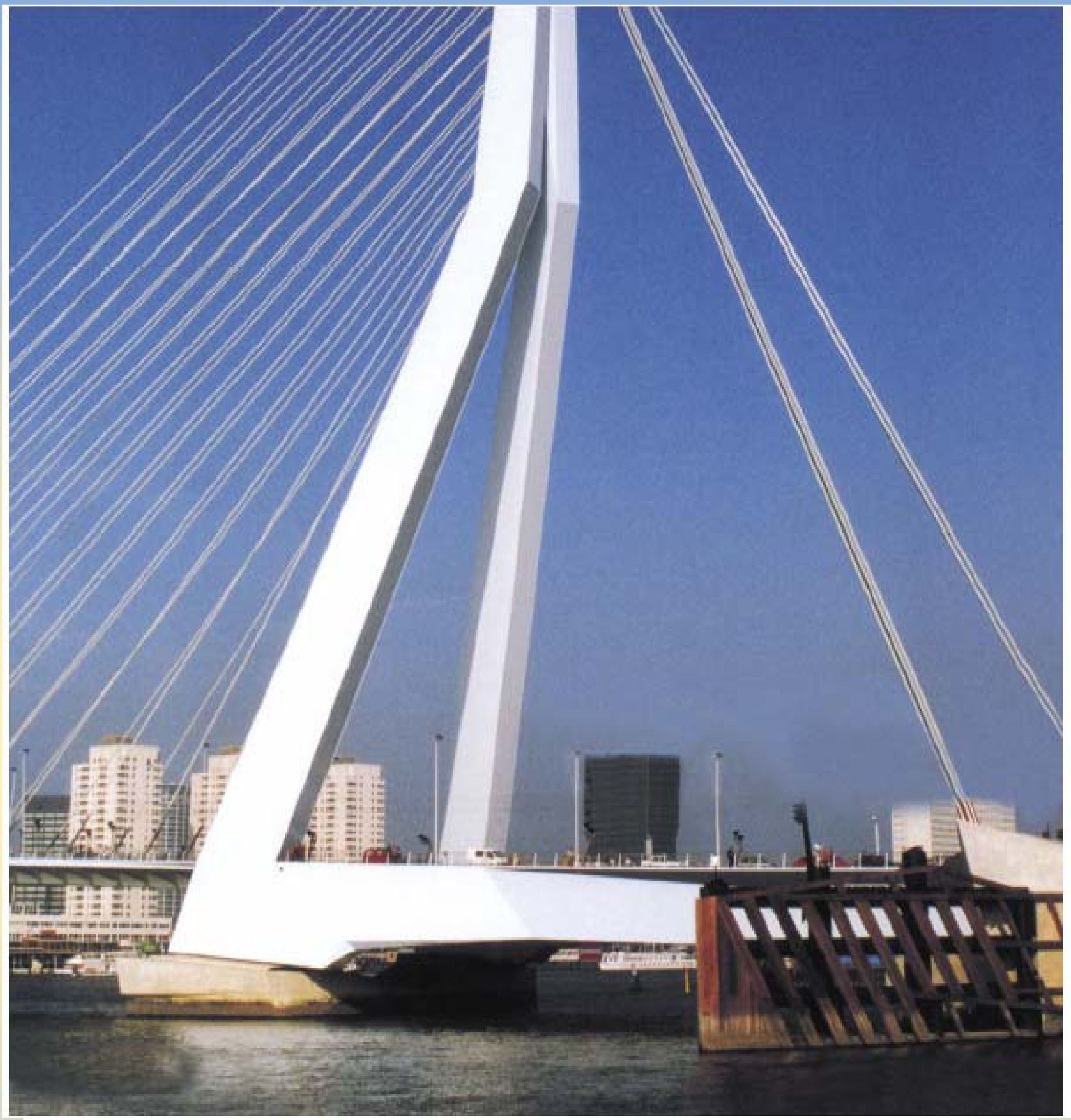
Honel Structural Products

(Pty) Ltd.



Elastomeric Bridge Bearings

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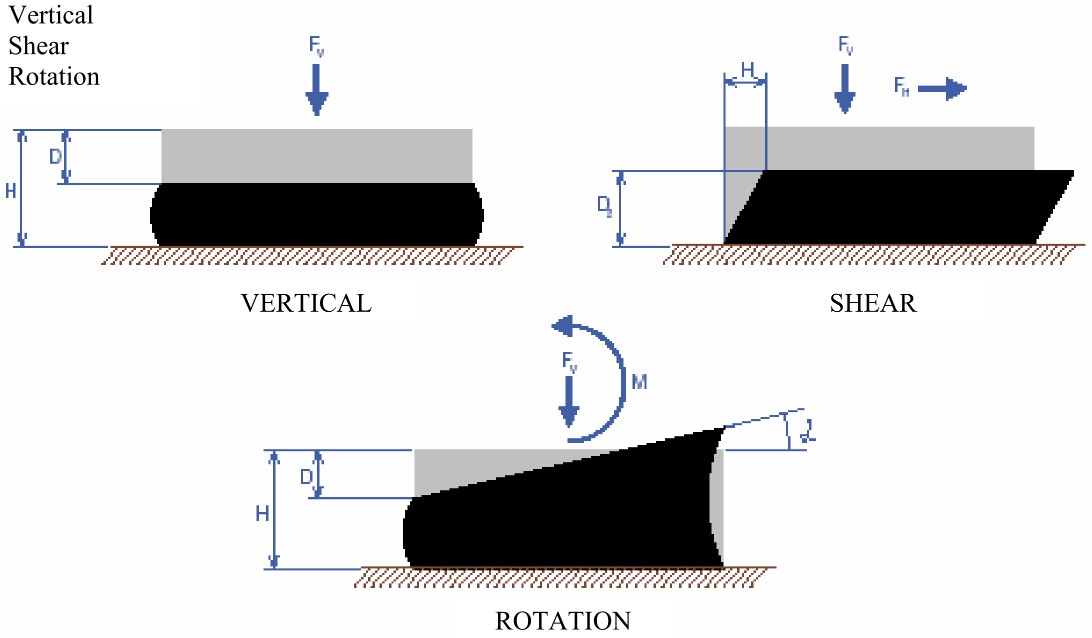
Structures are subjected to imperceptible displacements and rotations that have to be accommodated to protect the structure and surrounding infrastructure. The most common causes of movement being:

Temperature changes
Traffic movement and braking
Wind
Shrinkage and creep
Foundation movement
Post stressing

The function of the bearing is to safely accommodate the various movements and rotations as well as supporting the weight of the structure and to transmit the load through to the structures foundation.

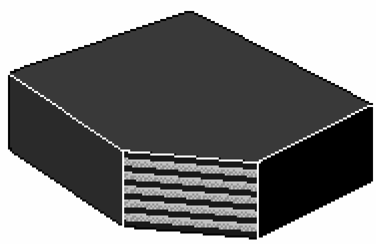
Elastomeric Bearings are designed to accommodate three types of movement:

1. Vertical
2. Shear
3. Rotation



Honel Bearings are manufactured from natural rubber compounds (chloroprene rubber compounds also available) to meet a wide range of international standards and design guides including, AS, BS, ASTM, AASHTO, NAASRA.

Honel Rubber is ISO9001 certified.



Honel Bearings are produced with and without reinforcing steel plates.
Steel plates are completely encased within the rubber.

Laminated Elastomeric Bearings

for Structural Movement - 60° Shore Hardness

LAMINATED ELASTOMERIC BEARINGS IN 60° N.R. TO BS 5400 : SECTION 9.1 : 1983

Ref. No.	Plan Size	o/a Height (mm)	Maximum Total Vertical Load Capacity in kN						Max. Shear Movement (mm)	Vertical Stiffness (kN/mm)	Shear Stiff-ness (kN/mm)
			LL/Total = 0,3		LL/Total = 0,5		LL/Total = 0,7				
			No Shear	Max. Shear	No Shear	Max. Shear	No Shear	Max. Shear			
A6101	200 x 150	22	231	174[5]	207	152[4]	186	133[0]	10	200	1.80
A6102		35	264	197[12]	240	176[9]	220	158[6]	16	100	1.11
A6103		48	276	197[17]	252	177[13]	231	160[9]	22	67	0.80
A6104		61	240	191[22]	240	172[16]	237	156[11]	28	50	0.63
B6141	300 x 150	26	337	260[7]	306	232[6]	280	208[0]	12	154	2.16
B6102		35	473	352	430	314[9]	394	282[6]	16	206	1.66
B6103		48	493	352	450	316[14]	414	286[10]	22	137	1.20
B6104		61	429	343	429	308[19]	424	279[13]	28	103	0.94
C6141	300 x 200	26	495	382[8]	445	335[6]	402	295[4]	12	305	2.88
C6142		43	562	420	511	375[13]	468	337[9]	21	153	1.69
C6103		48	758	561	687	498[17]	627	445[11]	22	269	1.60
C6104		61	788	567	718	507[22]	658	456[15]	28	201	1.25
C6105		74	769	561	736	503[27]	676	454[18]	34	161	1.03
D6103	300 x 250	48	990	737	889	645[17]	802	566[11]	22	435	2.00
D6104		61	1061	780	959	690[24]	872	613[16]	28	326	1.57
D6105		74	1103	794	1001	707[30]	914	632[20]	34	261	1.29
E6181	400 x 300	30	1020	769[11]	903	658[8]	804	565[0] 0.009	15	612	4.80
E6182		51	1236	948	1120	842[18]	1021	751[12]	25	306	2.74
E6142		43	1408	1059	1258	921[15]	1131	802[10]	21	631	3.39
E6143		60	1561	1171	1412	1037[24]	1284	922[16]	29	420	2.40
E6104		61	1800	1461	1775	1272	1596	1111[17]	28	805	2.50
E6105		74	1800	1540	1800	1356	1723	1198[22]	34	644	2.06
F6182	500 x 400	51	2341	1759	2085	1520[19]	1866	1316[13]	26	853	4.57
F6183		72	2630	1985	2373	1752[32]	2155	1554[21]	36	568	3.20
F6143		60	2897	2151	2567	1846	2286	1585[17]	29	1148	4.00
F6144		77	3000	2387	2874	2089	2593	1834[24]	37	861	3.10
F6145		94	3000	2482	3000	2191	2777	1943[31]	46	689	2.53
G6182	600 x 450	51	3319	2446	3915	2065[19] 0.009	2570	1741[13] 0.008	26	1518	6.17
G6183		72	3898	2939	3494	2567	3149	2251[22]	36	1012	4.32
G6184		93	4050	3115	3783	2753	3439	2445[31]	47	759	3.32
H6182	750 x 400	51	4159	3124	3703	2699[22]	3315	2337[14]	26	1728	6.86
H6183		72	4500	3527	4216	3113	3827	2760[23]	36	1152	4.80
H6184		93	4500	3640	4472	3239	4084	2897[32]	47	864	3.69
I6183	750 x 450	72	5063	4035	4798	3525	4324	3091[23]	36	1490	5.40
I6184		93	5063	4277	5063	3781	4722	3358[32]	47	1118	4.15

Note:

1. Rotation about longer axis = 0.01 rad. At max. load. execept where rotation is noted against max. load. Eg. 2183 0.009
2. Max. average pressure = 15MPa
3. No holes assumed
4. Max. shear strain assumed 60% (Permissable 70%, but load capacity reduced)
5. Loads shown thus 159 [11] means locate positively for shear movement > 11mm.

N.B.: The Table is for guidance only. Since it assumes:

- specific ratios of live to total load;
- either no shear movement, or 60% shear strain
- a rotation of 0.01 radians at maximum design load

After selecting a likely bearing, its suitability for the actual loads and movements occurring should be checked in accordance with the design rules of BS 5400 Section 9.1 1983, using our design guide.

The HONEL standard range of elastomeric bearings has been carefully selected to provide a load capacity range from 100kN to 5000kN. Within the overall mould sizes, we can provide economical custom designs to cater for any specific requirements.

DESIGN INFORMATION:

HONEL Elastomeric laminated bearings are designed, manufactured and tested in accordance with British Standards Institution BS 5400: Sections 9.1 & 9.2 : 1983.
Maximum capacity of a rubber bearing is controlled by a combination of direct load, shear movement and rotation. Where shear movement is required, the maximum direct load which a bearing can carry is reduced from that when no shear movement is required. Intermediate combinations may be interpolated, but a final check should be made, using our Design Guide.

All bearings are provided with a 3mm rubber envelope and 3mm steel plates throughout.

Bearings should be placed so that rotation occurs about the longer axis.
60° B.S. Hardness Natural Rubber is used throughout.

Design Parameters

Shear Modulus G = 0,96 N/mm^2
Bulk Modulus E = 2000 N/mm^2

When sending enquiries please provide the following information:

1. Maximum and minimum vertical loads, and the corresponding ratio of live load to total load.
2. Maximum positive and negative shear movements in longitudinal and transverse directions.
3. Maximum angular rotations with corresponding vertical loads.
4. Available plan dimensions.
5. Longitudinal and transverse horizontal loads due to external forces.

Also available is the same basic range in 50° natural rubber, which will result in a 30% decrease in compressive and shear stiffnesses, and a 30% increase in rotation capacity.

GENERAL INFORMATION:

Elastomaric bridge bearings can be conveniently divided into two types - 'Fixed' where horizontal movements of the deck are restrained and 'Free', where the deck can move horizontally.

Fixed Ends

Fixity is usually provided by dowels passing from the deck to the abutment and one end of those dowels should be fitted with dowel caps which permit the deck to expand and contract laterally and to rotate.

Free Ends

The bearing at the 'Free' end will locate satisfactorily by friction alone, where no suffix appears after the load given in the table. Otherwise locate by means of epoxy mortar and check that the ratio of the vertical load to the horizontal force does not fall below 3.

Inclined Soffits

Some additional consideration is required where the super-structure is inclined or has a cross-fall. Where lhe inclination is small, it may be possible to mount the bearings parallel with the slope, provided that the inclined component of vertical loading can be taken on the fixed end dowels, or resisted by the bearings in shear without excessive movement. Otherwise, the solution is to step the soffit and abutment to provide horizontal seatings for the bearings.

Plinths

The contact stresses under elastomeric bearings are generally low and seldom require special attention. However, where a bearing is seated on a raised concrete plinth of approximately the same size as the bearing, then the plinth will need to be reinforced. To ensure that the bearing is adequately restrained, and to guard against spalling of the concrete edge, it is important that any plinth should extend at least 50mm beyond the edge of the bearing, and that the reinforcement should contain the concrete assuming a 45° dispersion of stress from the bearing.

Handling and Storage on Site

Bearings should be stored under cover, away from sunlight, heat, oil and chemicals. They should always be handled and stacked carefully.
Damaged bearings, for example wrth bent steel interleaving plates or partially debonded layers, should never be installed. Bearings with differing internal arrangements of steel can have the same external dimensions but all bearings are clearly identified by a type reference number, and should be sorted out and stored by types.

INSTALLATION:

Seating

Where the support is concrete, the cast surface is usually irregular, so the bearings should be placed accurately to line and level on a 5 to 15 mm thick bedding of stiff mortar. This can be ordinary sand/cement with a low water/ cement ratio, or a mortar of fine dry sharp sand and chemical resin. In either case, the cube crushing strength of the mortar should be at least 20 N/mm^2. Where the support is steel, a rolled surface may be suitable for use directly, provided that it is reasonably smooth and true to level, but otherwise some surface preperation will be needed. Trowelling often seems to produce a bedding that is slightly rounded on the top surface, and it is preferable to screed off or cast against a flat plate.
When the superstructure is to be concrete cast in-situ, the spaces around and between the bearings can be filled with expanded polystyrene, or well rammed damp sand covered with an impervious membrane such as polythene sheet. Extreme care must be taken not to disturb the bearings during casting, and a temporary bond to the substructure with an impact adhesive will help. Do not use an adhesive with low shear resistance. After curing of the superstructure, the sand infill can be washed away from around the bearings, or the polystyrene can be broken up and blown out with compressed air. (It should not be dissolved because the solvent may attack the elastomer in the bearings.)

Precast concrete and steel superstructures

Where precast concrete beams are being used they should be lowered on to a mortar skim (2-3 mm), on the top of the bearings, to eliminate soffit irregularities and twist in the beams. The bearings should be selected to accommodate the rotation due to the precamber of the beams at this very low level of vertical loading, or the beams should be propped until the mortar skim has hardened into a wedge, so that the bearings are not rotated at this stage.

Special treatment is needed at a fixed end. The dowel caps can be cast in ready to slip over the dowels, but this requires very accurate precasting, and it is then difficult to land the beams on the bearings. Alternatively, pockets can be left in the precast beams at the appropriate points to receive the dowel caps, and these pockets can be grouted finally through small holes in the beams. Where transverse insitu end diaphragms are used, a better solution is to have dowels located between main beams, and not into them.

Steel beams will have to be jig drilled to accommodate any fixing devices, or have them ready attached to drop into pockets in the substructure for grouting. It is sometimes possible to land the beams directly on the bearings without using any mortar, because the camber tends to be fairly consistant - tapered plates can be attached to the beams during fabrication, to provide horizontal seatings for the bearings, although care must be taken to avoid difficulties due to lateral inaccuracies in level.

With both steel and precast concrete beams, it may prove easier to attach the dowels and bearings to the beams and lower the whole assembly onto a mortar skim on the bedding on the supports. The bearings can be temporarily attached to the beams with an impact adhesive, for location purposes only. Do not use an adhesive with low shear resistance. The mortar mix needs careful control and the beams should be propped until it has set.