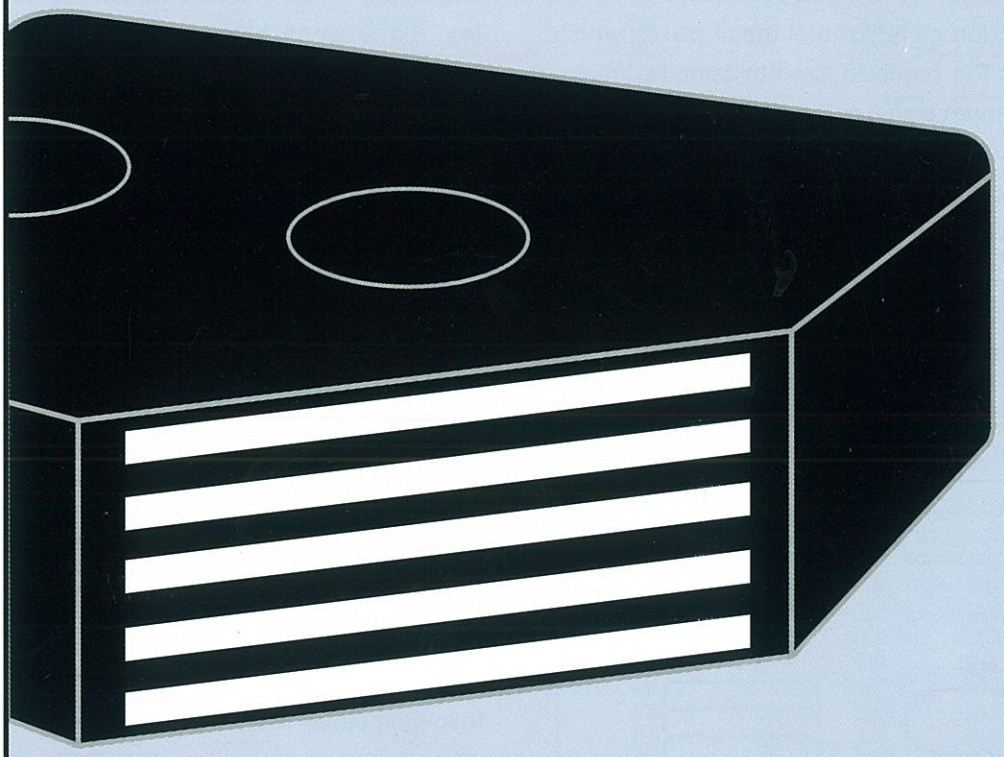
DOSHIN®
RUBBER ENGINEERING

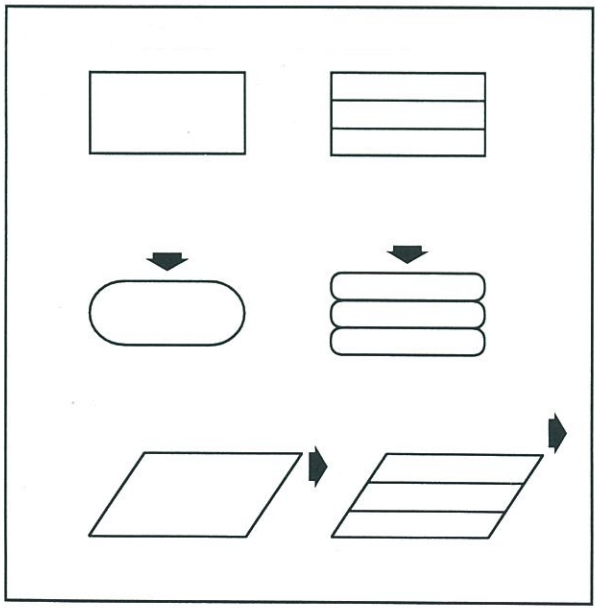
Laminated Structural Bearings



Doshin Rubber Bearings

Bearing thousands of road, rail and river bridges in all climates in many parts of the world, natural rubber bridge bearings are giving continued excellent service, demonstrating convincingly their efficiency and durability. Natural rubber bearings possess distinct advantages over alternative metal roller types, being easier to install, free from corrosion and requiring no maintenance, factors important in the economics of bridge building. In use, natural rubber has proved superior to all other rubbers as a bridge bearing material.

The **design** and positioning of the bridge bearing allows the vertical loads (deck and traffic) to be taken by the rubber in compression and horizontal deflections (expansion and contraction) by the rubber in shear. High vertical stiffness is achieved by the insertion of horizontal metal plates, which do not alter the required low horizontal stiffness. Under maximum traffic and deck load, the amount of vertical deflection must be limited and bearings can be precisely designed so that it does not exceed a few millimetres, of which only a fraction will be due to live load. Horizontal movements in more than one direction can be accommodated and, if necessary, the horizontal stiffness in two perpendicular directions can be varied independently. Some end rotation can be allowed with rubber bearings without resort to the complicated designs required with metal bearings.



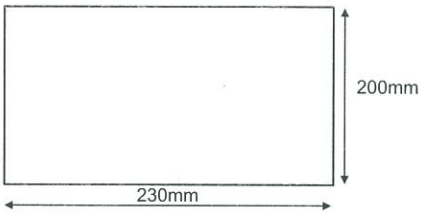
Construction of the rubber-metal plate sandwich is easily accomplished employing the excellent bonding to metal properties of natural rubber; the bearing may then be completely encased by a thin cover of rubber which protects the plates from corrosion and also provides a bedding surface to take up irregularities in the deck or supporting structure. Location holes may be provided in the outer steel plates as a precaution against slip.

Durability is ensured as a result of the bulk of rubber in the product (low surface/volume ratio) and is reinforced by the inclusion of protective chemicals which increase resistance to weathering. Experience has shown conclusively that weathering of large components made of natural rubber does not affect their service lives.

The **performance** of natural rubber bearings is determined by the highly suitable physical properties of natural rubber : it retains its designed stiffness at low temperatures better than alternative, more expensive, synthetic rubbers and it has low creep, high strength and excellent fatigue resistance.

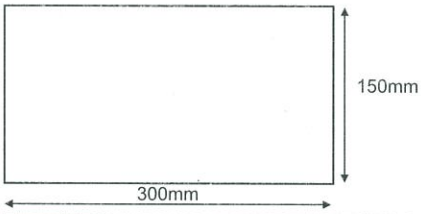
Design Considerations

The performance data of Doshin Rubber elastomeric bridge bearings presented in the following tables are calculated using shear moduli values appropriate to the strain in the rubber and 200MPa for its bulk modulus. These are indicative values for bearing selection. The maximum loads shown are calculated to the serviceability limit state as required in MS 671 and BS 5400 Part 9, assuming a dead load effect numerically equal to the live load effect.



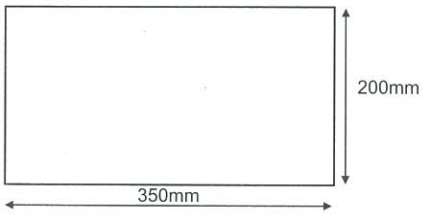
Top and Bottom cover rubber thickness 4mm
Side cover rubber thickness 6mm
Steel plate thickness 3mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
1DRP/1/06	200	230	20	859	0.00186	827	498	674	416	9.8	2.96
1DRP/2/06	200	230	29	589	0.00271	827	494	659	406	14.0	2.07
1DRP/3/06	200	230	38	448	0.00356	827	491	643	399	18.2	1.59
1DRP/4/06	200	230	47	362	0.00441	827	490	627	392	22.4	1.29
1DRP/5/06	200	230	56	303	0.00526	827	489	611	385	26.6	1.09
1DRP/6/06	200	230	65	261	0.00611	827	488	595	379	30.8	0.94
1DRP/7/06	200	230	74	229	0.00696	778	488	579	373	35.0	0.83
1DRP/8/06	200	230	83	204	0.00781	694	487	550	366	39.2	0.74
1DRP/1/09	200	230	23	436	0.00366	552	391	444	327	11.9	2.44
1DRP/2/09	200	230	35	253	0.00631	552	365	428	301	18.2	1.59
1DRP/3/09	200	230	47	178	0.00896	552	354	413	287	24.5	1.18
1DRP/4/09	200	230	59	137	0.01161	552	348	397	278	30.8	0.94
1DRP/5/09	200	230	71	112	0.01426	489	343	381	270	37.1	0.78
1DRP/6/09	200	230	83	94	0.01691	418	341	322	263	43.4	0.67
1DRP/1/12	200	230	26	224	0.00711	414	287	329	241	14.0	2.07
1DRP/2/12	200	230	41	121	0.01321	414	259	313	214	22.4	1.29
1DRP/3/12	200	230	56	83	0.01932	414	248	298	202	30.8	0.94
1DRP/4/12	200	230	71	63	0.02542	347	242	275	194	39.2	0.74
1DRP/5/12	200	230	86	51	0.03152	286	238	214	188	47.6	0.61



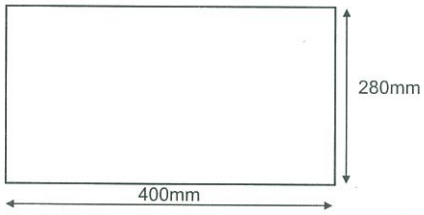
Top and Bottom cover rubber thickness 4mm
Side cover rubber thickness 6mm
Steel plate thickness 3mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
2DRP/1/06	150	300	20	727	0.00299	742	495	592	406	9.8	2.89
2DRP/2/06	150	300	29	498	0.00436	742	491	573	395	14.0	2.03
2DRP/3/06	150	300	38	379	0.00573	742	489	554	384	18.2	1.56
2DRP/4/06	150	300	47	306	0.00710	742	488	534	375	22.4	1.27
2DRP/5/06	150	300	56	257	0.00847	673	487	515	365	26.6	1.07
2DRP/6/06	150	300	65	221	0.00984	581	486	452	356	30.8	0.92
2DRP/7/06	150	300	74	194	0.01121	512	486	382	346	35.0	0.81
2DRP/8/06	150	300	83	173	0.01259	457	485	327	336	39.2	0.72
2DRP/1/09	150	300	23	366	0.00594	494	388	389	311	11.9	2.38
2DRP/2/09	150	300	35	212	0.01026	494	375	369	291	18.2	1.56
2DRP/3/09	150	300	47	149	0.01457	487	364	350	276	24.5	1.16
2DRP/4/09	150	300	59	115	0.01889	388	358	301	262	30.8	0.92
2DRP/5/09	150	300	71	94	0.02321	322	354	235	248	37.1	0.76
2DRP/6/09	150	300	83	79	0.02753	275	352	189	235	43.4	0.65
2DRP/1/12	150	300	26	187	0.01160	371	295	287	233	14.0	2.03
2DRP/2/12	150	300	41	101	0.02158	371	273	267	214	22.4	1.27
2DRP/3/12	150	300	56	69	0.03156	291	262	226	199	30.8	0.92
2DRP/4/12	150	300	71	52	0.04154	228	256	164	185	39.2	0.72
2DRP/5/12	150	300	86	42	0.05152	188	252	123	171	47.6	0.60



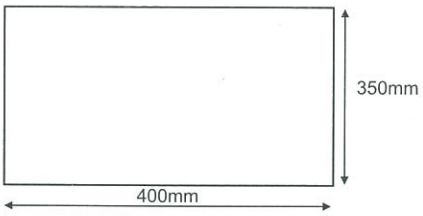
Top and Bottom cover rubber thickness 4mm
Side cover rubber thickness 6mm
Steel plate thickness 3mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
3DRP/1/06	200	350	20	1793	0.00089	1535	972	1252	809	9.8	4.50
3DRP/2/06	200	350	29	1232	0.00130	1466	964	1222	792	14.0	3.15
3DRP/3/06	200	350	38	938	0.00170	1466	960	1193	777	18.2	2.42
3DRP/4/06	200	350	47	757	0.00211	1466	958	1163	763	22.4	1.97
3DRP/5/06	200	350	56	635	0.00251	1466	956	1134	750	26.6	1.66
3DRP/6/06	200	350	65	547	0.00292	1466	955	1104	737	30.8	1.43
3DRP/7/06	200	350	74	480	0.00332	1443	954	1075	724	35.0	1.26
3DRP/8/06	200	350	83	428	0.00373	1289	953	1020	711	39.2	1.13
3DRP/1/09	200	350	23	932	0.00171	1024	784	825	642	11.9	3.71
3DRP/2/09	200	350	35	543	0.00294	978	737	795	605	18.2	2.42
3DRP/3/09	200	350	47	383	0.00417	978	716	766	578	24.5	1.80
3DRP/4/09	200	350	59	296	0.00540	978	704	736	559	30.8	1.43
3DRP/5/09	200	350	71	241	0.00662	908	696	707	542	37.1	1.19
3DRP/6/09	200	350	83	203	0.00785	776	691	597	523	43.4	1.02
3DRP/1/12	200	350	26	487	0.00328	768	590	611	486	14.0	3.15
3DRP/2/12	200	350	41	263	0.00607	733	536	582	442	22.4	1.97
3DRP/3/12	200	350	56	180	0.00887	733	515	552	417	30.8	1.43
3DRP/4/12	200	350	71	137	0.01166	644	503	510	400	39.2	1.13
3DRP/5/12	200	350	86	110	0.01445	531	496	396	387	47.6	0.93



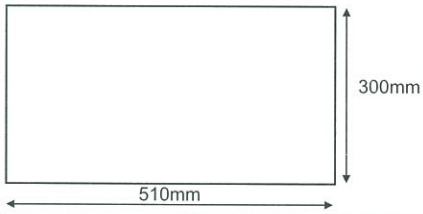
Top and Bottom cover rubber thickness 4mm
Side cover rubber thickness 6mm
Steel plate thickness 3mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
4DRP/1/09	280	400	23	2409	0.00046	2198	1536	1806	1294	11.9	5.93
4DRP/2/09	280	400	35	1416	0.00079	1600	1444	1491	1206	18.2	3.88
4DRP/3/09	280	400	47	1002	0.00112	1600	1403	1454	1160	24.5	2.88
4DRP/4/09	280	400	59	776	0.00144	1600	1380	1416	1129	30.8	2.29
4DRP/5/09	280	400	71	633	0.00177	1600	1365	1378	1105	37.1	1.90
4DRP/6/09	280	400	83	534	0.00210	1600	1355	1341	1085	43.4	1.63
4DRP/7/09	280	400	95	462	0.00242	1600	1347	1303	1066	49.7	1.42
4DRP/8/09	280	400	107	407	0.00275	1600	1341	1265	1048	56.0	1.26
4DRP/1/12	280	400	26	1300	0.00086	1648	1159	1343	979	14.0	5.04
4DRP/2/12	280	400	41	707	0.00158	1200	1059	1100	882	22.4	3.15
4DRP/3/12	280	400	56	485	0.00231	1200	1011	1062	838	30.8	2.29
4DRP/4/12	280	400	71	370	0.00303	1200	989	1024	811	39.2	1.80
4DRP/5/12	280	400	86	298	0.00375	1200	974	987	791	47.6	1.48
4DRP/6/12	280	400	101	250	0.00447	1200	965	949	774	56.0	1.26
4DRP/1/15	280	400	29	744	0.00150	1319	859	1066	727	16.1	4.38
4DRP/2/15	280	400	47	390	0.00287	960	769	865	646	26.6	2.65
4DRP/3/15	280	400	65	264	0.00424	960	735	827	612	37.1	1.90
4DRP/4/15	280	400	83	200	0.00560	960	718	789	592	47.6	1.48
4DRP/5/15	280	400	101	161	0.00697	960	707	752	576	58.1	1.21



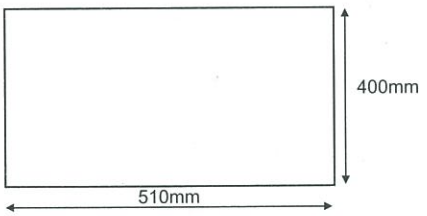
Top and Bottom cover rubber thickness	6mm
Side cover rubber thickness	10mm
Steel plate thickness	3mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
5DRP/1/09	350	400	27	2264	0.00040	2315	1735	2212	1456	14.7	6.00
5DRP/2/09	350	400	39	1554	0.00058	1929	1720	1806	1426	21.0	4.20
5DRP/3/09	350	400	51	1184	0.00077	1929	1712	1770	1404	27.3	3.23
5DRP/4/09	350	400	63	956	0.00095	1929	1707	1733	1383	33.6	2.63
5DRP/5/09	350	400	75	801	0.00113	1929	1704	1696	1364	39.9	2.21
5DRP/6/09	350	400	87	690	0.00132	1929	1701	1659	1345	46.2	1.91
5DRP/7/09	350	400	99	606	0.00150	1929	1699	1622	1327	52.5	1.68
5DRP/8/09	350	400	111	540	0.00168	1929	1698	1585	1308	58.8	1.50
5DRP/1/12	350	400	30	1469	0.00062	1929	1499	1808	1257	16.8	5.25
5DRP/2/12	350	400	45	892	0.00102	1447	1426	1336	1182	25.2	3.50
5DRP/3/12	350	400	60	640	0.00142	1447	1391	1300	1140	33.6	2.63
5DRP/4/12	350	400	75	499	0.00182	1447	1372	1263	1110	42.0	2.10
5DRP/5/12	350	400	90	409	0.00222	1447	1359	1226	1085	50.4	1.75
5DRP/6/12	350	400	105	347	0.00262	1447	1350	1189	1063	58.8	1.50
5DRP/1/15	350	400	33	937	0.00097	1654	1242	1437	1043	18.9	4.67
5DRP/2/15	350	400	51	528	0.00172	1158	1144	1054	950	29.4	3.00
5DRP/3/15	350	400	69	368	0.00247	1158	1103	1018	905	39.9	2.21
5DRP/4/15	350	400	87	282	0.00322	1158	1080	981	875	50.4	1.75
5DRP/5/15	350	400	105	229	0.00398	1158	1066	944	852	60.9	1.45



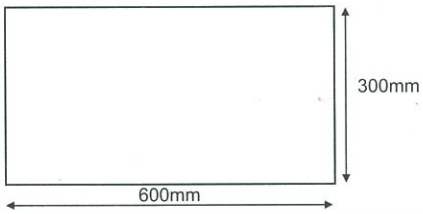
Top and Bottom cover rubber thickness	6mm
Side cover rubber thickness	10mm
Steel plate thickness	4.5mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
6DRP/1/12	300	510	33.0	1632	0.00066	2445	1804	1976	1502	16.8	5.74
6DRP/2/12	300	510	49.5	991	0.00108	2375	1722	1913	1412	25.2	3.83
6DRP/3/12	300	510	66.0	711	0.00151	2375	1684	1850	1359	33.6	2.87
6DRP/4/12	300	510	82.5	555	0.00193	2375	1662	1787	1319	42.0	2.30
6DRP/5/12	300	510	99.0	455	0.00236	2375	1648	1724	1284	50.4	1.91
6DRP/6/12	300	510	115.5	385	0.00278	2037	1638	1609	1252	58.8	1.64
6DRP/7/12	300	510	132.0	334	0.00320	1783	1630	1355	1222	67.2	1.43
6DRP/8/12	300	510	148.5	295	0.00363	1584	1624	1157	1186	75.6	1.28
6DRP/1/15	300	510	36.0	1042	0.00103	1956	1514	1568	1233	18.9	5.10
6DRP/2/15	300	510	55.5	587	0.00182	1900	1404	1505	1153	29.4	3.28
6DRP/3/15	300	510	75.0	409	0.00262	1900	1357	1442	1096	39.9	2.42
6DRP/4/15	300	510	94.5	313	0.00342	1900	1331	1379	1056	50.4	1.91
6DRP/5/15	300	510	114.0	254	0.00421	1574	1314	1231	1020	60.9	1.58
6DRP/6/15	300	510	133.5	214	0.00501	1342	1302	1000	978	71.4	1.35
6DRP/1/18	300	510	39.0	679	0.00158	1630	1247	1296	1030	21.0	4.59
6DRP/2/18	300	510	61.5	367	0.00292	1583	1132	1233	933	33.6	2.87
6DRP/3/18	300	510	84.0	251	0.00427	1583	1087	1170	881	46.2	2.09
6DRP/4/18	300	510	106.5	191	0.00561	1358	1062	1073	845	58.8	1.64
6DRP/5/18	300	510	129.0	154	0.00696	1118	1047	833	817	71.4	1.35



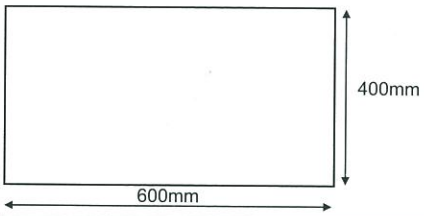
Top and Bottom cover rubber thickness	6mm
Side cover rubber thickness	10mm
Steel plate thickness	4.5mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
7DRP/1/12	400	510	33.0	3005	0.00026	3985	2679	3276	2255	16.8	7.65
7DRP/2/12	400	510	49.5	1835	0.00043	3223	2555	3009	2129	25.2	5.10
7DRP/3/12	400	510	66.0	1320	0.00060	3223	2497	2938	2060	33.6	3.83
7DRP/4/12	400	510	82.5	1031	0.00077	3223	2463	2867	2010	42.0	3.06
7DRP/5/12	400	510	99.0	846	0.00093	3223	2441	2795	1970	50.4	2.55
7DRP/6/12	400	510	115.5	717	0.00110	3223	2426	2724	1935	58.8	2.19
7DRP/7/12	400	510	132.0	622	0.00127	3223	2415	2653	1903	67.2	1.91
7DRP/8/12	400	510	148.5	550	0.00144	3223	2406	2582	1872	75.6	1.70
7DRP/1/15	400	510	36.0	1951	0.00040	3188	2241	2605	1889	18.9	6.80
7DRP/2/15	400	510	55.5	1106	0.00071	2578	2072	2379	1729	29.4	4.37
7DRP/3/15	400	510	75.0	771	0.00102	2578	2001	2307	1653	39.9	3.22
7DRP/4/15	400	510	94.5	592	0.00133	2578	1961	2236	1602	50.4	2.55
7DRP/5/15	400	510	114.0	481	0.00164	2578	1936	2165	1564	60.9	2.11
7DRP/6/15	400	510	133.5	404	0.00195	2578	1919	2094	1531	71.4	1.80
7DRP/1/18	400	510	39.0	1288	0.00061	2657	1836	2159	1550	21.0	6.12
7DRP/2/18	400	510	61.5	698	0.00113	2148	1664	1958	1391	33.6	3.83
7DRP/3/18	400	510	84.0	479	0.00165	2148	1596	1887	1321	46.2	2.78
7DRP/4/18	400	510	106.5	364	0.00217	2148	1559	1816	1277	58.8	2.19
7DRP/5/18	400	510	129.0	294	0.00269	2148	1537	1745	1244	71.4	1.80



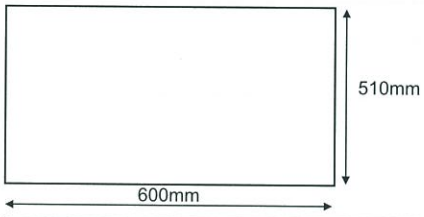
Top and Bottom cover rubber thickness	6mm
Side cover rubber thickness	10mm
Steel plate thickness	4.5mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
8DRP/1/12	300	600	33.0	2132	0.00050	3067	2307	2479	1913	16.8	6.75
8DRP/2/12	300	600	49.5	1297	0.00083	2811	2206	2400	1808	25.2	4.50
8DRP/3/12	300	600	66.0	932	0.00115	2811	2159	2321	1740	33.6	3.38
8DRP/4/12	300	600	82.5	727	0.00147	2811	2132	2242	1689	42.0	2.70
8DRP/5/12	300	600	99.0	596	0.00180	2811	2114	2163	1644	50.4	2.25
8DRP/6/12	300	600	115.5	505	0.00212	2556	2102	2019	1603	58.8	1.93
8DRP/7/12	300	600	132.0	438	0.00245	2236	2093	1699	1553	67.2	1.69
8DRP/8/12	300	600	148.5	387	0.00277	1988	2085	1451	1503	75.6	1.50
8DRP/1/15	300	600	36.0	1368	0.00078	2453	1918	1967	1561	18.9	6.00
8DRP/2/15	300	600	55.5	772	0.00139	2249	1811	1888	1470	29.4	3.86
8DRP/3/15	300	600	75.0	538	0.00199	2249	1752	1809	1404	39.9	2.84
8DRP/4/15	300	600	94.5	413	0.00260	2249	1719	1730	1347	50.4	2.25
8DRP/5/15	300	600	114.0	335	0.00320	1974	1698	1545	1293	60.9	1.86
8DRP/6/15	300	600	133.5	282	0.00381	1684	1684	1254	1240	71.4	1.59
8DRP/1/18	300	600	39.0	895	0.00120	2044	1614	1626	1305	21.0	5.40
8DRP/2/18	300	600	61.5	484	0.00222	1874	1469	1547	1208	33.6	3.38
8DRP/3/18	300	600	84.0	331	0.00323	1874	1411	1468	1141	46.2	2.45
8DRP/4/18	300	600	106.5	252	0.00425	1704	1380	1346	1095	58.8	1.93
8DRP/5/18	300	600	129.0	203	0.00527	1403	1361	1045	1042	71.4	1.59



Top and Bottom cover rubber thickness 6mm
Side cover rubber thickness 10mm
Steel plate thickness 4.5mm

Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
9DRP/1/12	400	600	33.0	3977	0.00020	5060	3477	4159	2925	16.8	9.00
9DRP/2/12	400	600	49.5	2434	0.00032	3815	3322	3562	2767	25.2	6.00
9DRP/3/12	400	600	66.0	1753	0.00045	3815	3250	3477	2678	33.6	4.50
9DRP/4/12	400	600	82.5	1370	0.00580	3815	3209	3393	2615	42.0	3.60
9DRP/5/12	400	600	99.0	1125	0.00070	3815	3181	3309	2563	50.4	3.00
9DRP/6/12	400	600	115.5	954	0.00083	3815	3162	3224	2518	58.8	2.57
9DRP/7/12	400	600	132.0	828	0.00095	3815	3140	3140	2476	67.2	2.25
9DRP/8/12	400	600	148.5	731	0.00108	3815	3137	3056	2435	75.6	2.00
9DRP/1/15	400	600	36.0	2602	0.00030	4048	2931	3308	2468	18.9	8.00
9DRP/2/15	400	600	55.5	1478	0.00053	3052	2718	2816	2266	29.4	5.14
9DRP/3/15	400	600	75.0	1032	0.00076	3052	2628	2731	2167	39.9	3.79
9DRP/4/15	400	600	94.5	793	0.00100	3052	2578	2647	2102	50.4	3.00
9DRP/5/15	400	600	114.0	644	0.00123	3052	2546	2563	2052	60.9	2.48
9DRP/6/15	400	600	133.5	542	0.00146	3052	2524	2478	2008	71.4	2.12
9DRP/1/18	400	600	39.0	1727	0.00046	3373	2419	2741	2040	21.0	7.20
9DRP/2/18	400	600	61.5	938	0.00084	2543	2198	2318	1837	33.6	4.50
9DRP/3/18	400	600	84.0	644	0.00123	2543	2111	2234	1745	46.2	3.27
9DRP/4/18	400	600	106.5	490	0.00161	2543	2064	2150	1687	58.8	2.57
9DRP/5/18	400	600	129.0	396	0.00200	2543	2035	2065	1643	71.4	2.12



Top and Bottom cover rubber thickness 6mm
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Part No	DIMENSIONS			CALCULATED COMPRESSIVE STIFFNESS	CALCULATED ROTATIONAL CAPACITY	FIXED BEARINGS MAXIMUM LOAD ZERO ROTATION	FIXED BEARINGS MAXIMUM LOAD FULL ROTATION	FREE BEARINGS MAXIMUM LOAD ZERO ROTATION	FREE BEARINGS MAXIMUM LOAD FULL ROTATION	UNLOCATED MAXIMUM SHEAR	UNLOCATED SHEAR STIFFNESS
	mm	mm	mm	kN/mm	RAD/100kN	kN	kN	kN	kN	mm	kN/mm
10DRP/1/12	510	600	33.0	6395	0.00010	6558	4707	6269	3986	16.8	11.48
10DRP/2/12	510	600	49.5	3936	0.00016	4919	4496	4666	3781	25.2	7.65
10DRP/3/12	510	600	66.0	2842	0.00022	4919	4397	4582	3671	33.6	5.74
10DRP/4/12	510	600	82.5	2224	0.00028	4919	4340	4497	3597	42.0	4.59
10DRP/5/12	510	600	99.0	1827	0.00034	4919	4303	4413	3539	50.4	3.83
10DRP/6/12	510	600	115.5	1550	0.00039	4919	4277	4329	3489	58.8	3.28
10DRP/7/12	510	600	132.0	1346	0.00045	4919	4257	4244	3445	67.2	2.87
10DRP/8/12	510	600	148.5	1190	0.00051	4919	4242	4160	3404	75.6	2.55
10DRP/1/15	510	600	36.0	4261	0.00014	5622	3961	4993	3357	18.9	10.20
10DRP/2/15	510	600	55.5	2435	0.00025	3935	3671	3699	3090	29.4	6.56
10DRP/3/15	510	600	75.0	1704	0.00036	3935	3548	3615	2965	39.9	4.83
10DRP/4/15	510	600	94.5	1311	0.00047	3935	3480	3530	2886	50.4	3.83
10DRP/5/15	510	600	114.0	1065	0.00057	3935	3436	3446	2827	60.9	3.17
10DRP/6/15	510	600	133.5	897	0.00068	3935	3407	3362	2780	71.4	2.70
10DRP/1/18	510	600	39.0	2866	0.00021	4919	3263	4142	2769	21.0	9.18
10DRP/2/18	510	600	61.5	1565	0.00039	3279	2964	3054	2498	33.6	5.74
10DRP/3/18	510	600	84.0	1076	0.00057	3279	2845	2970	2381	46.2	4.17
10DRP/4/18	510	600	106.5	820	0.00075	3279	2782	2886	2311	58.8	3.28
10DRP/5/18	510	600	129.0	662	0.00092	3279	2742	2801	2260	71.4	2.70

MATERIAL SPECIFICATION

Laminated Bearings listed in this brochure are manufactured from Natural Rubber, nominal hardness 60 IRHD, with physical properties shown below, in accordance with BS 5400: Section 9.2 : 1983 when tested to BS 903 and BS 5400 : Part 9 : 1983.

Elastomer properties

Tensile Strength, Mpa	15.5
Elongation at Break, minimum	400 %
Hardness, IRHD	56 – 65
Ozone Resistance, (25pphm/20% strain/96h/30°C)	No cracks
Bond strength, minimum	7 N/mm
Ageing Resistance (7 days/70°C in Air) Maximum change from initial values :	
Hardness, IRHD	10
Tensile Strength, %	15
Elongation at Break, %	20
Compression set, % (22h/70°C)	30 max

NOTES ON INSTALLATION

GENERAL. Available experience to date indicates that elastomeric bearings should have effective lives at least equal to the design life of the structure; however it is good practice to design structures in such a manner as to facilitate possible replacement of the bearings.

INSTALLATION. When the requirements for bearing installation are being specified, the following matters should be considered:

(a) *Flatness of contact surfaces.* As laminated bearings are stiff the contact surfaces should be flat and irregularities should be kept small. A tolerance of ± 1 mm over the contact surface is normally adequate.

(b) *Out-of-parallel between contact surfaces.* Where bearings are to be installed between preformed surfaces, the out-of-parallel tolerance between these surfaces should be specified to ensure that the combination of out-of-parallel of the bearings themselves added to the out-of -parallel of the contact surfaces will leave sufficient rotation capacity in the bearing for working conditions.
For thin bearings having a small rotation capacity, it may be advisable to form one contact surface after placing the bearings.

(c) *Texture of contact surfaces.* The best contact surfaces are those that have a uniform texture and a high coefficient of friction. Smooth or slippery surfaces should be avoided.
Where steel plates are used and corrosion protection is required, zinc spraying has been shown to be the most satisfactory.

(d) *Edge clearance.* Contact surfaces should extend beyond the edge of the bearings to allow for tolerances on placing and ensure adequate edge support.
A distance of 20 mm is generally adequate.

DOSHIN RUBBER

Engineered Rubber Products

THE COMPANY

Experience

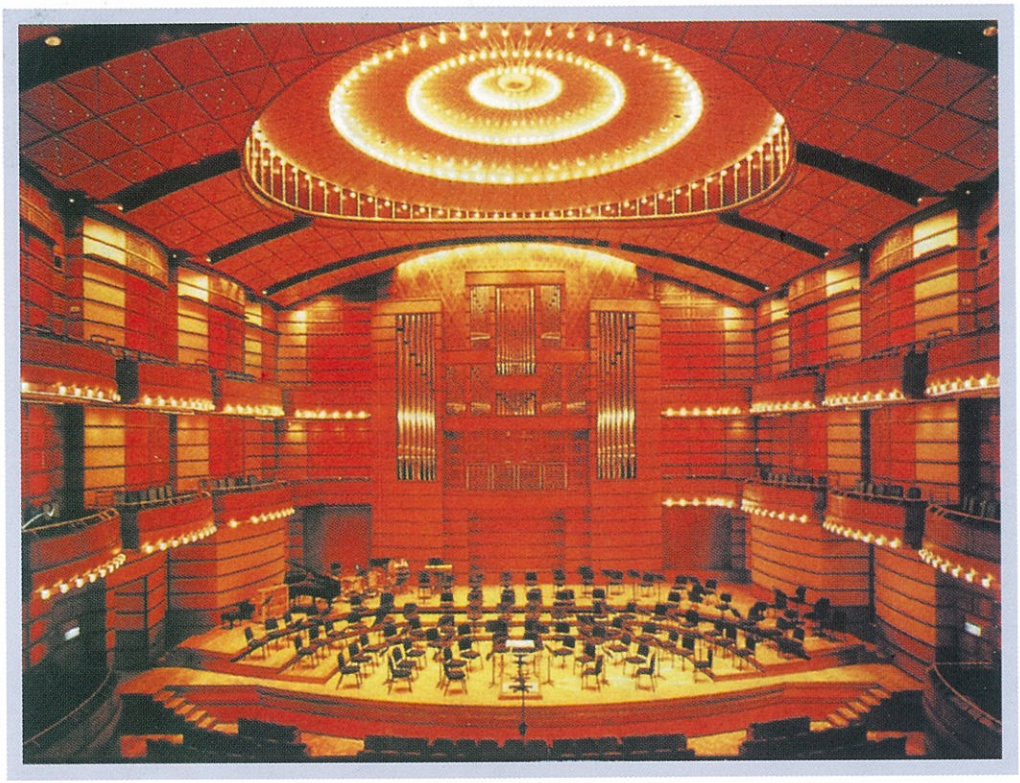
Doshin Rubber have combined experience in excess of 30 years in the design and manufacture of elastomeric products for the civil engineering and building industry with the emphasis on the application of Natural Rubber and other polymers in the construction industry
Elastomeric Products related to such applications include :-

- ❑ Elastomeric Bearing Pads for Bridges and Buildings
- ❑ Elastomeric Bearing Strip & Pads
- ❑ Expansion Joints, for civil and architectural application
- ❑ Structural Slide Bearings.
- ❑ Slip Joint for buildings
- ❑ Waterstop and Water Control Seals
- ❑ Marine Fenders
- ❑ Traffic controls

Doshin Rubber products have been supplied to many prestigious projects both within Malaysia and throughout South East Asia and Western countries.

Company Assurance

To supply service and product quality which consistently surpasses The expectation fo our customers.



Vibration Isolation and Load Bearing Pads.

Petronas Philharmonic Hall at the KLCC is reputed to be the biggest in Asia. Specialist and advanced acoustic devices have been installed in the hall to provide optimum sound quality for every type of performance.

To eliminate external noises and vibrations, the hall sits on 44 pieces of specialized Laminated Rubber Bearing Pads that separate it from the surrounding buildings to create a virtually silent atmosphere for the performance of music.

The size of the Laminated Rubber Bearing Pad is 900mm x 400mm x 300mm thick laminated with 11 pieces of special grade steel plates and a 40mm thick Top-plate.

This is the biggest Laminated Rubber Bearing Pads produced in this country.

The manufacturer - DOSHIN RUBBER PRODUCTS (M) SDN BHD, manufacturing of Rubber Bearing Pads and Rubber In Engineering products for the construction industry since 1984.

DOSHIN®
RUBBER ENGINEERING

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