



## Bearing Pre-Load Waved Washers

**EMO** springs

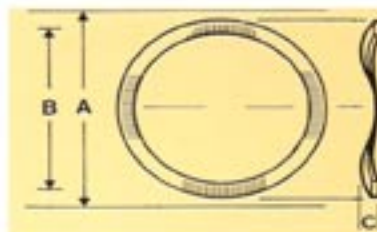
George Emmott (Pawsons) Ltd.

# Bearing Pre-Load Waved Washers

for standard single row ball journal bearings

## Application

For pre-loading bearings in electric motors. The waved washer is installed in the bearing housing and works by maintaining a force on the outer race of the ball bearing, ensuring smooth and quiet running of the bearing which results in extended life.



H = Bearing housing diameter  
 S = Material thickness  
 W = Number of waves  
 H<sub>1</sub>  
 EPL1 - EPL13 = 1mm  
 EPL15 - EMO-X105 = 1.5mm  
 EPL108 - EPL141 = 3.5mm

## EPL and EMO-X Pre-load Waved Washer Series

Developed in liaison with bearing and electric motor manufacturers on the optimum loading characteristics required. The basic EPL range has now been supplemented with the EMO-X range of waved washers since designers have found in some circumstances even better results can be obtained with more pressure on the outer ring of the bearing.

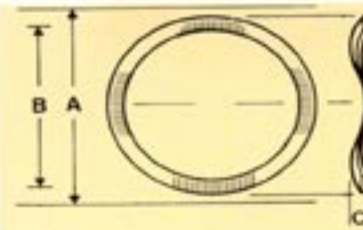
### M E T R I C S E R I E S

EMO ref	H mm	A mm	B mm	C mm	S mm	W	Spring Rate N/mm	Load at H <sub>1</sub> N	Bearing references
EPL1	10	9.5	4.5	1.5	0.15	2	30	15	623
EPL2	13	12.5	7.5	1.5	0.20	2	38	19	624
EPL4	16	15.5	10.5	1.5	0.15	3	38	19	625 634
EPL5	16	15.5	10.5	1.6	0.15	3	38	23	
EPL6	17	16.5	11.5	1.5	0.20	3	58	29	
EPL8	19	18.5	13.0	2.0	0.20	3	29	29	607 626 635
EPL10	21	20.5	15.0	2.0	0.20	3	29	29	
EPL12	22	21.5	16.0	2.0	0.23	3	34	34	
EMO-X12	22	21.5	16.0	1.8	0.20	4	44	35	608 627
EPL13	24	23.5	17.0	3.0	0.25	3	23	35	609
EPL15	26	25.5	19.0	3.0	0.25	3	26	39	
EPL16	26	25.5	19.0	3.0	0.30	3	29	44	6000 629
EMO-X16	26	25.5	19.0	2.0	0.43	4	176	88	
EPL17	28	27.5	21.0	2.6	0.30	3	36	39	
EPL19	28	27.5	21.0	3.0	0.30	3	36	54	6001
EMO-X19	28	27.5	21.0	2.0	0.40	4	216	108	
EPL20	30	29.5	23.0	3.5	0.30	3	22	44	6200
EPL22	32	31.5	25.0	3.2	0.35	3	27	46	
EPL24	32	31.5	25.0	3.5	0.35	3	27	54	6002 6201
EMO-X24	32	31.5	25.0	2.5	0.35	4	108	108	
EPL25	32	31.5	25.0	4.0	0.35	3	27	67	
EPL28	35	34.5	28.0	3.5	0.40	3	34	68	
EMO-X28	35	34.5	28.0	2.5	0.40	4	137	137	6003 6202 6300
EPL29	35	34.5	28.0	3.8	0.40	3	34	78	
EPL30	37	36.5	30.0	4.0	0.38	3	22	55	6301
EPL31	37	36.5	30.0	4.5	0.38	3	22	66	
EPL32	38	37.5	31.0	4.0	0.40	3	29	73	
EPL34	40	39.5	33.0	4.0	0.43	3	31	77	
EMO-X34	40	39.5	33.0	3.0	0.43	4	98	147	6203
EPL37	42	41.5	33.5	5.0	0.38	3	20	70	
EMO-X37	42	41.5	33.5	3.5	0.38	4	88	176	6004 6302
EPL38	42	41.5	33.5	5.0	0.40	3	25	87	
EPL39	44	43.5	35.5	5.0	0.40	3	22	77	
EPL40	47	46.5	38.5	4.7	0.40	3	25	80	
EPL41	47	46.5	38.5	4.4	0.45	3	30	87	6005 6204 6303
EMO-X41	47	46.5	38.5	3.5	0.45	4	118	236	
EPL42	47	46.5	38.5	5.2	0.45	3	30	112	
EPL43	52	51.5	42.0	5.0	0.40	3	25	87	
EPL44	52	51.5	42.0	5.5	0.45	3	28	112	6205 6304
EMO-X44	52	51.5	42.0	4.0	0.45	4	133	332	
EPL45	55	54.5	43.5	5.5	0.45	3	33	132	6006

EMO ref	H mm	A mm	B mm	C mm	S mm	W	Spring Rate N/mm	Load at H <sub>1</sub> N	Bearing references			
EPL46	62	61.5	50.5	4.0	0.50	3	30	75	6007	6206	6305	6403
EPL47	62	61.5	50.5	5.2	0.50	3	30	111				
EPL48	62	61.5	50.5	5.5	0.55	3	33	132				
EMO-X48	62	61.5	50.5	4.0	0.55	4	157	392	6008			
EPL50	68	67.5	55.0	6.5	0.55	3	35	175				
EPL51	70	69.5	57.0	6.5	0.55	3	31	155				
EPL53	72	71.5	59.0	5.8	0.55	3	31	133				
EPL54	72	71.5	59.0	6.5	0.55	3	31	155				
EMO-X54	72	71.5	59.0	5.5	0.55	4	103	412		6207	6306	6404
EPL55	75	74.5	62.0	7.0	0.60	3	37	203	6009			
EPL57	80	79.5	63.5	6.4	0.60	3	32	156	6010	6208	6307	6405
EPL58	80	79.5	63.5	7.0	0.60	3	32	176				
EMO-X58	80	79.5	63.5	6.0	0.60	4	120	540				
EPL60	85	84.5	67.0	8.0	0.60	3	31	201	6209			
EPL61	90	89.5	72.0	6.5	0.60	3	27	135	6011	6210	6308	6406
EPL62	90	89.5	72.0	8.0	0.60	3	27	175				
EMO-X62	90	89.5	72.0	6.5	0.66	4	118	590				
EPL64	90	89.5	72.0	10.5	0.60	3	27	243	6012			
EPL65	95	94.5	75.5	8.5	0.70	3	38	266				
EPL67	100	99.5	80.5	8.5	0.70	3	29	203				
EMO-X67	100	99.5	80.5	7.0	0.70	4	110	605	6013	6211	6309	6407
EPL70	105	104.5	84.5	8.5	0.70	3	38	266	6014	6212	6310	6408
EPL72	110	109.5	90.5	9.5	0.70	3	28	224				
EMO-X72	110	109.5	90.5	7.0	0.76	4	125	687				
EPL75	115	114.5	95.5	9.5	0.80	3	35	280	6015			
EPL77	117	116.5	97.5	9.5	0.80	3	31	248	6016	6213	6311	
EPL79	120	119.5	100.5	9.5	0.80	3	31	248				
EPL82	125	124.5	105.5	9.5	0.80	3	39	312				
EPL84	127	126.5	107.5	9.5	0.80	3	39	312	6017	6215	6312	6410
EPL86	130	129.5	110.5	9.5	0.80	3	33	264				
EMO-X86	130	129.5	110.5	7.5	1.0	4	151	906				
EPL87	130	129.5	110.5	11.5	0.80	3	33	330	6018	6216	6313	6411
EPL89	135	134.5	114.0	11.0	0.90	3	38	361				
EPL90	137	136.5	116.0	11.0	0.90	3	30	285				
EPL92	140	139.5	119.0	11.0	0.90	3	30	285	6019			
EMO-X92	140	139.5	119.0	9.0	0.90	4	66	495				
EPL96	145	144.5	124.0	11.0	0.90	3	44	418				
EPL99	150	149.5	129.0	11.0	1.0	3	28	266	6020	6217	6314	6412
EMO-X99	150	149.5	129.0	9.0	1.0	4	73	547	6021	6218	6315	6413
EPL103	157	156.5	136.0	12.0	1.0	3	32	336				
EPL105	160	159.5	139.0	12.0	1.0	3	32	336				
EMO-X105	160	159.5	139.0	10.0	1.0	4	59	501	6022	6219	6316	
EPL109	170	169.5	149.0	12.0	1.2	3	35	297				
EMO-X109	170	169.5	149.0	10.0	1.2	4	84	546				
EPL113	180	179.5	159.0	12.0	1.0	3	37	314	6024	6220	6317	6414
EMO-X113	180	179.5	159.0	10.0	1.0	4	70	455				
EPL118	190	189.5	167.0	12.0	1.2	3	39	331				
EMO-X118	190	189.5	167.0	10.0	1.2	4	65	422		6221	6318	6415
EPL122	200	199.5	177.0	12.0	1.2	3	20	170		6222	6319	6416
EPL124	210	209.5	185.5	12.5	1.2	3	19	171		6223		6417
EPL127	215	214.5	190.5	12.5	1.2	3	19	171		6224	6320	
EPL129	220	219.5	195.5	12.5	1.6	3	37	333	6026			
EPL131	225	224.5	200.5	12.5	1.6	3	63	567				
EPL132	230	229.5	205.0	12.5	1.8	3	60	540				
EPL134	240	239.5	214.0	14.5	1.8	3	54	594			6322	
EPL136	250	249.5	224.0	14.5	2.0	3	73	803		6228	6323	
EPL138	260	259.5	234.0	14.5	2.3	3	70	770		6229	6324	
EPL140	270	269.5	242.0	15.0	2.6	3	103	1184		6230		
EPL141	280	279.5	252.0	15.0	2.6	3	78	897				6326

# Bearing Pre-Load Waved Washers

for standard single row  
ball journal bearings



H = Bearing housing diameter  
S = Material thickness  
W = Number of waves  
H<sub>1</sub>  
PLW1+ PLW2 = 0.031"  
PLW3- PLW57 = 0.063"

## Application

For pre-loading bearings in electric motors. The waved washer is installed in the bearing housing and works by maintaining a force on the outer race of the ball bearing, ensuring smooth and quiet running of the bearing which results in extended life.

## Materials & Finishes

All the waved washers listed are listed in both the metric and inch series are supplied from high carbon spring steel. Surface coating and alternative materials can be supplied on request.

### I N C H S E R I E S

EMO ref	H inch	A inch	B inch	C inch	S inch	W	Spring Rate N/inch	Load at H <sub>1</sub> N	Bearing references
PLW1	0.375	0.36	0.23	0.06	0.008	2	482	14	EE0
PLW2	0.500	0.48	0.30	0.06	0.010	2	758	22	EE1
PLW3	0.750	0.73	0.51	0.08	0.008	3	1529	26	EE2
PLW4	0.875	0.86	0.64	0.08	0.010	3	2588	44	EE3
PLW5	1.125	1.11	0.86	0.11	0.014	3	1234	58	EE4
PLW6	1.313	1.30	1.05	0.13	0.010	3	388	26	
PLW7	1.313	1.30	1.05	0.13	0.016	3	866	58	MJ1/4 LJ1/2
PLW8	1.375	1.36	1.11	0.13	0.016	3	1059	71	EE5
PLW9	1.500	1.48	1.23	0.16	0.015	3	453	44	MJ3/8
PLW10	1.563	1.55	1.30	0.16	0.016	3	731	71	LJ5/8
PLW12	1.625	1.61	1.30	0.16	0.016	3	865	84	EE6 MJ1/2
PLW13	1.750	1.73	1.42	0.19	0.016	3	661	84	EE7
PLW14	1.813	1.80	1.48	0.19	0.016	3	559	71	MJ5/8
PLW15	1.875	1.86	1.55	0.19	0.018	3	661	84	EE8 LJ3/4
PLW17	2.000	1.98	1.61	0.22	0.016	3	535	84	EE9 MJ3/4 LJ7/8
PLW18	2.000	1.98	1.61	0.22	0.018	3	624	98	EE9 MJ3/4 LJ7/8
PLW20	2.125	2.11	1.67	0.22	0.018	3	808	127	EE10
PLW22	2.250	2.23	1.80	0.22	0.020	3	687	108	EE11 MJ7/8 LJ1
PLW23	2.250	2.23	1.80	0.26	0.020	3	687	137	EE11 MJ7/8 LJ1
PLW24	2.500	2.48	2.05	0.22	0.020	3	687	108	EE12 MJ1 LJ1.1/8
PLW26	2.500	2.48	2.05	0.29	0.020	3	687	156	EE12 MJ1 LJ1.1/8
PLW28	2.690	2.67	2.17	0.25	0.022	3	877	166	XLJ1.1/8
PLW30	2.813	2.80	2.30	0.25	0.024	3	680	127	MJ1.1/8
PLW31	2.875	2.86	2.36	0.25	0.024	3	941	176	XLJ1.5/8
PLW32	3.000	2.98	2.48	0.28	0.024	3	718	156	LJ1.3/8
PLW34	3.125	3.11	2.48	0.28	0.024	3	631	137	MJ1.1/4
PLW36	3.250	3.23	2.61	0.28	0.024	3	764	166	LJ1.1/2
PLW37	3.313	3.30	2.67	0.31	0.024	3	910	225	XLJ2
PLW38	3.500	3.48	2.80	0.31	0.024	3	631	156	MJ1.3/8
PLW40	3.563	3.55	2.80	0.31	0.024	3	1028	254	XLJ2.1/4
PLW41	3.750	3.73	2.98	0.34	0.024	3	600	166	MJ1.1/2
PLW44	4.000	3.98	3.23	0.34	0.028	3	671	186	MJ1.5/8
PLW46	4.000	3.98	3.23	0.40	0.028	3	671	225	LJ2
PLW48	4.250	4.23	3.48	0.34	0.028	3	707	196	MJ1.3/4
PLW57	5.250	5.23	4.42	0.44	0.036	3	830	313	LJ2.3/4

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