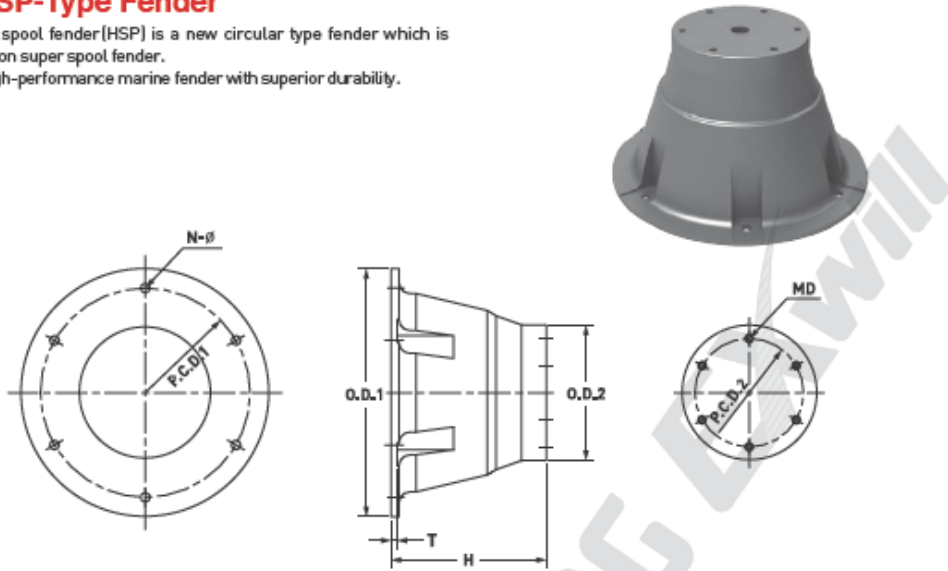


■ HSP-Type Fender

Hyper spool fender(HSP) is a new circular type fender which is based on super spool fender.
It is high-performance marine fender with superior durability.



● Dimension

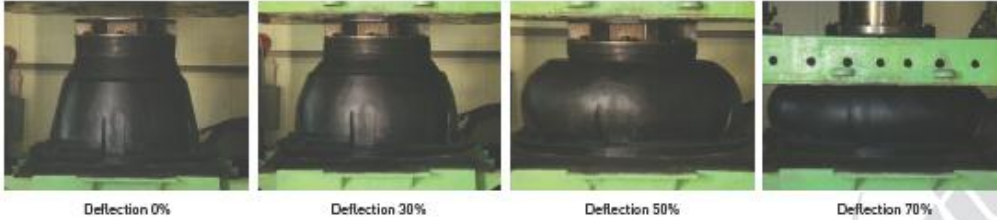
[Unit:mm]

Dimension	MD	O.D.1	P.C.D.1	O.D.2	P.C.D.2	T	N-Ø
300H	M20(3/4)	500	440	262	210	18	4-26
350H	M20(3/4)	575	510	306	245	20	4-26
400H	M20(3/4)	650	585	350	280	20	4-26
500H	M24(1)	820	730	436	350	22	4-30
600H	M24(1)	900	810	525	420	23	4-30
700H	M30(1 1/4)	1120	1020	615	490	26	4-38
800H	M36(1 1/2)	1250	1165	700	560	31	6-44
900H	M36(1 1/2)	1450	1313	785	630	36	6-44
1000H	M42(1 3/4)	1600	1460	875	700	38	6-50
1150H	M42(1 3/4)	1850	1550	1000	805	41	6-50
1200H	M42(1 3/4)	1920	1750	1050	840	46	8-50
1300H	M48(2)	2080	1900	1140	910	50	8-60
1400H	M48(2)	2240	2040	1230	980	53	8-60
1600H	M48(2)	2500	2330	1400	1120	80	8-60
1800H	M56(2 1/4)	2880	2620	1575	1260	90	10-70
2000H	M56(2 1/4)	3200	2920	1700	1400	100	10-70

- MD : Anchor Size See Page 45-47

Morse Rubber

● Compression Test



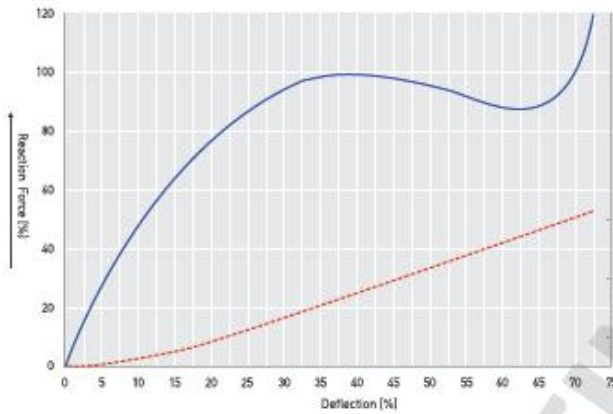
Deflection 0%

Deflection 30%

Deflection 50%

Deflection 70%

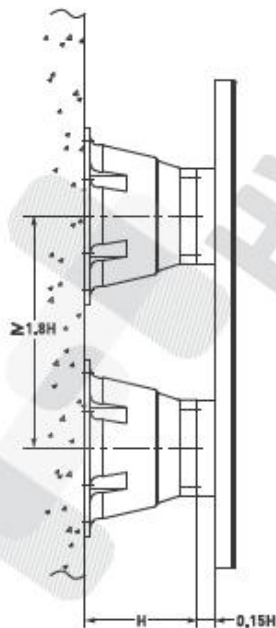
● Performance Curve



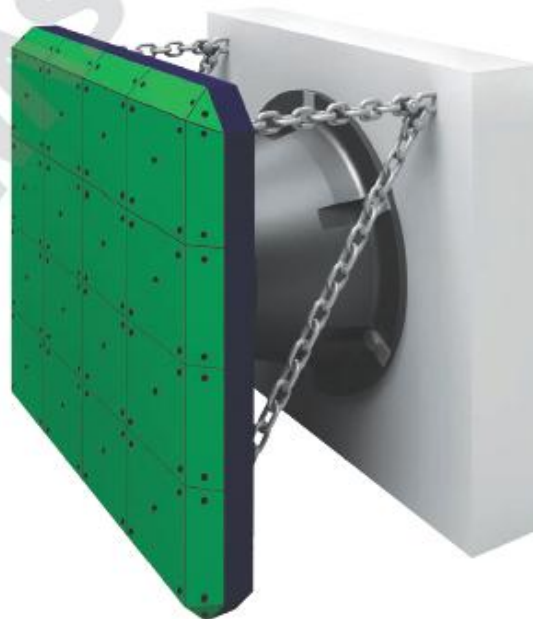
● Performance of Intermediate Deflection

Deflection (%)	R - F (%)	E - A (%)
0	0	0
5	27	1
10	48	5
15	65	10
20	78	16
25	88	24
30	95	32
35	99	40
40	100	49
45	99	58
50	96	67
55	93	75
60	89	84
65	89	92
70	100	100
72.5	121	105

● Clearances



● 3D Model



● Performance Table

Size		300H	350H	400H	500H	600H	700H	800H	900H	1000H	1150H	1200H	1300H	1400H	1600H	1800H	2000H	
Performance																		
R150	R • F(kN)	108.9	148.7	194.2	304.6	437.0	596.0	778.4	984.4	1215.5	1606.9	1749.6	2054.2	2382.4	3112.2	3937.7	4861.8	
	E • A(kJ)	17.7	28.1	42.7	85.3	145.7	232.5	347.3	493.0	676.9	1030.1	1169.8	1487.7	1857.0	2772.3	3948.0	5415.1	
R145	R • F(kN)	105.3	143.7	187.8	294.4	422.5	576.1	752.5	951.6	1174.9	1553.3	1691.3	1985.7	2302.9	3008.5	3806.5	4699.8	
	E • A(kJ)	17.1	27.2	41.3	82.5	140.8	224.7	335.7	476.5	654.3	995.7	1130.8	1438.1	1795.1	2679.9	3816.4	5234.6	
R140	R • F(kN)	101.6	138.7	181.3	284.3	407.9	556.2	726.5	918.8	1134.4	1499.8	1633.0	1917.3	2223.5	2904.7	3675.2	4537.7	
	E • A(kJ)	16.5	26.3	39.8	79.7	136.0	217.0	324.1	460.1	631.8	961.4	1091.9	1388.5	1733.2	2587.5	3684.8	5054.1	
R135	R • F(kN)	98.0	133.8	174.8	274.1	393.3	536.4	700.6	886.0	1093.9	1446.2	1574.7	1848.8	2144.1	2801.0	3544.0	4375.7	
	E • A(kJ)	15.9	25.3	38.4	76.8	131.1	209.2	312.5	443.7	609.2	927.0	1052.9	1338.9	1671.3	2495.1	3553.2	4873.6	
R130	R • F(kN)	94.4	128.8	168.3	264.0	378.8	516.5	674.6	853.2	1053.4	1392.6	1516.3	1780.3	2064.7	2697.3	3412.7	4213.6	
	E • A(kJ)	15.3	24.4	37.0	74.0	126.3	201.5	301.0	427.2	586.6	892.7	1013.9	1289.3	1609.4	2402.7	3421.6	4693.1	
R125	R • F(kN)	90.7	123.9	161.9	253.8	364.2	496.6	648.7	820.4	1012.9	1339.1	1458.0	1711.8	1985.3	2593.5	3281.4	4051.5	
	E • A(kJ)	14.7	23.4	35.6	71.1	121.4	193.7	289.4	410.8	564.1	858.4	974.9	1239.7	1547.5	2310.3	3290.0	4512.6	
R120	R • F(kN)	87.1	118.9	155.4	243.7	349.6	476.8	622.7	787.5	972.4	1285.5	1399.7	1643.4	1905.9	2489.8	3150.2	3889.5	
	E • A(kJ)	14.1	22.5	34.1	68.3	116.5	186.0	277.8	394.4	541.5	824.0	935.9	1190.1	1485.6	2217.8	3158.4	4332.1	
R115	R • F(kN)	83.5	114.0	148.9	233.5	335.1	456.9	596.8	754.7	931.9	1231.9	1341.4	1574.9	1826.5	2386.0	3018.9	3727.4	
	E • A(kJ)	13.5	21.6	32.7	65.4	111.7	178.2	266.2	377.9	518.9	789.7	896.9	1140.6	1423.7	2125.4	3026.8	4151.6	
R110	R • F(kN)	79.9	109.0	142.4	223.4	320.5	437.0	570.8	721.9	891.3	1178.4	1283.0	1506.4	1747.1	2282.3	2887.7	3565.3	
	E • A(kJ)	12.9	20.6	31.3	62.6	106.8	170.5	254.7	361.5	496.4	755.4	857.9	1091.0	1361.8	2033.0	2895.2	3971.1	
R105	R • F(kN)	76.2	104.1	136.0	213.2	305.9	417.2	544.9	689.1	850.8	1124.8	1224.7	1437.9	1667.7	2178.6	2756.4	3403.3	
	E • A(kJ)	12.4	19.7	29.9	59.7	102.0	162.7	243.1	345.1	473.8	721.0	818.9	1041.4	1299.9	1940.6	2763.6	3790.6	
R100	R • F(kN)	72.6	99.1	129.5	203.1	291.4	397.3	518.9	656.3	810.3	1071.3	1166.4	1369.5	1588.2	2074.8	2625.2	3241.2	
	E • A(kJ)	11.8	18.8	28.4	56.9	97.1	155.0	231.5	328.6	451.3	686.7	779.9	991.8	1238.0	1848.2	2632.0	3610.1	
R95	R • F(kN)	69.0	94.1	123.0	192.9	276.8	377.4	493.0	623.5	769.8	1017.7	1108.1	1301.0	1508.8	1971.1	2493.9	3079.2	
	E • A(kJ)	11.2	17.8	27.0	54.1	92.3	147.2	219.9	312.2	428.7	652.4	740.9	942.2	1176.1	1755.8	2500.4	3429.6	
R90	R • F(kN)	65.3	89.2	116.5	182.8	262.2	357.6	467.1	590.7	729.3	964.1	1049.8	1232.5	1429.4	1867.3	2362.6	2917.1	
	E • A(kJ)	10.6	16.9	25.6	51.2	87.4	139.5	208.4	295.8	406.1	618.0	701.9	892.6	1114.2	1663.4	2368.8	3249.1	
R85	R • F(kN)	61.7	84.2	110.1	172.6	247.7	337.7	441.1	557.8	688.8	910.6	991.4	1164.1	1350.0	1763.6	2231.4	2755.0	
	E • A(kJ)	10.0	15.9	24.2	48.4	82.6	131.7	196.8	279.3	383.6	583.7	662.9	843.0	1052.3	1571.0	2237.2	3068.6	
R80	R • F(kN)	58.1	79.3	103.6	162.5	233.1	317.8	415.2	525.0	648.2	857.0	933.1	1095.6	1270.6	1659.9	2100.1	2593.0	
	E • A(kJ)	9.4	15.0	22.8	45.5	77.7	124.0	185.2	262.9	361.0	549.4	623.9	793.4	990.4	1478.6	2105.6	2888.1	

- R • F : Reaction Force(kN) - E • A : Energy Absorption(kJ) - Tolerance : ±5% or ±10% - Rated Deflection : 70% - Maximum Deflection : 72.5%
 Additionally, if other performance grades/ tolerance are required for fender, we can manufacture various grades/ tolerance to meet your requirement.
 Please inquire to HWASEUNG EXWILL

● PIANC Factor

Angle Factor		Velocity Factor		Temperature Factor	
Angle(°)	Factor	Time(sec)	Factor	Temp.(°C)	Factor
0	1.000	1	1.048	-30	1.205
3	1.000	2	1.025	-20	1.165
5	1.000	3	1.014	-10	1.128
8	0.991	4	1.006	0	1.092
10	0.982	5	1.000	10	1.054
15	0.935	6	1.000	23	1.000
20	0.876	8	1.000	30	0.975
		≥10	1.000	40	0.945
				50	0.935

MCE CONE FENDERS

Size	FC10		FC25		FC44		FC62		FC96		Size
	Reaction (kN)	Energy (kNm)	Reaction (kN)	Energy (kNm)	Reaction (kN)	Energy (kNm)	Reaction (kN)	Energy (kNm)	Reaction (kN)	Energy (kNm)	
300H	57	9.0	72	11.2	82	13	93	15	112	18	300H
350H	78	14.3	97	17.8	112	21	126	23	153	28	350H
400H	102	21.3	127	26.6	147	31	165	35	199	42	400H
500H	159	41.6	199	52.0	229	60	258	67	312	82	500H
600H	229	71.9	286	89.9	330	104	371	117	449	141	600H
700H	312	114.2	390	142.8	449	164	505	185	611	224	700H
800H	407	170	509	213	586	246	659	276	798	334	800H
900H	515	243	644	303	742	350	835	393	1010	476	900H
1000H	636	333	795	416	916	480	1030	539	1250	653	1000H
1100H	770	443	962	554	1108	638	1246	718	1513	869	1100H
1150H	841	506	1050	633	1210	729	1360	820	1650	993	1150H
1200H	916	575	1140	719	1320	829	1480	932	1800	1128	1200H
1300H	1075	732	1340	915	1550	1054	1740	1185	2110	1434	1300H
1400H	1247	914	1560	1142	1800	1316	2020	1480	2440	1791	1400H
1600H	1628	1364	2040	1705	2340	1964	2640	2210	3190	2673	1600H
1800H	2061	1942	2576	2428	2967	2797	3337	3146	4050	3806	1800H
2000H	2544	2664	3180	3330	3663	3836	4120	4316	5000	5221	2000H

PERFORMANCE TOLERANCE ±10%

Performance of Intermediate Deflection

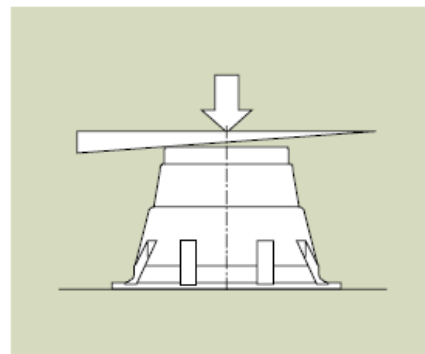
Deflection	R/F	E/A
0	0%	0%
5	27%	1%
10	48%	5%
15	65%	10%
20	79%	17%
25	90%	25%
30	97%	34%
35	100%	44%
40	99%	53%
45	93%	62%
50	84%	71%
55	73%	78%
60	68%	85%
65	76%	92%
70	100%	100%
72	132%	104%
73	148%	107%
74	165%	110%

Small Reduction Force for Angular Compression

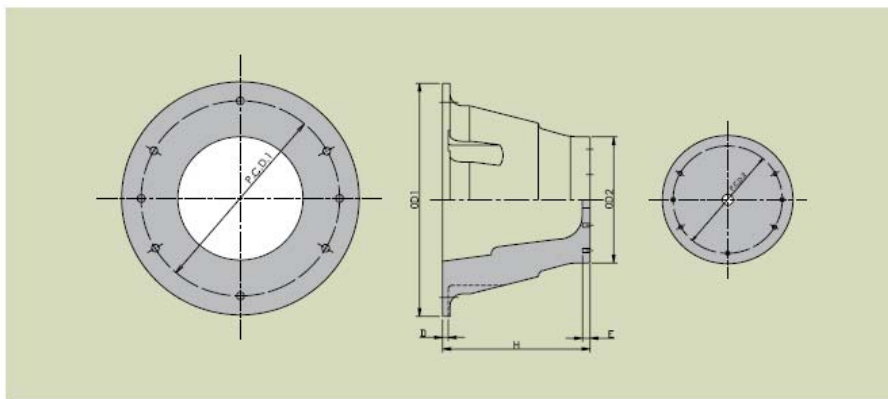
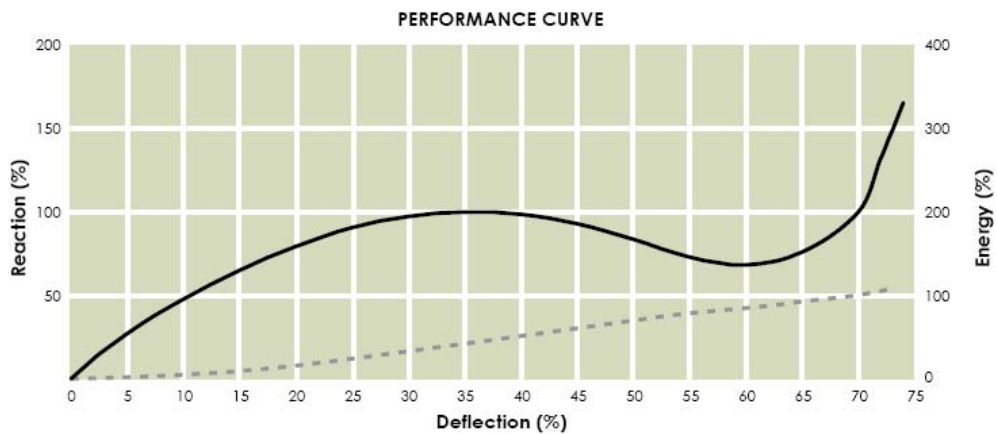
Angle (deg)	0	3	6	9	12	15	20
E/A	1.00	1.00	1.00	0.989	0.965	0.920	0.800
R/F	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Temperature Factor

Temperature (°C)	TF
-20	1.375
-10	1.182
0	1.083
10	1.034
23	1
30	0.976
40	0.945
50	0.918
60	0.917



Morse Rubber



	H	OD1	PCDC1	OD2	PCDC2	D (mm)	E (mm)	Bolt Size	Weight		
	300H	300	500	440	262	210	18	25	M20X4	35kg	300H
	350H	350	575	510	306	245	20	25	M20X4	51kg	350H
	400H	400	650	585	350	280	20	25	M20X4	76kg	400H
	500H	500	820	730	436	350	22	30	M24X4	151kg	500H
	600H	600	900	810	525	420	23	45	M24X4	247kg	600H
	700H	700	1120	1020	615	490	26	45	M30X4	402kg	700H
	800H	800	1250	1165	700	560	31	72	M36X6	587kg	800H
	900H	900	1450	1313	785	630	36	72	M36X6	853kg	900H
	1000H	1000	1600	1460	875	700	38	82	M42X6	1129kg	1000H
	1150H	1150	1850	1550	1000	805	41	92	M42X6	1720kg	1150H
	1200H	1200	1920	1750	1050	840	46	92	M42X8	1980kg	1200H
	1300H	1300	2080	1900	1140	910	50	95	M48X8	2500kg	1300H
	1400H	1400	2240	2040	1230	980	53	95	M48X8	3130kg	1400H
	1600H	1600	2500	2330	1400	1120	80	105	M48X8	4670kg	1600H
	1800H	1800	2880	2620	1575	1260	90	120	M56X10	6650kg	1800H
	2000H	2000	3200	2920	1700	1400	100	123	M56X10	9560kg	2000H