

GO BEYOND LIMITS MAKE DREAMS REALITY



# MARINE PRODUCTS



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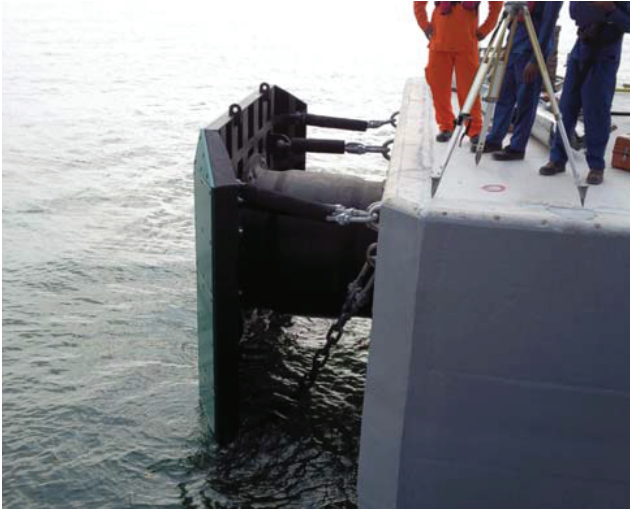
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# CSS FENDER

CSS FENDER



Vietnam



Singapore



Oman



Australia



## CSS FENDER

Fender Performance At 52.5% Design Deflection (Rated Performance Data)

		CSS	CSS	CSS	CSS	CSS	CSS	CSS	CSS	CSS	CSS	CSS	CSS	CSS			
		500H	600H	800H	1000H	1150H	1250H	1450H	1600H	1700H	1800H	2000H	2250H	2500H		3000H	
F4	0	E/A	17.9	30.9	73.1	143	217	279	434	583	699	830	1137	1618	2217	3826	0
		R/F	78.3	112	200	313	414	489	658	802	905	1015	1253	1586	1958	2819	
	1	E/A	18.5	31.8	75.3	147	224	287	447	601	720	854	1171	1666	2284	3941	1
		R/F	80.6	116	206	322	426	504	678	826	932	1045	1290	1633	2016	2904	
	2	E/A	19.0	32.8	77.6	152	230	296	461	619	742	880	1206	1716	2352	4059	2
		R/F	83.0	119	212	332	439	519	698	850	960	1076	1329	1682	2077	2991	
	3	E/A	19.6	33.8	79.9	156	237	304	475	637	764	906	1242	1768	2423	4181	3
		R/F	85.5	123	219	342	452	534	719	876	989	1109	1369	1733	2139	3081	
	4	E/A	20.2	34.8	82.3	161	244	314	489	656	787	934	1280	1821	2495	4306	4
		R/F	88.1	126	225	352	466	550	741	902	1019	1142	1410	1785	2203	3173	
	5	E/A	20.8	35.8	84.8	166	252	323	504	676	810	962	1318	1875	2570	4435	5
		R/F	90.7	130	232	363	480	567	763	929	1049	1176	1452	1838	2269	3268	
F3	0	E/A	21.4	36.9	87.3	171	259	333	519	696	835	990	1358	1931	2647	4568	0
		R/F	93.5	134	239	374	494	584	786	957	1081	1212	1496	1893	2338	3366	
	1	E/A	22.0	38.0	89.9	176	267	343	534	717	860	1020	1398	1989	2727	4705	1
		R/F	96.3	138	246	385	509	602	810	986	1113	1248	1541	1950	2408	3467	
	2	E/A	22.7	39.1	92.6	181	275	353	550	739	886	1051	1440	2049	2808	4846	2
		R/F	99.2	142	253	396	524	620	834	1015	1146	1285	1587	2009	2480	3571	
	3	E/A	23.4	40.3	95.4	187	283	363	567	761	912	1082	1483	2110	2893	4992	3
		R/F	102	147	261	408	540	638	859	1046	1181	1324	1635	2069	2554	3678	
	4	E/A	24.1	41.5	98.3	192	292	374	584	784	939	1115	1528	2174	2980	5141	4
		R/F	105	151	269	421	556	657	885	1077	1216	1364	1684	2131	2631	3789	
	5	E/A	24.8	42.8	102	198	300	386	601	807	968	1148	1574	2239	3069	5296	5
		R/F	108	156	277	433	573	677	911	1110	1253	1405	1734	2195	2710	3902	
F2	0	E/A	25.5	44.0	105	204	309	397	619	831	997	1183	1621	2306	3161	5454	0
		R/F	111	160	285	446	590	697	939	1143	1290	1447	1786	2261	2791	4020	
	1	E/A	26.3	45.4	108	210	319	409	638	856	1027	1218	1670	2375	3256	5618	1
		R/F	115	165	294	460	608	718	967	1177	1329	1490	1840	2329	2875	4140	
	2	E/A	27.1	46.7	111	216	328	421	657	882	1057	1255	1720	2446	3353	5787	2
		R/F	118	170	303	473	626	740	996	1213	1369	1535	1895	2399	2961	4264	
	3	E/A	27.9	48.1	114	223	338	434	677	908	1089	1292	1771	2520	3454	5960	3
		R/F	122	175	312	488	645	762	1026	1249	1410	1581	1952	2470	3050	4392	
	4	E/A	28.7	49.6	118	229	348	447	697	936	1122	1331	1824	2595	3558	6139	4
		R/F	125	180	321	502	664	785	1057	1287	1452	1628	2010	2545	3142	4524	
	5	E/A	29.6	51.1	121	236	359	460	718	964	1155	1371	1879	2673	3664	6323	5
		R/F	129	186	331	517	684	809	1088	1325	1496	1677	2071	2621	3236	4660	
F1	0	E/A	30.5	52.6	125	243	369	474	739	992	1190	1412	1935	2753	3774	6513	0
		R/F	133	192	341	533	705	833	1121	1365	1541	1728	2133	2700	3333	4800	
	1	E/A	31.4	54.2	129	251	381	488	761	1022	1226	1454	1994	2836	3887	6708	1
		R/F	137	197	351	549	726	858	1155	1406	1587	1779	2197	2781	3433	4944	
	2	E/A	32.3	55.8	132	258	392	503	784	1053	1262	1498	2053	2921	4004	6909	2
		R/F	141	203	362	565	748	884	1189	1448	1635	1833	2263	2864	3536	5092	
	3	E/A	33.3	57.5	136	266	404	518	808	1084	1300	1543	2115	3009	4124	7117	3
		R/F	145	209	372	582	770	910	1225	1491	1684	1888	2331	2950	3642	5245	
	4	E/A	34.3	59.2	141	274	416	534	832	1117	1339	1589	2178	3099	4248	7330	4
		R/F	150	216	384	600	793	937	1262	1536	1734	1944	2401	3038	3751	5402	
	5	E/A	35.3	61.0	145	282	428	550	857	1150	1379	1637	2244	3192	4375	7550	5
		R/F	154	222	395	618	817	966	1299	1582	1786	2003	2473	3130	3864	5564	
F0	0	E/A	36.4	62.8	149	290	441	566	883	1185	1421	1686	2311	3288	4507	7777	0
		R/F	159	229	407	636	842	995	1338	1630	1840	2063	2547	3224	3980	5731	
	1	E/A	37.5	64.7	153	299	454	583	909	1221	1463	1736	2380	3386	4642	8010	1
		R/F	163	236	419	655	867	1024	1379	1679	1895	2125	2623	3320	4099	5903	
	2	E/A	38.6	66.6	158	308	468	600	936	1257	1507	1789	2452	3488	4781	8250	2
		R/F	168	243	432	675	893	1055	1420	1729	1952	2189	2702	3420	4222	6080	
	3	E/A	39.7	68.6	163	317	482	618	964	1295	1552	1842	2525	3593	4924	8498	3
		R/F	173	250	445	695	920	1087	1463	1781	2011	2254	2783	3523	4349	6263	
	4	E/A	40.9	70.7	168	327	496	637	993	1334	1599	1897	2601	3700	5072	8753	4
		R/F	179	258	458	716	947	1119	1507	1834	2071	2322	2867	3628	4479	6451	
	5	E/A	45.0	77.7	184	359	546	701	1093	1467	1759	2087	2861	4070	5579	9628	5
		R/F	197	283	504	788	1042	1231	1657	2018	2278	2554	3153	3991	4927	7096	
	E/R	0.23	0.27	0.37	0.46	0.52	0.57	0.66	0.73	0.77	0.82	0.91	1.02	1.13	1.36		
		500H	600H	800H	1000H	1150H	1250H	1450H	1600H	1700H	1800H	2000H	2250H	2500H	3000H		

Units: Energy Absorption E/R:kNm Reaction Force F/A: kN-m

\* Specification will be changed without prior notice.

\* Special Rubber Grade can be available due to design condition.

Standard PERFORMANCE TOLERANCE ±10%

**Small Reduction Force for Angular Compression Performance Adjustment Factor from 52.5% deflection Value**

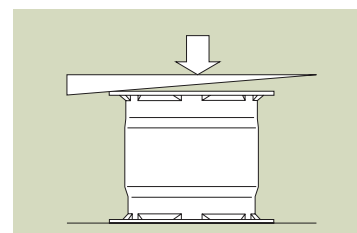
Angle(deg)	0	3	4	5	6	7	8	9	10	15	20
Compress until Design Fender Reaction Force Value											
E/A	1.000	0.977	0.966	0.950	0.965	0.920	0.910	0.898	0.883	0.801	0.652
R/F	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Compress until Maximum Fender Reaction Force Value											
E/A	1.059	1.036	1.024	1.009	0.997	0.982	0.968	0.955	0.940	0.861	0.722
R/F	1.063	1.063	1.063	1.063	1.063	1.063	1.063	1.063	1.063	1.063	1.063

**Performance of Intermediate deflection**

Deflection (%)	R/F	E/A
0	0%	0%
5	39%	2%
10	70%	8%
15	88%	17%
20	96%	28%
25	100%	39%
30	99%	50%
35	97%	62%
40	96%	72%
45	95%	83%
50	97%	94%
52.5	100%	100%
55	107%	106%

**Temperature Factor**

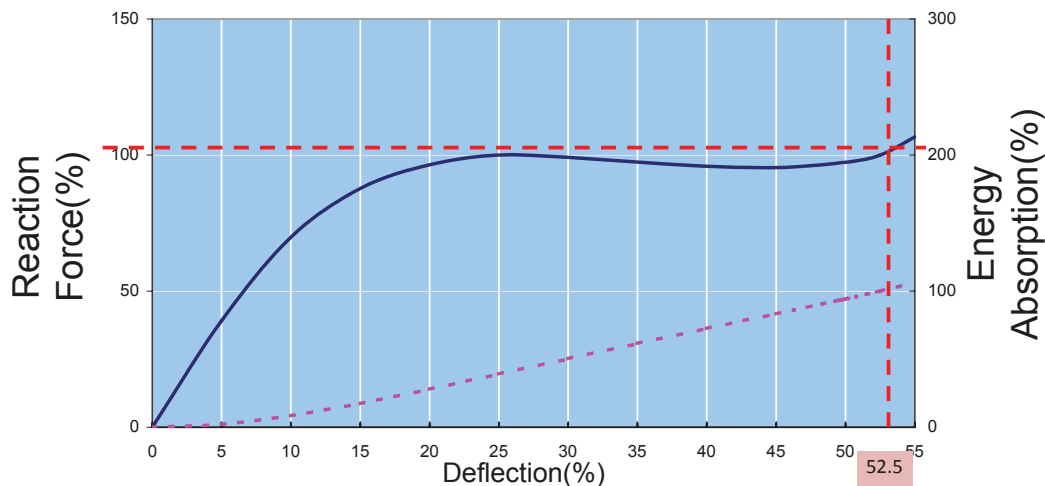
Temperature (°C)	TF
-20	1.375
-10	1.182
0	1.083
10	1.034
23	1
30	0.976
40	0.945
50	0.918
60	0.917



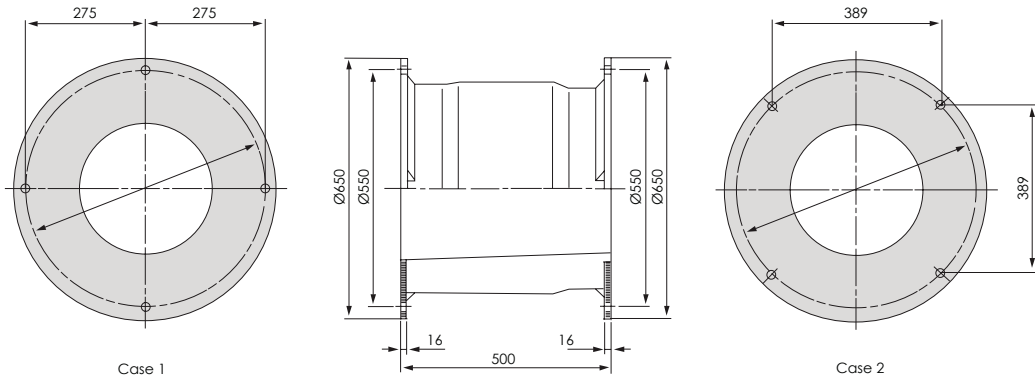
**Velocity Factor**

CSS	0.1m/sec VF		0.12m/sec VF		0.2m/sec VF		0.25m/sec VF		0.3m/sec VF		CSS
	R/F	E/A	R/F	E/A	R/F	E/A	R/F	E/A	R/F	E/A	
400	0.968	0.967	0.983	0.982	1.023	1.024	1.040	1.042	1.055	1.057	400
500	0.968	0.966	0.982	0.981	1.023	1.024	1.041	1.043	1.055	1.058	500
600	0.968	0.966	0.982	0.981	1.023	1.024	1.041	1.043	1.056	1.059	600
800	0.967	0.965	0.982	0.981	1.024	1.025	1.042	1.044	1.057	1.060	800
1000	0.967	0.965	0.982	0.981	1.024	1.025	1.043	1.045	1.058	1.061	1000
1150	0.967	0.965	0.982	0.981	1.024	1.025	1.043	1.045	1.058	1.061	1150
1250	0.967	0.965	0.982	0.980	1.024	1.025	1.043	1.045	1.058	1.062	1250
1450	0.967	0.964	0.981	0.980	1.024	1.026	1.043	1.046	1.059	1.062	1450
1600	0.966	0.964	0.981	0.980	1.024	1.026	1.043	1.046	1.059	1.062	1600
1700	0.966	0.964	0.981	0.980	1.024	1.026	1.043	1.046	1.059	1.063	1700
1800	0.966	0.964	0.981	0.980	1.024	1.026	1.044	1.046	1.059	1.063	1800
2000	0.966	0.964	0.981	0.980	1.024	1.026	1.044	1.047	1.060	1.063	2000
2250	0.966	0.963	0.981	0.980	1.025	1.026	1.044	1.047	1.060	1.064	2250
2500	0.966	0.963	0.981	0.980	1.025	1.026	1.044	1.047	1.060	1.064	2500
3000	0.966	0.963	0.981	0.980	1.025	1.027	1.044	1.048	1.060	1.065	3000

**PERFORMANCE CURVE**



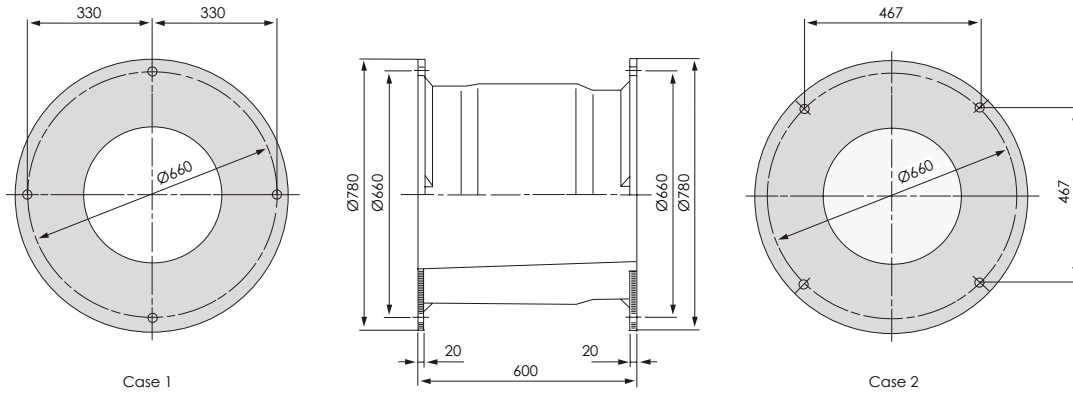
### CSS500H



Weight: 110kg

CSS500H		F4	F3	F2	F1	F0
0	E/A(kN-m)	17.9	21.4	25.5	30.5	36.4
	R/F(kN)	78.3	93.5	111	133	159
1	E/A(kN-m)	18.5	22.0	26.3	31.4	37.5
	R/F(kN)	80.6	96.3	115	137	163
2	E/A(kN-m)	19.0	22.7	27.1	32.3	38.6
	R/F(kN)	83.0	99.2	118	141	168
3	E/A(kN-m)	19.6	23.4	27.9	33.3	39.7
	R/F(kN)	85.5	102	122	145	173
4	E/A(kN-m)	20.2	24.1	28.7	34.3	40.9
	R/F(kN)	88.1	105	125	150	179
5	E/A(kN-m)	20.8	24.8	29.6	35.3	45.0
	R/F(kN)	90.7	108	129	154	197
Bolt Size: X4pcs		M20	M20	M20	M20	M22

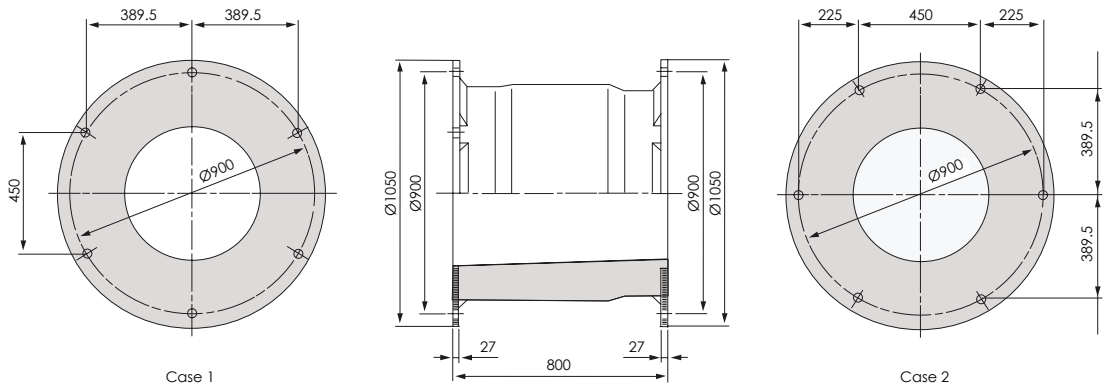
### CSS600H



Weight: 200kg

CSS600H		F4	F3	F2	F1	F0
0	E/A(kN-m)	30.9	36.9	44.0	52.6	62.8
	R/F(kN)	112	134	160	192	229
1	E/A(kN-m)	31.8	38.0	45.4	54.2	64.7
	R/F(kN)	116	138	165	197	236
2	E/A(kN-m)	32.8	39.1	46.7	55.8	66.6
	R/F(kN)	119	142	170	203	243
3	E/A(kN-m)	33.8	40.3	48.1	57.5	68.6
	R/F(kN)	123	147	175	209	250
4	E/A(kN-m)	34.8	41.5	49.6	59.2	70.7
	R/F(kN)	126	151	180	216	258
5	E/A(kN-m)	35.8	42.8	51.1	61.0	77.7
	R/F(kN)	130	156	186	222	283
Bolt Size: X4pcs		M22	M22	M22	M24	M24

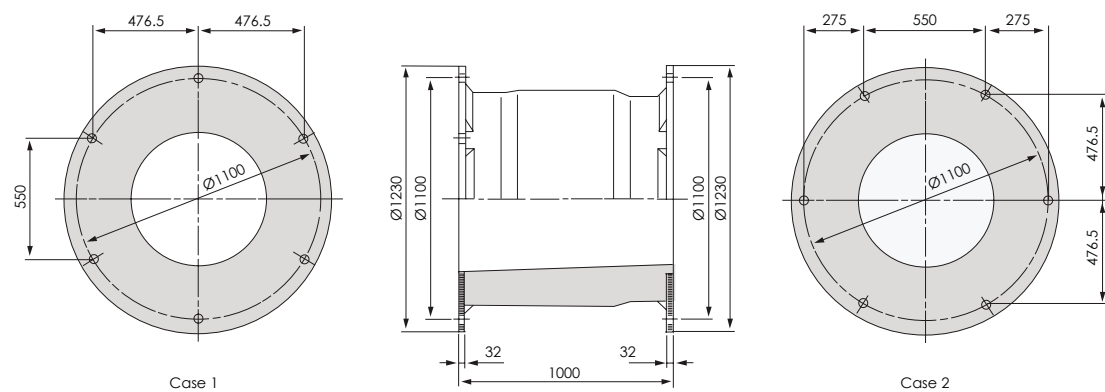
**CSS800H**



Weight: 435kg

CSS800H		F4	F3	F2	F1	F0
0	E/A(kN-m)	73.1	87.3	105	125	149
	R/F(kN)	200	239	285	341	407
1	E/A(kN-m)	75.3	89.9	108	129	153
	R/F(kN)	206	246	294	351	419
2	E/A(kN-m)	77.6	92.6	111	132	158
	R/F(kN)	212	253	303	362	432
3	E/A(kN-m)	79.9	95.4	114	136	163
	R/F(kN)	219	261	312	372	445
4	E/A(kN-m)	82.3	98.3	118	141	168
	R/F(kN)	225	269	321	384	458
5	E/A(kN-m)	84.8	102	121	145	184
	R/F(kN)	232	277	331	395	504
Bolt Size: X6pcs		M22	M22	M22	M24	M24

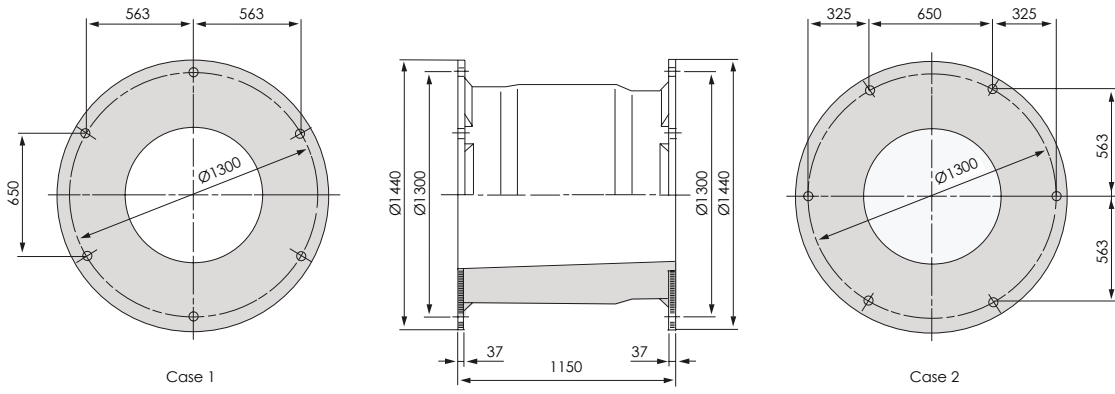
**CSS1000H**



Weight: 760kg

CSS1000H		F4	F3	F2	F1	F0
0	E/A(kN-m)	143	171	204	243	290
	R/F(kN)	313	374	446	533	636
1	E/A(kN-m)	147	176	210	251	299
	R/F(kN)	322	385	460	549	655
2	E/A(kN-m)	152	181	216	258	308
	R/F(kN)	332	396	473	565	675
3	E/A(kN-m)	156	187	223	266	317
	R/F(kN)	342	408	488	582	695
4	E/A(kN-m)	161	192	229	274	327
	R/F(kN)	352	421	502	600	716
5	E/A(kN-m)	166	198	236	282	359
	R/F(kN)	363	433	517	618	788
Bolt Size: X6pcs		M30	M30	M30	M30	M36

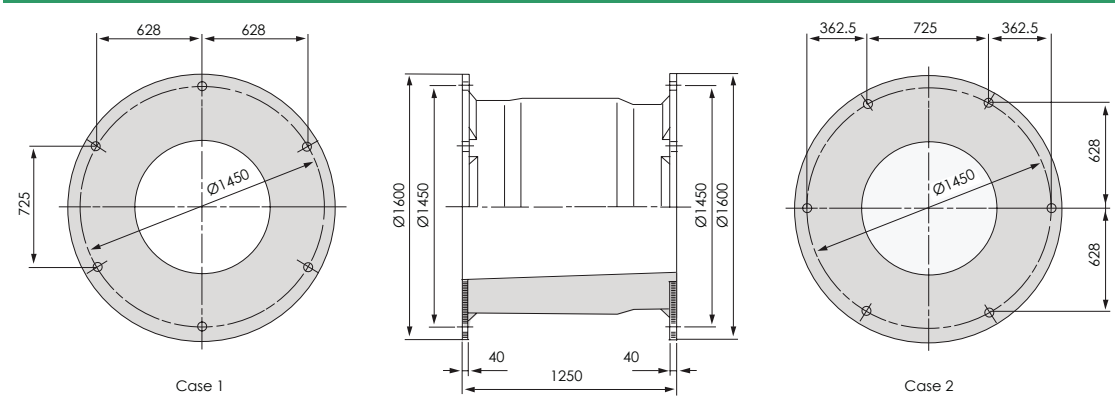
**CSS1150H**



Weight: 1205kg

CSS1150H		F4	F3	F2	F1	F0
0	E/A(kN-m)	217	259	309	369	441
	R/F(kN)	414	494	590	705	842
1	E/A(kN-m)	224	267	319	381	454
	R/F(kN)	426	509	608	726	867
2	E/A(kN-m)	230	275	328	392	468
	R/F(kN)	439	524	626	748	893
3	E/A(kN-m)	237	283	338	404	482
	R/F(kN)	452	540	645	770	920
4	E/A(kN-m)	244	292	348	416	496
	R/F(kN)	466	556	664	793	947
5	E/A(kN-m)	252	300	359	428	546
	R/F(kN)	480	573	684	817	1042
Bolt Size: X6pcs		M30	M30	M36	M36	M36

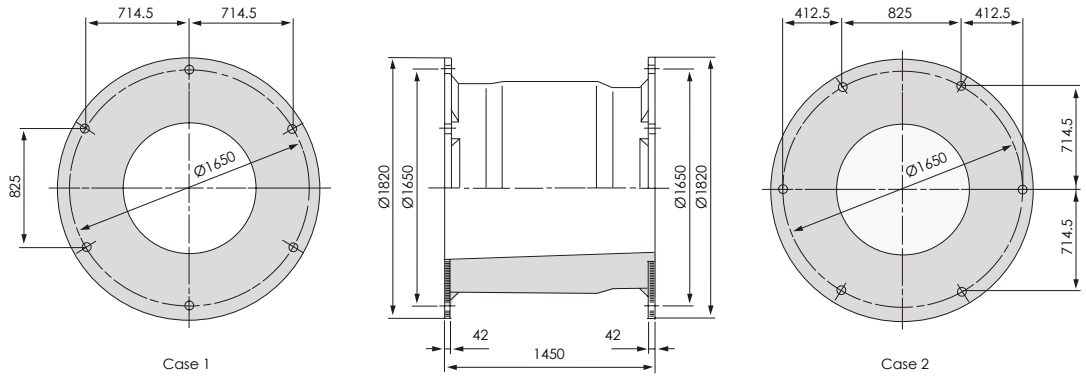
**CSS1250H**



Weight: 1550kg

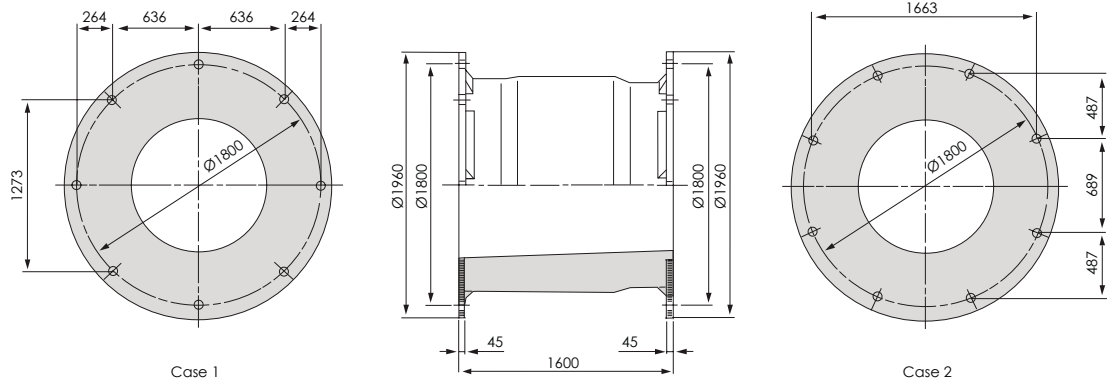
CSS1250H		F4	F3	F2	F1	F0
0	E/A(kN-m)	279	333	397	474	566
	R/F(kN)	489	584	697	833	995
1	E/A(kN-m)	287	343	409	488	583
	R/F(kN)	504	602	718	858	1024
2	E/A(kN-m)	296	353	421	503	600
	R/F(kN)	519	620	740	884	1055
3	E/A(kN-m)	304	363	434	518	618
	R/F(kN)	534	638	762	910	1087
4	E/A(kN-m)	314	374	447	534	637
	R/F(kN)	550	657	785	937	1119
5	E/A(kN-m)	323	386	460	550	701
	R/F(kN)	567	677	809	966	1231
Bolt Size: X6pcs		M30	M36	M36	M36	M36



**CSS1450H**


Weight: 2350kg

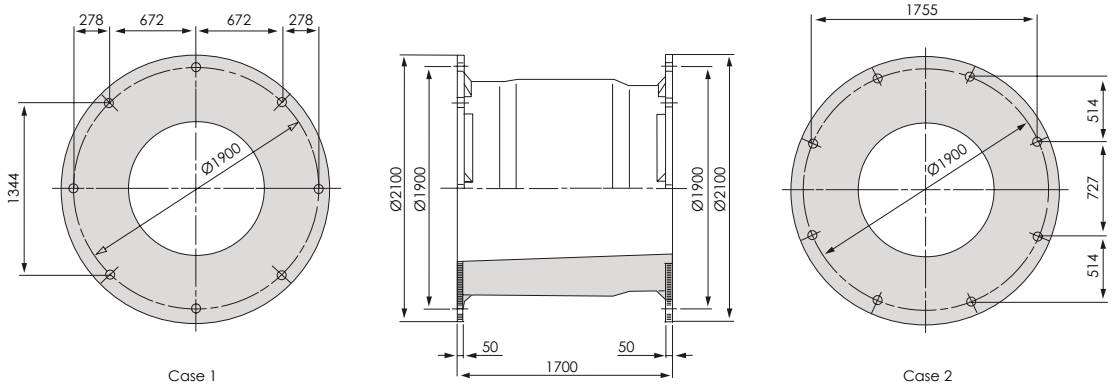
CSS1450H		F4	F3	F2	F1	F0
0	E/A(kN-m)	434	519	619	739	883
	R/F(kN)	658	786	939	1121	1338
1	E/A(kN-m)	447	534	638	761	909
	R/F(kN)	678	810	967	1155	1379
2	E/A(kN-m)	461	550	657	784	936
	R/F(kN)	698	834	996	1189	1420
3	E/A(kN-m)	475	567	677	808	964
	R/F(kN)	719	859	1026	1225	1463
4	E/A(kN-m)	489	584	697	832	993
	R/F(kN)	741	885	1057	1262	1507
5	E/A(kN-m)	504	601	718	857	1093
	R/F(kN)	763	911	1088	1299	1657
Bolt Size: X6pcs		M36	M36	M42	M42	M42

**CSS1600H**


Weight: 2940kg

CSS1600H		F4	F3	F2	F1	F0
0	E/A(kN-m)	583	696	831	992	1185
	R/F(kN)	802	957	1143	1365	1630
1	E/A(kN-m)	601	717	856	1022	1221
	R/F(kN)	826	986	1177	1406	1679
2	E/A(kN-m)	619	739	882	1053	1257
	R/F(kN)	850	1015	1213	1448	1729
3	E/A(kN-m)	637	761	908	1084	1295
	R/F(kN)	876	1046	1249	1491	1781
4	E/A(kN-m)	656	784	936	1117	1334
	R/F(kN)	902	1077	1287	1536	1834
5	E/A(kN-m)	676	807	964	1150	1467
	R/F(kN)	929	1110	1325	1582	2018
Bolt Size: X8pcs		M36	M36	M36	M42	M42

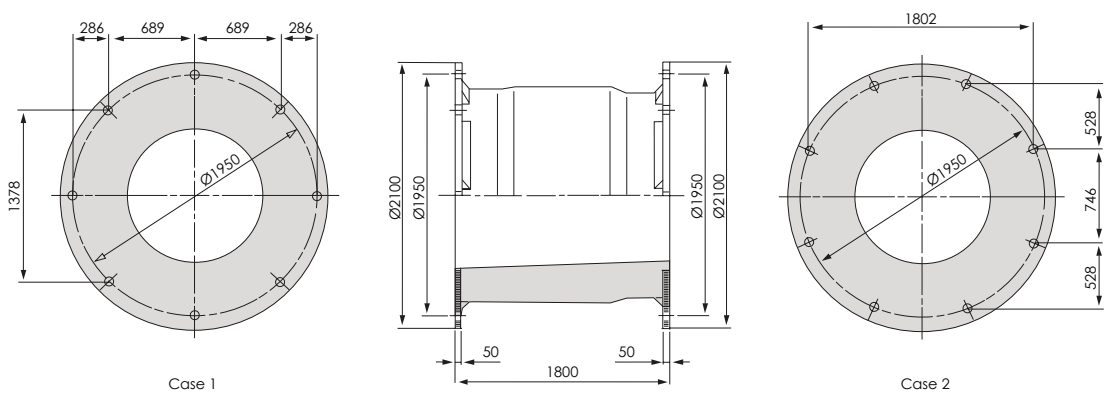
**CSS1700H**



Weight: 3730kg

CSS1700H		F4	F3	F2	F1	F0
0	E/A(kN-m)	699	835	997	1190	1421
	R/F(kN)	905	1081	1290	1541	1840
1	E/A(kN-m)	720	860	1027	1226	1463
	R/F(kN)	932	1113	1329	1587	1895
2	E/A(kN-m)	742	886	1057	1262	1507
	R/F(kN)	960	1146	1369	1635	1952
3	E/A(kN-m)	764	912	1089	1300	1552
	R/F(kN)	989	1181	1410	1684	2011
4	E/A(kN-m)	787	939	1122	1339	1599
	R/F(kN)	1019	1216	1452	1734	2071
5	E/A(kN-m)	810	968	1155	1379	1759
	R/F(kN)	1049	1253	1496	1786	2278
Bolt Size: X8pcs		M36	M36	M42	M42	M42

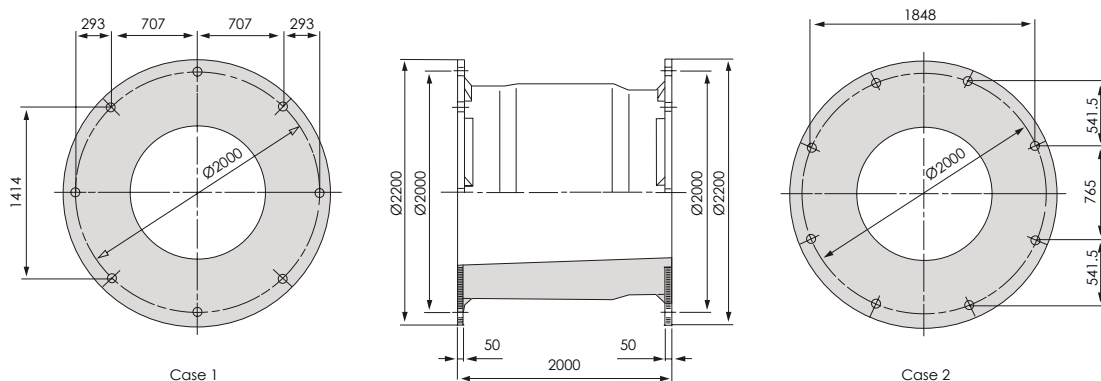
**CSS1800H**



Weight: 4550kg

CSS1800H		F4	F3	F2	F1	F0
0	E/A(kN-m)	830	990	1183	1412	1686
	R/F(kN)	1015	1212	1447	1728	2063
1	E/A(kN-m)	854	1020	1218	1454	1736
	R/F(kN)	1045	1248	1490	1779	2125
2	E/A(kN-m)	880	1051	1255	1498	1789
	R/F(kN)	1076	1285	1535	1833	2189
3	E/A(kN-m)	906	1082	1292	1543	1842
	R/F(kN)	1109	1324	1581	1888	2254
4	E/A(kN-m)	934	1115	1331	1589	1897
	R/F(kN)	1142	1364	1628	1944	2322
5	E/A(kN-m)	962	1148	1371	1637	2087
	R/F(kN)	1176	1405	1677	2003	2554
Bolt Size: X8pcs		M42	M42	M42	M48	M48

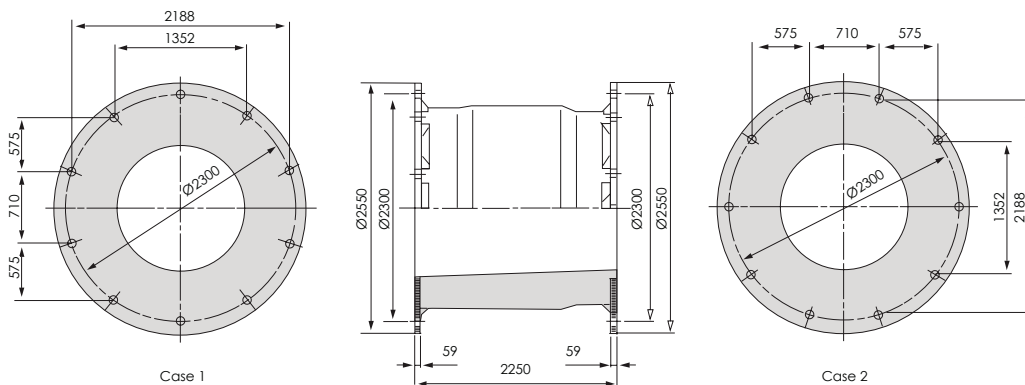
**CSS2000H**



Weight: 5260kg

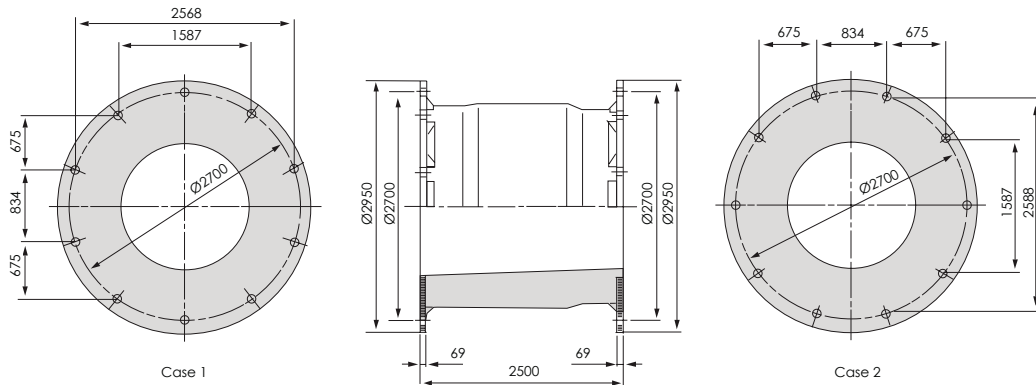
CSS2000H		F4	F3	F2	F1	F0
0	E/A(kN-m)	1137	1358	1621	1935	2311
	R/F(kN)	1253	1496	1786	2133	2547
1	E/A(kN-m)	1171	1398	1670	1994	2380
	R/F(kN)	1290	1541	1840	2197	2623
2	E/A(kN-m)	1206	1440	1720	2053	2452
	R/F(kN)	1329	1587	1895	2263	2702
3	E/A(kN-m)	1242	1483	1771	2115	2525
	R/F(kN)	1369	1635	1952	2331	2783
4	E/A(kN-m)	1280	1528	1824	2178	2601
	R/F(kN)	1410	1684	2010	2401	2867
5	E/A(kN-m)	1318	1574	1879	2244	2861
	R/F(kN)	1452	1734	2071	2473	3153
Bolt Size: X8pcs		M48	M48	M48	M56	M56

**CSS2250H**



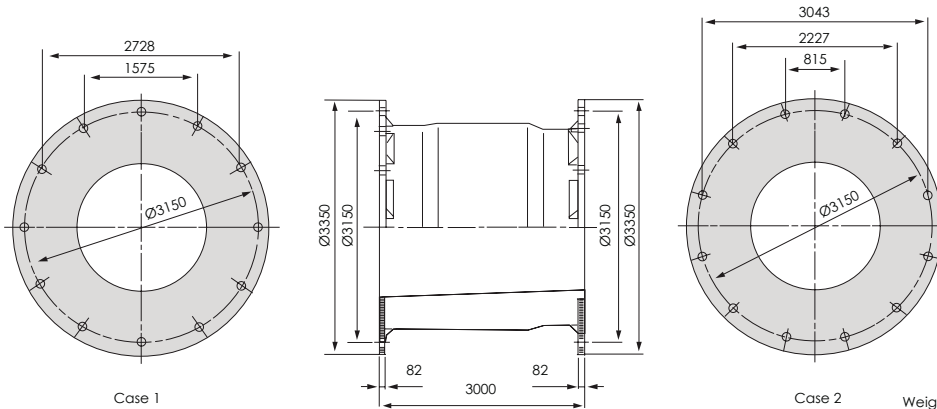
Weight: 7450kg

CSS2250H		F4	F3	F2	F1	F0
0	E/A(kN-m)	1618	1931	2306	2753	3288
	R/F(kN)	1586	1893	2261	2700	3224
1	E/A(kN-m)	1666	1989	2375	2836	3386
	R/F(kN)	1633	1950	2329	2781	3320
2	E/A(kN-m)	1716	2049	2446	2921	3488
	R/F(kN)	1682	2009	2399	2864	3420
3	E/A(kN-m)	1768	2110	2520	3009	3593
	R/F(kN)	1733	2069	2470	2950	3523
4	E/A(kN-m)	1821	2174	2595	3099	3700
	R/F(kN)	1785	2131	2545	3038	3628
5	E/A(kN-m)	1875	2239	2673	3192	4070
	R/F(kN)	1838	2195	2621	3130	3991
Bolt Size: X10pcs		M48	M48	M48	M56	M56

**CSS2500H**


Weight: 10750kg

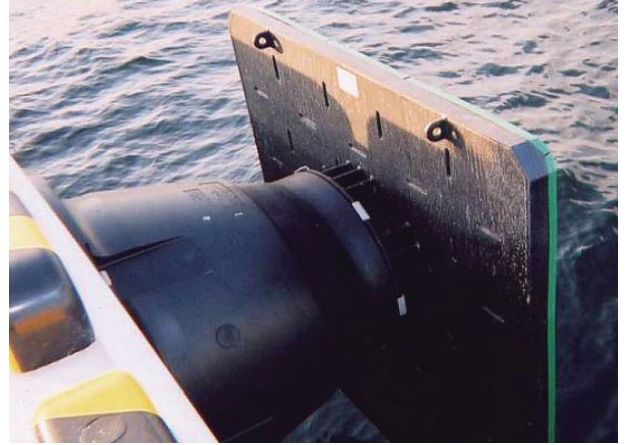
CSS2500H		F4	F3	F2	F1	F0
0	E/A(kN-m)	2217	2647	3161	3774	4507
	R/F(kN)	1958	2338	2791	3333	3980
1	E/A(kN-m)	2284	2727	3256	3887	4642
	R/F(kN)	2016	2408	2875	3433	4099
2	E/A(kN-m)	2352	2808	3353	4004	4781
	R/F(kN)	2077	2480	2961	3536	4222
3	E/A(kN-m)	2423	2893	3454	4124	4924
	R/F(kN)	2139	2554	3050	3642	4349
4	E/A(kN-m)	2495	2980	3558	4248	5072
	R/F(kN)	2203	2631	3142	3751	4479
5	E/A(kN-m)	2570	3069	3664	4375	5579
	R/F(kN)	2269	2710	3236	3864	4927
Bolt Size: X10pcs		M56	M56	M56	M56	M64

**CSS3000H**


Weight: 18600kg

CSS3000H		F4	F3	F2	F1	F0
0	E/A(kN-m)	3826	4568	5454	6513	7777
	R/F(kN)	2819	3366	4020	4800	5731
1	E/A(kN-m)	3941	4705	5618	6708	8010
	R/F(kN)	2904	3467	4140	4944	5903
2	E/A(kN-m)	4059	4846	5787	6909	8250
	R/F(kN)	2991	3571	4264	5092	6080
3	E/A(kN-m)	4181	4992	5960	7117	8498
	R/F(kN)	3081	3678	4392	5245	6263
4	E/A(kN-m)	4306	5141	6139	7330	8753
	R/F(kN)	3173	3789	4524	5402	6451
5	E/A(kN-m)	4435	5296	6323	7550	9628
	R/F(kN)	3268	3902	4660	5564	7096
Bolt Size: X12pcs		M56	M56	M56	M64	M64

## SUPER CIRCLE FENDER



## SUPER CIRCLE FENDER

### SPC FENDER

Fender Performance At 70% Design Deflection (Rated Performance Data)

				SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC			
				300H	350H	400H	500H	600H	700H	800H	900H	1000H	1150H	1200H	1300H	1400H	1600H			1800H
F4	0	E/A	10.6	16.6	24.6	47.0	80.0	126	185	262	356	533	605	760	949	1400	1974	2683	0	F4
		R/F	63.0	84.7	109	168	238	320	414	519	636	831	902	1051	1212	1565	1962	2401		
	1	E/A	11.1	17.5	25.8	49.4	84.0	132	195	275	374	560	636	798	996	1470	2072	2817	1	
		R/F	66.1	89.0	115	176	250	336	435	545	667	873	947	1104	1272	1644	2060	2521		
	2	E/A	11.6	18.1	26.8	51	87.2	137	202	285	388	581	660	829	1034	1526	2151	2925	2	
		R/F	68.6	92.3	119	183	260	349	451	566	693	906	983	1146	1321	1706	2138	2617		
	3	E/A	11.9	18.7	27.6	52.8	89.9	141	208	294	399	598	680	854	1065	1572	2216	3012	3	
		R/F	70.7	95.1	123	188	267	360	465	583	714	933	1012	1180	1360	1757	2202	2695		
	4	E/A	12.1	19.0	28.2	53.9	91.6	144	212	299	407	610	693	871	1086	1603	2260	3073	4	
		R/F	72.1	97.0	125	192	273	367	474	595	728	952	1033	1204	1388	1793	2246	2749		
F3	0	E/A	12.5	19.6	29.0	55.5	94.4	149	219	308	420	629	714	897	1119	1651	2328	3165	0	
		R/F	74.3	99.9	129	198	281	378	488	612	750	980	1064	1240	1429	1846	2314	2832		
	1	E/A	12.8	20.0	29.6	56.6	96.3	151	223	315	428	641	728	915	1141	1684	2374	3228	1	
		R/F	75.8	101	131	202	287	386	498	625	765	1000	1085	1265	1458	1883	2360	2888		
	2	E/A	13.1	20.6	30.5	58.3	99	156	230	324	441	660	750	942	1175	1735	2446	3325	2	
		R/F	78.0	105	135	208	295	397	513	643	788	1030	1117	1303	1502	1940	2431	2975		
	3	E/A	13.4	21.0	31.1	59.4	102	159	234	330	450	673	765	961	1199	1770	2495	3392	3	
		R/F	80	107	138	212	301	405	523	656	803	1050	1140	1329	1532	1979	2480	3034		
	4	E/A	13.7	21.4	31.7	60.6	104	162	239	337	459	687	780	980	1223	1805	2544	3459	4	
		R/F	81.2	109	141	216	307	413	534	669	819	1071	1163	1355	1562	2018	2529	3095		
F2	0	E/A	14.1	22.1	32.6	62.4	107	167	246	347	472	708	804	1010	1260	1859	2621	3563	0	
		R/F	83.6	112	145	223	316	426	550	690	844	1104	1197	1396	1609	2079	2605	3188		
	1	E/A	14.4	22.5	33.3	63.7	109	170	251	354	482	722	820	1030	1285	1896	2673	3634	1	
		R/F	85	114	148	227	323	434	561	703	861	1126	1221	1424	1641	2120	2657	3252		
	2	E/A	14.6	22.9	34.0	65.0	111	174	256	361	491	736	836	1050	1310	1934	2727	3707	2	
		R/F	87.0	117	151	232	329	443	572	717	878	1148	1246	1453	1674	2163	2710	3317		
	3	E/A	15.1	23.6	35.0	66.9	114	179	264	372	506	758	861	1082	1350	1992	2808	3818	3	
		R/F	89.6	120	155	239	339	456	589	739	905	1183	1283	1496	1725	2228	2792	3416		
	4	E/A	15.4	24.1	35.7	68.2	117	183	269	379	516	773	878	1104	1377	2032	2865	3895	4	
		R/F	91.4	123	159	244	346	465	601	754	923	1206	1309	1526	1759	2272	2848	3485		
F1	0	E/A	15.8	24.8	36.7	70.3	120	188	277	391	532	797	905	1137	1418	2093	2950	4011	0	
		R/F	94.2	126	163	251	356	479	619	776	950	1243	1348	1572	1812	2340	2933	3589		
	1	E/A	16.3	25.6	37.8	72.4	124	194	285	402	548	820	932	1171	1461	2156	3039	4132	1	
		R/F	97.0	130	168	259	367	494	638	800	979	1280	1389	1619	1866	2411	3021	3697		
	2	E/A	16.6	26.1	38.6	73.8	126	198	291	411	559	837	950	1194	1490	2199	3100	4214	2	
		R/F	98.9	133	172	264	374	503	651	816	998	1305	1416	1651	1904	2459	3081	3771		
	3	E/A	17.0	26.6	39.4	75.3	129	202	297	419	570	854	969	1218	1520	2243	3162	4299	3	
		R/F	100	135	175	269	382	514	664	832	1018	1332	1445	1684	1942	2508	3143	3846		
	4	E/A	17.5	27.4	40.5	77.6	132	208	306	431	587	879	999	1255	1565	2310	3257	4428	4	
		R/F	103	139	180	277	393	529	684	857	1049	1372	1488	1735	2000	2583	3237	3962		
F0	0	E/A	17.8	27.9	41.4	79.1	135	212	312	440	599	897	1018	1280	1596	2356	3322	4516	0	
		R/F	106	142	184	283	401	540	697	874	1070	1399	1518	1770	2040	2635	3302	4041		
	1	E/A	18.2	28.5	42.2	80.7	138	216	318	449	611	915	1039	1305	1628	2403	3388	4606	1	
		R/F	108	145	188	288	409	550	711	892	1091	1427	1548	1805	2081	2688	3368	4122		
	2	E/A	18.7	29.4	43.4	83.1	142	222	328	462	629	942	1070	1344	1677	2475	3490	4745	2	
		R/F	111	149	193	297	422	567	733	918	1124	1470	1595	1859	2143	2768	3469	4245		
	3	E/A	20.2	31.7	46.9	89.8	153	240	354	499	679	1017	1155	1452	1811	2673	3769	5124	3	
		R/F	120	161	209	321	455	612	791	992	1214	1587	1722	2008	2315	2990	3747	4585		
	4	E/A	20.6	32.3	47.8	91.4	156	245	360	508	692	1036	1177	1479	1845	2723	3839	5219	4	
		R/F	122	164	213	327	464	624	806	1010	1237	1617	1754	2045	2358	3045	3816	4670		
		300H	350H	400H	500H	600H	700H	800H	900H	1000H	1150H	1200H	1300H	1400H	1600H	1800H	2000H			

Units: Energy Absorption E/A:kN-m Reaction Force R/F: kN

Standard PERFORMANCE TOLERANCE ±10%

\* Specification will be changed without prior notice.

\* Special Rubber Grade can be available due to design condition.

**Performance of Intermediate deflection**

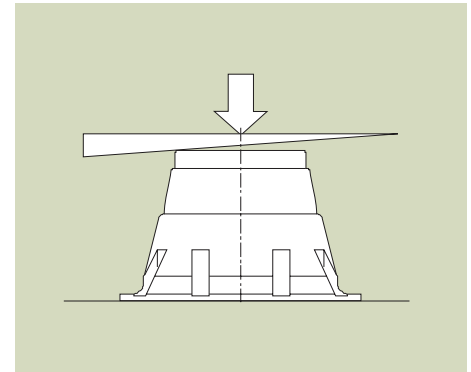
Deflection (%)	R/F	E/A
0	0%	0%
5	27%	1%
10	48%	5%
15	65%	10%
20	79%	17%
25	90%	25%
30	97%	34%
35	100%	44%
40	99%	53%
45	93%	62%
50	84%	71%
55	73%	78%
60	68%	85%
65	76%	92%
70	100%	100%
72	132%	104%
73	148%	107%
74	165%	110%

**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


**Velocity Factor**

SPC	0.1m/sec VF		0.12m/sec		0.2m/sec VF		0.25m/sec VF		0.3m/sec VF		SPC
	R/F	E/A	R/F	E/A	R/F	E/A	R/F	E/A	R/F	E/A	
300	0.969	0.968	0.983	0.982	1.022	1.023	1.039	1.041	1.053	1.056	300
350	0.969	0.967	0.983	0.982	1.022	1.023	1.040	1.042	1.054	1.056	350
400	0.968	0.967	0.983	0.982	1.023	1.024	1.040	1.042	1.055	1.057	400
500	0.968	0.966	0.982	0.981	1.023	1.024	1.041	1.043	1.055	1.058	500
600	0.968	0.966	0.982	0.981	1.023	1.024	1.041	1.042	1.056	1.059	600
700	0.967	0.966	0.982	0.981	1.023	1.025	1.042	1.044	1.057	1.059	700
800	0.967	0.965	0.982	0.981	1.024	1.025	1.042	1.044	1.057	1.060	800
900	0.967	0.965	0.982	0.981	1.024	1.025	1.042	1.044	1.058	1.060	900
1000	0.967	0.965	0.982	0.981	1.024	1.025	1.043	1.045	1.058	1.061	1000
1150	0.967	0.965	0.982	0.981	1.024	1.025	1.043	1.045	1.058	1.061	1150
1200	0.967	0.965	0.982	0.980	1.024	1.025	1.043	1.045	1.058	1.061	1200
1300	0.967	0.964	0.982	0.980	1.024	1.025	1.043	1.045	1.059	1.062	1300
1400	0.967	0.964	0.981	0.980	1.024	1.026	1.043	1.046	1.059	1.062	1400
1600	0.966	0.964	0.981	0.980	1.024	1.026	1.043	1.046	1.059	1.062	1600
1800	0.966	0.964	0.981	0.980	1.024	1.026	1.044	1.046	1.059	1.063	1800
2000	0.966	0.964	0.981	0.980	1.024	1.026	1.044	1.047	1.060	1.063	2000

## SUPER CIRCLE FENDER

0%



35%

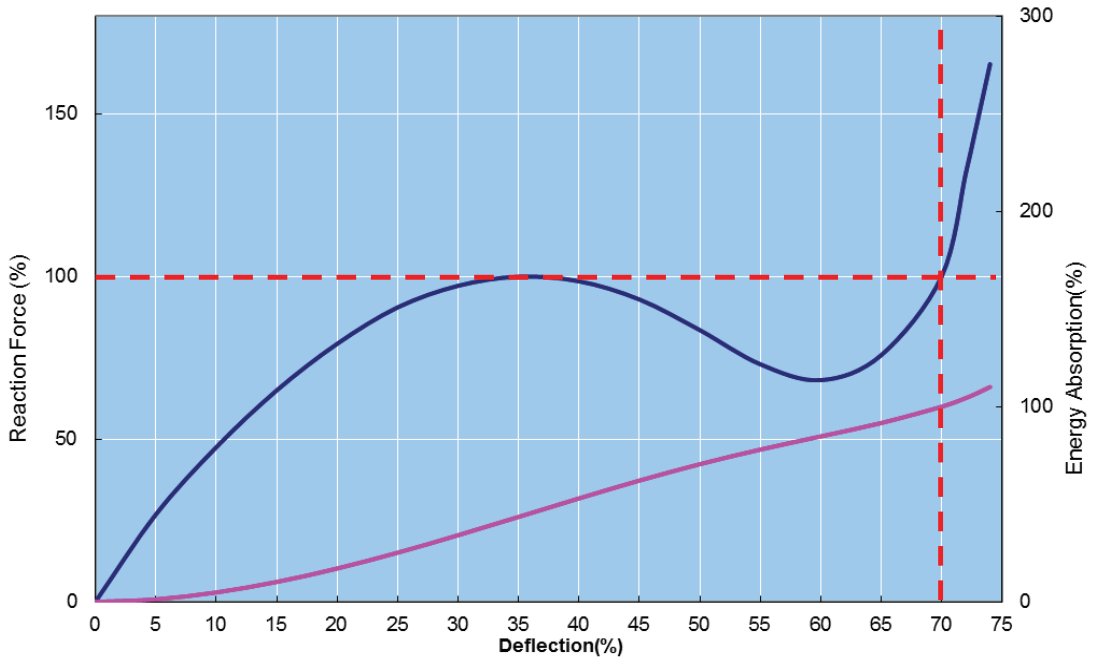


70%

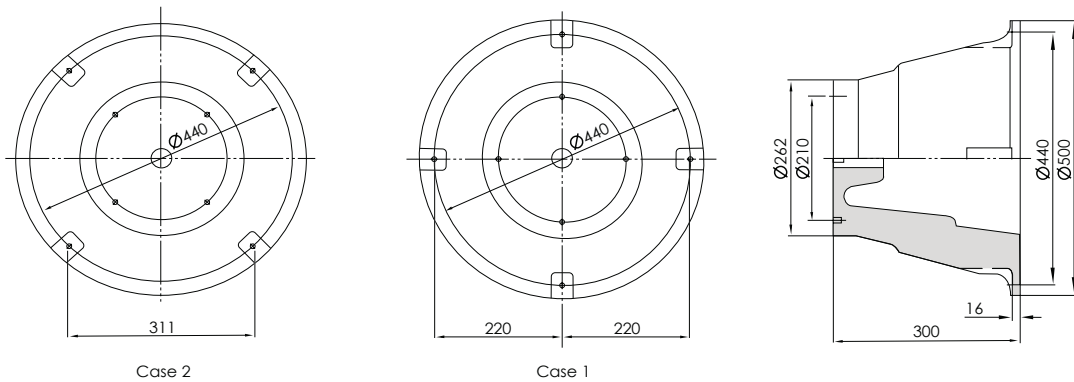




### PERFORMANCE CURVE

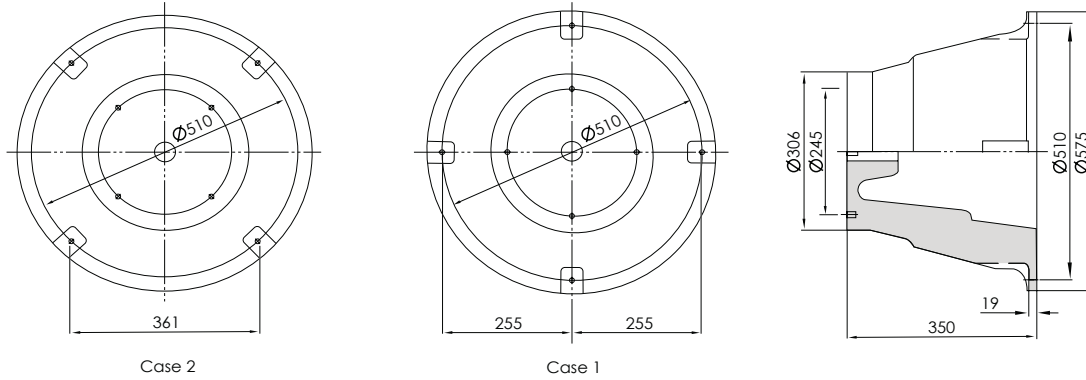


### SPC300H



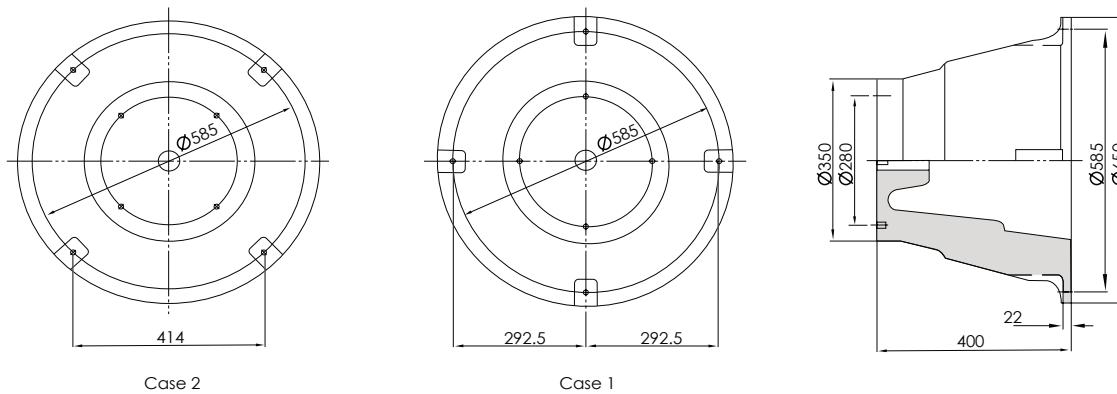
Weight: 35kg

		F4	F3	F2	F1	F0
0	E/A(kN-m)	10.6	12.5	14.1	15.8	17.8
	R/F(kN)	63.0	74.3	83.6	94.2	106
1	E/A(kN-m)	11.1	12.8	14.4	16.3	18.2
	R/F(kN)	66.1	75.8	85	97.0	108
2	E/A(kN-m)	11.6	13.1	14.6	16.6	18.7
	R/F(kN)	68.6	78.0	87.0	98.9	111
3	E/A(kN-m)	11.9	13.4	15.1	17.0	20.2
	R/F(kN)	70.7	80	89.6	100	120
4	E/A(kN-m)	12.1	13.7	15.4	17.5	20.6
	R/F(kN)	72.1	81.2	91.4	103	122
Bolt Size: x 4pcs		M16	M16	M16	M20	M20

**SPC350H**


Weight: 52kg

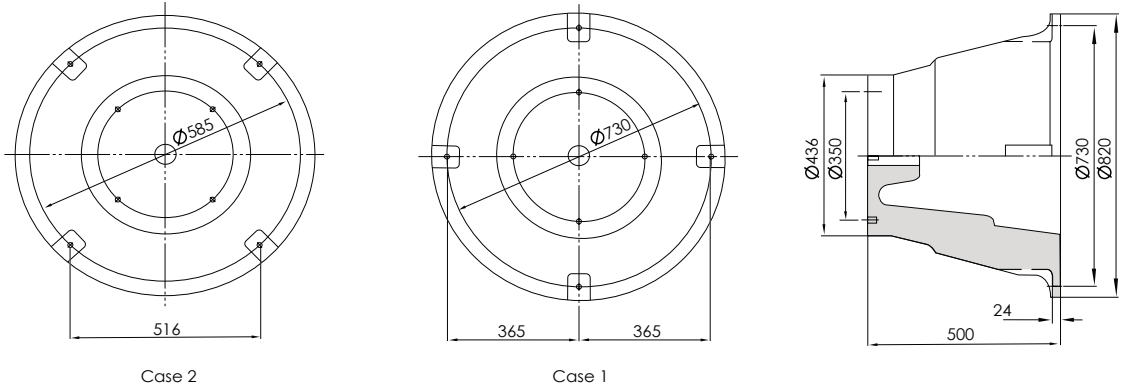
350H		F4	F3	F2	F1	F0
0	E/A(kN-m)	16.6	19.6	22.1	24.8	27.9
	R/F(kN)	84.7	99.9	112	126	142
1	E/A(kN-m)	17.5	20.0	22.5	25.6	28.5
	R/F(kN)	89.0	101	114	130	145
2	E/A(kN-m)	18.1	20.6	22.9	26.1	29.4
	R/F(kN)	92.3	105	117	133	149
3	E/A(kN-m)	18.7	21.0	23.6	26.6	31.7
	R/F(kN)	95.1	107	120	135	161
4	E/A(kN-m)	19.0	21.4	24.1	27.4	32.3
	R/F(kN)	97.0	109	123	139	164
Bolt Size: x 4pcs		M16	M16	M20	M20	M20

**SPC400H**


Weight: 75kg

400H		F4	F3	F2	F1	F0
0	E/A(kN-m)	24.6	29.0	32.6	36.7	41.4
	R/F(kN)	109	129	145	163	184
1	E/A(kN-m)	25.8	29.6	33.3	37.8	42.2
	R/F(kN)	115	131	148	168	188
2	E/A(kN-m)	26.8	30.5	34.0	38.6	43.4
	R/F(kN)	119	135	151	172	193
3	E/A(kN-m)	27.6	31.1	35.0	39.4	46.9
	R/F(kN)	123	138	155	175	209
4	E/A(kN-m)	28.2	31.7	35.7	40.5	47.8
	R/F(kN)	125	141	159	180	213
Bolt Size: x 4pcs		M16	M20	M20	M20	M20

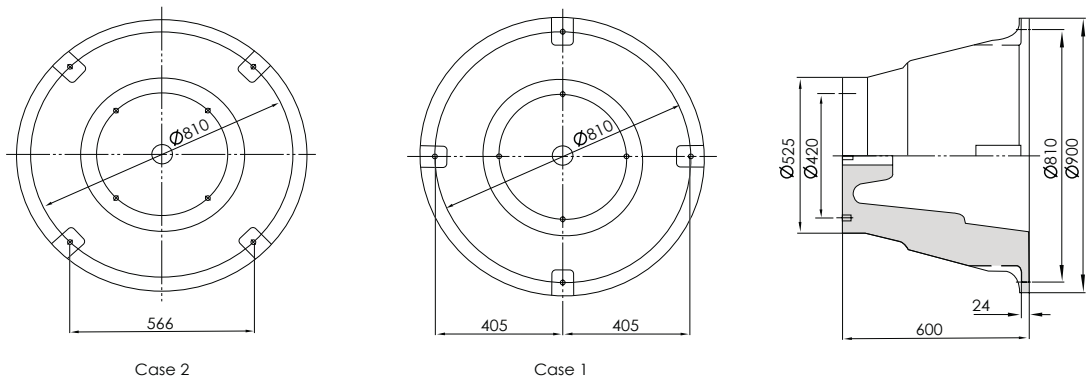
**SPC500H**



Weight: 150kg

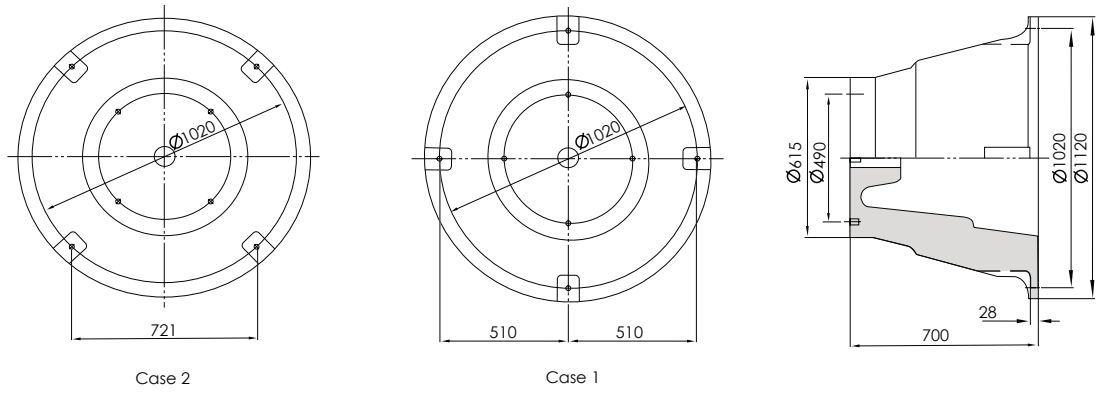
500H		F4	F3	F2	F1	F0
0	E/A(kN-m)	47.0	55.5	62.4	70.3	79.1
	R/F(kN)	168	198	223	251	283
1	E/A(kN-m)	49.4	56.6	63.7	72.4	80.7
	R/F(kN)	176	202	227	259	288
2	E/A(kN-m)	51	58.3	65.0	73.8	83.1
	R/F(kN)	183	208	232	264	297
3	E/A(kN-m)	52.8	59.4	66.9	75.3	89.8
	R/F(kN)	188	212	239	269	321
4	E/A(kN-m)	53.9	60.6	68.2	77.6	91.4
	R/F(kN)	192	216	244	277	327
Bolt Size: x 4pcs		M20	M24	M24	M24	M24

**SPC600H**



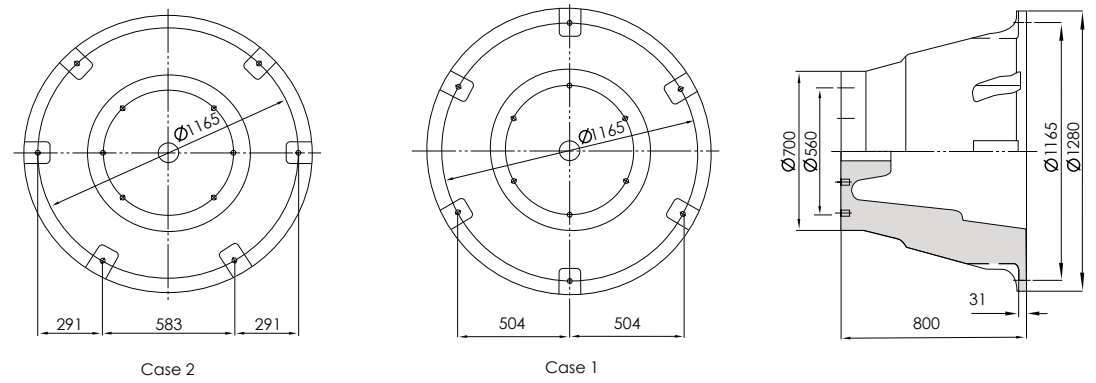
Weight: 275kg

600H		F4	F3	F2	F1	F0
0	E/A(kN-m)	80.0	94.4	107	120	135
	R/F(kN)	238	281	316	356	401
1	E/A(kN-m)	84.0	96.3	109	124	138
	R/F(kN)	250	287	323	367	409
2	E/A(kN-m)	87.2	99	111	126	142
	R/F(kN)	260	295	329	374	422
3	E/A(kN-m)	89.9	102	114	129	153
	R/F(kN)	267	301	339	382	455
4	E/A(kN-m)	91.6	104	117	132	156
	R/F(kN)	273	307	346	393	464
Bolt Size: x 4pcs		M24	M24	M24	M24	M24

**SPC700H**


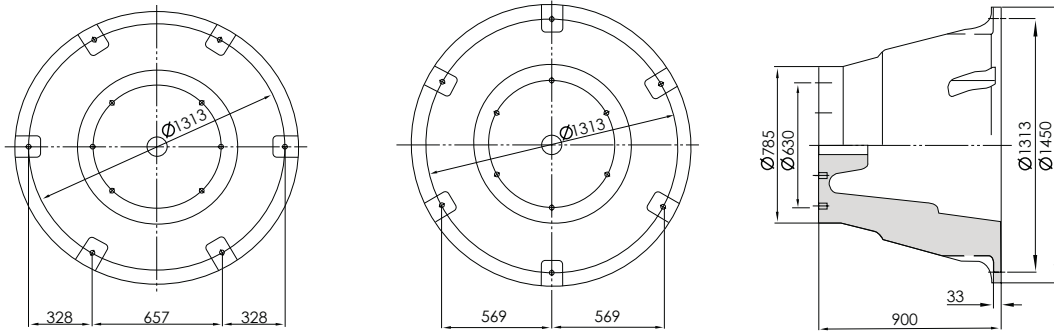
Weight: 405kg

700H		F4	F3	F2	F1	F0
0	E/A(kN-m)	126	149	167	188	212
	R/F(kN)	320	378	426	479	540
1	E/A(kN-m)	132	151	170	194	216
	R/F(kN)	336	386	434	494	550
2	E/A(kN-m)	137	156	174	198	222
	R/F(kN)	349	397	443	503	567
3	E/A(kN-m)	141	159	179	202	240
	R/F(kN)	360	405	456	514	612
4	E/A(kN-m)	144	162	183	208	245
	R/F(kN)	367	413	465	529	624
Bolt Size: x 4pcs		M27	M27	M27	M30	M30

**SPC800H**


Weight: 590kg

800H		F4	F3	F2	F1	F0
0	E/A(kN-m)	185	219	246	277	312
	R/F(kN)	414	488	550	619	697
1	E/A(kN-m)	195	223	251	285	318
	R/F(kN)	435	498	561	638	711
2	E/A(kN-m)	202	230	256	291	328
	R/F(kN)	451	513	572	651	733
3	E/A(kN-m)	208	234	264	297	354
	R/F(kN)	465	523	589	664	791
4	E/A(kN-m)	212	239	269	306	360
	R/F(kN)	474	534	601	684	806
Bolt Size: x 6pcs		M27	M27	M27	M30	M30

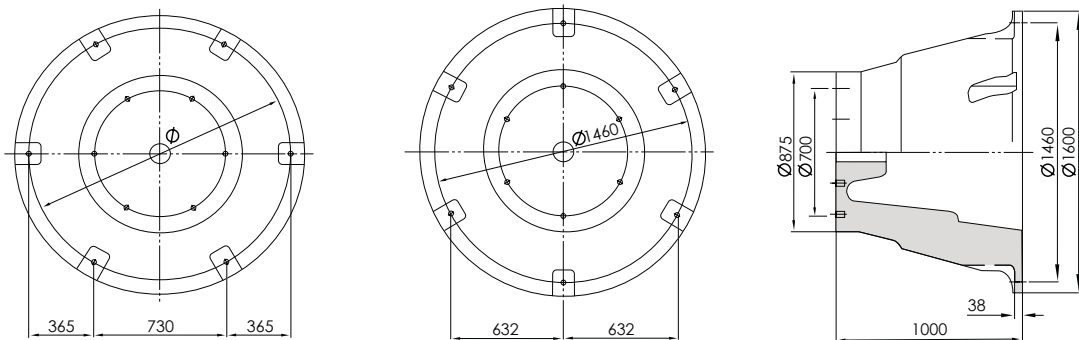
**SPC900H**


Case 2

Case 1

Weight: 855kg

900H		F4	F3	F2	F1	F0
0	E/A(kN-m)	262	308	347	391	440
	R/F(kN)	519	612	690	776	874
1	E/A(kN-m)	275	315	354	402	449
	R/F(kN)	545	625	703	800	892
2	E/A(kN-m)	285	324	361	411	462
	R/F(kN)	566	643	717	816	918
3	E/A(kN-m)	294	330	372	419	499
	R/F(kN)	583	656	739	832	992
4	E/A(kN-m)	299	337	379	431	508
	R/F(kN)	595	669	754	857	1010
Bolt Size: x 6pcs		M30	M30	M30	M36	M36

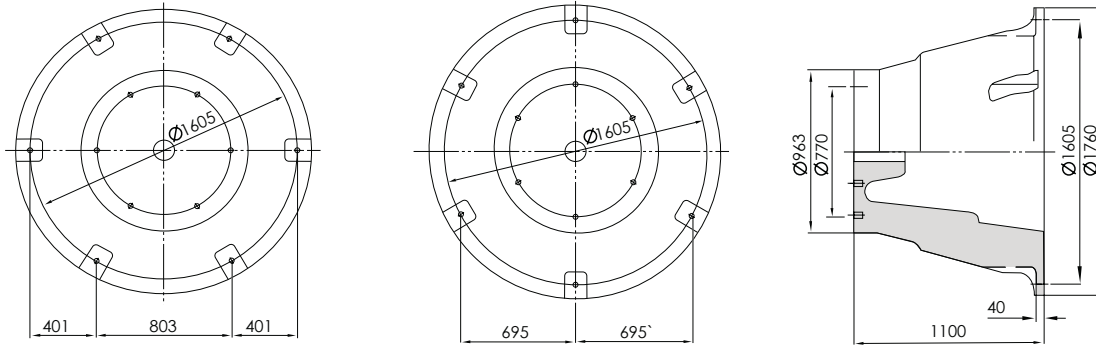
**SPC1000H**


Case 2

Case 1

Weight: 1130kg

1000H		F4	F3	F2	F1	F0
0	E/A(kN-m)	356	420	472	532	599
	R/F(kN)	636	750	844	950	1070
1	E/A(kN-m)	374	428	482	548	611
	R/F(kN)	667	765	861	979	1091
2	E/A(kN-m)	388	441	491	559	629
	R/F(kN)	693	788	878	998	1124
3	E/A(kN-m)	399	450	506	570	679
	R/F(kN)	714	803	905	1018	1214
4	E/A(kN-m)	407	459	516	587	692
	R/F(kN)	728	819	923	1049	1237
Bolt Size: x 6pcs		M36	M36	M36	M42	M42

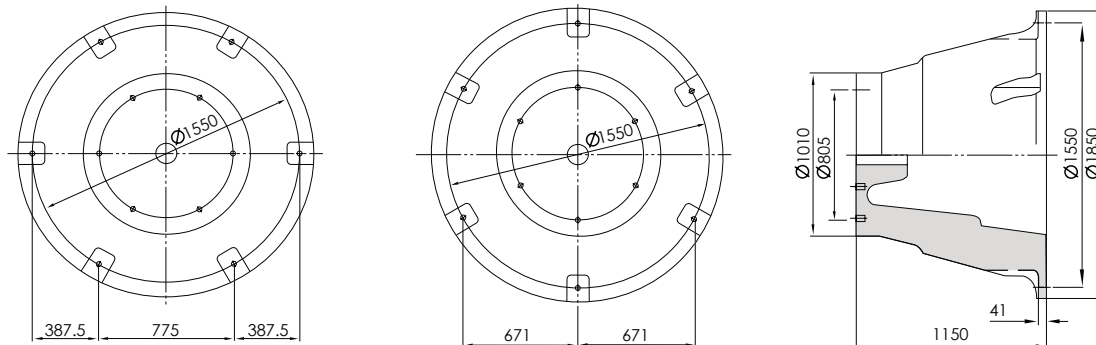
**SPC1100H**


Case 2

Case 1

Weight: 1520kg

1100H		F4	F3	F2	F1	F0
0	E/A(kN-m)	470	554	624	702	790
	R/F(kN)	763	900	1013	1141	1285
1	E/A(kN-m)	493	565	636	723	806
	R/F(kN)	801	918	1034	1175	1310
2	E/A(kN-m)	512	582	649	737	830
	R/F(kN)	832	946	1054	1199	1350
3	E/A(kN-m)	527	594	668	752	897
	R/F(kN)	857	965	1086	1223	1458
4	E/A(kN-m)	538	605	682	775	913
	R/F(kN)	874	984	1108	1259	1485
Bolt Size: x 6pc		M36	M36	M36	M42	M42

**SPC1150H**


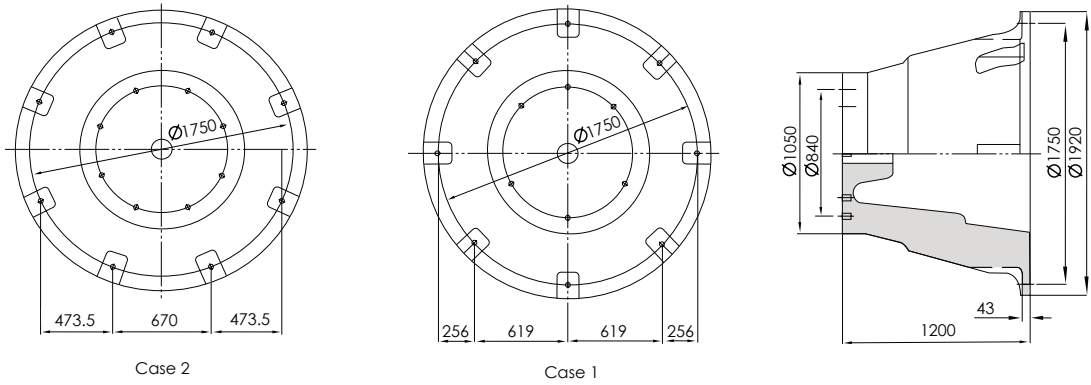
Case 2

Case 1

Weight: 1720kg

1150H		F4	F3	F2	F1	F0
0	E/A(kN-m)	533	629	708	797	897
	R/F(kN)	831	980	1104	1243	1399
1	E/A(kN-m)	560	641	722	820	915
	R/F(kN)	873	1000	1126	1280	1427
2	E/A(kN-m)	581	660	736	837	942
	R/F(kN)	906	1030	1148	1305	1470
3	E/A(kN-m)	598	673	758	854	1017
	R/F(kN)	933	1050	1183	1332	1587
4	E/A(kN-m)	610	687	773	879	1036
	R/F(kN)	952	1071	1206	1372	1617
Bolt Size: x 6p		M36	M36	M42	M42	M42

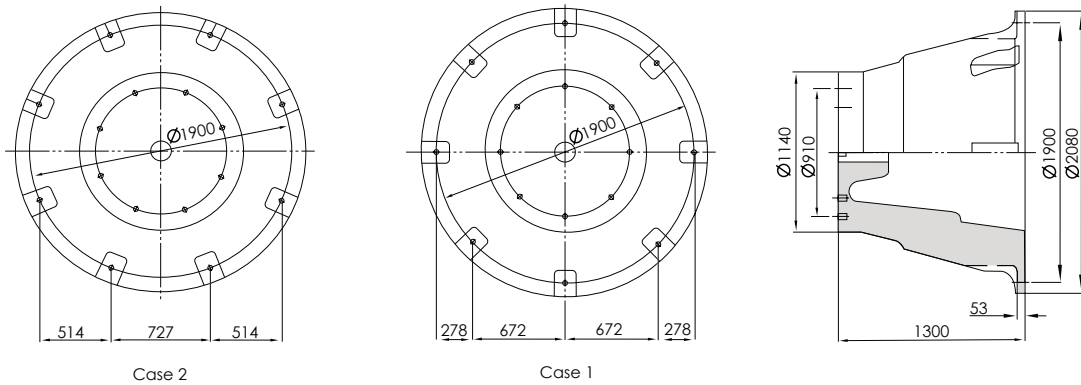
**SPC1200H**



Weight: 1980kg

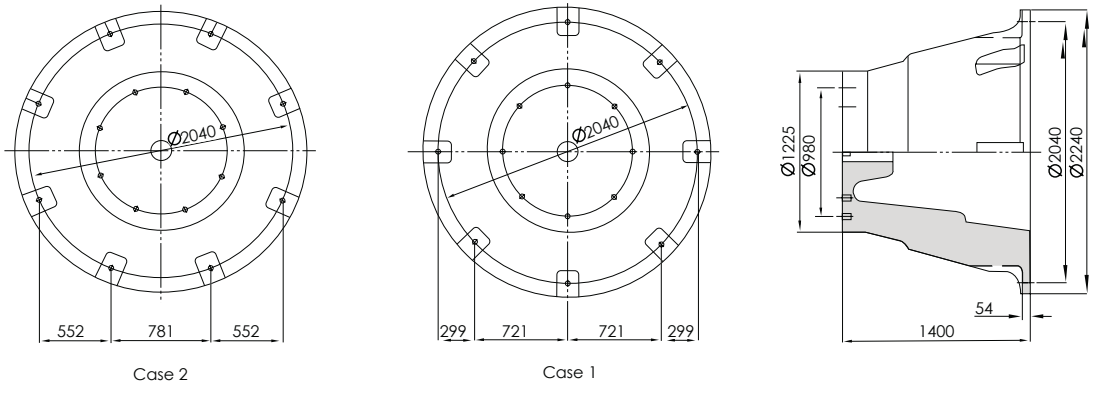
1200H		F4	F3	F2	F1	F0
0	E/A(kN-m)	605	714	804	905	1018
	R/F(kN)	902	1064	1197	1348	1518
1	E/A(kN-m)	636	728	820	932	1039
	R/F(kN)	947	1085	1221	1389	1548
2	E/A(kN-m)	660	750	836	950	1070
	R/F(kN)	983	1117	1246	1416	1595
3	E/A(kN-m)	680	765	861	969	1155
	R/F(kN)	1012	1140	1283	1445	1722
4	E/A(kN-m)	693	780	878	999	1177
	R/F(kN)	1033	1163	1309	1488	1754
Bolt Size: x 8pcs		M36	M36	M36	M36	M42

**SPC1300H**



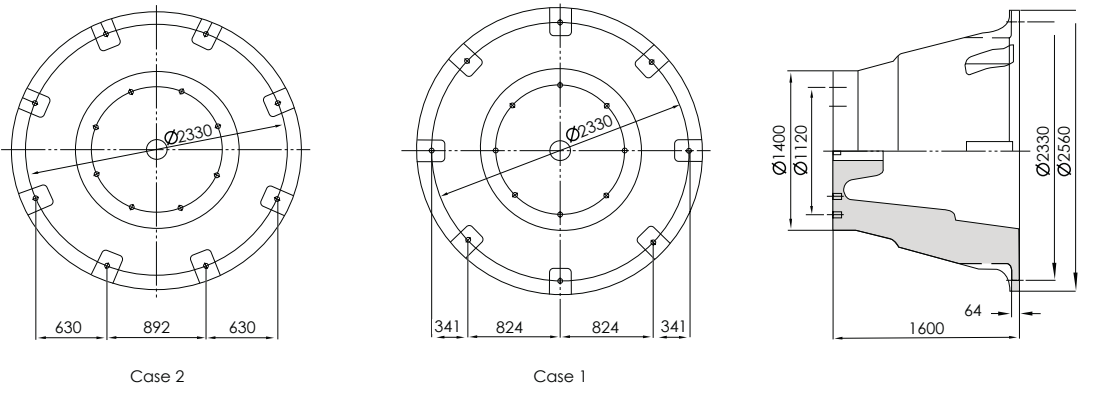
Weight: 2500kg

1300H		F4	F3	F2	F1	F0
0	E/A(kN-m)	760	897	1010	1137	1280
	R/F(kN)	1051	1240	1396	1572	1770
1	E/A(kN-m)	798	915	1030	1171	1305
	R/F(kN)	1104	1265	1424	1619	1805
2	E/A(kN-m)	829	942	1050	1194	1344
	R/F(kN)	1146	1303	1453	1651	1859
3	E/A(kN-m)	854	961	1082	1218	1452
	R/F(kN)	1180	1329	1496	1684	2008
4	E/A(kN-m)	871	980	1104	1255	1479
	R/F(kN)	1204	1355	1526	1735	2045
Bolt Size: x 8pcs		M36	M36	M36	M42	M42

**SPC1400H**


Weight: 3130kg

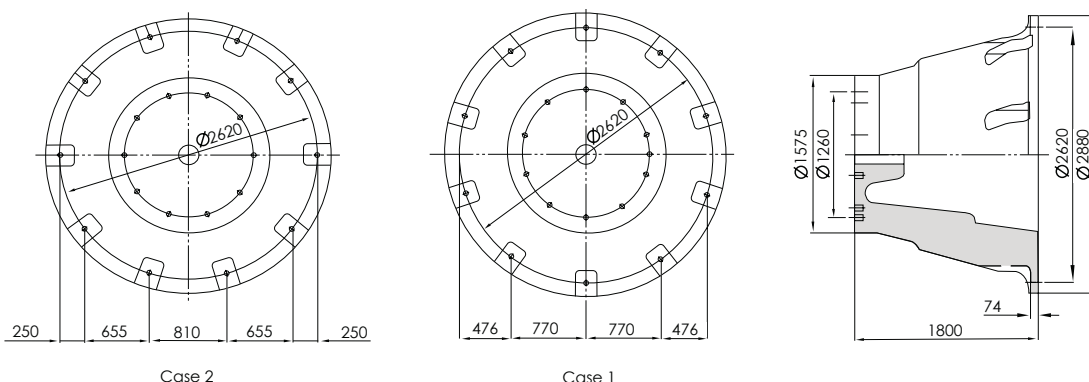
1400H		F4	F3	F2	F1	F0
0	E/A(kN-m)	949	1119	1260	1418	1596
	R/F(kN)	1212	1429	1609	1812	2040
1	E/A(kN-m)	996	1141	1285	1461	1628
	R/F(kN)	1272	1458	1641	1866	2081
2	E/A(kN-m)	1034	1175	1310	1490	1677
	R/F(kN)	1321	1502	1674	1904	2143
3	E/A(kN-m)	1065	1199	1350	1520	1811
	R/F(kN)	1360	1532	1725	1942	2315
4	E/A(kN-m)	1086	1223	1377	1565	1845
	R/F(kN)	1388	1562	1759	2000	2358
Bolt Size: x 8pcs		M36	M36	M42	M42	M42

**SPC1600H**


Weight: 4670kg

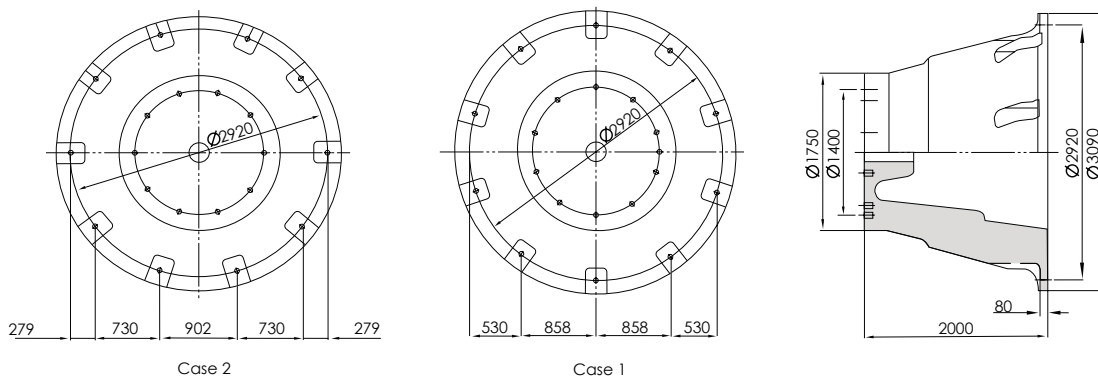
1600H		F4	F3	F2	F1	F0
0	E/A(kN-m)	1400	1651	1859	2093	2356
	R/F(kN)	1565	1846	2079	2340	2635
1	E/A(kN-m)	1470	1684	1896	2156	2403
	R/F(kN)	1644	1883	2120	2411	2688
2	E/A(kN-m)	1526	1735	1934	2199	2475
	R/F(kN)	1706	1940	2163	2459	2768
3	E/A(kN-m)	1572	1770	1992	2243	2673
	R/F(kN)	1757	1979	2228	2508	2990
4	E/A(kN-m)	1603	1805	2032	2310	2723
	R/F(kN)	1793	2018	2272	2583	3045
Bolt Size: x 8pcs		M42	M42	M42	M48	M48



**SPC1800H**


Weight: 6650kg

1800H		F4	F3	F2	F1	F0
0	E/A(kN-m)	1974	2328	2621	2950	3322
	R/F(kN)	1962	2314	2605	2933	3302
1	E/A(kN-m)	2072	2374	2673	3039	3388
	R/F(kN)	2060	2360	2657	3021	3368
2	E/A(kN-m)	2151	2446	2727	3100	3490
	R/F(kN)	2138	2431	2710	3081	3469
3	E/A(kN-m)	2216	2495	2808	3162	3769
	R/F(kN)	2202	2480	2792	3143	3747
4	E/A(kN-m)	2260	2544	2865	3257	3839
	R/F(kN)	2246	2529	2848	3237	3816
Bolt Size: x 10pcs		M48	M48	M48	M48	M56

**SPC2000H**


Weight: 9560kg

2000H		F4	F3	F2	F1	F0
0	E/A(kN-m)	2683	3165	3563	4011	4516
	R/F(kN)	2401	2832	3188	3589	4041
1	E/A(kN-m)	2817	3228	3634	4132	4606
	R/F(kN)	2521	2888	3252	3697	4122
2	E/A(kN-m)	2925	3325	3707	4214	4745
	R/F(kN)	2617	2975	3317	3771	4245
3	E/A(kN-m)	3012	3392	3818	4299	5124
	R/F(kN)	2695	3034	3416	3846	4585
4	E/A(kN-m)	3073	3459	3895	4428	5219
	R/F(kN)	2749	3095	3485	3962	4670
Bolt Size: x 10pcs		M48	M48	M48	M56	M56

## V-SHAPED FENDER

### SV-type fender

A conventional cylindrical type fender absorbed energy through compressive deformation, while this SV-type fender materialized a revolutionary improved energy absorption efficiency by adding the compressive deformation to buckling deformation.

Once again, the introduction of a stationary system with anchor bolts improved the durability remarkably.

This fender is used most widely in the world harbors as “multi purpose type” fender.

### Features

- 1) Excellent energy absorption efficiency
- 2) Excellent durability and stability



**SV FENDER PERFORMANCE**
**Fender Performance At 45% Design Deflection (Rated Performance Data)**

Size	V1		V2		V3		V4		LENGTH Up to mm	Size
	Reaction Force (tonf)	Energy Absorption (tonf-m)	Reaction Force (tonf)	Energy Absorption (tonf-m)	Reaction Force (tonf)	Energy Absorption (tonf-m)	Reaction Force (tonf)	Energy Absorption (tonf-m)		
150	12.8	0.641	11.3	0.563	8.44	0.422	5.63	0.281	3500	150
200	17.1	1.14	15.0	1.00	11.3	0.750	7.50	0.500	3500	200
250	21.4	1.78	18.8	1.56	14.1	1.17	9.38	0.781	3500	250
300	25.7	2.57	22.5	2.25	16.9	1.69	11.3	1.13	3500	300
400	34.2	4.56	30.0	4.00	22.5	3.00	15.0	2.00	3500	400
500	42.8	7.13	37.5	6.25	28.1	4.69	18.8	3.13	3000	500
600	51.3	10.3	45.0	9.00	33.8	6.75	22.5	4.50	3000	600
800	68.4	18.2	60.0	16.0	45.0	12.0	30.0	8.00	3000	800
1000	85.5	28.5	75.0	25.0	56.3	18.8	37.5	12.5	3000	1000

Size	V1		V2		V3		V4		LENGTH Up to mm	Size
	Reaction Force (kN)	Energy Absorption (kN-m)	Reaction Force (kN)	Energy Absorption (kN-m)	Reaction Force (kN)	Energy Absorption (kN-m)	Reaction Force (kN)	Energy Absorption (kN-m)		
150	126.0	6.29	111	5.52	82.8	4.14	55.2	2.76	3500	150
200	168	11.2	147	9.81	111	7.35	73.5	4.90	3500	200
250	210	17.5	184	15.3	138	11.5	92.0	7.66	3500	250
300	252	25.2	221	22.1	166	16.6	111	11.1	3500	300
400	335	44.7	294	39.2	221	29.4	147	19.6	3500	400
500	420	69.9	368	61.3	276	46.0	184	30.7	3000	500
600	503	101	441	88.3	331	66.2	221	44.1	3000	600
800	671	178	588	157	441	118	294	78.5	3000	800
1000	838	279	735	245	552	184	368	123	3000	1000

Performance Per Meter Length with 45% Deflection

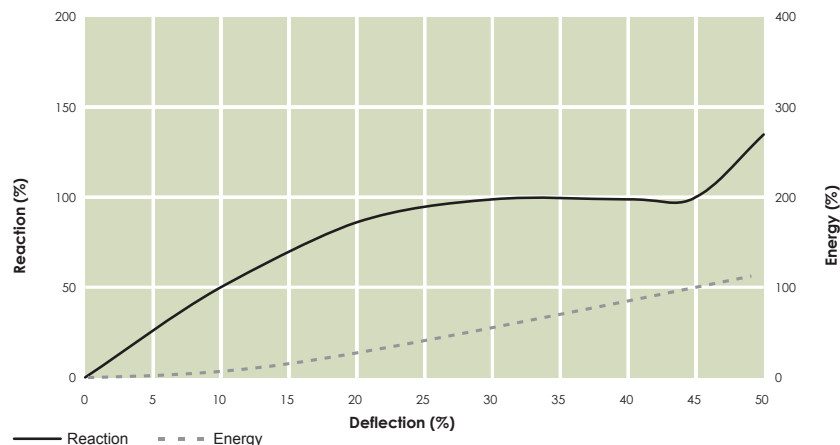
 \*PERFORMANCE TOLERANCE  $\pm 10\%$ 

 \* **Specification will be changed without prior notice.**

\* Special Rubber Grade can be available due to design condition.

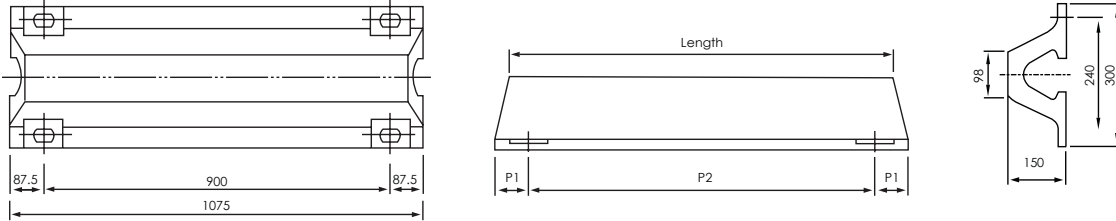
## Intermediate deflection

Def(%)	R/F	E/A
0%	0%	0%
10%	50%	7%
20%	86%	28%
30%	99%	56%
40%	99%	85%
45%	100%	100%
50%	135%	118%

**PERFORMANCE CURVE**


## V-SHAPED FENDER

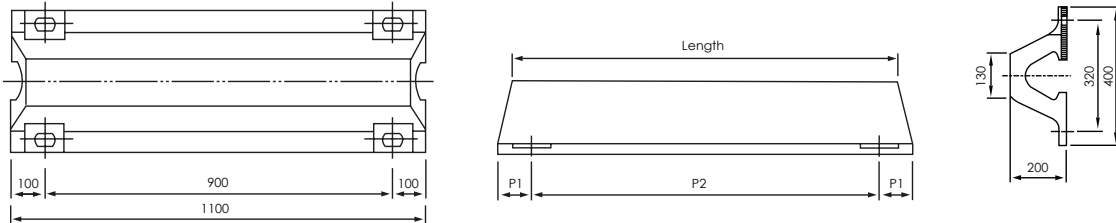
### SV150H



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	87.5mm	900mm	34kg	4	M20 ~ M24
1500L	87.5mm	700mm	50kg	6	
2000L	92.5mm	630mm	66kg	8	
2500L	87.5mm	800mm	82kg	8	
3000L	87.5mm	725mm	98kg	10	
3500L	87.5mm	680mm	114kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
126	6.29	111	5.52	82.8	4.14	55.2	2.76

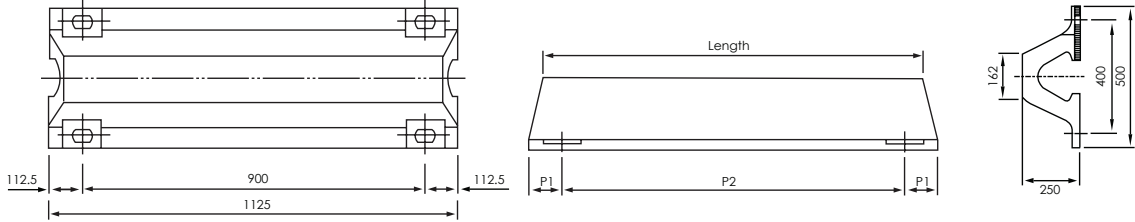
### SV200H



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	100mm	900mm	60kg	4	M20 ~ M24
1500L	100mm	700mm	89kg	6	
2000L	105mm	630mm	117kg	8	
2500L	100mm	800mm	146kg	8	
3000L	100mm	725mm	175kg	10	
3500L	100mm	680mm	203kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
168	11.2	147	9.81	111	7.35	73.5	4.90

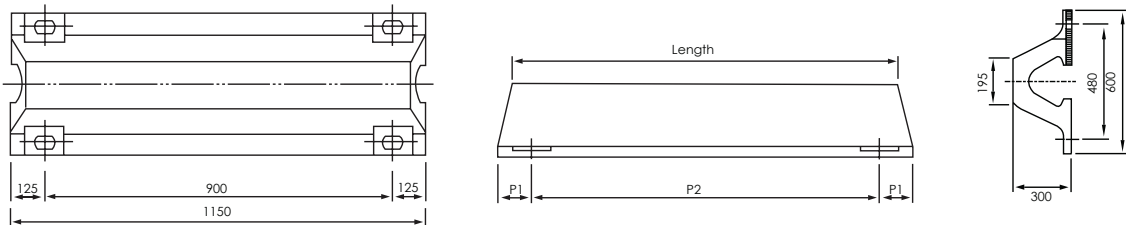
**SV250H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	112.5mm	900mm	87kg	4	M20 ~ M24
1500L	112.5mm	700mm	128kg	6	
2000L	117.5mm	630mm	169kg	8	
2500L	112.5mm	800mm	210kg	8	
3000L	112.5mm	725mm	250kg	10	
3500L	112.5mm	680mm	291kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
210	17.5	184	15.3	138	11.5	92.0	7.66

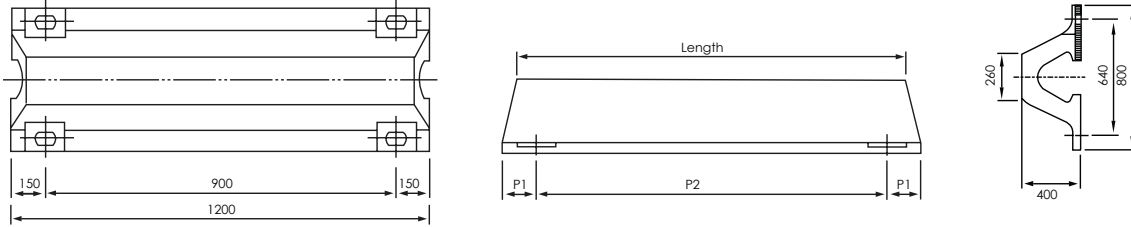
**SV300H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	125mm	900mm	133kg	4	M20 ~ M30
1500L	125mm	700mm	194kg	6	
2000L	130mm	630mm	254kg	8	
2500L	125mm	800mm	316kg	8	
3000L	125mm	725mm	377kg	10	
3500L	125mm	680mm	438kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
252	25.2	221	22.1	166	16.6	111	11.1

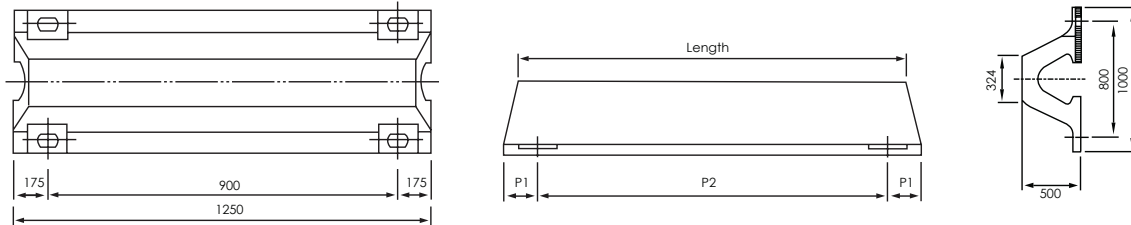
### SV400H



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	150mm	900mm	245kg	4	M24 ~ M36
1500L	150mm	700mm	354kg	6	
2000L	155mm	630mm	463kg	8	
2500L	150mm	800mm	575kg	8	
3000L	150mm	725mm	684kg	10	
3500L	150mm	680mm	793kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
335	44.7	294	39.2	221	29.4	147	19.6

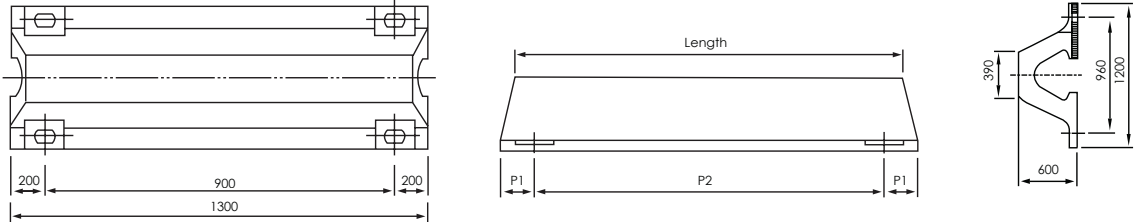
### SV500H



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	175mm	900mm	364kg	4	M27 ~ M36
1500L	175mm	700mm	523kg	6	
2000L	180mm	630mm	682kg	8	
2500L	175mm	800mm	844kg	8	
3000L	175mm	725mm	1,003kg	10	
3500L	175mm	680mm	1,159kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
420	69.9	368	61.3	276	46.0	184	30.7

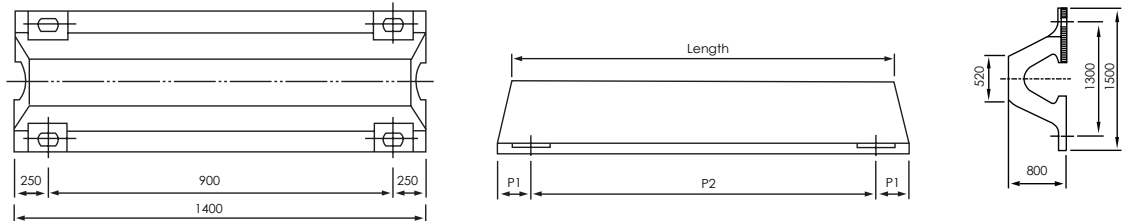
**SV600H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	200mm	900mm	526kg	4	M30 ~ M42
1500L	200mm	700mm	750kg	6	
2000L	205mm	630mm	945kg	8	
2500L	200mm	800mm	1,204kg	8	
3000L	200mm	725mm	1,428kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
503	101	441	88.3	331	66.2	221	44.1

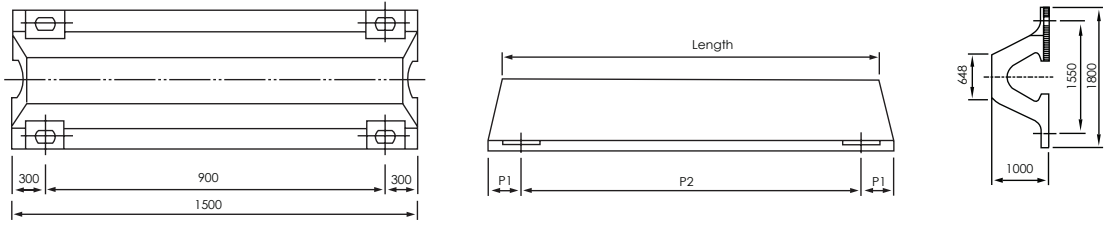
**SV800H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	250mm	900mm	890kg	4	M30 ~ M48
1500L	250mm	700mm	1,255kg	6	
2000L	255mm	630mm	1,620kg	8	
2500L	250mm	800mm	1,993kg	8	
3000L	250mm	725mm	2,358kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
671	178	588	157	441	118	294	78.5

SV1000H



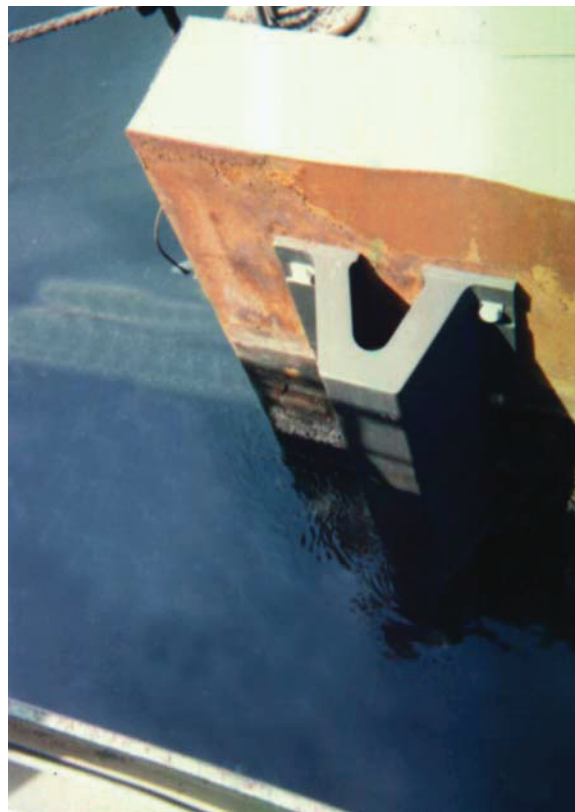
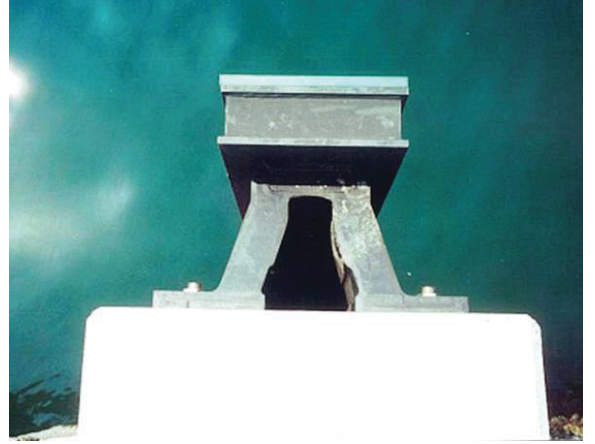
Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	300mm	900mm	1,389kg	4	M36 ~ M48
1500L	300mm	700mm	1,935kg	6	
2000L	305mm	630mm	2,482kg	8	
2500L	300mm	800mm	3,041kg	8	
3000L	300mm	725mm	3,588kg	10	

V1		V2		V3		V4	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
838	279	735	245	552	184	368	122.5





## V-SHAPED FENDER



**SX, SX-P PERFORMANCE**
**Fender Performance At 52.5 % Design Deflection (Rated Performance Data)**

Size	H0		H1		H2		H3		LENGTH Up to mm	Size
	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption		
	(tonf)	(tonf-m)	(tonf)	(tonf-m)	(tonf)	(tonf-m)	(tonf)	(tonf-m)		
250	26.9	2.83	20.7	2.18	17.3	1.81	13.8	1.45	3500	250
300	32.3	4.07	24.9	3.13	20.7	2.61	16.6	2.09	3500	300
400	43.1	7.24	33.2	5.57	27.6	4.64	22.1	3.71	3500	400
500	53.9	11.3	41.5	8.70	34.6	7.25	27.6	5.80	3500	500
600	64.7	16.3	49.8	12.5	41.5	10.4	33.2	8.35	3500	600
800	86.2	29.0	66.3	22.3	55.3	18.6	44.2	14.8	3000	800
1000	108	45.2	82.9	34.8	69.1	29.0	55.3	23.2	3000	1000

Size	H0		H1		H2		H3		LENGTH Up to mm	Size
	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption		
	(kN)	(kN-m)	(kN)	(kN-m)	(kN)	(kN-m)	(kN)	(kN-m)		
250	264	27.8	203	21.4	170	17.8	135	14.2	3500	250
300	317	39.9	244	30.7	203	25.6	163	20.5	3500	300
400	423	71	326	54.6	271	45.5	217	36.4	3500	400
500	529	111	407	85.3	339	71.1	271	56.9	3500	500
600	634	160	488	123	407	102	326	81.9	3500	600
800	845	284	650	219	542	182	433	145	3000	800
1000	1059	443	813	341	678	284	542	228	3000	1000

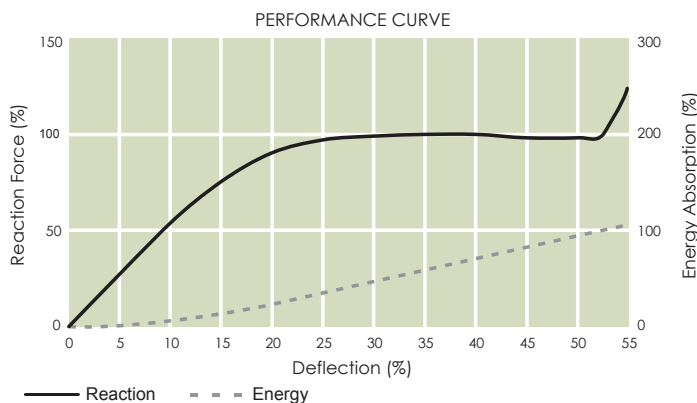
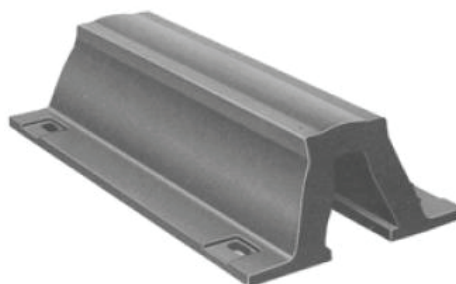
Performance Per Meter Length with 52.5% Deflection

\*PERFORMANCE TOLERANCE ±10

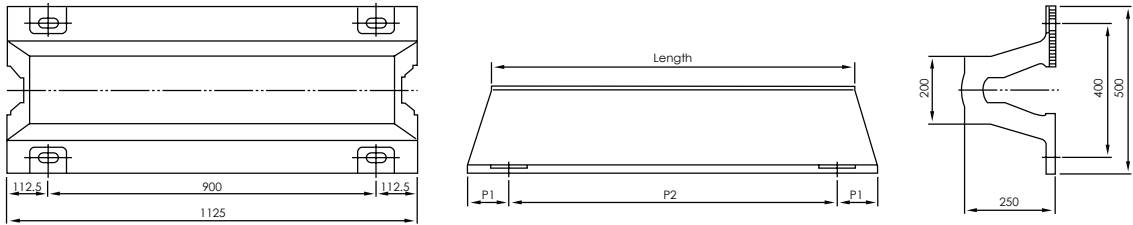
\* Specification will be changed without prior notice.

\* Special Rubber Grade can be available due to design condition.

Def (%)	RF	EA
0%	0%	0%
5%	27%	2%
10%	54%	6%
15%	76%	14%
20%	91%	24%
25%	98%	35%
30%	99%	47%
35%	100%	59%
40%	100%	71%
45%	98%	82%
50%	98%	94%
52.5%	100%	100%
55%	125%	107%



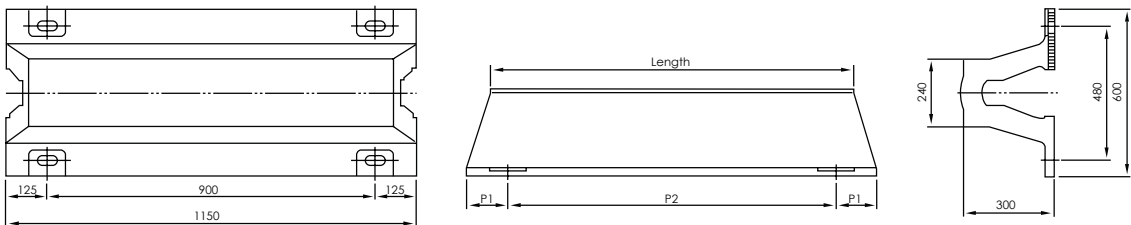
**SX250H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	112.5mm	900mm	85kg	4	M20 ~ M24
1500L	112.5mm	700mm	123kg	6	
2000L	117.5mm	630mm	162kg	8	
2500L	112.5mm	800mm	200kg	8	
3000L	112.5mm	725mm	239kg	10	
3500L	112.5mm	680mm	277kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
264	27.8	203	21.4	170	17.8	135	14.2

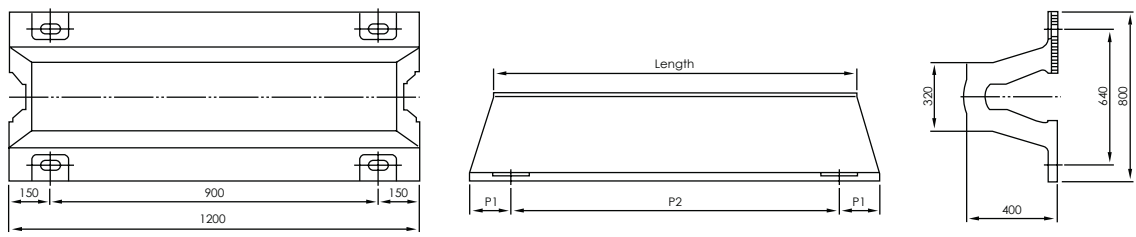
**SX300H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	125mm	900mm	129kg	4	M20 ~ M30
1500L	125mm	700mm	187kg	6	
2000L	130mm	630mm	244kg	8	
2500L	125mm	800mm	302kg	8	
3000L	125mm	725mm	359kg	10	
3500L	125mm	680mm	417kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
317	39.9	244	30.7	203	25.6	163	20.5

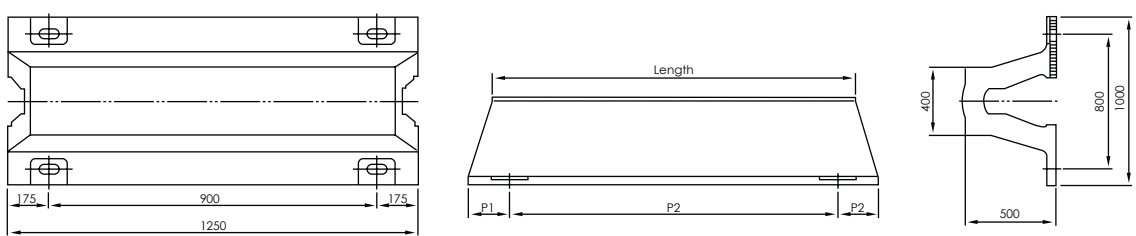
**SX400H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	150mm	900mm	240kg	4	M24 ~ M36
1500L	150mm	700mm	342kg	6	
2000L	155mm	630mm	445kg	8	
2500L	150mm	800mm	548kg	8	
3000L	150mm	725mm	651kg	10	
3500L	150mm	680mm	754kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
423	71	326	54.6	271	45.5	217	36.4

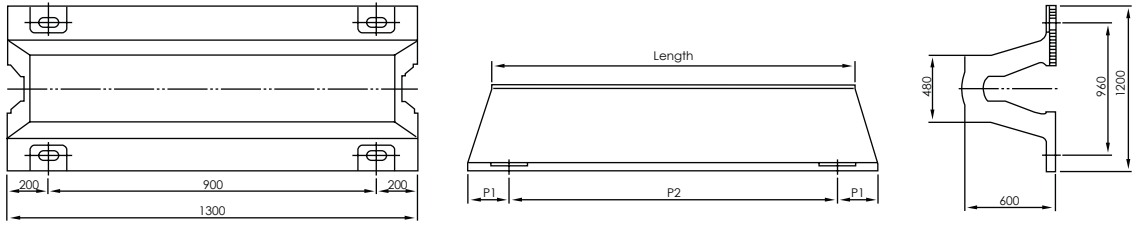
**SX500H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	175mm	900mm	358kg	4	M27 ~ M36
1500L	175mm	700mm	506kg	6	
2000L	180mm	630mm	654kg	8	
2500L	175mm	800mm	802kg	8	
3000L	175mm	725mm	951kg	10	
3500L	175mm	680mm	1,099kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
529	111	407	85.3	339	71.1	271	56.9

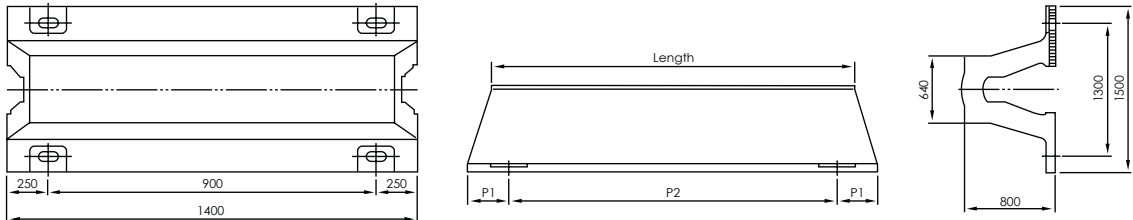
### SX600H



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	200mm	900mm	525kg	4	M30 ~ M42
1500L	200mm	700mm	734kg	6	
2000L	205mm	630mm	944kg	8	
2500L	200mm	800mm	1,153kg	8	
3000L	200mm	725mm	1,363kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
634	160	488	123	407	102	326	81.9

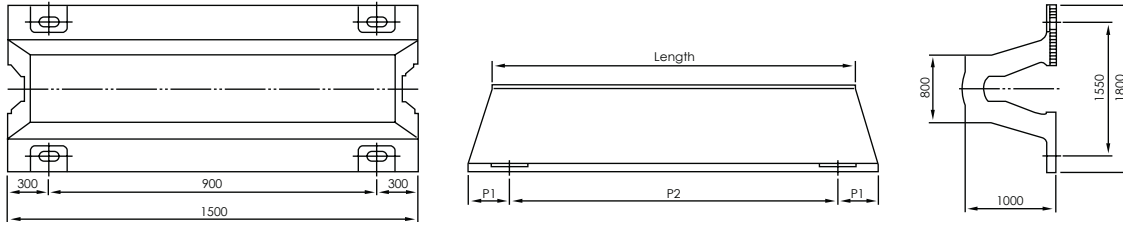
### SX800H



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	250mm	900mm	890kg	4	M30 ~ M48
1500L	250mm	700mm	1,227kg	6	
2000L	255mm	630mm	1,563kg	8	
2500L	250mm	800mm	1,900kg	8	
3000L	250mm	725mm	2,237kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
845	284	650	219	542	182	433	145

**SX1000H**



Length	P1	P2	Weight	No. Bolt	Bolt Size
1000L	300mm	900mm	1,397kg	4	M36 ~ M48
1500L	300mm	700mm	1,902kg	6	
2000L	305mm	630mm	2,406kg	8	
2500L	300mm	800mm	2,910kg	8	
3000L	300mm	725mm	3,414kg	10	

H0		H1		H2		H3	
R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)	R/F(kN)	E/A(kN-m)
1059	443	813	341	678	284	542	228



## CYLINDRICAL FENDER - CT -

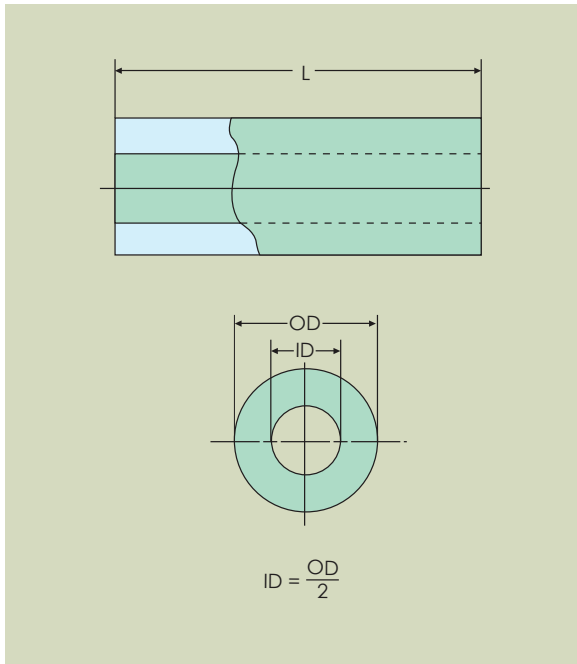
Item	S0		S1		S2		Weight/m	Item
	ODxID	R/F	E/A	R/F	E/A	R/F		
150x75	101.0	2.6	82.4	2.3	40.2	1.5	16.3kg	150x75
200x100	135.4	4.7	109.9	4.1	53.0	2.6	29.0kg	200x100
250x125	168.7	7.3	137.3	6.4	66.7	4.1	45.3kg	250x125
300x150	203.1	10.5	164.8	9.2	79.5	5.8	65.2kg	300x150
350x175	236.4	14.3	192.3	12.5	93.2	7.9	86.6kg	350x175
400x200	269.8	19.2	219.7	16.3	105.9	10.4	116kg	400x200
500x250	337.5	29.2	274.7	25.5	132.4	16.2	181kg	500x250
600x300	405.2	42.0	329.6	36.7	158.9	23.3	255kg	600x300
700x350	471.9	57.2	384.6	49.9	185.4	31.7	347kg	700x350
800x400	539.6	74.8	439.5	65.2	211.9	41.4	453kg	800x400
900x450	608.2	94.6	500.3	82.6	238.4	52.5	573kg	900x450
1000x500	676.9	116.7	549.4	102.0	264.9	64.7	707kg	1000x500
1100x550	745.6	141.3	608.2	122.6	291.4	78.4	855kg	1100x550
1200x600	814.2	167.8	667.1	146.2	317.8	93.2	1018kg	1200x600
1300x650	882.9	197.2	716.1	171.7	344.3	109.9	1194kg	1300x650
1400x700	951.6	228.6	775.0	199.1	370.8	126.5	1386kg	1400x700
1500x750	1,010.4	262.9	824.0	229.6	397.3	146.2	1591kg	1500x750

\*) Performance Tolerance ±10%

\*\*) Performance specifications are given on a per meter basis.

\*\*\*) Other Rubber Grade: Available

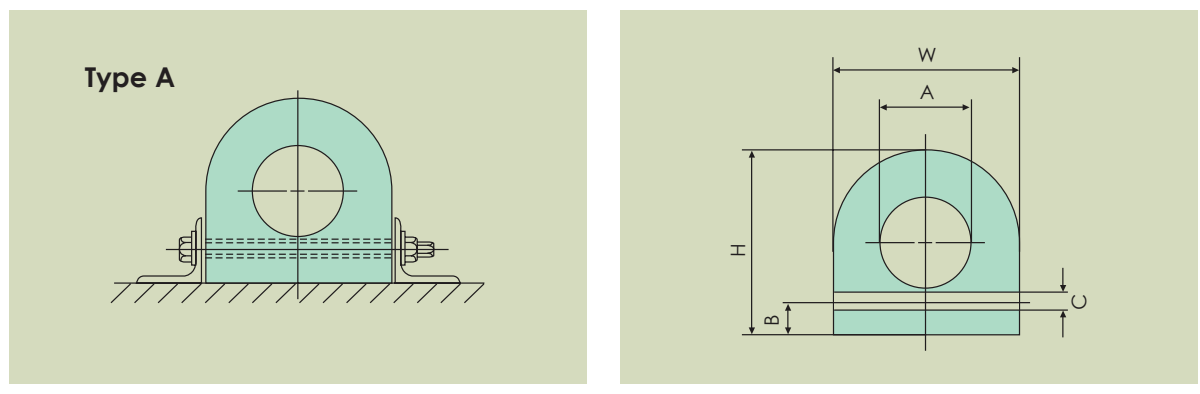
\*\*\*\*) DEFLECTION AT 50%



## RIGID FENDER - D & SQUARE SHAPE -

\*Performance refers to 50% deflection with per meter length  
 \*With  $\pm 10\%$  Tolerance

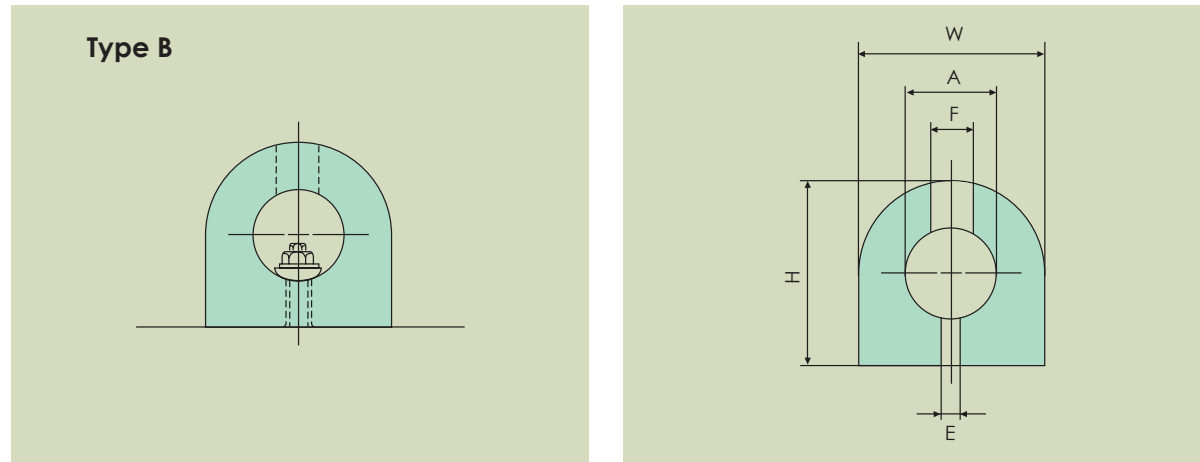
### DC Type



H x W	A (φ)	B	C (φ)	Bolt Size	Bolt Pitch	R/F (kN)	E/A (kN-m)	H x W
150 x 150	75	30	24	M20	300-480	213.9	3.86	150 x 150
200 x 200	100	35	27	M22	300-460	284.5	6.9	200 x 200
250 x 250	125	45	30	M24	280-420	356.1	10.7	250 x 250
300 x 300	150	55	33	M27	260-450	426.7	15.5	300 x 300
350 x 350	175	65	36	M30	200-460	500.3	21.1	350 x 350
400 x 400	200	75	36	M30	200-400	569	27.6	400 x 400
500 x 500	250	95	45	M36	200-450	716.1	43.1	500 x 500
600 x 600	300	120	50	M42	200-600	853.5	62	600 x 600

\*DEFLECTION: 50% (Per Meter)

\*Performance refers to 40% deflection with per meter length



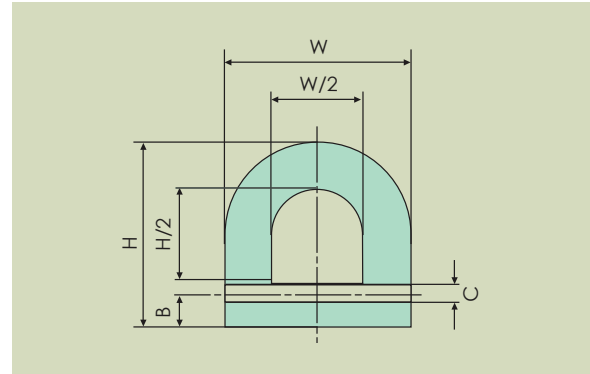
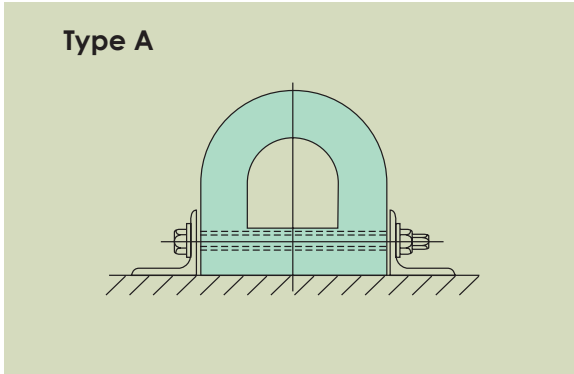
H x W	A (φ)	E (φ)	F (φ)	Bolt Size	Bolt Pitch	R/F (kN)	E/A (kN-m)	H x W
150 x 150	75	24	55	M20	300-470	76.5	1.88	150 x 150
200 x 200	100	27	60	M22	300-470	102	3.37	200 x 200
250 x 250	125	30	65	M24	280-470	127.5	5.26	250 x 250
300 x 300	150	33	75	M27	240-460	153	7.59	300 x 300
350 x 350	175	36	80	M30	200-550	178.5	10.3	350 x 350
400 x 400	200	36	80	M30	200-450	204	13.4	400 x 400
500 x 500	250	45	95	M36	200-625	255	21.1	500 x 500
600 x 600	300	50	105	M42	200-600	306.1	30.3	600 x 600

\*DEFLECTION: 40% (Per Meter)



\*Performance refers to 50% deflection with per meter length

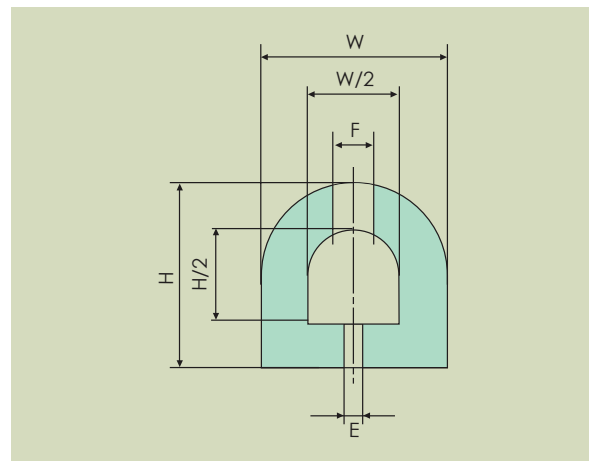
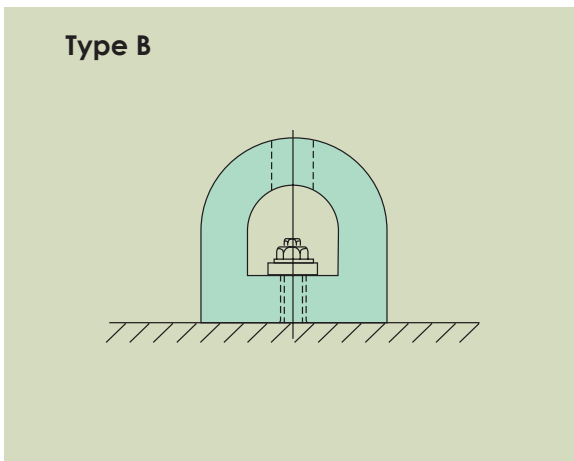
**DD Type**



H x W	B	C (φ)	Bolt Size	Bolt Pitch	R/F (kN)	E/A (kN-m)	H x W
150 x 150	30	24	M20	300-480	140.3	3.5	150 x 150
200 x 200	35	27	M22	300-460	186.4	6.2	200 x 200
250 x 250	45	30	M24	280-470	233.5	9.7	250 x 250
300 x 300	55	33	M27	260-580	279.6	13.9	300 x 300
350 x 350	65	36	M30	200-610	328.6	18.7	350 x 350
400 x 400	75	36	M30	200-600	372.8	24.7	400 x 400
500 x 500	95	45	M36	200-620	469.9	38.7	500 x 500
600 x 600	120	50hn	M42	200-680	560.2	55.6	600 x 600

\*DEFLECTION: 50% (Per Meter)

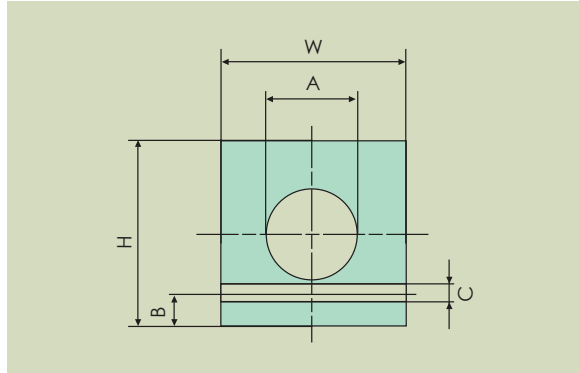
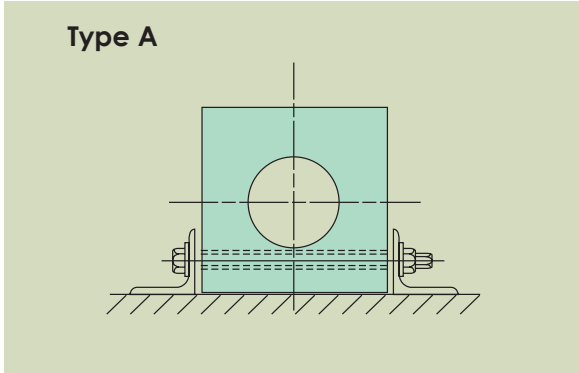
\*Performance refers to 40% deflection with per meter length



H x W	E (φ)	F (φ)	Bolt Size	Bolt Pitch	R/F (kN)	E/A (kN-m)	H x W
150 x 150	24	55	M20	300-470	70.7	2.0	150 x 150
200 x 200	27	60	M22	300-470	94.3	3.6	200 x 200
250 x 250	30	65	M24	280-470	117.7	5.6	250 x 250
300 x 300	33	75	M27	240-570	141.3	8.0	300 x 300
350 x 350	36	80	M30	200-550	164.8	10.6	350 x 350
400 x 400	36	80	M30	200-450	188.4	14.2	400 x 400
500 x 500	45	95	M36	200-600	235.4	22.3	500 x 500
600 x 600	50	105	M42	200-630	282.5	32.0	600 x 600

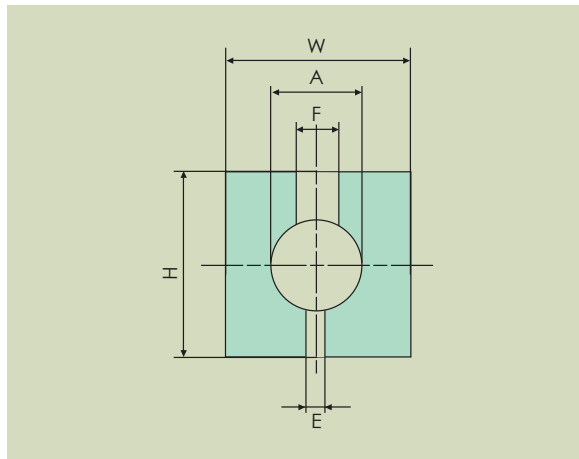
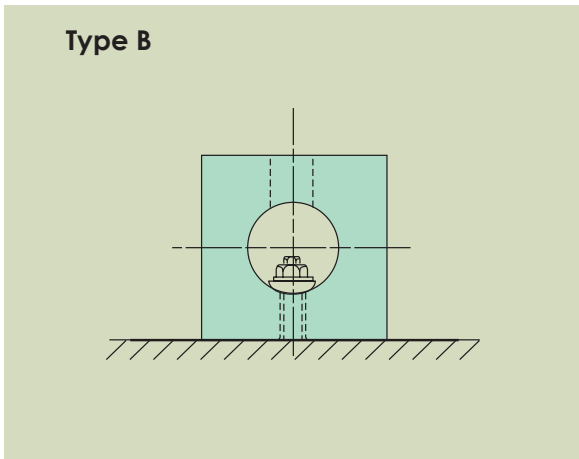
\*DEFLECTION: 40% (Per Meter)

**SC Type**



H x W	A (φ)	B	C (φ)	Bolt Size	Bolt Pitch	R/F (kN)	E/A (kN-m)	H x W
150 x 150	75	30	24	M20	300-480	213.9	3.9	150 x 150
200 x 200	100	35	27	M22	300-460	284.5	6.9	200 x 200
250 x 250	125	45	30	M24	280-420	356.1	10.7	250 x 250
300 x 300	150	55	33	M27	260-450	426.7	15.5	300 x 300
350 x 350	175	65	36	M30	240-450	500.3	21.1	350 x 350
400 x 400	200	75	36	M30	200-400	569	27.6	400 x 400
500 x 500	250	95	45	M36	200-450	716.1	43.1	500 x 500
600 x 600	300	120	50	M42	200-600	853.5	62.0	600 x 600

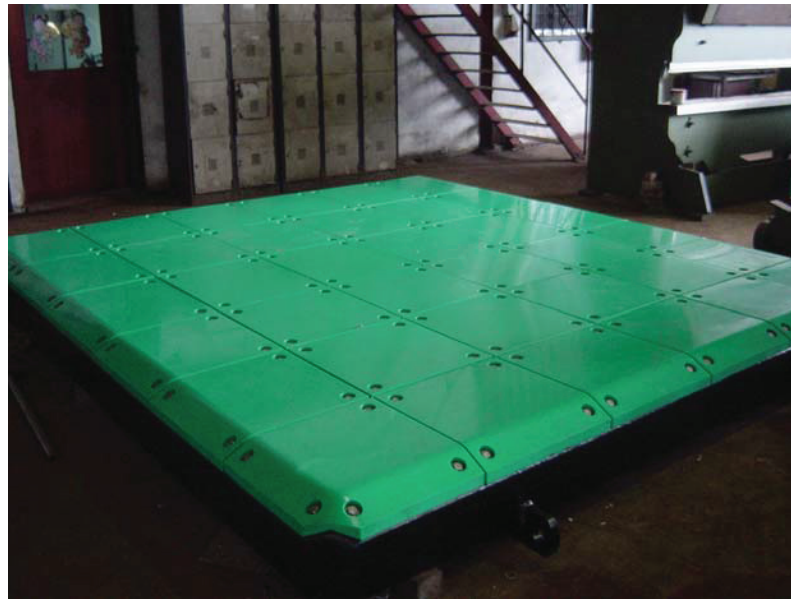
\*DEFLECTION: 50% (Per Meter)



H x W	A (φ)	E (φ)	F (φ)	Bolt Size	Bolt Pitch	R/F (kN)	E/A (kN-m)	H x W
150 x 150	75	24	55	M20	300-400	114.8	3.76	150 x 150
200 x 200	100	27	60	M22	260-330	153	6.72	200 x 200
250 x 250	125	30	65	M24	260-320	191.3	10.4	250 x 250
300 x 300	150	33	75	M27	240-320	229.6	15.1	300 x 300
350 x 350	175	36	80	M30	240-370	267.8	20.5	350 x 350
400 x 400	200	36	80	M30	200-300	306.1	26.9	400 x 400
500 x 500	250	45	95	M36	200-340	382.6	42.0	500 x 500
600 x 600	300	50	105	M42	200-420	459.1	60.4	600 x 600

\*DEFLECTION: 40% (Per Meter)

## PHYSICAL PROPERTIES OF UHMW-PE



### Low Friction Face Pads-(Ship Friendly Resin Pads)

UHMW-PE is characterized by corrosion resistance, water resistance, as well as high impact strength even with very low temperatures. The material offers a combination of low friction together with high wear resistance. Consequently, UHMW-PE material is most suitable for marine application.

Description	Test method	Value	Unit
<b>Physical properties</b>			
Molecular weight	Viscosimetric Method	≤ 3	10 <sup>6</sup> g/mol
Mass density	ISO 1183	~ 0.94	g/cm <sup>3</sup>
<b>Mechanical properties</b>			
Yield Stress	ISO 527	~ 20	MPa
Tensile stress at break	ISO 527	~ 200	%
Modulus of elasticity in tension	ISO 527	~ 600	MPa
Ball indentation hardness	ISO 2039-1	≥ 30	MPa
Charpy impact strength	ISO 11542-2	~ 80	kJ/m <sup>2</sup>
Wear Resistance	Sand - Slurry	~ 130	-
Dynamic coefficient of friction		0.12 ~ 0.2	-
Hardness shore	ISO 868	D60....D65	-
<b>Thermal properties</b>			
Permanent temperature		-60...+80	°C
Melting point	ISO 3146	~ 135	°C
Thermal length expansion	DIN 53752	1.5...2	10 <sup>-4</sup> K <sup>-1</sup>
Thermal conductivity (+23°C)		0.4	W/(m.K)



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