



DockGuard

Fender technology and mooring solutions



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Why DockGuard?



Why DockGuard?

One simple reason... Our refreshing approach!

DockGuard is a global provider of fender technology and mooring solutions with more than 40 years experience serving the global marine industry. We have a 'can do, will do' approach and exceptional flexibility. This has earned us a reputation for delivering competitive products to the most demanding specifications - solutions that respond to the most challenging environments and tightest budgets.

Whilst this brochure features our key products and services, we are continually expanding our product offering to meet changing market needs. Our design, custom manufacturing and installation services also enable us to deliver wider ranging solutions than could be captured here. So if you have a mooring equipment requirement or seek a fender solution that is not featured here, contact DockGuard - whatever your mooring needs.

At DockGuard, you'll instantly notice our confident and enthusiastic attitude to a fender challenge. We work hard to keep things as simple and straightforward as possible. Even though your requirements may be varied, complex and challenging, we think you'll quickly recognise the importance we put on creative thinking and our ability to problem solve: And that excellence in design doesn't have to come at an unaffordable price.

You can be confident in the many decades experience of our design team and our refined expertise but reassured by our modest approach. We know the importance of listening and respecting our customers' input. You won't find us telling you that there is only one way to solve the problem and we're always willing to take a new perspective to find you the most elegant solution.

We're pleased of our broadminded, enlightened attitude and understand the frustration that lack of choice and imaginative thinking can stifle a project. Whether it is a challenge of system performance or budget, our innovation in design or supply of fender systems only comes through persistence and tenacity.

Our catalogue is an excellent starting point; giving the wide range of products that could be relevant to your application. We offer all the main categories of fender forms as standard and are willing to adopt any new variety for the benefit of your finished fender system.

We don't believe you should accept the status-quo and we know that you'll be invigorated and satisfied by our inspired and enthusiastic approach. So if you want to experience what it feels to have a fender solution from us, why not give our team a call to discuss your particular requirement.

Quality

All the products we supply are manufactured to order; either from our manufacturing units in the UK, or from our specialist manufacturing partners around the world. This network of partners gives us a number of unique advantages:

- it enables us to deliver a wide range of solutions
- it means we can match manufacturing expertise and material quality to each project's specific requirements
- it ensures we are always likely to provide the most competitive solution
- It gives us the flexibility to respond to tight deadlines, budgets and challenging design specifications, some of which could be:
 - *Fender design to BS6349-4: 1994*
 - *Quality Management system to BS EN ISO 9000*
 - *Environmental Management to BS EN ISO 14001*
 - *Fender performance testing where required*
 - *with reference to PIANC Guidelines for the design of fender systems: 2002*
 - *Independent third party inspection such as*
 - *Lloyds Register of Shipping*

Proven in Practice



Norway



Russia



UK



UK



Norway

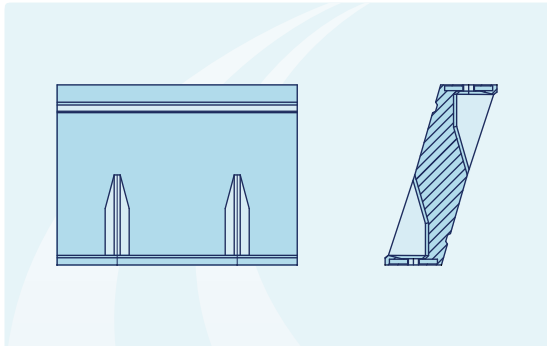


Italy



UAE

Product Overview



Leg Fenders

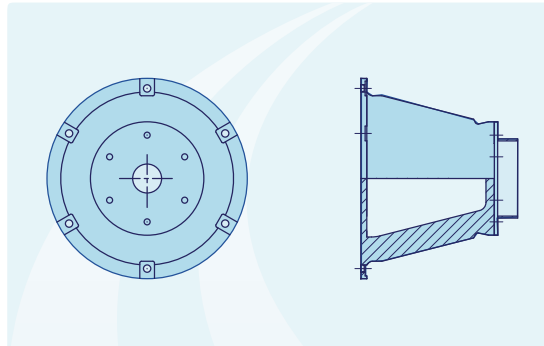
(see Page 8 for Specification)

Construction: Leg Fenders are moulded into a rhomboid shape for optimum energy absorption. The twin notches on the side of the fender ensure it will compress at exactly the same point on each compression. These fenders can be combined with additional legs to form either a simple V-fender, or a larger and more sophisticated Modular Fender system. They can be mounted vertically or horizontally on any quay wall.

Energy/Technical: The normal compression on a leg fender is 57.5% and the maximum compression is 65% of its height. The Leg Fender varies in height from 150mm high to 1600mm and are manufactured in lengths from 750mm to 3000mm, depending on the required size and application.

Key benefits: DockGuard Leg Fenders are of a high performance, modular design that delivers flexibility in application. It has high energy absorption in proportion to weight of rubber, and the compact design and small foot print allow for flexible orientation on any quay wall. They are produced from good quality marine compounds which are resistant to the effects of ozone degradation, UV radiation and water-borne oil pollution.

Applications: Ideal for any application with limited space for installation such as piers, pivot pillars and steel piles.



Cone Fenders

(see Page 10 for Specification)

Construction: DockGuard Cone Fenders offer the most advanced cone fender technology available.

The Fenders are moulded into a conical shape, combining the very best of both attributes of both cell and leg fender design and construction. Cone Fenders provide excellent energy capability with low reaction. The conical design and circular mounting base make this an extremely stable fender especially where angular performance is required.

Energy/Technical: The geometry of the design has been optimised for maximum energy absorption combined with a low reaction force derived from its capability of compressing by more than 72% of its height, the maximum compression is 75% of its height. The Cone Fenders varies in height from 500mm high to 1800mm.

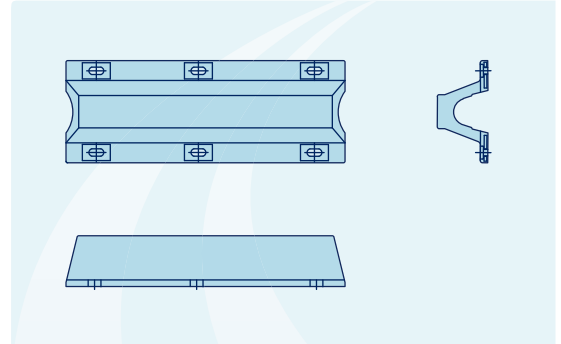
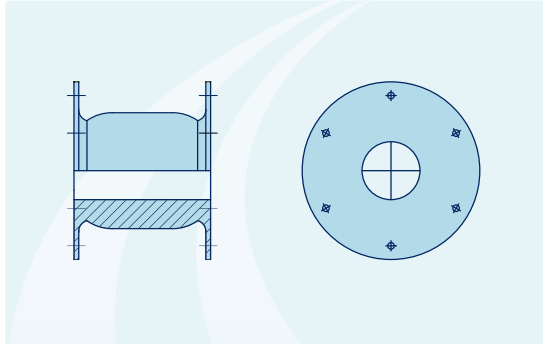
Key benefits: The high performance capabilities enables the Cone Fender to be used instead of a larger Cell Fender.

Like all of our fenders they are produced from good quality marine compounds which are resistant to the effects of ozone degradation, UV radiation and water-borne oil pollution.

Applications: Cone Fenders are ideally suited to a wide range of berthing applications- including oil and LNG facilities, offshore platforms, bulk handling terminals, general cargo, container berths, RoRo and cruise terminals.



Product Overview



Cell Fenders

(see Page 12 for Specification)

Construction: DockGuard Cell Fenders are moulded into a cylindrical shape. Cell fenders provide good energy capability. The circular design and circular mounting base make this an extremely stable fender especially where extreme berthing movements may be present.

Energy/Technical: The normal compression on a cell fender is 52% and the maximum compression is 55% of its height. The cell fender varies in height from 500mm high to 2500mm.

Key benefits: DockGuard's Cell Fenders have a good performance, that delivers all round flexibility in application. They are produced from good quality marine compounds which are resistant to the effects of ozone degradation, UV radiation and water-borne oil pollution.

Applications: Cell Fenders are ideally suited to applications that are subject to circular motion and extreme weather conditions or where heavy and angular berthing may be required. With a higher reaction than cones and leg fenders, cell fenders are generally used on quay structures rather than dolphin berths. They are suitable for a wide range of berthing applications - including oil and LNG facilities, offshore platforms, bulk terminals, container berths, RoRo and cruise terminals.

Arch Fenders

(see Page 14 for Specification)

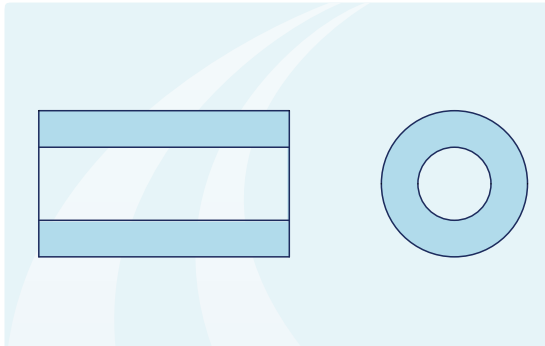
Construction: DockGuard Arch Fenders ('DGA' Fenders) are moulded from a choice of rubber compounds, each of which delivers different characteristics. The choice of compound is made based on the design specification and the specific requirements of the application. They are manufactured using a twin Leg system and can be mounted horizontally or vertically on a quay wall. The front face has a high friction factor that is ideal for smaller vessels where friction is not a problem.

Energy/Technical: The normal compression is 52.5% of the Fender's height, which defines its rated energy and reaction. Maximum compression is 55%.

Key benefits: Simple in both design and installation, the 'DGA' Fender is an economic alternative to a system type Fender. It has the advantage of a high friction face to limit vessel movement. They are very durable, require no maintenance and, as with all DockGuard's rubber based products, they are produced from good quality marine compounds which are highly resistant to the effects of ozone degradation, UV radiation and water borne oil pollution.

They are available in a standard range of popular sizes from 150mm high to 1000mm high.

Applications: Berthing for a wide range of smaller vessels such as; general cargo, workboats, barges and tugs. Also suitable for RoRo ferries and bridge and tower protection.



Cylindrical Fenders

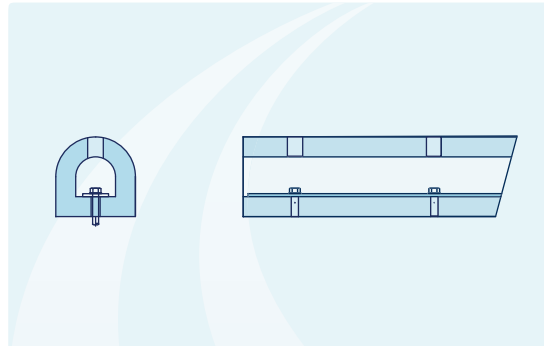
(see Page 16 for Specification)

Construction: DockGuard Cylindrical Fenders are versatile and highly cost effective. Their simple hollow cylinder design can be produced in almost any length and diameter combination to meet specific performance and space requirements. They are produced in a choice of compounds (EPDM, SBR or SBR/Natural mix) with product performance and cost effectiveness maximised by selecting the optimised manufacturing process for the required Fender diameter. Smaller diameter products are produced by extruding the chosen compound through a die; whilst the larger diameter Fenders are produced by wrapping and curing under pressure to guarantee high quality homogeneous sections.

Energy/Technical: The normal compression of a DockGuard Hollow Cylindrical Fender is 80% of the internal bore dimension. The maximum compression is 95% of the internal bore. They can be produced to almost any length and diameter as required and are delivered as rubber sections ready for installation. A full range of optional fixing solutions are available to suit the specific application.

Key benefits: Their simplicity of construction and installation can make DockGuard's Cylindrical Fenders a highly economical option especially where a flexible fendering solution is required. They have an equal energy capacity equal to more expensive solutions; and installation and maintenance are both easy and low cost.

Applications: Fender diameters and lengths can be matched to almost any application, including berths serving both large and small vessels such as general cargo and fishing vessels. Also these Fenders can be attached to Tug vessels.



Extruded Fenders

(see Page 18+19 for Specification)

Construction: As the name suggests, DockGuard's Hollow 'D' Fenders are manufactured to a simple 'D' profile using the latest extrusion technology. They are available in a choice of rubber compounds (EPDM, SBR and SBR/Natural mix); all of which are highly resistant to the effects of ozone degradation, UV radiation and water-borne oil pollution. They provide a highly economic solution for lower energy absorption applications.

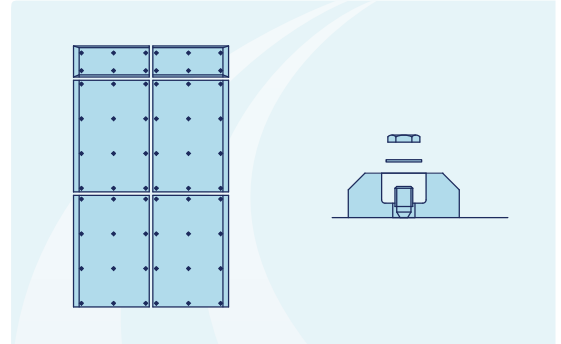
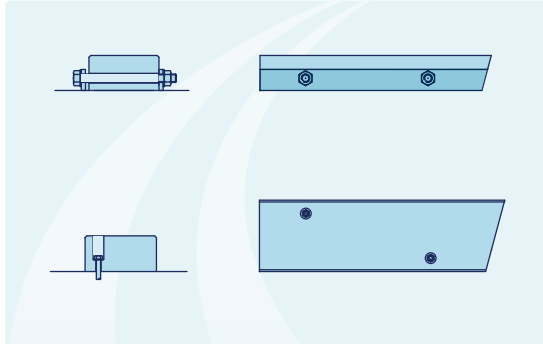
Energy/Technical: The normal compression of DockGuard 'D' Fender is 90% of the internal 'D' dimension. The maximum compression is 100% of the internal 'D'. They can be supplied in a wide range of sizes and lengths, and are delivered predrilled ready for installation. Steel flat bars, bolts and anchors are readily available as a fixing option.

Key benefits: The simplicity of construction and installation make DockGuard's 'D' Fender a highly economical solution. The quality of the compounds and the extrusion processes we use make them highly robust with better energy performance than Cylindrical Fenders and many more expensive solutions. Installation is also low cost with a choice of fixing options.

Applications: Fender heights and lengths can be matched to almost any application, including berths serving both large and small vessels such as general cargo and fishing ports.



Product Overview



UHMW-PE Sliding Fenders

(see Page 21 for Specification)

Construction: DockGuard’s Sliding Fenders are UHMW-PE rubbing strips manufactured and machined in sizes to suit your application.

Extremely hard wearing and highly resistant, they are an environmentally beneficial alternative to timber or rubber facings as well as providing a low maintenance, low friction and low cost solution.

Energy/Technical: UHMW-PE Sliding Fenders can be supplied pre-drilled for easy installation and chamfered to avoid snagging. They are available in a full range of colours – either to suit the aesthetics of the installation, to match corporate colour schemes or in high visibility colours for added safety and easier quay/jetty identification.

Key benefits: UHMW-PE Fenders are an environmentally responsible alternative to tropical hardwoods and are fully recyclable. They also provide the benefits of higher wear resistance (even greater than steel) and lower maintenance; as they do not split or rot and are fully resistant to infestation from marine borers.

The low friction coefficient and high abrasion resistance of UHMW-PE provides an ultra smooth surface for the vessel to slide easily along the face of the Fender.

Applications: UHMW-PE Sliding Fenders are used in many applications including the replacement of timber piles, beams and dolphins, as well as other applications where lumber would have been the traditional fendering material. They are also ideal wherever the requirement is for a durable sliding surface rather than energy absorption.

UHMW-PE Fender Pads

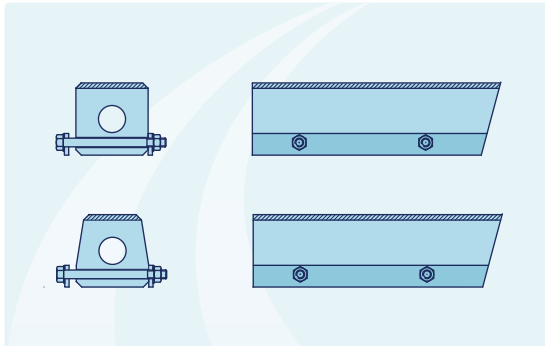
(see Page 22 for Specification)

Construction: DockGuard’s Fender Pads are UHMW-PE 1000 Grade manufactured and machined in sizes to suit the panel. They are fixed to the panel generally with Stainless Steel studs that are welded to the skin of the steel panel. The minimum wear allowance on the PE is usually 12mm.

Energy/Technical: UHMW-PE Fender Pads are supplied pre-drilled for easy installation and chamfered to avoid snagging. The PE normally arrives on site pre-fitted to the steel panel. They are available in a full range of colours – either to suit the aesthetics of the installation, to match corporate colour schemes or for easier quay/jetty identification.

Key benefits: UHMW-PE Fender Pads provide the benefits of higher wear resistance (even greater than steel) and lower maintenance; as they do not split or rot and are fully resistant to infestation from marine borers.

Applications: The low friction coefficient and high abrasion resistance of UHMW-PE provides an ultra smooth surface for the vessel to berth easily along the face of the Fender.



Polyrub Buffers

(see Page 20 for Specification)

Construction: DockGuard PolyRub Buffers are manufactured using the latest molecular bonding technology to combine the energy absorbing qualities of a rubber fender with the low friction benefits of a polyethylene facing. They are produced with a choice of rubber compounds with different material grades (EPDM, SBR and SBR/Natural mix) bonded to a Ultra High Molecular Weight Polyethylene (UHMWPE) face which is UV stabilised to protect against bleaching and UV degradation.

Energy/Technical: The compression ratios for DockGuard PolyRub Buffers vary dependant upon the compounds selected. They are available in a range of sizes, a choice of two different profiles and a range of colours.

Key benefits: The Polyrub[®] UHMW-PE face offers a low friction, hard wearing, durable contact facing; while the rubber elements are produced from marine quality compounds which are highly resistant to the effects of ozone degradation, UV radiation and water-borne oil pollution.

Independent testing of the molecular bonding of the Polyrub[®] system fender confirms the exceptional strength of the bond between the Polyethylene and rubber.

Applications: PolyRub[®] Buffers are ideal for most side fendering and guiding applications and any installation requiring a simple Extruded Fender with low shear forces. Because of its low friction capabilities there will be less wear in the fenders.

DockGuard's PolyRub is ideal for mounting on quay structures where tidal conditions exist. It allows vessels to rise and fall with tide levels without damaging the fender or the vessel.

Rubber Properties

Different manufacturing requirements demand different characteristics from rubber and rubber compounds and our experience enables us to ensure the right materials are selected to ensure perfect product quality and durability for every application – balancing materials quality with cost-effectiveness to exactly meet the customers cost and quality requirements.

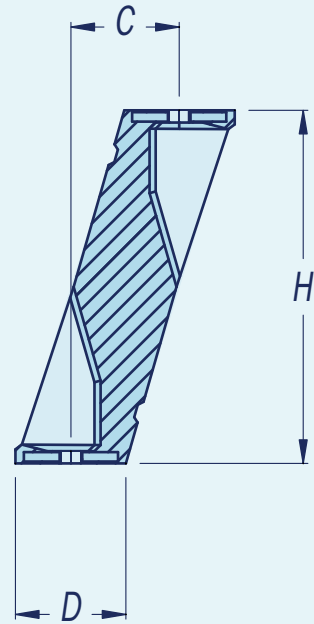
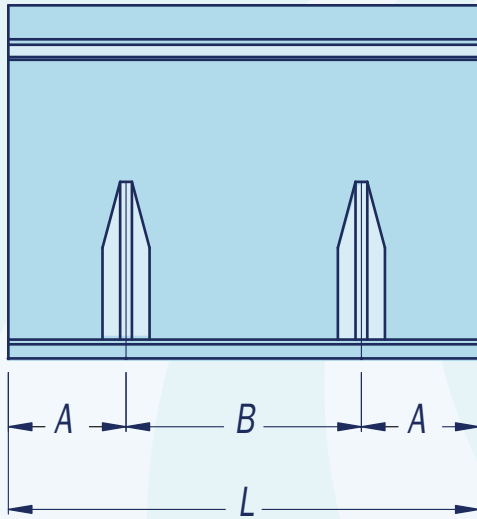
We use natural rubber and styrene based rubber compounds which meet or exceed the performance requirements of international fender recommendations, such as PIANC and EAU. We also utilise other compounds incorporating Butyl Rubber, EPDM, Polyurethane and Neoprene.

We are always happy to provide detailed technical information on the compounds and rubber qualities of any of our products as well as laboratory results from our quality assurance testing programmes and to provide cured samples for independent testing.

Leg Fenders



Specification



Fender	H	L	A	B	C	D	Bolts	Max Length	Weight
DGL300	300	1000	250	500	93	95	2 x M20	3000	44
DGL400	400	1000	250	500	124	125	2 x M24	3000	72
DGL500	500	1000	250	500	142	158	2 x M30	3000	111
DGL550	550	1000	250	500	170	172	2 x M30	3000	128
DGL600	600	1000	250	500	199	188	2 x M30	2500	149
DGL750	750	1000	250	500	230	235	2 x M36	2000	239
DGL800	800	1000	250	500	240	250	2 x M36	2000	266
DGL1000	1000	1000	250	500	310	322	2 x M42	1500	430
DGL1250	1250	1000	250	500	388	400	2 x M48	1500	627
DGL1450	1450	1000	250	500	445	454	2 x M48	1500	888
DGL1600	1600	1000	250	500	480	500	2 x M56	1500	1018

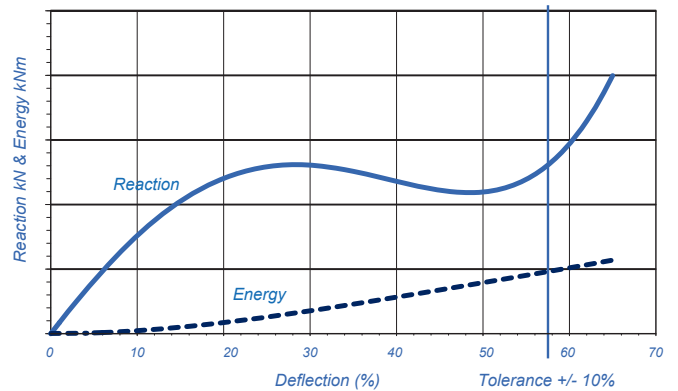
The table on page 27 gives an indication on whether support chains are required for use on the fender system

All dimensions in mm.
All weights in Kgs per 1000mm.

Performance Graph

Energy and Reaction Graph

Rated deflection 57.5%



Leg Fender Performance Table

Energy Reaction		DGL 300	DGL 400	DGL 500	DGL 550	DGL 600	DGL 750	DGL 800	DGL 1000	DGL 1250	DGL 1450	DGL 1600
D1.0	E	15	27	43	52	62	97	110	172	268	361	440
	R	112	149	187	205	224	280	299	374	467	542	598
D1.1	E	15	27	43	53	63	99	112	175	273	368	449
	R	114	152	191	209	228	286	305	382	477	553	610
D1.2	E	16	28	44	54	64	101	114	179	279	376	458
	R	116	155	195	213	233	292	311	390	487	565	623
D1.3	E	16	28	45	55	65	103	117	183	285	384	468
	R	119	158	199	218	238	298	318	398	497	576	636
D1.4	E	17	29	46	56	67	105	119	186	291	392	477
	R	121	161	203	222	243	304	324	406	507	588	649
D1.5	E	17	30	47	57	68	107	121	190	297	399	487
	R	124	165	207	227	248	310	331	414	517	600	662
D1.6	E	17	30	48	58	69	109	124	193	302	407	496
	R	126	168	211	231	252	316	337	422	527	611	674
D1.7	E	18	31	49	59	71	111	126	197	308	415	505
	R	128	171	215	236	257	322	343	430	537	623	687
D1.8	E	18	31	50	60	72	113	128	201	314	423	515
	R	131	174	219	240	262	328	350	438	547	634	700
D1.9	E	18	32	51	61	73	115	131	204	320	430	524
	R	133	177	223	245	267	334	356	446	557	646	713
D2.0	E	19	33	52	63	75	117	133	208	326	438	534
	R	136	181	227	249	272	340	363	454	567	658	726
D2.1	E	19	33	52	64	76	119	135	212	331	446	543
	R	138	184	231	254	276	346	369	462	577	669	738
D2.2	E	19	34	53	65	77	121	138	215	337	454	552
	R	140	187	235	258	281	352	375	470	587	681	751
D2.3	E	20	34	54	66	78	123	140	219	343	461	562
	R	143	190	239	262	286	358	382	478	597	692	764
D2.4	E	20	35	55	67	80	125	142	223	349	469	571
	R	145	193	243	267	291	364	388	486	607	704	777
D2.5	E	20	36	56	68	81	127	145	226	355	477	581
	R	148	197	247	271	296	370	395	494	617	716	790
D2.6	E	21	36	57	69	82	129	147	230	360	485	590
	R	150	200	251	276	300	376	401	502	627	727	802
D2.7	E	21	37	58	70	84	131	150	234	366	492	599
	R	152	203	255	280	305	382	407	510	637	739	815
D2.8	E	21	37	59	71	85	133	152	237	372	500	609
	R	155	206	259	285	310	388	414	518	647	750	828
D2.9	E	22	38	60	72	86	136	154	241	378	508	618
	R	157	209	263	289	315	394	420	526	657	762	841
D3	E	22	39	61	74	88	138	157	245	384	516	628
	R	160	213	267	294	320	400	427	534	667	774	854
Energy Reaction		DGL 300	DGL 400	DGL 500	DGL 550	DGL 600	DGL 750	DGL 800	DGL 1000	DGL 1250	DGL 1450	DGL 1600

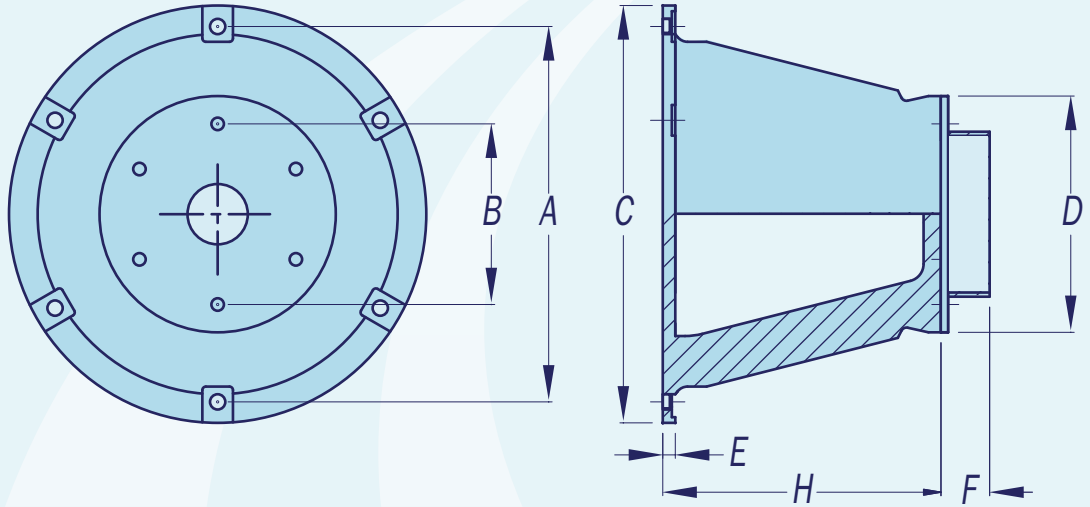


All energy figures are in kNm.
All reaction figures are in kN.
Performance figures for 1000mm length. Standard tolerance applies.

Cone Fenders



Specification



Fender	H	ØA	ØB	ØC	ØD	Bolts	E	F	Weight
DCN500	500	675	325	750	425	4 x M24	19	75	141
DCN600	600	810	390	900	510	6 x M30	27	90	242
DCN700	700	945	455	1050	595	6 x M30	32	105	395
DCN800	800	1080	520	1200	680	6 x M36	38	120	610
DCN900	900	1215	585	1350	765	6 x M36	41	140	845
DCN1000	1000	1350	650	1500	850	6 x M42	45	155	1125
DCN1100	1100	1485	715	1650	935	6 x M42	45	170	1540
DCN1150	1150	1550	750	1725	998	6 x M42	45	180	1680
DCN1200	1200	1620	780	1800	1020	8 x M42	45	185	1965
DCN1300	1300	1755	845	1950	1105	8 x M48	50	200	2455
DCN1400	1400	1890	930	2100	1190	8 x M48	50	210	3100
DCN1600	1600	2160	1060	2400	1360	8 x M48	60	250	4650
DCN1800	1800	2430	1190	2700	1530	8 x M56	60	270	6620

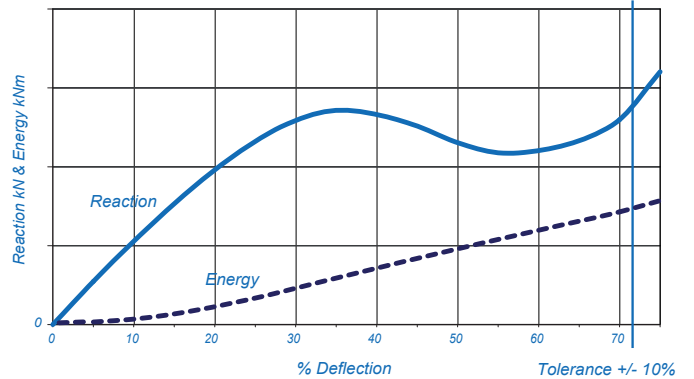
The table on page 27 gives an indication on whether support chains are required for use on the fender system

All dimensions in mm.
All weights in Kgs.

Performance Graph

Energy and Reaction Graph

Rated deflection 72%



Cone Fender Performance Table



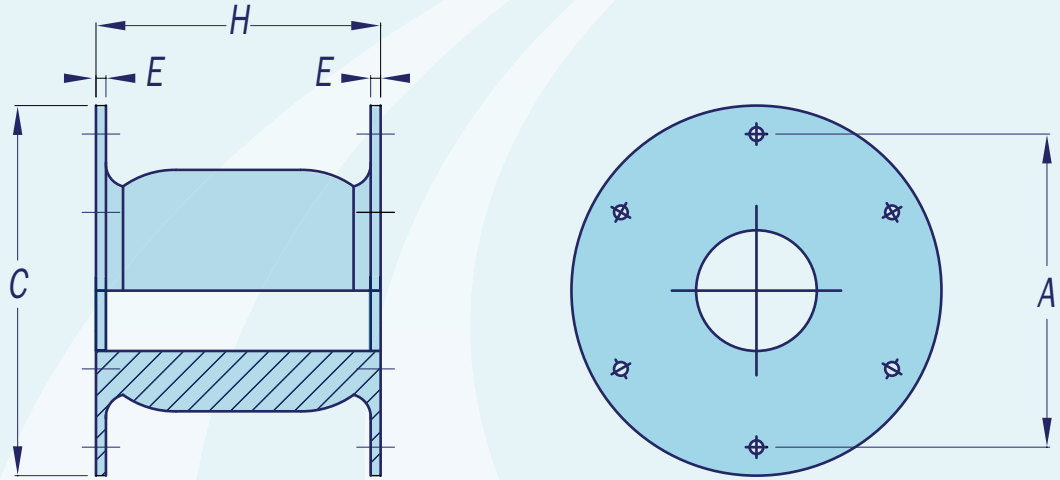
Energy Reaction		DCN 500	DCN 600	DCN 700	DCN 800	DCN 900	DCN 1000	DCN 1100	DCN 1150	DCN 1200	DCN 1300	DCN 1400	DCN 1600	DCN 1800
D1.0	E	41	73	125	180	273	360	500	565	640	820	1015	1505	2160
	R	186	252	355	465	585	725	875	998	1045	1225	1420	1855	2350
D1.1	E	42	75	129	186	282	372	515	583	660	845	1047	1554	2229
	R	191	259	366	479	603	747	902	1025	1077	1262	1463	1911	2421
D1.2	E	44	78	133	193	290	385	531	602	680	871	1079	1603	2297
	R	196	267	377	493	622	769	929	1053	1109	1300	1507	1968	2493
D1.3	E	45	80	137	199	299	397	546	620	700	896	1110	1651	2366
	R	201	274	387	507	640	791	955	1080	1140	1337	1550	2024	2564
D1.4	E	46	82	141	205	307	409	561	638	720	921	1142	1700	2434
	R	207	282	398	521	658	813	982	1107	1172	1374	1593	2080	2635
D1.5	E	48	85	145	211	316	421	576	656	740	946	1174	1749	2503
	R	212	289	409	535	676	835	1009	1135	1204	1411	1636	2136	2706
D1.6	E	49	87	149	218	325	434	592	675	760	972	1206	1798	2571
	R	217	296	420	549	695	857	1036	1162	1236	1449	1680	2193	2778
D1.7	E	50	89	153	224	333	446	607	693	780	997	1237	1846	2640
	R	222	304	430	563	713	879	1062	1189	1267	1486	1723	2249	2849
D1.8	E	52	92	157	230	342	458	622	711	800	1022	1269	1895	2708
	R	227	311	441	577	731	901	1089	1217	1299	1523	1766	2305	2920
D1.9	E	53	94	161	236	350	470	637	729	820	1047	1301	1944	2777
	R	232	319	452	591	749	923	1116	1244	1331	1560	1809	2361	2991
D2.0	E	55	97	165	243	359	483	653	748	840	1073	1333	1993	2845
	R	238	326	463	606	768	945	1143	1272	1363	1598	1853	2418	3063
D2.1	E	56	99	169	249	368	495	668	766	860	1098	1364	2041	2914
	R	243	333	473	620	786	967	1169	1299	1394	1635	1896	2474	3134
D2.2	E	57	101	173	255	376	507	683	784	880	1123	1396	2090	2982
	R	248	341	484	634	804	989	1196	1326	1426	1672	1939	2530	3205
D2.3	E	59	104	177	261	385	519	698	802	900	1148	1428	2139	3051
	R	253	348	495	648	822	1011	1223	1354	1458	1709	1982	2586	3276
D2.4	E	60	106	181	268	393	532	714	821	920	1174	1460	2188	3119
	R	258	356	506	662	841	1033	1250	1381	1490	1747	2026	2643	3348
D2.5	E	61	108	185	274	402	544	729	839	940	1199	1491	2236	3188
	R	263	363	516	676	859	1055	1276	1408	1521	1784	2069	2699	3419
D2.6	E	63	111	189	280	411	556	744	857	960	1224	1523	2285	3256
	R	268	370	527	690	877	1077	1303	1436	1553	1821	2112	2755	3490
D2.7	E	64	113	193	286	419	568	759	875	980	1249	1555	2334	3325
	R	274	378	538	704	895	1099	1330	1463	1585	1858	2155	2811	3561
D2.8	E	65	115	197	293	428	581	775	894	1000	1275	1587	2383	3393
	R	279	385	549	718	914	1121	1357	1490	1617	1896	2199	2868	3633
D2.9	E	67	118	201	299	436	593	790	912	1020	1300	1618	2431	3462
	R	284	393	559	732	932	1143	1383	1518	1648	1933	2242	2924	3704
D3	E	68	120	205	305	445	605	805	930	1040	1325	1650	2480	3530
	R	289	400	570	746	950	1165	1410	1545	1680	1970	2285	2980	3775
D4	E	81	140	223	333	474	650	774	898	1124	1428	1784	2663	3710
	R	307	441	601	785	993	1226	1423	1621	1765	2027	2403	3139	3860
Energy Reaction		DCN 500	DCN 600	DCN 700	DCN 800	DCN 900	DCN 1000	DCN 1100	DCN 1150	DCN 1200	DCN 1300	DCN 1400	DCN 1600	DCN 1800

All energy figures are in kNm.
All reaction figures are in kN.
Standard tolerance applies.

Cell Fenders



Specification



Fender	H	ØA	ØC	Bolts	E	Weight
DCE400	400	550	650	4 x M22	25	75
DCE500	500	550	650	4 X M24	25	95
DCE630	630	700	840	4 X M27	25	220
DCE800	800	900	1050	6 x M30	30	400
DCE1000	1000	1100	1300	6 x M36	35	790
DCE1150	1150	1300	1500	6 x M42	40	1200
DCE1250	1250	1450	1650	6 x M42	40	1500
DCE1450	1450	1650	1850	6 x M48	42	2300
DCE1600	1600	1800	2000	8 x M48	45	3000
DCE1700	1700	1900	2100	8 x M56	50	3700
DCE2000	2000	2000	2200	8 x M64	50	5000
DCE2250	2250	2300	2550	10 x M64	57	7400
DCE2500	2500	2700	2950	10 x M64	70	10700

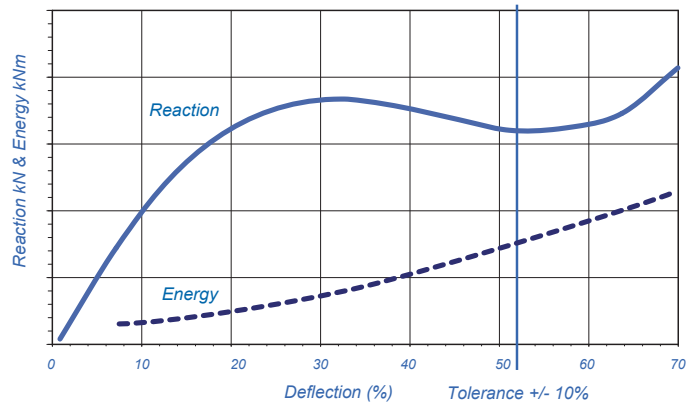
The table on page 27 gives an indication on whether support chains are required for use on the fender system

All dimensions in mm.
All weights in Kgs.

Performance Graph

Energy and Reaction Graph

Rated deflection 52%



Cell Fender Performance Table



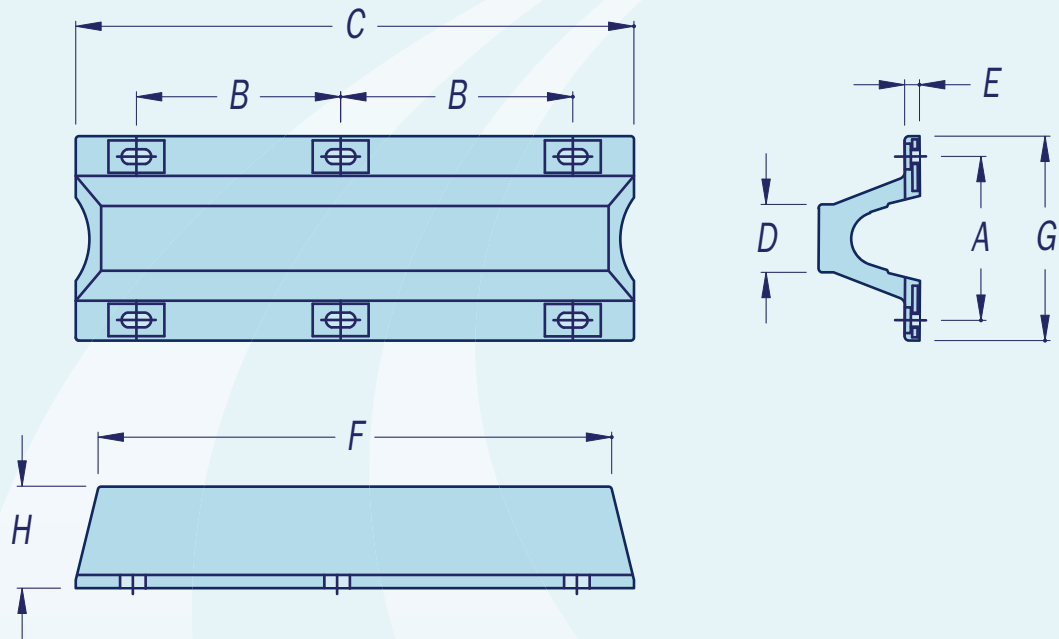
Energy Reaction		DCE 400	DCE 500	DCE 630	DCE 800	DCE 1000	DCE 1150	DCE 1250	DCE 1450	DCE 1600	DCE 1700	DCE 2000	DCE 2250	DCE 2500
D1.0	E	9	18	38	74	153	233	300	467	629	754	1227	2062	2829
	R	55	87	137	211	349	462	545	734	894	1009	1397	2085	2574
D1.1	E	10	19	40	79	162	246	316	493	664	796	1296	2163	2968
	R	59	92	144	223	368	488	575	775	944	1065	1474	2188	2701
D1.2	E	11	20	42	83	171	259	333	520	699	838	1365	2265	3108
	R	62	97	152	236	388	513	606	816	993	1122	1551	2291	2828
D1.3	E	11	21	45	88	179	272	350	546	734	880	1433	2367	3247
	R	65	102	160	249	407	539	636	857	1043	1178	1629	2394	2956
D1.4	E	12	23	47	92	188	285	367	572	769	923	1502	2469	3387
	R	68	107	168	262	427	565	667	898	1093	1235	1706	2498	3083
D1.5	E	12	24	49	97	197	298	384	598	804	965	1570	2571	3526
	R	71	112	175	274	446	591	697	939	1143	1291	1783	2601	3211
D1.6	E	13	25	51	101	205	311	401	625	839	1007	1639	2673	3666
	R	75	117	183	287	466	617	728	980	1193	1348	1861	2704	3338
D1.7	E	14	26	53	106	214	324	418	651	874	1049	1708	2775	3805
	R	78	122	191	300	485	643	758	1022	1243	1404	1938	2807	3466
D1.8	E	14	27	55	110	223	337	435	677	909	1091	1776	2877	3945
	R	81	127	199	313	505	669	789	1063	1293	1461	2015	2911	3593
D1.9	E	15	28	57	115	231	351	452	703	944	1134	1845	2979	4084
	R	84	132	206	325	525	695	820	1104	1343	1517	2093	3014	3721
D2.0	E	15	29	60	119	240	364	469	730	979	1176	1914	3081	4224
	R	88	137	214	338	544	721	850	1145	1393	1574	2170	3117	3848
D2.1	E	16	30	62	124	249	377	485	756	1014	1218	1982	3182	4363
	R	91	142	222	351	564	747	881	1186	1443	1630	2247	3220	3976
D2.2	E	17	31	64	128	257	390	502	782	1049	1260	2051	3284	4503
	R	94	147	230	364	583	773	911	1227	1493	1687	2325	3324	4103
D2.3	E	17	32	66	133	266	403	519	809	1084	1302	2119	3386	4642
	R	97	152	237	376	603	799	942	1269	1543	1743	2402	3427	4230
D2.4	E	18	33	68	137	275	416	536	835	1119	1344	2188	3488	4782
	R	100	157	245	389	622	825	972	1310	1593	1800	2479	3530	4358
D2.5	E	18	35	70	142	283	429	553	861	1154	1387	2257	3590	4921
	R	104	162	253	402	642	851	1003	1351	1643	1856	2557	3633	4485
D2.6	E	19	36	73	146	292	442	570	887	1189	1429	2325	3692	5061
	R	107	167	261	415	661	877	1033	1392	1693	1913	2634	3737	4613
D2.7	E	20	37	75	151	301	455	587	914	1224	1471	2394	3794	5200
	R	110	172	268	427	681	903	1064	1433	1743	1969	2712	3840	4740
D2.8	E	20	38	77	156	309	468	604	940	1259	1513	2462	3896	5340
	R	113	177	276	440	700	929	1094	1474	1793	2026	2789	3943	4868
D2.9	E	21	39	79	160	318	481	621	966	1294	1555	2531	3998	5479
	R	116	182	284	453	720	955	1125	1515	1843	2082	2866	4046	4995
D3	E	21	40	81	165	327	495	638	993	1329	1598	2600	4100	5619
	R	120	187	292	466	740	981	1156	1557	1893	2139	2944	4150	5123
D4	E	22	44	89	180	357	545	700	1090	1463	1752	2853	4510	6182
	R	131	205	321	513	813	1078	1276	1713	2082	2350	3240	4563	5633
Energy Reaction		DCE 400	DCE 500	DCE 630	DCE 800	DCE 1000	DCE 1150	DCE 1250	DCE 1450	DCE 1600	DCE 1700	DCE 2000	DCE 2250	DCE 2500

All energy figures are in kNm.
All reaction figures are in kN.
Standard tolerance applies.

Arch Fenders



Specification

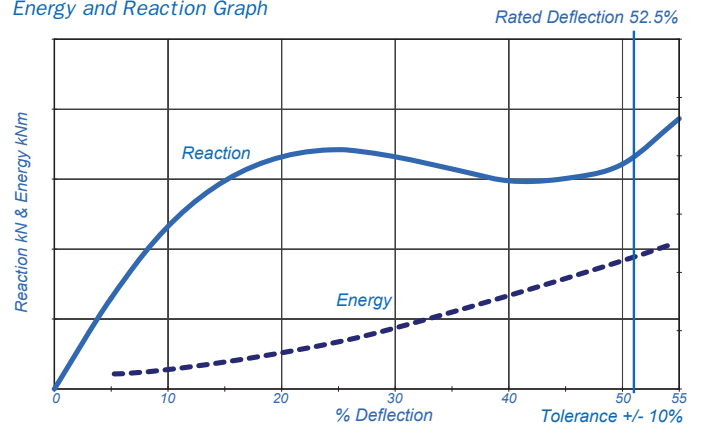


Fender	H	A	B	C	D	Bolts	E	F	G	Weight
DGA150	150	240	675	1575	98	6xM20	23	1500	300	38
DGA200	200	320	680	1600	130	6xM24	35	1500	400	62
DGA250	250	410	680	1625	164	6xM24	27	1500	500	88
DGA300	300	490	685	1650	225	6xM30	33	1500	600	120
DGA400	400	670	700	1700	300	6xM36	40	1500	800	200
DGA500	500	840	715	1750	375	6xM42	45	1500	1000	310
DGA600	600	1010	730	1800	450	6xM48	54	1500	1200	455
DGA800	800	1340	770	1990	600	6xM56	72	1500	1600	820
DGA1000	1000	1680	800	2000	750	6xM56	90	1500	2000	1275

All dimensions in mm.
All weights in Kgs
per 1000mm.

Performance Graph

Energy and Reaction Graph



Arch Fender Performance Table



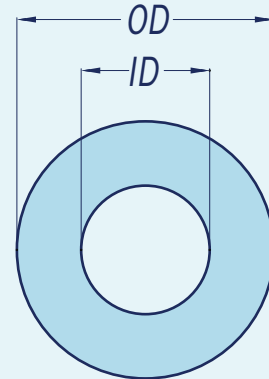
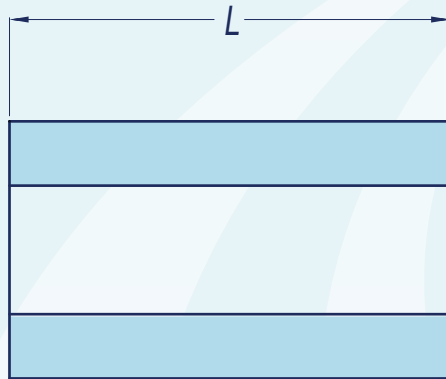
Energy Reaction		DGA 150	DGA 200	DGA 250	DGA 300	DGA 400	DGA 500	DGA 600	DGA 800	DGA 1000
D1.0	E	4.0	7.0	17.0	24.0	43.0	66.0	95.0	170.0	266.0
	R	76.0	104.0	205.0	246.0	328.0	410.0	492.0	656.0	820.0
D1.1	E	4.2	7.4	17.7	25.0	44.8	68.8	99.0	177.1	277.0
	R	80.9	110.5	213.5	256.2	341.6	427.0	512.4	683.2	854.0
D1.2	E	4.4	7.8	18.3	26.0	46.5	71.5	103.0	184.1	288.0
	R	85.8	117.0	222.0	266.4	355.2	444.0	532.7	710.4	888.0
D1.3	E	4.6	8.2	19.0	27.0	48.3	74.3	107.0	191.2	299.0
	R	90.7	123.5	230.5	276.6	368.8	461.0	553.1	737.6	922.0
D1.4	E	4.8	8.6	19.6	28.0	50.0	77.0	111.0	198.2	310.0
	R	95.6	130.0	239.0	286.8	382.4	478.0	573.4	764.8	956.0
D1.5	E	5.0	9.0	20.3	29.0	51.8	79.8	115.0	205.3	321.0
	R	100.5	136.5	247.5	297.0	396.0	495.0	593.8	792.0	990.0
D1.6	E	5.2	9.4	20.9	30.0	53.5	82.5	119.0	212.3	332.0
	R	105.4	143.0	256.0	307.2	409.6	512.0	614.1	819.2	1024.0
D1.7	E	5.4	9.8	21.6	31.0	55.3	85.3	123.0	219.4	343.0
	R	110.3	149.5	264.5	317.4	423.2	529.0	634.5	846.4	1058.0
D1.8	E	5.6	10.2	22.2	32.0	57.0	88.0	127.0	226.4	354.0
	R	115.2	156.0	273.0	327.6	436.8	546.0	654.8	873.6	1092.0
D1.9	E	5.8	10.6	22.9	33.0	58.8	90.8	131.0	233.5	365.0
	R	120.1	162.5	281.5	337.8	450.4	563.0	675.2	900.8	1126.0
D2.0	E	6.0	11.0	23.5	34.0	60.5	93.5	135.0	240.5	376.0
	R	125.0	169.0	290.0	348.0	464.0	580.0	695.5	928.0	1160.0
D2.1	E	6.2	11.4	24.2	35.0	62.3	96.3	139.0	247.6	387.0
	R	129.9	175.5	298.5	358.2	477.6	597.0	715.9	955.2	1194.0
D2.2	E	6.4	11.8	24.8	36.0	64.0	99.0	143.0	254.6	398.0
	R	134.8	182.0	307.0	368.4	491.2	614.0	736.2	982.4	1228.0
D2.3	E	6.6	12.2	25.5	37.0	65.8	101.8	147.0	261.7	409.0
	R	139.7	188.5	315.5	378.6	504.8	631.0	756.6	1009.6	1262.0
D2.4	E	6.8	12.6	26.1	38.0	67.5	104.5	151.0	268.7	420.0
	R	144.6	195.0	324.0	388.8	518.4	648.0	776.9	1036.8	1296.0
D2.5	E	7.0	13.0	26.8	39.0	69.3	107.3	155.0	275.8	431.0
	R	149.5	201.5	332.5	399.0	532.0	665.0	797.3	1064.0	1330.0
D2.6	E	7.2	13.4	27.4	40.0	71.0	110.0	159.0	282.8	442.0
	R	154.4	208.0	341.0	409.2	545.6	682.0	817.6	1091.2	1364.0
D2.7	E	7.4	13.8	28.1	41.0	72.8	112.8	163.0	289.9	453.0
	R	159.3	214.5	349.5	419.4	559.2	699.0	838.0	1118.4	1398.0
D2.8	E	7.6	14.2	28.7	42.0	74.5	115.5	167.0	296.9	464.0
	R	164.2	221.0	358.0	429.6	572.8	716.0	858.3	1145.6	1432.0
D2.9	E	7.8	14.6	29.4	43.0	76.3	118.3	171.0	304.0	475.0
	R	169.1	227.5	366.5	439.8	586.4	733.0	878.7	1172.8	1466.0
D3	E	8.0	15.0	30.0	44.0	78.0	121.0	175.0	311.0	486.0
	R	174.0	234.0	375.0	450.0	600.0	750.0	899.0	1200.0	1500.0
Energy Reaction		DGA 150	DGA 200	DGA 250	DGA 300	DGA 400	DGA 500	DGA 600	DGA 800	DGA 1000

All energy figures are in kNm.
All reaction figures are in kN.
Performance figures for 1000mm length. Standard tolerance applies.

Cylindrical Fenders



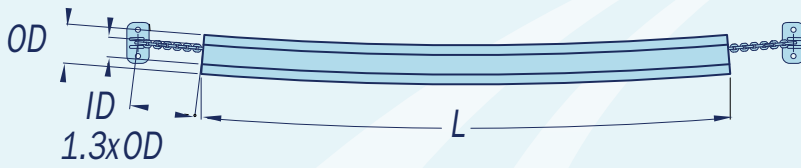
Specification & Performance



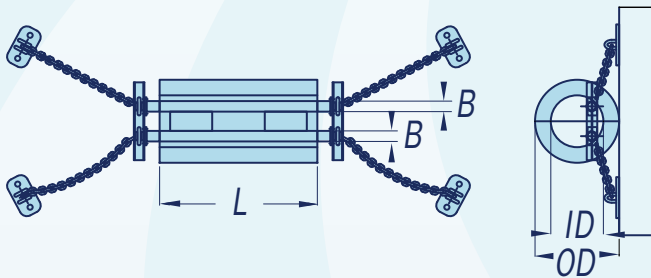
OD	ID	L Max	E (kNm) P/M	R (kN) P/M	HP (kNm ²) P/M	ØB	Chain	Shackle	Weight
100	50	6000	0.8	43	547		14	16	7.2
125	65	6000	1.3	51	500		14	16	11
150	75	6000	1.8	65	552		16	16	16.3
175	75	6000	2.7	92	781		16	16	24.1
200	100	6000	3.3	86	547		18	19	29
250	125	6000	5.1	108	550		20	22	45.3
300	150	6000	7.4	129	547		24	28	65.2
380	190	6000	11.8	164	550		28	35	105
400	200	6000	13.1	172	547		28	35	116
450	225	6000	16.6	194	549		28	35	147
500	250	6000	28	275	700		32	38	181
600	300	3000	40	330	700		35	44	255
800	400	3000	72	440	700	55	32	38	453
1000	500	3000	112	550	700	65	38	44	707
1200	600	3000	162	660	700	75	40	50	1018
1400	700	3000	220	770	700	80			1386
1400	800	3000	208	649	516	80			1245
1500	750	3000	253	825	700	85			1591
1600	800	3000	288	880	700	90			1810
1750	900	3000	340	929	657	100			2124
2000	1200	3000	415	871	462	110			2414
2400	1200	3000	647	1321	701	130			4073
2700	1300	3000	818	1486	728	140			5154

All dimensions in mm.
 All weights in Kgs per 1000mm.
 Figures for 1000mm length.
 All energy figures are in kNm.
 All reaction figures are in kN.
 Standard tolerance applies.

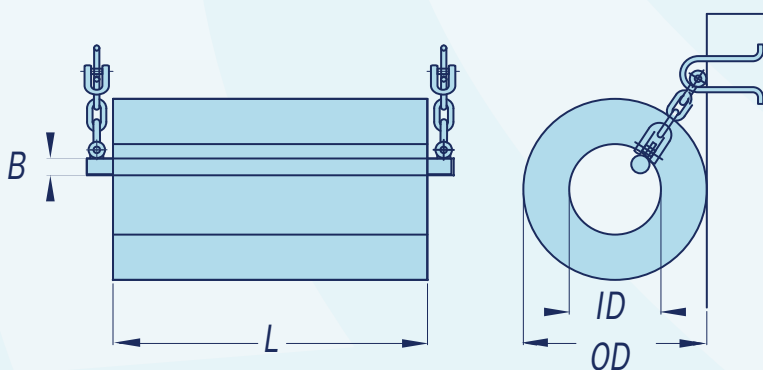
Cylindrical Fenders



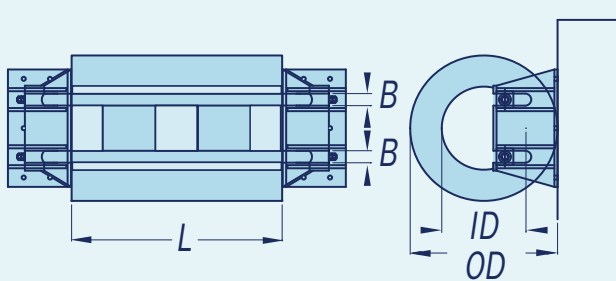
Small Hollow Cylindrical Fender between 100mm - 500mm OD suspended using Chains and brackets or U anchors.



Medium Hollow Cylindrical Fender between 600mm - 1000mm OD fixed to quay side using two central support bars connected to 4 support chains which is mounted to four brackets fixed to quay structure with anchors.



Large Hollow Cylindrical Fender between 1000mm - 1600mm OD fixed to quay side using central support bar connected to hanging chains at either end fixed to either brackets or U anchors.

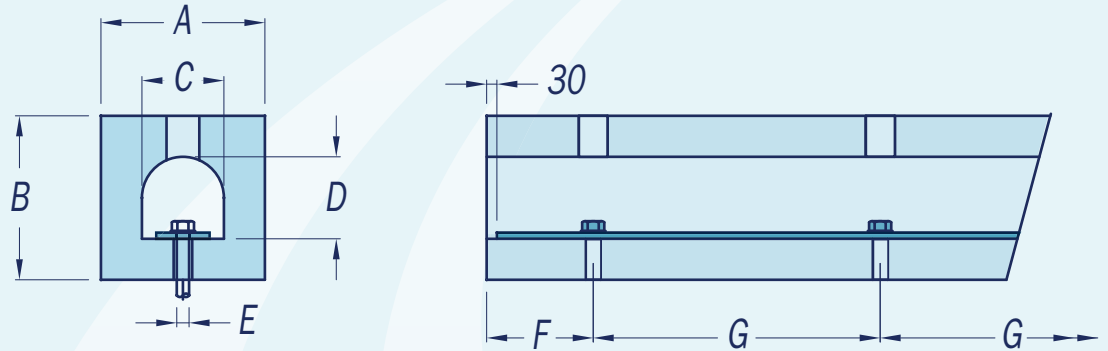


Jumbo Large Hollow Cylindrical Fender between 1700mm - 2200mm OD fixed to quay side using two central support bars connected to a fixed bracket which is mounted to the quay structure secured with anchors.

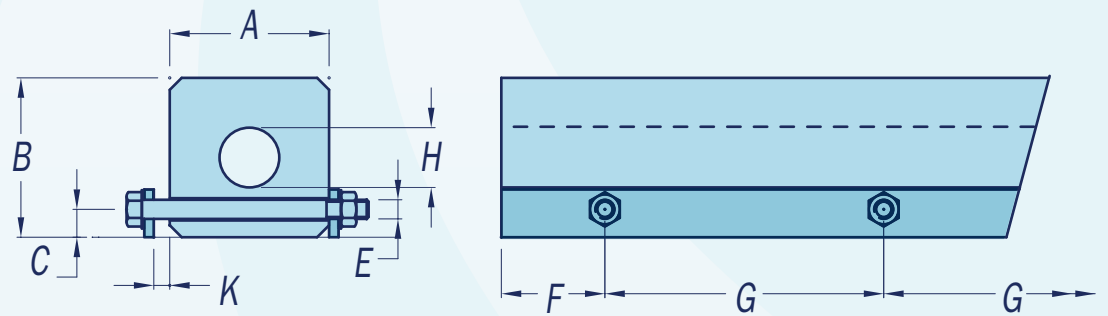
Extruded Fenders



Hollow D Bore Specification



Hollow C Bore Specification



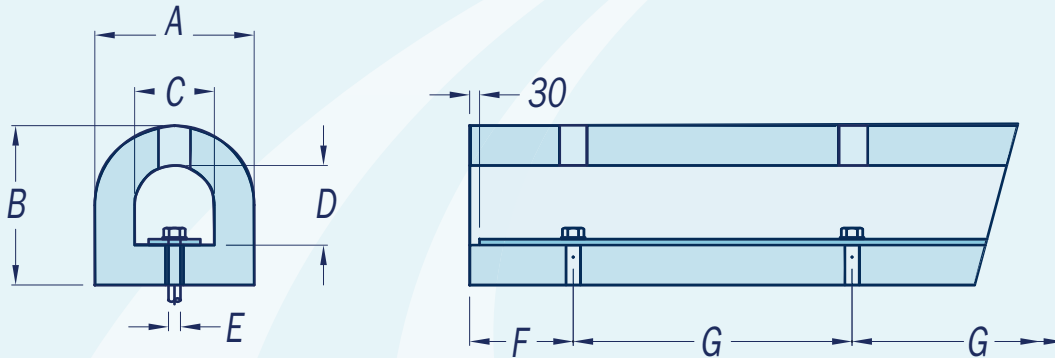
A	B	C	D	K	E Bolt	F Max	G Max	Flat Bar	Weight "D"	Weight "C"
80	70	45	30	10	M12	100	280	35 x 5	6	5
100	100	50	45	10	M12	120	280	40 x 5	10	11
125	125	60	60	15	M16	150	280	50 x 6	17	17
150	150	75	75	15	M16	150	300	60 x 8	25	22
200	150	80	80	20	M20	170	350	80 x 10	30	25
200	200	100	100	20	M20	170	400	80 x 10	41	41
250	200	100	100	25	M24	180	450	90 x 12	57	43
250	250	125	125	25	M24	180	450	90 x 12	70	62
300	300	150	150	30	M24	190	500	110 x 12	102	90
350	350	175	175	30	M30	190	500	130 x 15	143	119
400	400	175	150	35	M30	200	500	130 x 15	192	153
450	450	200	200	35	M36	200	500	150 x 15	242	194
500	500	250	250	40	M36	230	500	180 x 20	302	241

All dimensions in mm.
All weights in Kgs per 1000mm.
Standard tolerance applies.

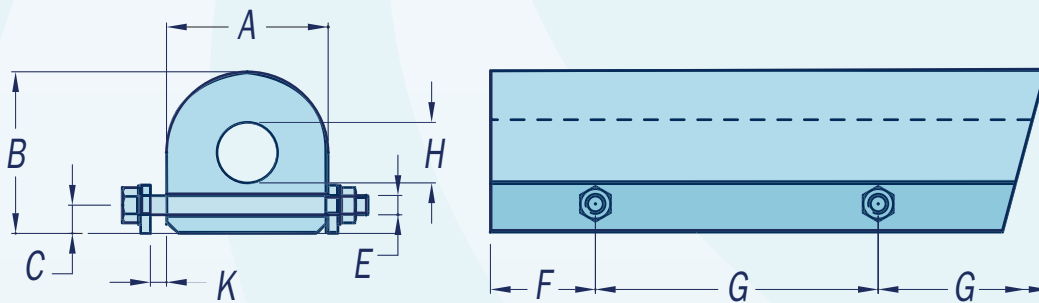
Extruded Fenders



DD Specification



DD1 Specification



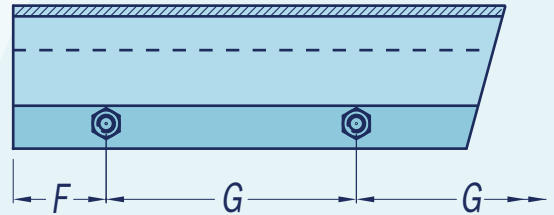
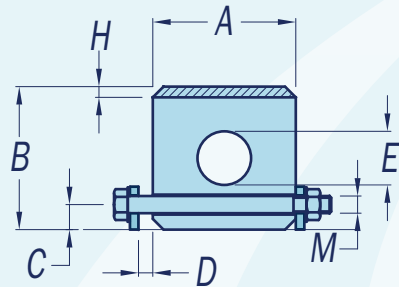
A	B	C	D	ØH	K	E Bolt	F Max	G Max	Flat Bar	Weight "DD"	Weight "DD1"
80	70	45	30	30	10	M12	100	280	35 x 5	5	5
100	100	50	45	30	10	M12	120	280	40 x 5	9	11
125	125	60	60	35	15	M16	150	280	50 x 6	14	17
150	150	75	75	65	15	M16	150	300	60 x 8	20	22
200	150	80	80	75	20	M20	170	350	80 x 10	24	25
200	200	100	100	75	20	M20	170	400	80 x 10	35	41
250	200	100	100	100	25	M24	180	450	90 x 12	41	43
250	250	125	125	100	25	M24	180	450	90 x 12	54	62
300	300	150	150	120	30	M24	190	500	110 x 12	78	90
350	350	175	175	150	30	M30	190	500	130 x 15	107	119
400	400	175	150	180	35	M30	200	500	130 x 15	157	153
450	450	200	200	200	35	M30	200	500	150 x 15	189	194
500	500	250	250	220	40	M36	230	500	180 x 20	218	241

All dimensions in mm.
All weights in Kgs per 1000mm.
Standard tolerance applies.

Polyrub Buffers

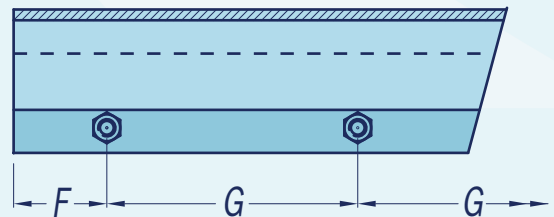
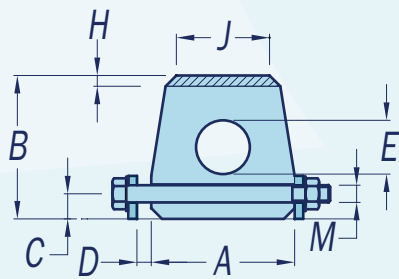


Type 1 Specification



A	B	C	D	ØE	F Max	G Max	H	M	Flat Bar	Max Lgth	Weight
100	100	25	10	30	100	250	20	M12	50 x 6	3000	11
150	150	30	12	65	140	350	20	M16	60 x 8	3000	22
200	200	45	20	75	160	400	25	M20	80 x 10	3000	42
250	250	50	30	100	190	450	25	M24	100 x 10	3000	63
300	300	60	30	125	200	450	25	M24	110 x 12	3000	95

Type 2 Specification



A	B	C	D	ØE	F Max	G Max	H	J	M	Flat Bar	Max Lgth	Weight
100	100	25	10	30	100	250	20	60	M12	50 x 6	3000	9
150	150	30	12	65	140	350	20	110	M16	60 x 8	3000	22
200	200	45	20	75	160	400	20	160	M20	80 x 10	3000	29

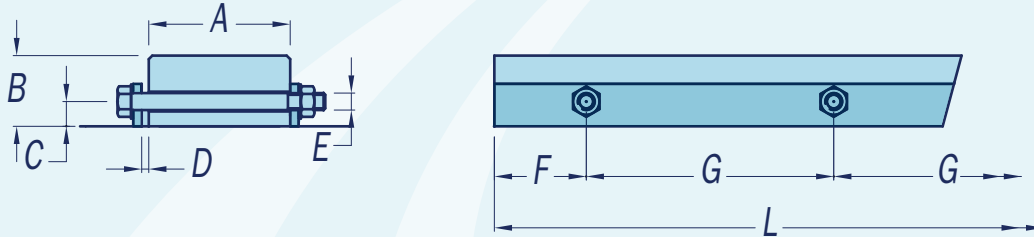
All weights in Kgs per 1000mm.

UHMW-PE Sliding Fenders

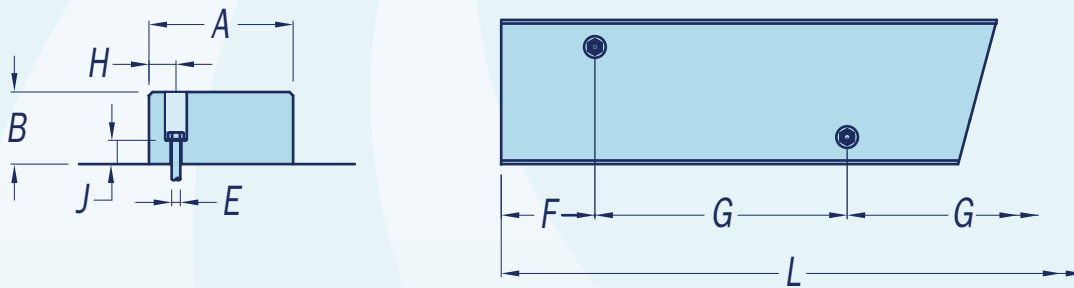


Sliding Fender Specification

UHMW PE Fender side mount



UHMW PE Fender top mount



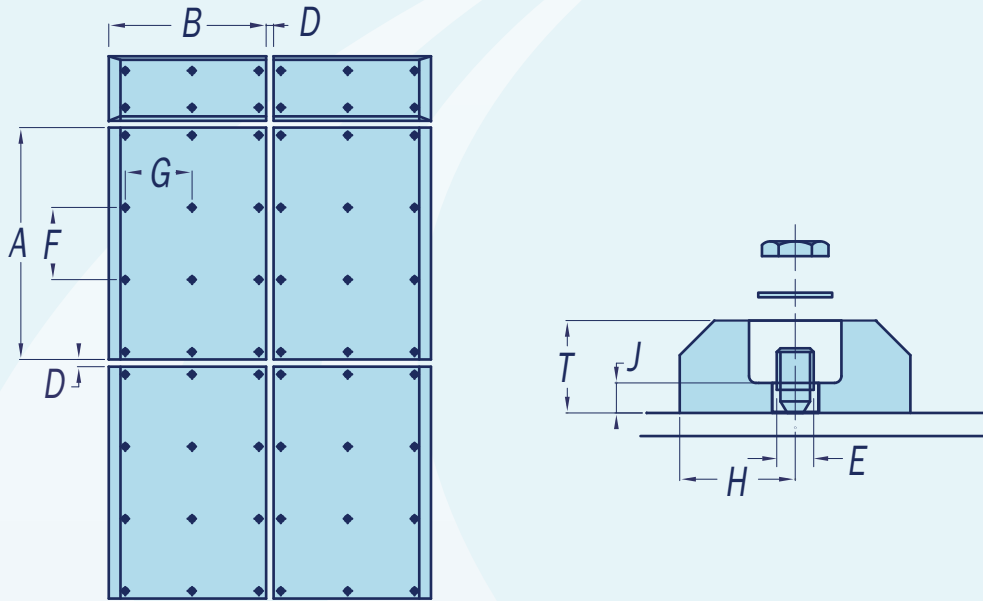
A	B	L Max	C	D	E Bolt	F Max	G Max	H	J	Flat Bar	Weight
70	50	6200			M16	60	120	35	15		3
80	60	6200			M16	60	120	40	18		5
100	50	6200			M16	60	120	50	15		5
100	65	6200			M16	60	120	50	20		6
100	100	6200			M16	60	120	50	30		10
120	80	6200			M16	60	300	60	24		9
120	120	6200			M16	60	300	60	36		14
140	70	6200	30	10	M20	100	300	70	21	80 x 10	9
160	70	6200	30	10	M20	100	300	80	21	80 x 10	11
160	160	6200	30	10	M20	100	300	80	48	80 x 10	25
170	120	6200	35	10	M20	100	300	85	36	80 x 10	20
180	70	6200	35	10	M20	100	300	90	21	80 x 10	12
180	180	6200	35	10	M20	130	400	90	55	80 x 10	31
190	110	6200	35	10	M20	130	400	90	33	80 x 10	20
200	75	6200	50	10	M20	130	400	60	23	80 x 10	14
200	100	6200	50	10	M20	130	400	60	30	80 x 10	19
200	150	6200	50	10	M20	130	400	60	45	80 x 10	29
200	200	6200	50	10	M20	130	400	60	61	80 x 10	38
250	150	6200	50	10	M24	150	500	60	45	80 x 10	36
250	160	6200	50	10	M24	150	500	60	48	100 x 10	38
250	250	6200	50	10	M24	150	500	60	76	100 x 10	60

All dimensions in mm.
All weights in Kgs per 1000mm.
Standard tolerance applies.

UHMW-PE Fender Pads



Fender Pad Specification



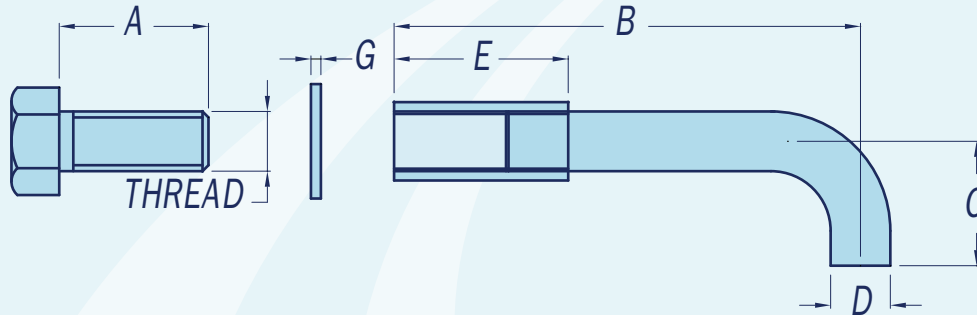
A	B	T	D	E	F Max	G Max	H Max	J	Weight
500	500	30	10	M16	500	500	50	9	7
500	500	40	10	M16	500	500	50	13	10
500	500	50	10	M16	500	500	75	16	12
500	500	60	10	M16	500	500	75	19	14
500	500	70	10	M24	500	500	100	22	17
500	1000	30	10	M16	500	500	50	9	14
500	1000	40	10	M16	500	500	50	13	19
500	1000	50	10	M20	500	500	75	16	24
500	1000	60	10	M20	500	500	75	19	29
500	1000	70	10	M24	500	500	100	22	34
1000	1000	40	10	M16	500	500	50	13	38
1000	1000	50	10	M16	500	500	75	16	48
1000	1000	60	10	M20	500	500	75	19	58
1000	1000	70	10	M24	500	500	100	22	67
1000	1500	40	10	M16	500	500	50	13	58
1000	1500	50	10	M16	500	500	75	16	72
1500	1500	40	15	M16	500	500	50	13	86
1500	1500	50	15	M16	500	500	75	16	108
1200	2000	40	15	M16	500	500	50	13	92
1200	2000	50	15	M16	500	500	75	16	115
1500	2000	40	15	M16	500	500	50	13	115
1500	2000	50	15	M16	500	500	75	16	144

All dimensions in mm.
All weights in Kgs.
Standard tolerance applies.

Fixings - Anchors

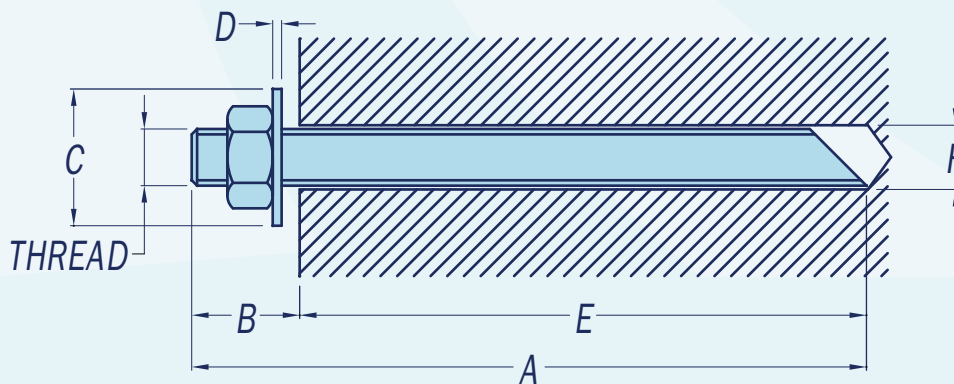


Cast Anchor Specification



Type	Thread	A	B	C	ØD	E	ØF	G	Weight
MAC16	M16	50	190	50	16	60	39	3	0.5
MAC20	M20	50	210	60	20	70	40	3	1.0
MAC24	M24	60	260	60	24	90	50	3	1.7
MAC30	M30	80	280	80	30	95	60	4	2.9
MAC36	M36	80	320	80	36	120	72	5	4.3
MAC42	M42	100	345	90	42	135	78	7	6.4
MAC48	M48	120	375	100	48	140	92	8	9.2
MAC56	M56	140	420	110	56	170	105	9	14.2
MAC64	M64	130	600	140	64	190	115	9	24.2

Resin Anchor Specification



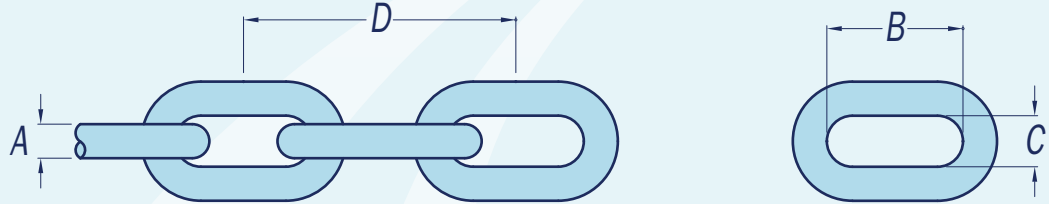
Type	Thread	A	B	ØC	D	E	ØF	Weight
MAR16	M16	210	50	39	3	160	20	0.5
MAR20	M20	250	50	40	3	200	24	0.8
MAR24	M24	310	50	50	3	240	28	1.3
MAR30	M30	370	70	60	4	300	36	2.2
MAR36	M36	440	80	72	5	360	42	3.9
MAR42	M42	500	80	78	7	420	48	6.0
MAR48	M48	580	100	92	8	480	54	8.8
MAR56	M56	680	120	105	9	560	62	13.9
MAR64	M64	770	130	115	9	640	70	20.2

All dimensions in mm.
All weights in Kgs.

Fixings - Chains



Specification

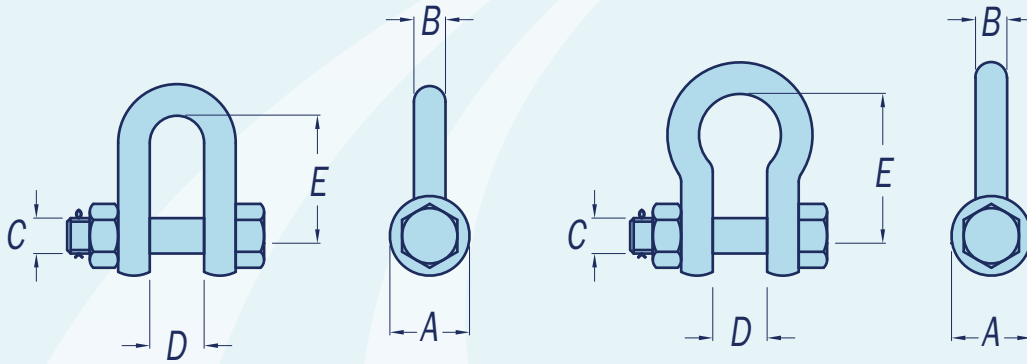


A	B	C	D	Safe Working Load kN	Min. Breaking Load kN	Weight Kg/m
19	76	29	152	45	244	6.67
20	80	30	160	52	263	8.78
22	88	33	176	61	305	10.77
24	96	36	192	70	350	11.28
25	100	38	200	80	399	13.39
27	108	41	216	90	450	15.48
28	112	42	224	101	504	16.73
30	120	45	240	112	562	18.53
32	128	48	256	125	623	21.43
34	136	51	272	137	685	22.90
35	140	53	280	150	753	25.08
36	144	54	288	164	823	27.43
38	152	57	304	179	897	30.21
40	160	60	320	194	972	32.71
42	168	63	336	210	1052	35.79
43	172	65	344	226	1135	38.65
45	180	68	360	244	1221	41.61
46	184	69	368	263	1309	45.57
48	192	72	384	280	1401	48.05
49	196	74	392	299	1495	51.39
50	200	75	400	319	1594	54.93
52	208	78	416	339	1694	58.08
54	216	81	432	360	1800	61.93
57	228	86	456	404	2018	69.51
60	240	90	480	449	2248	77.34
64	256	96	512	498	2491	85.90

All dimensions in mm.
All weights in Kgs per 1000mm.

Fixings - Shackles

Specification



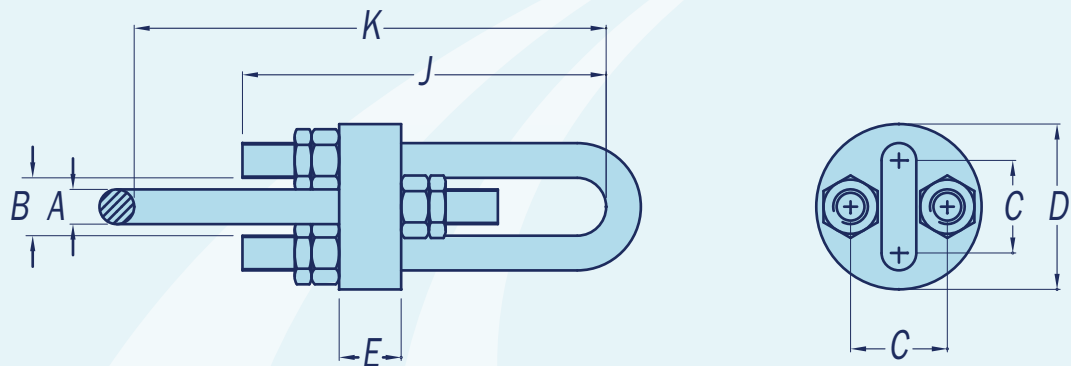
Eye Dia A	Matl. Size B	Dia Pin C	Inside Width D	Inside Length E			Weight
				Anchor Type	Chain Type	SWL kN	
40	16	19	27	71	60	35	0.73
50	19	22	32	83	71	47	1.27
57	22	25	36	97	84	65	1.78
63	25	28	43	109	95	85	2.52
70	28	32	46	124	105	95	3.52
76	32	35	51	137	118	117	5.03
82	35	38	57	152	133	132	6.49
92	38	42	60	167	145	166	8.78
102	42	48	66	189	160	196	10.65
108	44	50	73	203	171	245	14.06
117	48	54	76	214	186	294	17.23
127	50	57	82	226	200	345	18.50
152	63	70	105	302	238	490	38.39
165	76	82	127	371	270	735	56.06
203	89	95	140	429	315	981	99.16

All dimensions in mm.
All weights in Kgs.

Fixings - Chain Adjusters

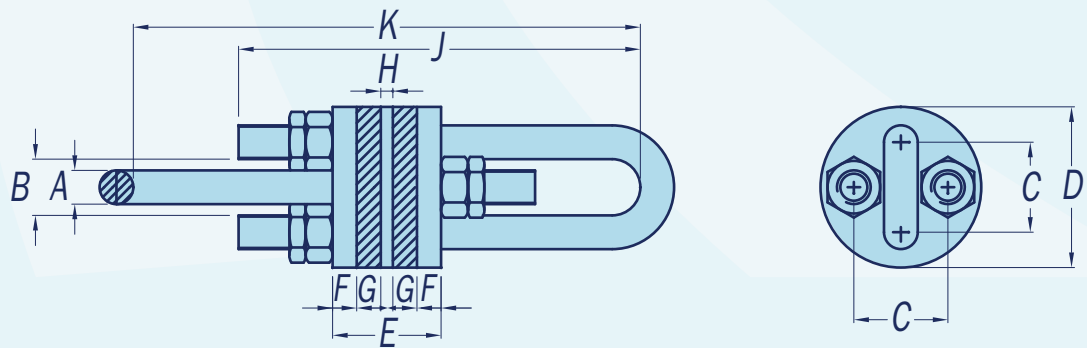


Chain Adjuster Specification



SWL kN	A	B	C	D	E	J	Weight	Thread Length	Full Open K	Full Close K
80	24	38	62	120	25	220	11.6	150	450	300
130	30	48	78	150	30	330	25.7	185	615	430
180	35	60	95	180	40	445	32.0	200	775	575
250	42	70	112	200	40	500	46.0	230	865	637
320	45	80	125	220	40	540	56.0	240	920	680
410	52	83	135	275	50	630	85.0	270	1080	810
509	56	100	156	295	50	670	107.0	290	1145	855
726	68	112	180	320	80	880	190.0	370	1470	1100
1000	76	129	200	350	80	960	273.0	410	1595	1185

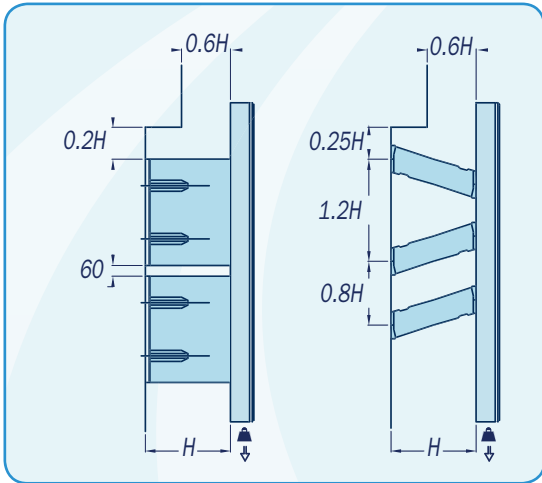
Shock Absorber Specification



SWL kN	A	B	C	D	E	F	G	H	J	Weight	Thread Length	Full Open K	Full Close K
45	19	38	62	120	72	12	20	8	220	11.6	150	400	250
80	24	38	62	120	102	25	20	12	220	11.6	150	375	225
130	30	48	78	150	102	25	20	12	330	25.7	185	545	360
180	35	60	95	180	135	30	30	15	445	32.0	200	680	480
250	42	70	112	200	135	30	30	15	500	46.0	230	770	542
320	45	80	125	220	135	30	30	15	540	56.0	240	825	585
410	52	83	135	275	180	40	40	20	630	85.0	270	950	680
509	56	100	156	295	180	40	40	20	670	107.0	290	1015	725
726	68	112	180	320	230	50	50	30	880	190.0	370	1320	950
1000	76	129	200	350	230	50	50	30	960	273.0	410	1445	1035

All dimensions in mm.
All weights in Kgs.

Support Weight Requirements



Leg Fender

DGL Leg Fender mounted Horizontally

D1 Max support = $0.81 \times n \times h \times l$

D2 Max support = $1.0 \times n \times h \times l$

D3 Max support = $1.12 \times n \times h \times l$

DGL Leg Fender mounted Vertically

D1 Max support = $1.29 \times n \times h \times l$

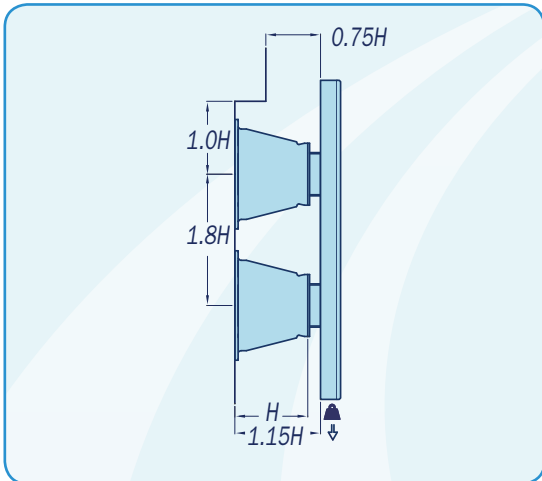
D2 Max support = $1.51 \times n \times h \times l$

D3 Max support = $1.78 \times n \times h \times l$

n = number of pairs of Leg Fenders

h = Height of Leg Fender

l = Length of Leg Fender



Cone Fender

DCN Cone Fender mounted Horizontally

D1 Max support = $1.12 \times n \times w$

D2 Max support = $1.41 \times n \times w$

D3 Max support = $1.63 \times n \times w$

D4 Max support = $1.84 \times n \times w$

DCN Cone Fender mounted Vertically

D1 Max support = $1.35 \times n \times w$

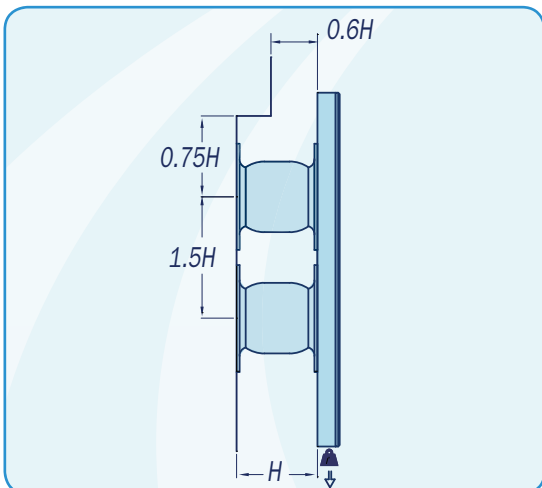
D2 Max support = $1.84 \times n \times w$

D3 Max support = $1.93 \times n \times w$

D4 Max support = $2.04 \times n \times w$

n = number of Cone Fenders

w = weight of Cone Fender



Cell Fender

DGC Cell Fender mounted Horizontally

D1 Max support = $1.12 \times n \times w$

D2 Max support = $1.41 \times n \times w$

D3 Max support = $1.82 \times n \times w$

DGC Cell Fender mounted Vertically

D1 Max support = $1.31 \times n \times w$

D2 Max support = $1.79 \times n \times w$

D3 Max support = $1.24 \times n \times w$

n = number of Cell Fenders

w = weight of Cell Fender

Properties & Specifications



UHMW PE Fender Properties

Property	Test Method	Typical Value	Unit
Density	DIN 53479 / ASTM D 792	0.93-0.95	g/cm ³
Molecular Weight	Viscosimetric	~4,000,000	g/mol
Dynamic Function	DIN 53375 / ASTM D 1894	≤0.15	—
Yield Strength	ISO 527 / ASTM D 638	≥17 / ≥20	MPa
Tensile Break	ASTM D 638	≥40	MPa
Elongation at Break	ISO 527 / ASTM D 638	≥50 / ≥350	%
Flexural Modulus	ASTM D 790B	≥800	MPa
Shore Hardness	ISO 868	60	15 sec
Single-V notched Impact	ISO 868 / ASTM 256A	≥130 / No break	Kj/m ²
Abrasion Index	Sand Slurry (steel=100)	10-15	—
Operating Temperature	—	-80 to +80	°C
Thermal Expansion	DIN 52328 / ASTM D 696	~2x10 ⁻⁴	K ⁻¹

Rubber Properties - Moulded

Property	Testing Standard	Condition	Requirement
Tensile Strength	DIN 53504; ASTM D 412 Die C; AS 1180.2; BS ISO 37; JIS K 6251 GB/T528	Original	17.8 MPa (min)
		Aged for 96 hours at 70°C	15.7 MPa (min)
Elongation at break	DIN 53504; ASTM D 412 Die C; AS 1180.2; BS ISO 37; JIS K 6251GB/T528,I	Original	445%
		Aged for 96 hours at 70°C	378%
Hardness	DIN 53505; ASTM D 2240; AS1683.15.2; JIS K 6253 GB/T531	Original	72°Shore A (max)
		Aged for 96 hours at 70°C	Original +5° Shore A (max)
Compression Set	ASTM D 395 Method B; AS 1683.13 Method B; BS903 A6 ISO 815; JIS K 6262 DIN53517 GB/7759,I	22 hours at 70°C	25.3% (max)
		24 hours at 70°C	
Tear Resistance	ASTM D 624 Die B; AS1683.12; BS ISO 34-1; JIS K 6252 DIN53507 GB/T7529	Original	70kN/m (min) 84N/cm (min)
Ozone Resistance	DIN 53509; ASTM D 1149; AS 1683-24; ISO 34.1; JIS K 6259 GB/T13642	50pphm at 20% strain, 40°C, 48 hours	No Cracks
Seawater Resistance	DIN 86076	28 days at 95°C ± 2°C	Shore A: ±7° (max) / Volume +8% (max)
Abrasion Resistance	DIN53516 GB9867;BS903.A9i	Original	95mm ³ (max)
Bond Strength	ASTM D429, Method B; BS 903.A21 Section 21.1	Rubber to Steel	7.5N/mm (min)

Properties & Specifications

Rubber Properties - Extruded



Property	Testing Standard	Condition	Requirement
Tensile Strength	DIN 53504; ASTM D 412 Die C; AS 1180.2; BS ISO 37; JIS K 6251	Original	13.0 MPa (min)
		Aged for 96 hours at 70°C	10.4 MPa (min)
Elongation at break	DIN 53504; ASTM D 412 Die C; AS 1180.2; BS ISO 37; JIS K 6251	Original	280%
		Aged for 96 hours at 70°C	224%
Hardness	DIN 53505; ASTM D 2240; AS1683.15.2; JIS K 6253	Original	78°Shore A (max)
		Aged for 96 hours at 70°C	Original +8° Shore A (max)
Compression Set	ASTM D 395 Method B; AS 1683.13 Method B; BS903 A6 ISO 815; JIS K 6262	22 hours at 70°C	30% (max)
		DIN53517	24 hours at 70°C
Tear Resistance	ASTM D 624 Die B; AS1683.12; BS ISO 34-1; JIS K 6252	Original	60kN/m (min)
		DIN53507	50N/cm (min)
Ozone Resistance	DIN 53509; ASTM D 1149; AS 1683-24; BS ISO 1431-1; JIS K 6259	50pphm at 20% strain, 40°C, 100 hours	No Cracks
Seawater Resistance	DIN 86076	28 days at 95° C ± 2°c	Shore A: ±10° (max)/Volume +10/-5% (max)
Abrasion Resistance	DIN53516	Original	180mm ³ (max)

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*Issue 3
November 2009*