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Remetente: "ADM Construtora AJM" <administrativo@ajminfra.com.br>
Para: "APPA EQUIPE DE PREGÃO" <pregaoeletronico@appa.pr.gov.br>
Data: 08/05/2025 14:50 (20 minutos atrás)
Assunto: Re: Diligência
Anexos: AJM_DEFENSAS.zip (14.69 MB)

Prezados, boa tarde.

Segue em anexo a documentação solicitada.

Em ter., 6 de mai. de 2025 às 09:25, APPA EQUIPE DE PREGÃO
<pregaoeletronico@appa.pr.gov.br> escreveu:

Bom dia

Realizada a competente análise técnica, solicitamos seus préstimos para esclarecimentos/correções acerca dos apontamentos incidentes sobre a proposta, informações técnicas, laudos e relatórios.

Prazo de atendimento: 2 dias

Coloco-me à disposição para eventuais esclarecimentos.

Angelo G. Bochenek

Pregoeiro



Gerência de Administração
PREGÃO ELETRÔNICO | Coordenadoria de Licitações - COLIC

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DOM PEDRO II - Paranaguá/PR

PLANILHA REEQUILBRADA

Nº do Item (na ATA)	DESCRIÇÃO	MATERIAL	Qtde	UM	Unitário	Total
1	ARRUELA LISA Ø1" GF	ASTM A36	80,00	UND	R\$ 34,80	R\$ 2.784,00
2	ARRUELA LISA DIN 125 M36 GF	SAE 1010/1020	20,00	UND	R\$ 15,75	R\$ 315,00
3	ARRUELA ESPECIAL 86 X 86 X 3/8" GF	ASTM A36	100,00	UND	R\$ 25,40	R\$ 2.540,00
4	ARRUELA ESPECIAL 125 X 170 X 3/8" GF	ASTM A36	100,00	UND	R\$ 55,11	R\$ 5.511,00
5	ARRUELA ESPECIAL 6 X 125 X 130 GF	ASTM A36	48,00	UND	R\$ 29,75	R\$ 1.428,00
6	PORCA SEXTAVADA ASTM A194 GR.2H UNC Ø1" GF	SAE 1045	300,00	UND	R\$ 64,30	R\$ 19.290,00
7	PORCA ASTM A194 GR.2H UNC Ø1.3/4" GF	SAE 1045	300,00	UND	R\$ 105,80	R\$ 31.740,00
8	CHUMBADOR (BARRA ROSCADA) UNC Ø1" X 395 GF	SAE 1045	50,00	UND	R\$ 683,00	R\$ 34.150,00
9	CHUMBADOR CONCRETO NOVO UNC Ø1" X 260 GF	SAE 1045	18,00	UND	R\$ 930,00	R\$ 16.740,00
10	CHUMBADOR CONCRETO NOVO UNC Ø1.3/4" X 360 GF	SAE 1045	12,00	UND	R\$ 2.325,00	R\$ 27.900,00
11	CHUMBADOR CONCRETO NOVO MA M36 X 320 GF	SAE 1045	48,00	UND	R\$ 1.705,00	R\$ 81.840,00
12	PARAFUSO SEXTAVADO ASTM A325 UNC Ø1.3/4" X 127 GF	SAE 1045	300,00	UND	R\$ 483,00	R\$ 144.900,00
13	PARAFUSO SEXTAVADO A325 RI UNC Ø1" X 65 GF	SAE 1045	18,00	UND	R\$ 65,10	R\$ 1.171,80
14	PARAFUSO SEXTAVADO ASTM A325 RI UNC Ø1.3/4" X 85 GF	SAE 1045	20,00	UND	R\$ 325,00	R\$ 6.500,00
15	PARAFUSO SEXTAVADO DIN 933 8.8 MA M36 X 100 GF	SAE 1045	25,00	UND	R\$ 192,96	R\$ 4.824,00
16	PARAFUSO SEXTAVADO DIN 933 8.8 MA M36 X 120 GF	SAE 1045	16,00	UND	R\$ 232,50	R\$ 3.720,00
17	PARAFUSO SEXTAVADO DIN 933 8.8 MA M36 X 80 GF	SAE 1045	25,00	UND	R\$ 158,10	R\$ 3.952,50
18	CORRENTE DE CISALHAMENTO Ø1" X 20 ELOS CONF DIN 764	GRAU 2	200,00	UND	R\$ 597,23	R\$ 119.446,00
19	CORRENTE DE CISALHAMENTO Ø1" X 09 ELOS	GRAU 2	100,00	UND	R\$ 268,75	R\$ 26.875,00
20	CORRENTE DE CISALHAMENTO Ø1" X 07 ELOS	GRAU 2	100,00	UND	R\$ 209,03	R\$ 20.903,00
21	CORRENTE DE CISALHAMENTO INFERIOR Ø1.1/2" X 10 ELOS GF	GRAU 3	10,00	UND	R\$ 685,61	R\$ 6.856,10
22	CORRENTE DE CISALHAMENTO SUPERIOR Ø1.1/2" X 9 ELOS GF	GRAU 3	10,00	UND	R\$ 617,04	R\$ 6.170,40
23	CORRENTE DE PESO Ø1" X 9 ELOS CONF DIN 764	GRAU 2	100,00	UND	R\$ 268,75	R\$ 26.875,00
24	CORRENTE DE PESO Ø1.1/4" X 12 ELOS GF	GRAU 3	10,00	UND	R\$ 459,57	R\$ 4.595,70
25	CORRENTE DE PESO Ø1.1/4" X 15 ELOS GF	GRAU 2	100,00	UND	R\$ 574,46	R\$ 57.446,00

26	ELO DE LIGAÇÃO 1" X Ø270 GF	ASTM A36	10,00	UND	R\$	1.400,00	R\$	14.000,00
27	SUORTE DE CORRENTE 120 X 340 X 25,4 GF	ASTM A36	150,00	UND	R\$	1.511,25	R\$	226.687,50
28	SUORTE DE CORRENTE U INFERIOR Ø2" X 580 GF	SAE 1045	50,00	UND	R\$	759,50	R\$	37.975,00
29	SUORTE DE CORRENTE U SUPERIOR Ø2" X 710 GF	SAE 1045	50,00	UND	R\$	1.999,50	R\$	99.975,00
30	SUORTE DE CORRENTE Ø1.1/2" X 580 UNC GF	SAE 1045	50,00	UND	R\$	2.418,00	R\$	120.900,00
31	AJUSTADOR DE CORRENTE Ø1.1/4" X 270 GF	SAE 1045	50,00	UND	R\$	1.233,80	R\$	61.690,00
32	AJUSTADOR DE CORRENTE Ø1.1/4" X 285 GF	SAE 1045	4,00	UND	R\$	3.720,00	R\$	14.880,00
33	TENSIONADOR DE CORRENTE Ø2" GF	SAE 1045	10,00	UND	R\$	3.875,00	R\$	38.750,00
34	MANILHA RETA COM PINO ROSCADO Ø1.1/4" GF CONF DIN 82101 TIPO C	GRAU 2	200,00	UND	R\$	288,57	R\$	57.714,00
35	MANILHA RETA COM PINO ROSCADO Ø1.3/4" GF	GRAU 3	20,00	UND	R\$	900,00	R\$	18.000,00
36	MANILHA RETA COM PINO ROSCADO Ø1" GF	GRAU 3	100,00	UND	R\$	152,91	R\$	15.291,00
37	PAINEL METÁLICO 1800 X 2200 C/ CHANFROS	ASTM A36 / UHMWPE	10,00	UND	R\$	48.370,00	R\$	483.700,00
38	PAINEL METÁLICO 2600 X 5500 C/ CHANFROS	ASTM A36 / UHMWPE	1,00	UND	R\$	165.574,58	R\$	165.574,58
39	PAINEL METÁLICO 4550 X 3800 C/ CHANFROS	ASTM A36 / UHMWPE	4,00	UND	R\$	191.370,00	R\$	765.480,00
40	ELEMENTO DE BORRACHA MV1000H X 1000L (A)	BORRACHA / ASTM A36	20,00	UND	R\$	18.300,00	R\$	366.000,00
41	ELEMENTO DE BORRACHA MODULAR 1000H x 900L	BORRACHA / ASTM A36	65,00	UND	R\$	16.420,00	R\$	1.067.300,00
42	ELEMENTO DE BORRACHA CONE SCN 1300H F1.3	BORRACHA / ASTM A36	2,00	UND	R\$	139.367,61	R\$	278.735,22
43	ELEMENTO DE BORRACHA CONE SCN 1000H	BORRACHA	5,00	UND	R\$	52.174,84	R\$	260.874,20
							R\$	4.752.000,00

Atenciosamente,

Alberto João Marcatto
 Eng. Civil
 CREA-SC 052910-0
 Construtora AJM Ltda
 CNPJ 04.991.446/0001-86

A

ADMINISTRAÇÃO DOS PORTOS DE PARANAGUÁ E ANTONINA – APPA

Gerência de Administração

Pregão Eletrônico / Coordenadoria de Licitações – COLIC

Prezados,

A Construtora AJM Ltda, vem apresentar as justificativas da análise técnica realizada pela comissão de licitação, na qual apontamos que não conseguimos atender a adequação dos preços unitários aos preços de referência.

Em anexo encaminhamos o catálogo completo e os croquis faltantes para saneamento dos itens apontados.

Sobre os apontamentos feito pela equipe técnica, esclarecemos abaixo:

Apontamento APPA ITEM 01 – VALORES PROPOSTOS:

Quanto aos valores propostos dos itens, informarmos que devido a modalidade ser registro de preços, na qual, cuja aquisição integral dos itens não é garantida, a readequação dos preços unitários mantendo todos os itens unitários abaixo do valor referencial não é viável, podendo em casos de pedidos parciais acarretarem prejuízos para a contratada. Há de se destacar se os orçamentos referenciais utilizados pela APPA previam a aquisição parcial, haja vista que temos variáveis que dependem da quantidade solicitada, como frete marítimo, frete terrestre, serviço de galvanização, montante do pedido etc.

Os itens que estamos propondo vem de diversas fontes, como fabricação própria, fornecedores nacionais e internacionais, sendo que todos os itens foram cotados.

Como exemplo, a arruela lisa, se a aquisição for feita para 1000 unidades, o valor de referência da APPA está dentro do valor de mercado, porém em um pedido único deste item o frete e montante impacta diretamente o preço final. Este tipo de item, normalmente é realizado por milheiro e suas dimensões não são usuais. Serviços de corte e galvanização para uma quantidade pequena influencia diretamente no preço. O frete quando compartilhado com outros itens acaba sendo irrisório, porém isoladamente representa um dos maiores custos da peça.

Alguns itens avaliamos que temos alguma flexibilidade de adequar os preços unitários, porém ainda assim não conseguimos chegar no valor de referência.

Diante disso, ficamos impossibilitados de reequilibrar os preços unitários de nossa planilha.

Apontamento APPA ITEM 02 – ELEMENTO DE BORRACHA:

Da análise técnica da APPA: Em relação ao item “**Elemento de Borracha Cone SCN 1000H**”, **não foram apresentados croquis, especificações dimensionais, dados de energia absorvida, nem de reação**, conforme exigido.

Saneamento:

Os dados da energia absorvida e reação constavam no croqui apresentado.

Complementarmente estamos encaminhando o catálogo completo na qual estes dados são baseados.

Abaixo reproduzimos parcialmente os dados do catálogo, na qual pode-se verificar que os valores da Energia e Reação da Defesa NDCN 1300 (C1), coincidem com os valores apresentados nos Croquis:

[Unit: KN.M, KN]

	C0		C1		C2		C3	
	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption
NDCN500	165	37	200	47	268	63	318	74.4
NDCN550	198	49	242	61	328	85	385	99
NDCN600	225	63	276	78	375	111	440	132
NDCN700	308	120	393	144	534	193	627	226
NDCN800	402	179	515	212	699	291	820	341
NDCN900	527	248	649	303	885	412	1040	484
NDCN950	588	291	724	356	986	485	1158	570
NDCN1000	653	338	803	415	1092	566	1282	666
NDCN1050	720	392	886	481	1204	655	1414	770
NDCN1100	788	450	971	554	1322	754	1551	886
NDCN1150	830	532	1038	666	1392	882	1764	1029
NDCN1200	941	585	1157	720	1574	979	1848	1150
NDCN1300	1103	743	1357	913	1846	1245	2167	1463
NDCN1400	1278	927	1574	1140	2141	1554	2514	1826
NDCN1600	1285	1575	2055	1701	2793	2321	3278	2728
NDCN1800	1880	2125	2602	2421	3537	3304	4153	3883
NDCN2000	3060	3960	3212	3320	4366	4528	5126	5324

1. Deflection: 72%
2. Performance tolerance: $\pm 10\%$
3. Other performances are available on customer's request

Os valores de Energia e reação da tabela acima, estão destacados por um quadro verde para Defesa Cônica 1000H e quadro vermelho para defesa cônica 1300H.

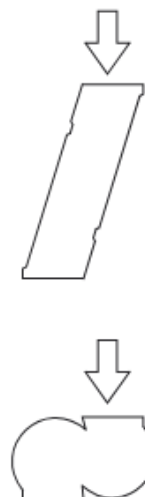
Da análise técnica da APPA: Para os demais elementos de borracha apresentados no catálogo (páginas 50 a 72), **não foi possível identificar os dados técnicos essenciais de desempenho (energia e reação)**. Tais informações são indispensáveis para verificação da eficiência das defensas, não sendo possível validar as informações dos croquis constantes nas páginas 47 a 49 da proposta.

Saneamento: Da mesma forma que o elemento anterior, os dados constavam nos croquis e adicionalmente incluímos o catálogo completo, na qual extraímos a imagem abaixo onde os dados foram obtidos:

Performance

	Rated Deflection 57.5%			
	C1		C2	
	Reaction force	Energy absorption	Reaction force	Energy absorption
NDMV300	110	15	161	22
NDMV400	150	27	214	39
NDMV500	187	43	267	61
NDMV550	206	52	294	75
NDMV600	224	62	320	89
NDMV750	282	96	402	137
NDMV800	299	110	428	157
NDMV1000	374	172	534	245
MDMV1250	467	268	667	383
MDMV1450	543	361	775	516
NDMV1600	599	440	855	628

1. Performance tolerance: $\pm 10\%$
2. Other performance are available on customer's request



O valor final da Energia e Reação para as defensas Tipo MV, devem ser multiplicadas pelo seu comprimento, ou seja:

Para Defesa MV 1000x1000:

$$R = 534 \text{ kN.m} \times 1\text{m} = 534 \text{ kN.m}$$

$$E = 245 \text{ kN} \times 1\text{m} = 245 \text{ kN}$$

Para Defesa MV 1000x900:

$$R = 534 \text{ kN.m} \times 0,9\text{m} = 480,60 \text{ kN.m}$$

$$E = 245 \text{ kN} \times 0,9\text{m} = 220,50 \text{ kN}$$

Apontamento APPA ITEM 03 – ENSAIOS E CERTIFICAÇÃO

Certificado das Defensas MV 1000H: Emitido pela Bureau Veritas, No. TA-INS/QD&HN-16/323-1, atestando que as defensas MV 1000H atendem a norma PIANC-2002.

Certificado das Defensas Cônicas 1000H e 1300H: Emitido pela Bureau Veritas, No. TA-INS/QD&HN-16/323-2, atestando que as defensas cônicas 1000H e 1300H atendem a norma PIANC-2002.

Certificado de composição da Borracha: GL21020048

Certificado das Placas de UHMW-PE: 20210119-010 N-2

Quanto aos demais ensaios estes são fornecidos juntamente com o fornecimento das peças e não antecipadamente, haja vista que se trata de ensaios destrutivos.

Atenciosamente,

Alberto João Marcatto
Eng. Civil
CREA-SC 052910-0
Construtora AJM Ltda
CNPJ 04.991.446/0001-86



Nanjing Deers Industrial Co.,Ltd

MARINE FENDER SYSTEM

Rubber Fenders

CUSTOMER FOCUS / PURSUING INNOVATION

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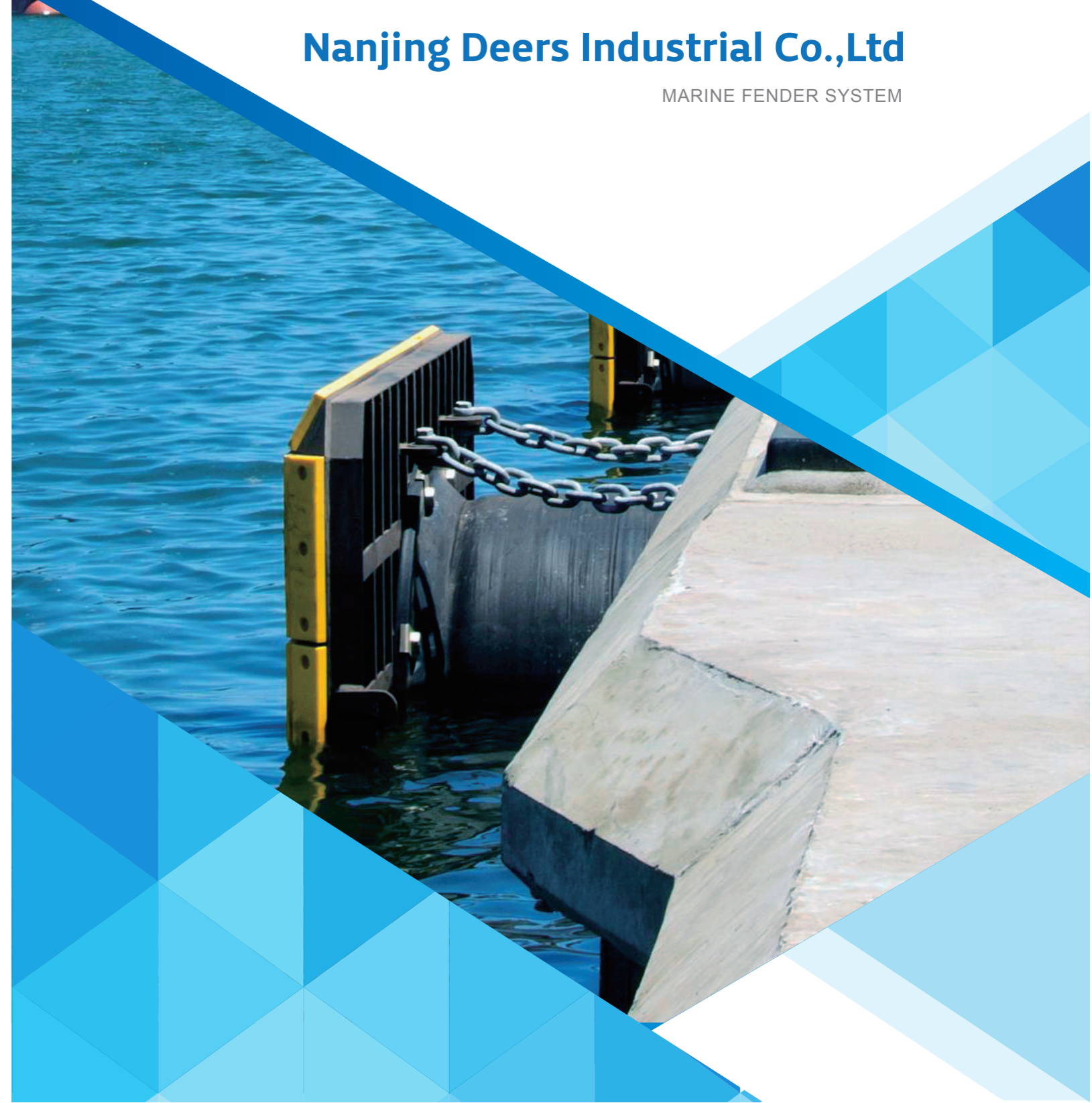
210002

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CUSTOMER FOCUS PURSUING INNOVATION



Nanjing Deers is focused on producing marine rubber fenders and other marine products in China. We have complete sets of production equipment, testing facilities and moulds to meet customer's demands and requirements.

Our rubber fender series include Cone rubber fender, Cell rubber fender, Cylindrical rubber fender, Arch rubber fender, NDMV rubber fender, D rubber fender, Tug boat rubber fender, Roller fender, W rubber fender, M rubber fender, Keyhole rubber fender, Floating fender and so on.

Meanwhile, we have strict management systems including production, quality control, package, transportation and after sales-service. And our products can be inspected by customers and any third party like ABS, BV, CCS, DNV, LR, SGS and so on. Our rubber fender types are approved by PIANC2002.

Our products are being used well in the world. Our company concept is QUALITY FIRST, CUSTOMER FOCUS, PURSUING INNOVATION.

CONTENTS

1. Rubber Fender Application.....	01
2. Production Equipment.....	05
3. Performance Testing System.....	06
4. Cell Fender.....	07
5. Cone Fender.....	15
6. Cylindrical Fender.....	24
7. Arch Fender.....	27
8. NDMV Fender.....	34
9. T Fender.....	39
10. SPI Fender.....	41
11. Corner Fender.....	44
12. Roller Fenders.....	45
13. Tug Fender.....	46
1) Tug Boat Fender.....	47
2) M Fender.....	50
3) W Fender.....	51
4) D Series Fender.....	52
14. GD Fender.....	61
15. Key-hole Fender.....	65
16. Rubber Ladder.....	66
17. Floating Fender.....	67
18. Foam Filled Fender.....	69
19. Fender System Test Method.....	71
20. Berthing Modes.....	72
21. Project Requirements.....	73
22. Ship Tables.....	75
23. Ship Features.....	77
24. Testing Procedures.....	78
25. Conversion Tables.....	79
26. Fender Panel Design.....	80
27. Mooring Bollard	81-88



Pneumatic rubber fenders
DNV Certificate



Pneumatic Rubber Fender
BV Certificate



Cylindrical Rubber Fender



Cone Fender1000
BV Certificate



Pneumatic Fender
D3.3xL4.5m
BV Certificate



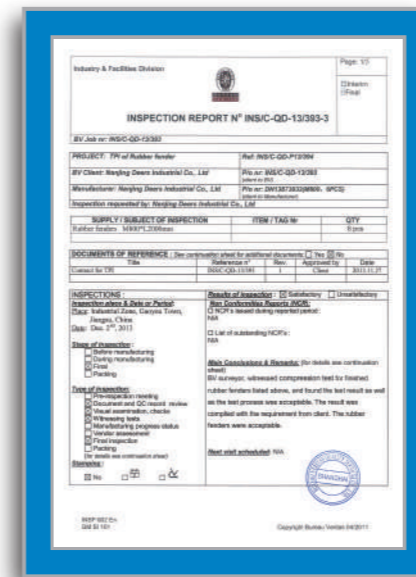
PIANC2002 TYPE APPROVAL CERTIFICATE



SGS Certificate



ABS Certificate



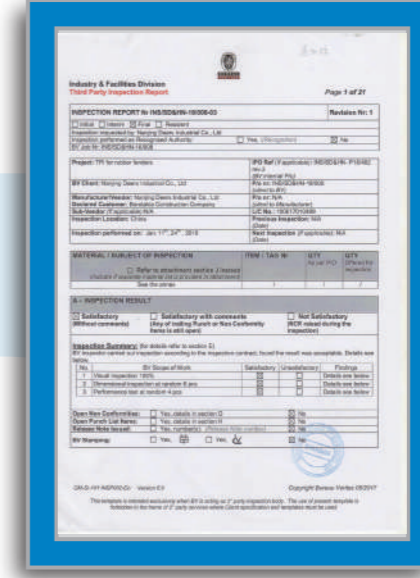
M Fender



Arch Fender



Cell Fender BV Certificate



Cone Fender 1300H BV Certificate



D Type Fender



CCS Certificate



Filled Foam Fender
BV Report



Tug Fender OD1000
SGS Report



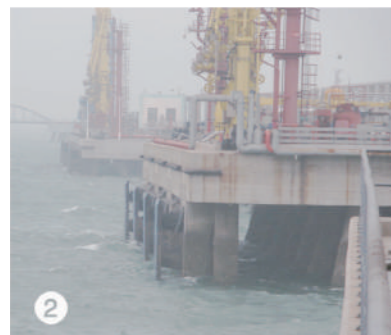
Comer Fender

Certificates

Certificates



Rubber Fender Application



- 1 Ningbo Meishan Bonded port container Terminal
- 2 Qingdao Red star Logistics Liquid chemical Terminal
- 3 Dongjiakou port of Qingdao port Liquid chemical Terminal
- 4 Zhuhai Gaolan port dry bulk terminal
- 5 Shanghai east port of the first project



- 6 Tangshan port Caofeidian Industrial company universal dock
- 7 Wenfu high-speed rail bridge pier collision xiabaishi
- 8 Shanghai waterway Bureau Dredging
- 9 Nanjing Military oil Terminal
- 10 Zhuhai Gaolan port container Terminal
- 11 Zhanjiang port 30 million-ton ore terminal

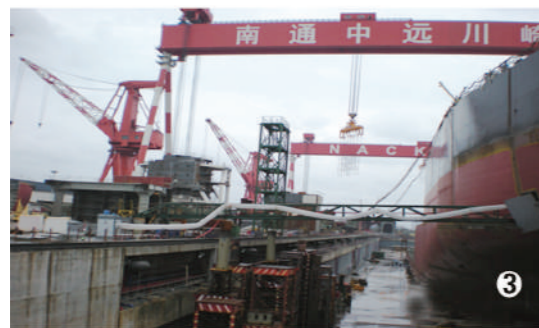




1



2



3



4



5

- 1 10 million tons of oil level in the oil terminal Qinzhou
- 2 Gaolan Port Container Terminal in Zhuhai
- 3 Nantong COSCO KHI Phase II project turning
- 4 Ore terminal in Jiangsu Sha Steel Group
- 5 PI-type fender Saigon Port



6



7



8



9

6 Po over Zhanjiang Port Container Terminal

8 CSSC Jiangnan Changxing Shipbuilding

7 Caofeidian 30 million tons of terminal

9 Datang International Power Generation Ningde



Production Equipment



■ Rubber Extruder



■ Sand-blasting Machine



■ Tableting Machine



■ Ø4000*5000mm Steam Autoclave



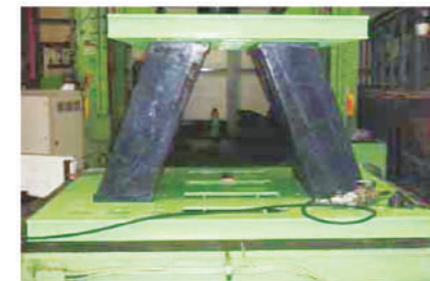
■ Production Line



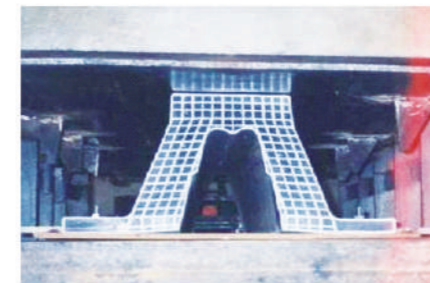
■ Rubber Calender System



Testing Equipment



■ Performance Testing System



■ Hardness



■ Abrasion



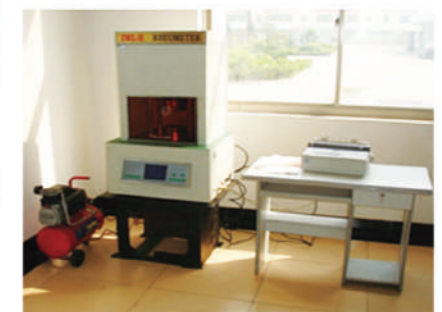
■ Adhesive Strength



■ Tensile Strength



■ Aging



■ Flat vulcanizing

Cell Fenders

Cell fenders

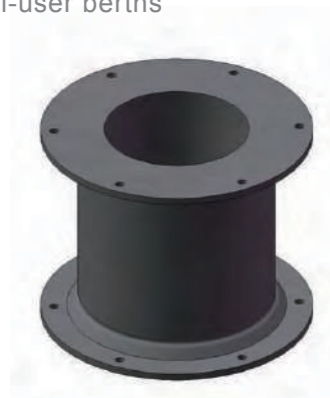
Cell fenders have a long history. Its current structure is the result of continuous refinement, making it simple, high performance and strong. Keep same installation dimension, so they are interchangeable with many older cell fender types. The cell fenders come in a wide range of standard sizes and can meet multiberthing conditions.

Features

1. High performance, reasonable structure
2. Can support large panels
3. Strong, well-proven design
4. Large range of performance

Applications

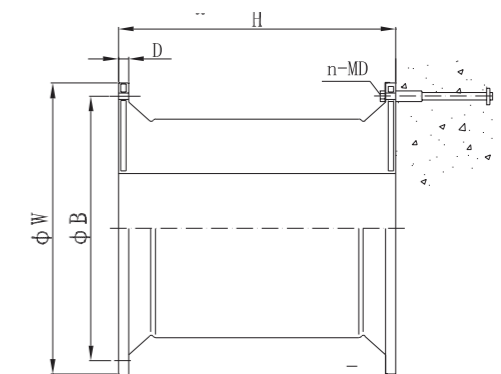
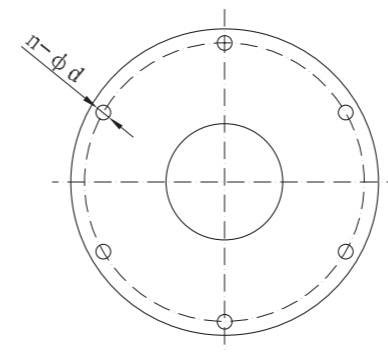
1. Bulk terminals
2. Oil and LNG facilities
3. Container terminals
4. RO-Ro and cruise terminals
5. Offshore platforms
6. Multi-user berths



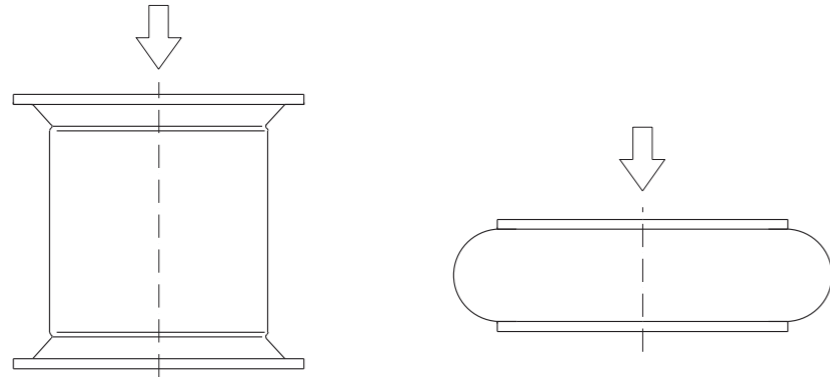
Specification

[units:mm]

	H	ϕW	ϕB	D	d	n-MD
NDSC 500	500	650	550	25	32	4-M32
NDSC 630	630	840	700	30	39	4-M39
NDSC 800	800	1050	900	30	40	6-M40
NDSC 1000	1000	1300	1100	35	47	6-M47
NDSC 1150	1150	1500	1300	37	50	6-M50
NDSC 1250	1250	1650	1450	40	53	6-M53
NDSC 1450	1450	1850	1650	42	61	6-M61
NDSC 1600	1600	2000	1800	45	61	8-M61
NDSC 1700	1700	2100	1900	50	66	8-M66
NDSC 2000	2000	2200	2000	50	74	8-M74
NDSC 2250	2250	2550	2300	67	74	10-M74
NDSC 2500	2500	2950	2700	70	74	10-M74
NDSC 3000	3000	3350	3150	75	90	12-M90



Rated Performance Data

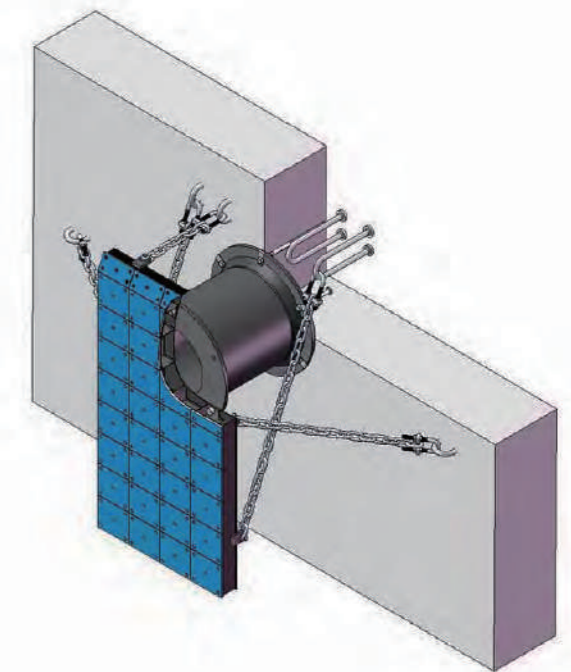
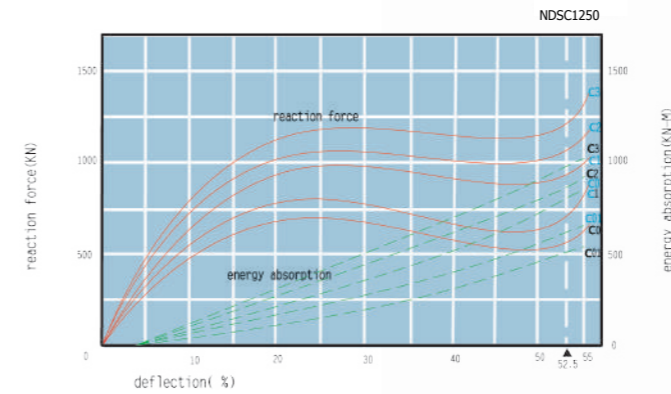


KN	KN-M	C01		C0		C1		C2		C3	
		Rated Deflection 52.5%	Max Deflection 55%	Rated Deflection 52.5%	Max Deflection 55%	Rated Deflection 52.5%	Max Deflection 55%	Rated Deflection 52.5%	Max Deflection 55%	Rated Deflection 52.5%	Max Deflection 55%
NDSC500	R	90	99	110	125	140	160	162	187	181	210
	E	17	19	22	24	30	32	35.6	37.8	40.2	42.7
NDSC630	R	140	145	175	180	228	240	262	275	298	314
	E	39	41	49	51	63	68	72	77	82	87
NDSC800	R	211	225	275	292	355	379	412	437	464	493
	E	75	78	96	102	125	132	145	153	163	173
NDSC1000	R	356	379	445	473	579	615	668	710	752	800
	E	156	166	195	207	254	269	293	310	330	350
NDSC1150	R	471	501	589	626	765	814	883	939	995	1058
	E	238	252	297	315	387	409	446	472	502	532
NDSC1250	R	556	592	696	739	904	961	1043	1109	1176	1250
	E	305	323	382	404	496	526	573	606	654	683
NDSC1450	R	749	796	936	995	1217	1294	1404	1493	1582	1682
	E	477	505	596	631	775	820	894	947	1007	1066
NDSC1600	R	894	950	1117	1189	1453	1544	1676	1781	1888	2007
	E	628	665	786	832	1020	1080	1177	1247	1326	1405
NDSC1700	R	1029	1094	1287	1368	1673	1778	1930	2052	2174	2311
	E	768	815	960	1012	1249	1322	1441	1525	1623	1718
NDSC2000	R	1425	1514	1781	1893	2315	2561	2671	2839	3000	3199
	E	1251	1325	1564	1656	2033	2153	2346	2484	2643	2798
NDSC2250	R	2126	2260	2502	2569	3252	3457	3752	3989	4228	4494
	E	2101	2224	2472	2617	3213	3402	3700	3925	4177	4423
NDSC2500	R	2625	2791	3088	3283	4015	4268	4633	4925	5220	5549
	E	2882	3051	3391	3590	4408	4667	5086	5385	5730	6067
NDSC3000	R	3750	4400	4400	5200	5800	6750				
	E	4300	4650	5100	5450	6700	7200				

performance tolerance:±10%

other performances are available on customer's request

Performance Curve

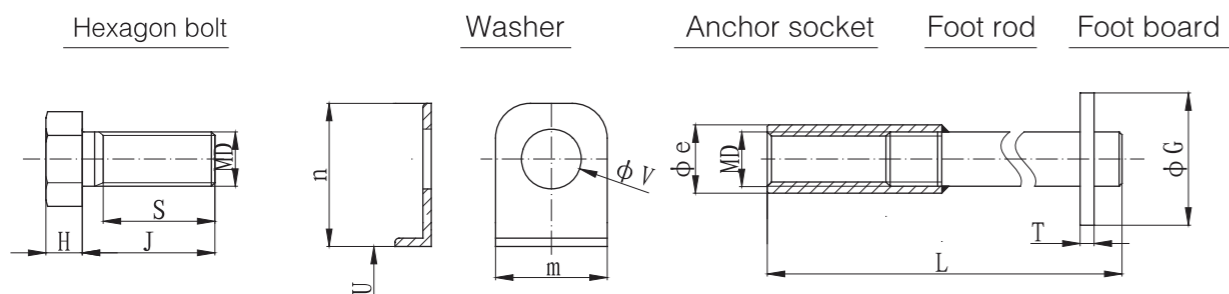
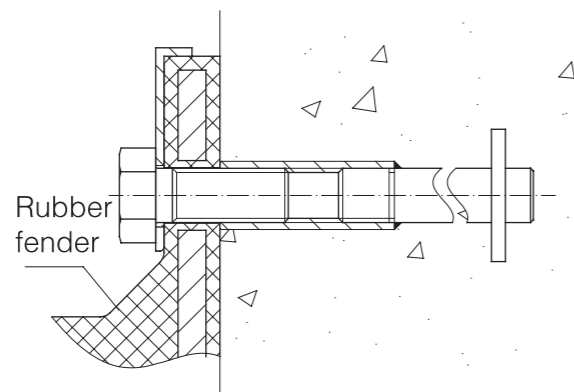


Installation

Cell fenders are used with frontal panel. The frontal panel is a steel part installed in front of cell fenders.

Accessories		Function
Cast-in accessories	U-ring	Connect chains
	Anchor socket	
	Foot rod	
	Foot board	
Panel fixings	Hexagon bolt	Assemble fender and panel
	Washer	
	Hexagon nut	
Pad fixings	Stud bolt	Install pads onto frontal panel
	Washer	
	Hexagon nut	
Chains	Tension chain	Restrict tensions on the rubber fender
	Weight chain	Support the steel panel and prevent excessive drooping of the system
	Shear chain	Restrict fender shear deflection
Frontal panel		Distribute reaction forces to provide low hull pressures and cope with large tidal variations
Face pads		Reduce friction, protect vessels

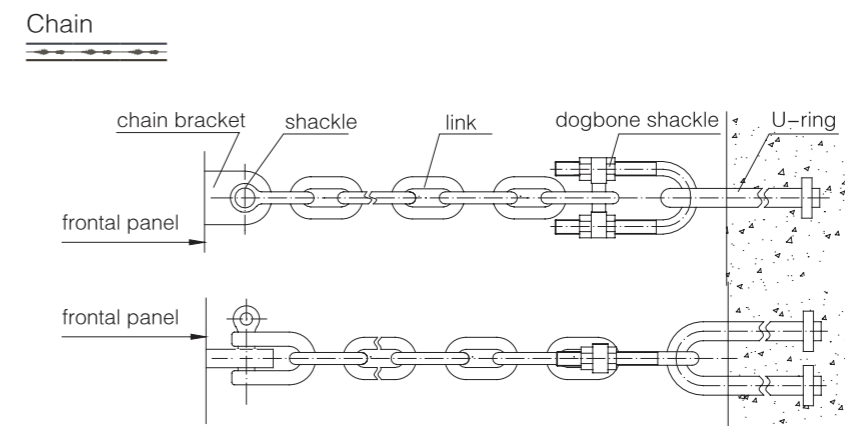
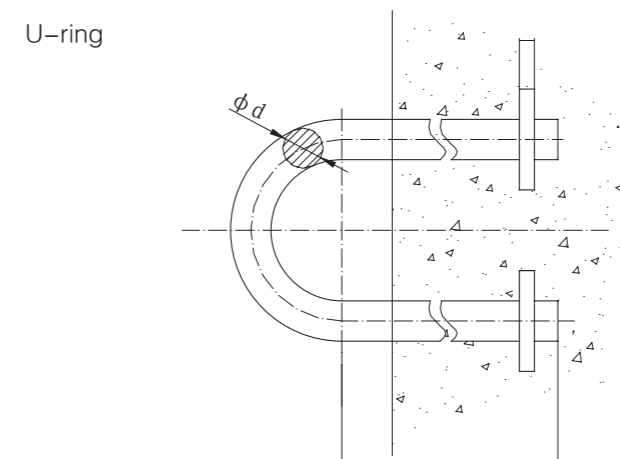
Install fenders to concrete



[Unit:mm]

	MD	Hexagon bolt			Washer				Anchor socket	Foot rod Foot board		
		H	J	S	m	n	U	V		e	G	T
NDSC500	M24	17	70	60	60	83	4.5	28	36	75	6-10	300
NDSC630	M30	19	75	60	65	110	4.5	34	38	75	10-12	330
NDSC800	M33	23	85	70	70	117	4.5	36	42	80	10-12	360
NDSC1000	M39	26	95	75	80	148	6	43	50	85	10-12	430
NDSC1150	M42	26	100	80	85	151	6	46	55	90	12-16	500
NDSC1250	M45	30	110	90	90	153	6	49	60	110	12-16	500
NDSC1450	M52	35	120	95	100	158	6	56	70	120	12-16	570
NDSC1600	M52	35	120	95	100	158	6	56	70	120	12-16	570
NDSC1700	M56	35	135	110	110	165	8	63	75	125	16-20	620
NDSC2000	M64	40	150	125	116	168	8	70	80	130	16-20	700
NDSC2250	M64	40	150	125	120	195	8	70	80	130	16-20	700
NDSC2500	M64	40	170	125	125	202	10	70	80	130	16-20	700
NDSC3000	M76	50	190	145	140	207	10	84	95	155	20-20	800

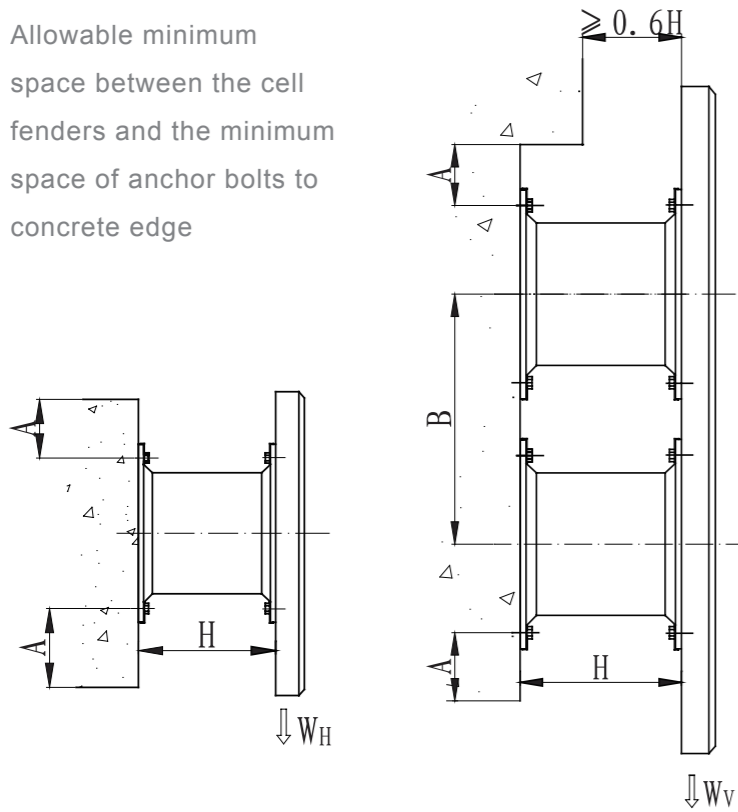
Accessories



[Unit:mm]

	Shackle	Link	Dogbone Shackle	U ring
NDSC500	M20	φ 20	M22	φ 40
NDSC630				φ 40
NDSC800	M25	φ 25	M36	φ 50
NDSC1000	M32	φ 28	M39	φ 55
NDSC1150		φ 32	M42	φ 60
NDSC1250	M36	φ 34	M45	φ 60
NDSC1450	M36	φ 36	M48	φ 60
NDSC1600		φ 38	M52	φ 65
NDSC1700	M42	φ 40	M56	φ 65
NDSC2000	M45	φ 42		φ 70
NDSC2250			φ 70	
NDSC2500		φ 46	M60	φ 80
NDSC3000	M50			φ 80

Allowable minimum space between the cell fenders and the minimum space of anchor bolts to concrete edge

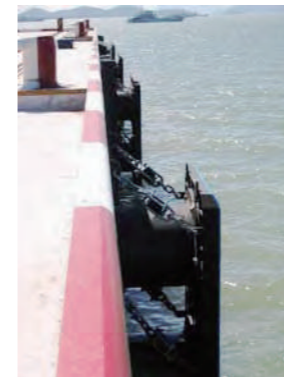


The table is a guide to the permitted weight of frontal panel before additional support chains may be required.

Grade	Single or multiple–horizontal	Single or multiple vertical	H(mm)
C1	$W_H \leq n * 0.95 * W$	$W_V \leq n * 1.2 * W$	≤ 800
C2	$W_H \leq n * 1.1 * W$	$W_V \leq n * 1.45 * W$	
C3	$W_H \leq n * 1.3 * W$	$W_V \leq n * 1.75 * W$	
C1	$W_H \leq n * 10 * W^{0.6}$	$W_V \leq n * 13.5 * W^{0.6}$	≥ 1000
C2	$W_H \leq n * 15 * W^{0.6}$	$W_V \leq n * 19 * W^{0.6}$	
C3	$W_H \leq n * 19 * W^{0.6}$	$W_V \leq n * 23.5 * W^{0.6}$	

n=number of cell fenders W=weight of cell fenders
 WH=Panel weight–horizontal Wv=panel weight–vertical

Engineering Applications



Cone Fenders

Cone fenders

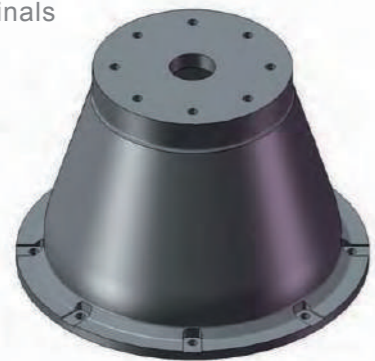
Cone fenders are the 3rd generation of cell fenders, with optimal performance and efficiency. The conical body shape makes the cone fender very stable even at large compression angles. They come in a wide range of standard sizes, can meet multi-berthing conditions.

Features

1. Big deflection, high performance
2. Large panels supporting
3. Better performance on angle compression, no performance loss under 10 degree
4. Wide range sizes, can meet multi-design requirements
5. Easy and quick installation

Applications

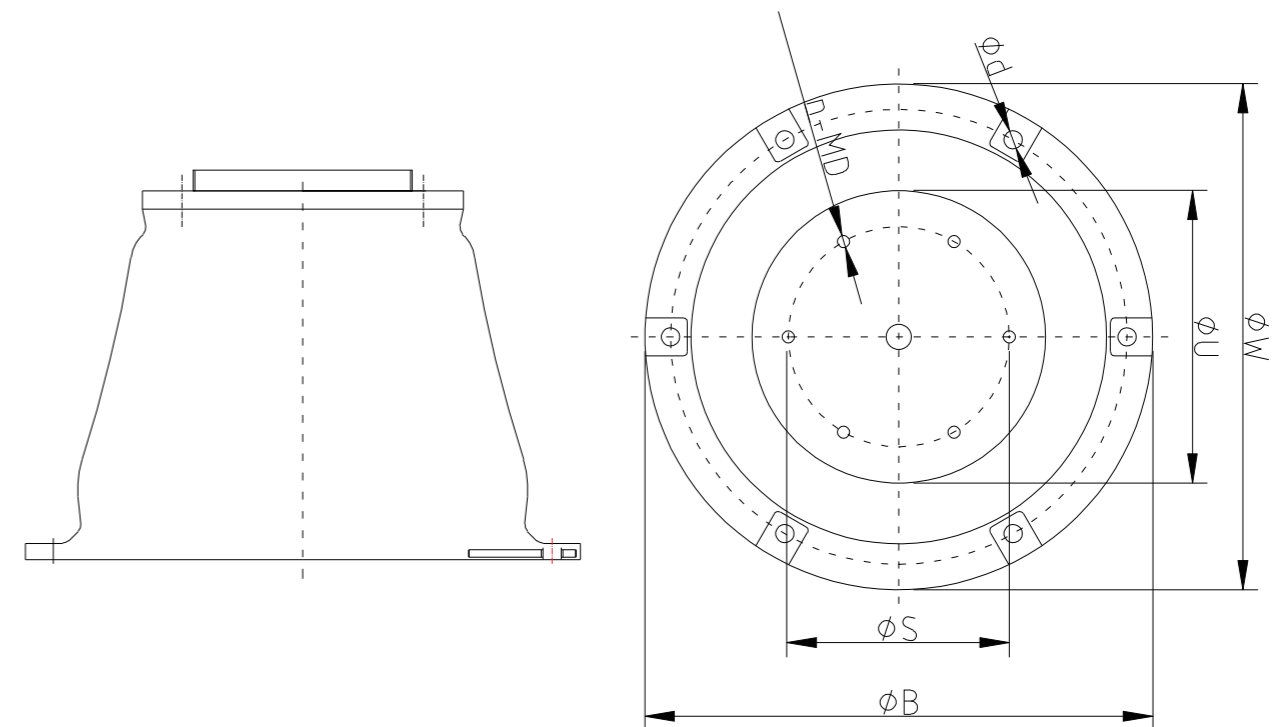
1. General cargo berths
2. Oil and LNG facilities
3. Container terminals
4. Ro-Ro and cruise terminals
5. Bulk terminals



Type I

[Unit: mm]

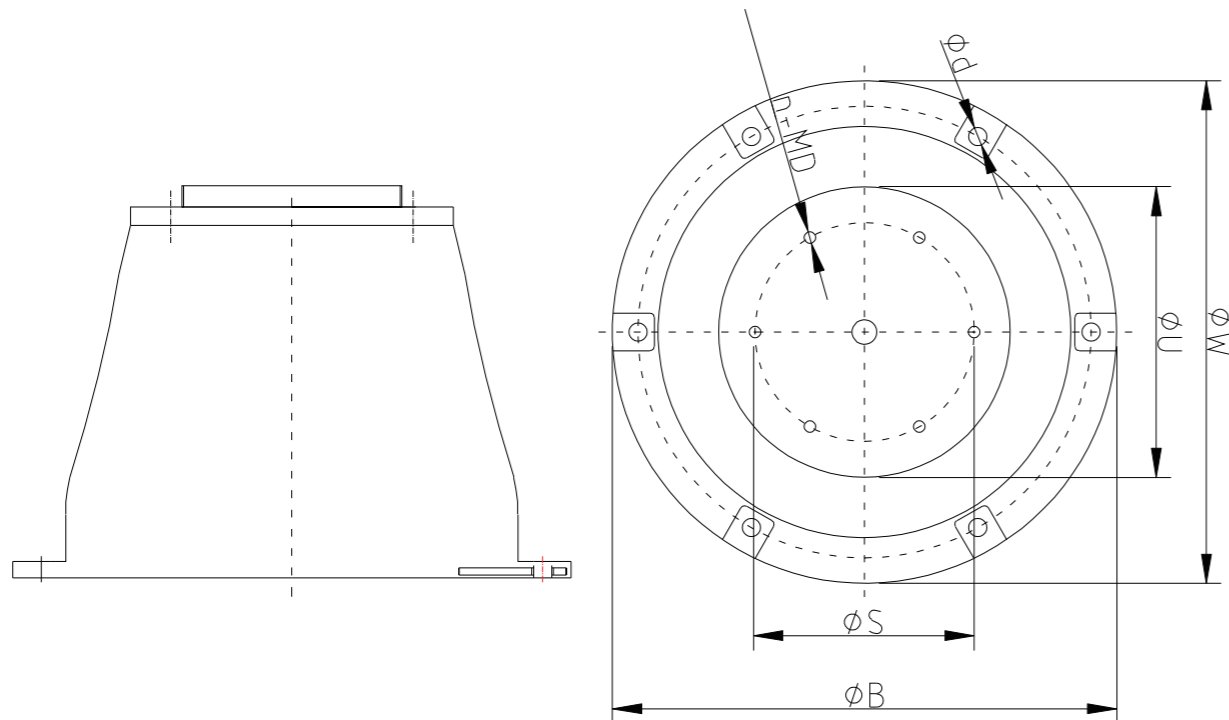
	H	ϕU	ϕW	ϕS	ϕB	n	Md
NDCN500	500	425	750	325	675	4	M24
NDCN600	600	510	900	390	810	6	M30
NDCN700	700	595	1050	455	945	6	M30
NDCN800	800	680	1200	520	1080	6	M36
NDCN900	900	765	1350	585	1215	6	M36
NDCN1000	1000	850	1500	650	1350	6	M42
NDCN1100	1100	935	1650	715	1485	6	M42
NDCN1150	1150	978	1725	750	1550	6	M42
NDCN1200	1200	1020	1800	780	1620	8	M42
NDCN1300	1300	1105	1950	845	1755	8	M48
NDCN1400	1400	1190	2100	910	1890	8	M48
NDCN1600	1600	1360	2400	1040	2160	8	M48
NDCN1800	1800	1530	2700	1170	2430	10	M56
NDCN2000	2000	1700	3000	1300	2700	10	M56



Type II

[Unit: mm]

	H	φW	φU	φS	φB	n	Md
NDCN500	500	800	490	425	730	4	M24
NDCN550	550	880	540	470	790	4	M24
NDCN600	600	960	590	515	875	4	M30
NDCN700	700	1120	685	600	1020	4	M30
NDCN800	800	1280	785	685	1165	6	M30
NDCN860	860	1376	845	735	1250	6	M30
NDCN900	900	1440	885	770	1313	6	M30
NDCN950	950	1520	930	815	1390	6	M30
NDCN1000	1000	1600	980	855	1460	6	M36
NDCN1050	1050	1680	1030	900	1530	6	M36
NDCN1100	1100	1760	1080	940	1605	8	M36
NDCN1200	1200	1920	1175	1025	1750	8	M42
NDCN1300	1300	2080	1275	1100	1900	8	M48
NDCN1400	1400	2240	1370	1195	2040	8	M48
NDCN1600	1600	2560	1570	1365	2335	8	M48
NDCN1800	1800	2880	1765	1540	2625	10	M56
NDCN2000	2000	3200	1955	1710	2920	10	M56

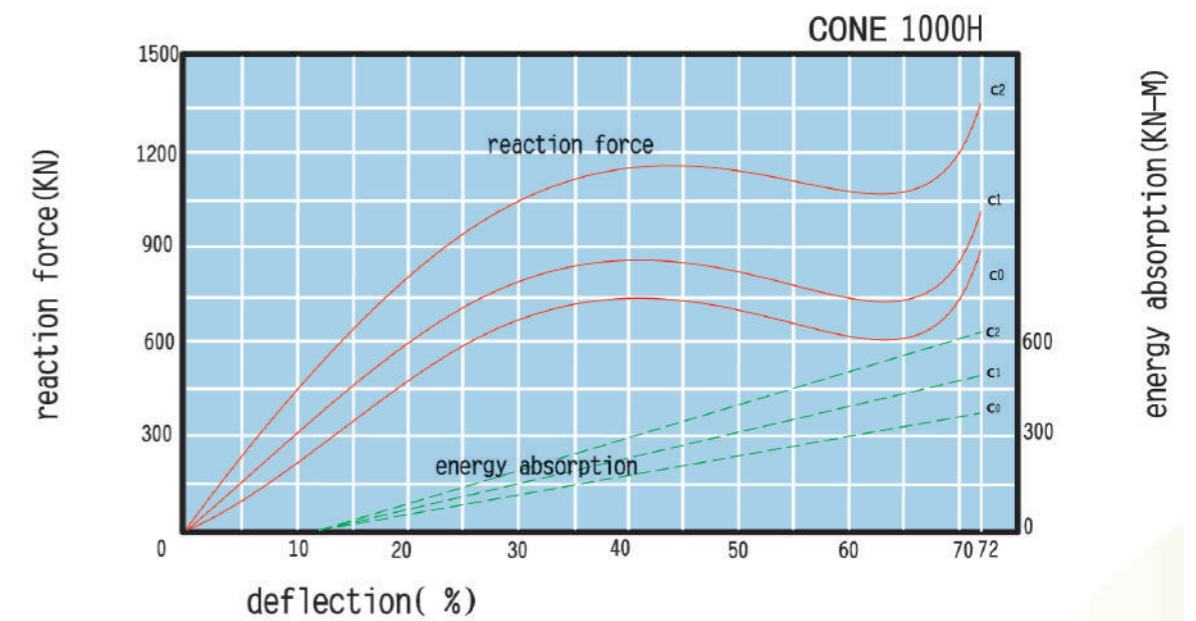


[Unit: KN.M, KN]

	C0		C1		C2		C3	
	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption	Reaction Force	Energy Absorption
NDCN500	165	37	200	47	268	63	318	74.4
NDCN550	198	49	242	61	328	85	385	99
NDCN600	225	63	276	78	375	111	440	132
NDCN700	308	120	393	144	534	193	627	226
NDCN800	402	179	515	212	699	291	820	341
NDCN900	527	248	649	303	885	412	1040	484
NDCN950	588	291	724	356	986	485	1158	570
NDCN1000	653	338	803	415	1092	566	1282	666
NDCN1050	720	392	886	481	1204	655	1414	770
NDCN1100	788	450	971	554	1322	754	1551	886
NDCN1150	830	532	1038	666	1392	882	1764	1029
NDCN1200	941	585	1157	720	1574	979	1848	1150
NDCN1300	1103	743	1357	913	1846	1245	2167	1463
NDCN1400	1278	927	1574	1140	2141	1554	2514	1826
NDCN1600	1285	1575	2055	1701	2793	2321	3278	2728
NDCN1800	1880	2125	2602	2421	3537	3304	4153	3883
NDCN2000	3060	3960	3212	3320	4366	4528	5126	5324

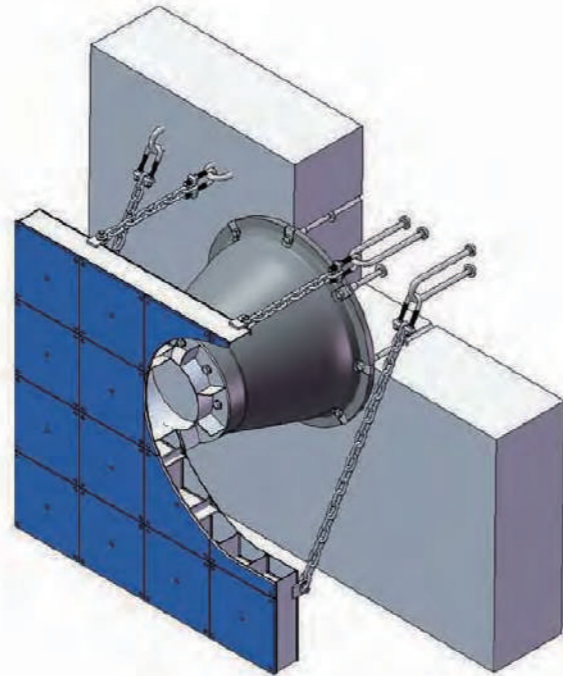
- 1.Deflection: 72%
- 2.Performance tolerance: ± 10%
- 3.Other performances are available on customer's request

Performance Curve



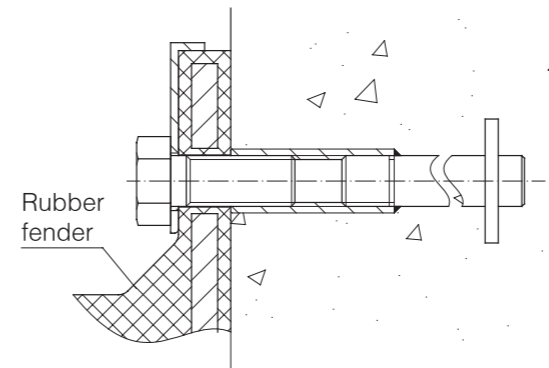
Installation

Cone fenders are used with frontal panel. The frontal panel is a steel part installed in front of cone fenders.

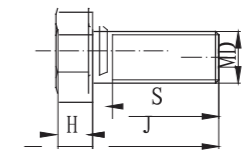


Accessories			Function
Cast-in Accessories	Cast-in Anchors	U-ring	Connect chains
		Anchor socket	Install fenders to concrete
		Foot-rod	
		Foot-board	
	Hexagon bolt		
	Washer		
Panel fixings	Hexagon nut		Assemble fenders and panels
	Hexagon bolt		
	Washer		
Pad fixings	Stud bolt		Install pads onto frontal panels
	Washer		
	Hexagon nut		
Chains	Tension chain		Restrict tensions on the rubber fender
	Weight chain		Support the steel panel and prevent excessive drooping of the system
	Shear chain		Restrict fender shear deflection
Frontal panel			Distribute reaction forces to provide low hull pressures and cope with large tidal variations
Face pad			Reduce friction, protect vessels

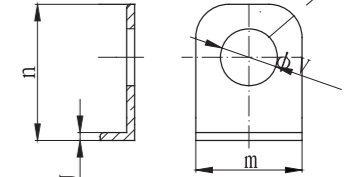
Fender Fixings Type



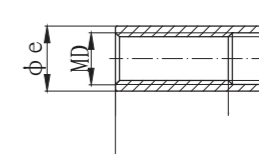
Hexagon bolt



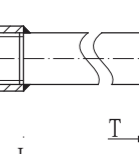
Washer



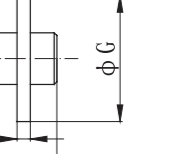
Anchor socket



Foot-rod



Foot-board



Accessories of Type I

[Unit: mm]

	MD	Hexagon bolt			Washer							Anchor		Foot-rod	
		H	J	S	m	N	n	P	U	V	R	b	e	G	L
NDCN500	M24	15	60	50	55	19	69	25	4	28	15	90	36	75	240
NDCN600		15	65	60	60	20	83	30	5	28	15	100	36	75	240
NDCN700	M30	19	70	65	65	20	93	33	5	34	15	105	39	80	300
NDCN800	M36	23	85	70	70	24	102	35	5	40	15	120	44	85	360
NDCN900		23	90	75	70	24	113	37	6	40	15	120	44	85	360
NDCN1000	M42	26	95	85	85	26	126	43	6	46	25	125	59	100	420
NDCN1100		26	100	90	85	26	134	43	6	46	25	130	59	100	420
NDCN1150		26	100	90	90	28	142	46	6	46	25	130	59	100	420
NDCN1200		26	110	90	100	31	145	47	6	46	30	140	60	100	420
NDCN1300	M48	30	120	95	105	31	158	52	6	52	30	150	65	115	480
NDCN1400		35	120	95	125	31	165	52	6	52	30	150	65	130	570
NDCN1600		35	135	110	130	35	190	60	8	52	40	150	65	140	570
NDCN1800	M56	35	135	110	130	40	205	60	8	60	40	165	75	140	620
NDCN2000		35	170	135	140	50	220	66	10	70	50	190	80	140	700

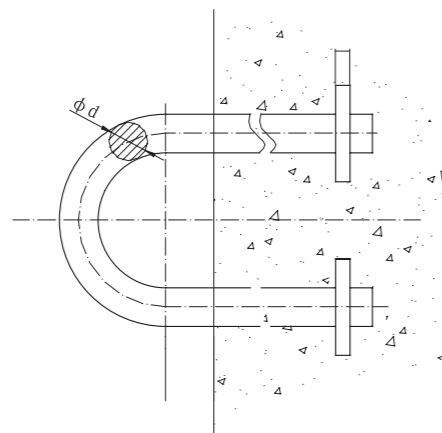
Accessories of Type II

[Unit: mm]

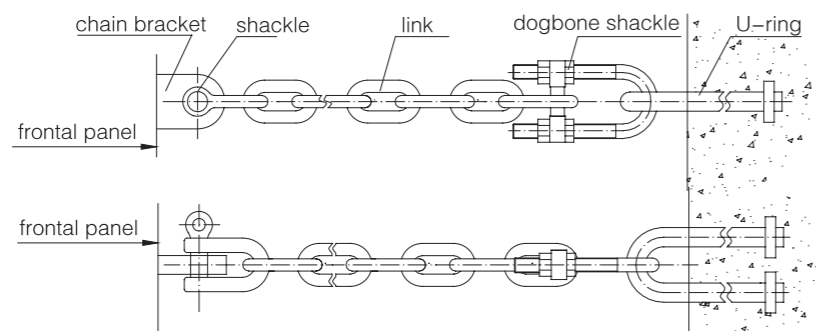
	MD	Hexagon bolt			Washer							Anchor		Foot-rod	
		H	J	S	m	N	n	P	U	V	R	b	e	G	L
NDCN500	M24	15	60	50	55	19	69	25	4	28	15	90	36	75	240
NDCN550		15	60	50	55	19	69	25	4	28	15	90	36	75	240
NDCN600	M30	19	65	60	60	20	83	30	5	28	15	100	36	75	240
NDCN700		19	70	65	65	20	93	33	5	34	15	105	39	80	300
NDCN800		19	85	70	70	24	102	35	5	40	15	120	44	85	360
NDCN860		19	85	70	70	24	102	35	5	40	15	120	44	85	360
NDCN900		19	90	75	70	24	113	37	6	40	15	120	44	85	360
NDCN950		19	90	75	70	24	113	37	6	40	15	120	44	85	360
NDCN1000	M36	23	95	85	85	26	126	43	6	46	25	125	59	100	420
NDCN1050		23	95	85	85	26	126	43	6	46	25	125	59	100	420
NDCN1100		23	100	90	85	26	134	43	6	46	25	130	59	100	420
NDCN1200	M42	26	110	90	100	31	145	47	6	46	30	140	60	100	420
NDCN1300	M48	30	120	95	105	31	158	52	6	52	30	150	65	115	480
NDCN1400		30	120	95	125	31	165	52	6	52	30	150	65	130	570
NDCN1600		30	135	110	130	35	190	60	8	52	40	150	65	140	570
NDCN1800	M56	35	135	110	130	40	205	60	8	60	40	165	75	140	620
NDCN2000		35	170	135	140	50	220	66	10	70	50	190	80	140	700

Accessories

U-ring



Chain



[Unit: mm]

	Shackle	Link	Dogbone Shackle	U ring
NDCN500	M25	$\phi 20$	M36	$\phi 40$
NDCN550	M25	$\phi 20$	M36	$\phi 40$
NDCN600	M25	$\phi 25$	M36	$\phi 40$
NDCN700	M25	$\phi 25$	M39	$\phi 50$
NDCN800	M28	$\phi 28$	M42	$\phi 50$
NDCN860	M28	$\phi 28$	M42	$\phi 50$
NDCN900	M28	$\phi 28$	M45	$\phi 50$
NDCN1000	M32	$\phi 30$	M48	$\phi 55$
NDCN1050	M32	$\phi 30$	M48	$\phi 55$
NDCN1100	M32	$\phi 30$	M48	$\phi 55$
NDCN1150	M34	$\phi 30$	M52	$\phi 60$
NDCN1200	M34	$\phi 30$	M56	$\phi 70$
NDCN1300	M36	$\phi 36$	M56	$\phi 70$
NDCN1400	M42	$\phi 36$	M56	$\phi 70$
NDCN1600	M42	$\phi 36$	M56	$\phi 70$
NDCN1800	M42	$\phi 38$	M56	$\phi 80$
NDCN2000	M50	$\phi 40$	M64	$\phi 80$



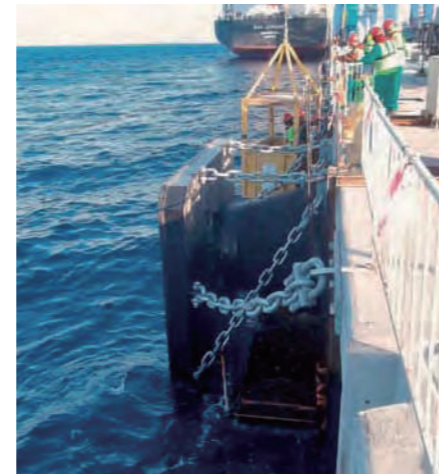
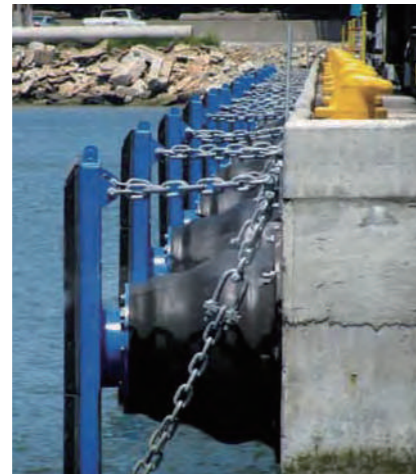
The table is a guide to the permitted weight of frontal panel before additional support chains may be required.

Grade	Single or multiple–horizontal	Single or multiple–vertical
C1	$W_H \leq n \cdot 0.85 \cdot W$	$W_V \leq n \cdot 1.0 \cdot W$
C2	$W_H \leq n \cdot 1.0 \cdot W$	$W_V \leq n \cdot 1.25 \cdot W$
C3	$W_H \leq n \cdot 1.3 \cdot W$	$W_V \leq n \cdot 1.55 \cdot W$

n=number of cone fenders W=weight of cone fenders
 W_H =panel weight–horizontal W_V =panel weight–vertical



Engineering Applications



Cylindrical Fenders

Cylindrical fenders

Cylindrical fenders have a long history.

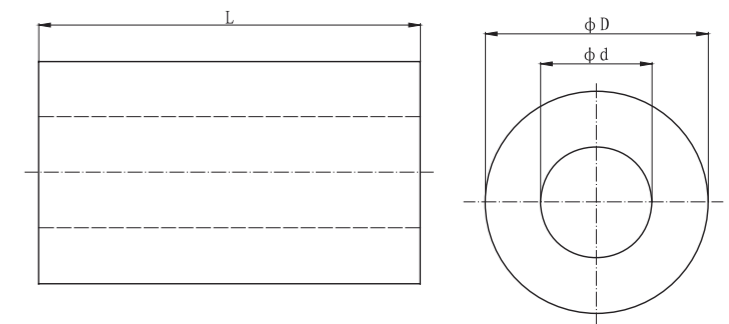
Cylindrical fenders are simple and versatile as well as being easy to install. Their progressive reaction makes them ideal for berths serving large and small vessels special for the upper protection of gravity quay wall.

Features

- 1.Low reaction,reasonable energy absorption,low hull pressure
- 2.Easy to install and maintain
- 3.Suit to rolling and pitching of berthing vessels
- 4.Versatile installation,vertical,horizontal,diagonal.

Application

- 1.Bulk cargo berths
- 2.General cargo quays
- 3.RO-Ro and ferry terminals
- 4.Fishing and workboat berths
- 5.Pontoons and floating structures

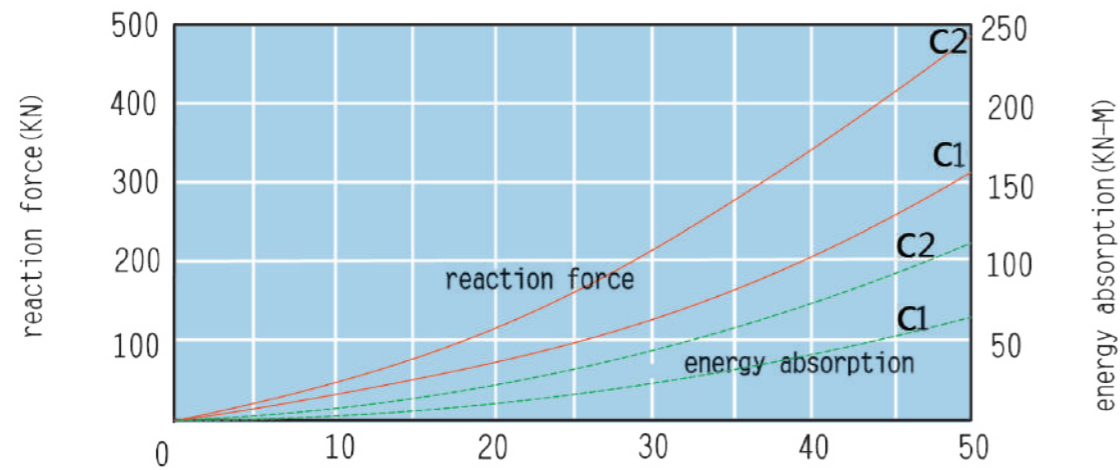


Specification

NDHC*d	Rated deflection 50%				Typical fixing arrangement	
	C1		C2			
	R:KN	E:KNm	R:KN	E:KNm		
NDHC150*75	44	1.5	73	2.3		
NDHC200*100	60	2.6	95	4.2		
NDHC250*125	75	4	120	6.5		
NDHC300*150	89	6	143	9		
NDHC350*175	104	8	167	13		
NDHC400*200	119	10	191	17		
NDHC500*250	148	16	239	26		
NDHC600*300	179	24	286	37		
NDHC700*350	208	31	334	50		
NDHC800*400	237	41	383	66		
NDHC900*450	268	52	430	84		
NDHC1000*500	297	64	479	103		
NDHC1100*550	331	77	528	129		
NDHC1200*600	363	95	574	152		
NDHC1300*650	392	108	623	179		
NDHC1400*700	422	128	670	208		
NDHC1500*750	451	147	718	238		
NDHC1600*800	481	176	776	282		
NDHC1700*850	511	206	824	338		
NDHC1800*900	541	247	872	406		
NDHC1900*950	570	288	920	487		
NDHC2000*1000	653	321	1054	584		

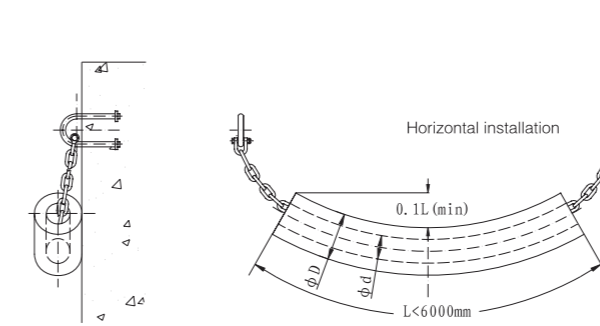
Lengths are available on requests

Performance Curve

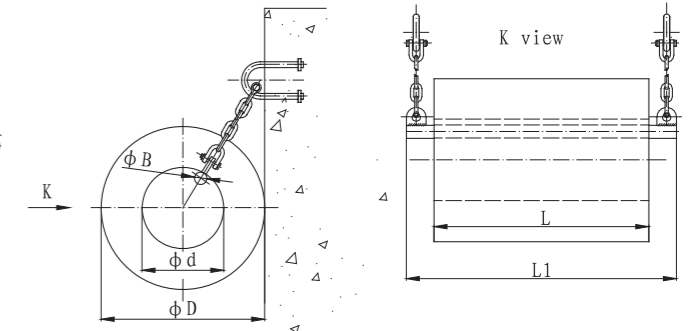


Installation and accessories

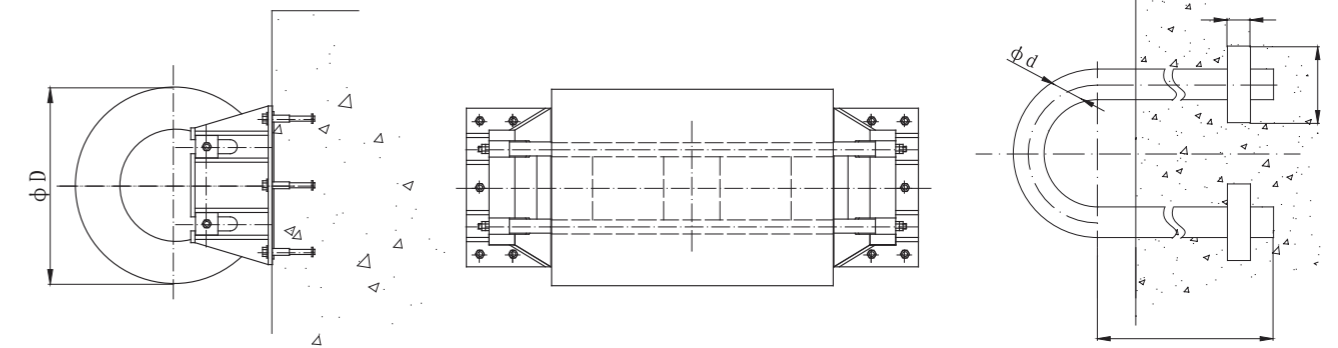
Type 1:



Type 2:



Type 3:

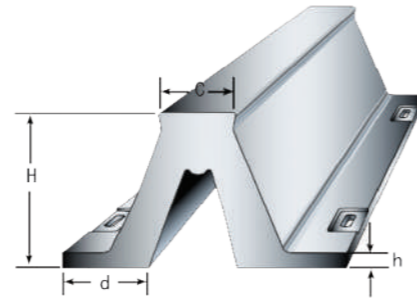


Specification	Steel Bar	Ring	Shackle	U-Ring
NDHC150	—	12-18	16-22	15-25
NDHC300	—	15-26	19-30	20-36
NDHC400	—	20-30	27-37	20-36
NDHC500	—	24-34	30-40	25-40
NDHC600	—	28-37	34-43	30-50
NDHC1000	100-150	24-42	24-42	38-65
NDHC1200	120-180	34-46	28-45	40-70
NDHC1400	130-200	40-50	30-48	42-80
NDHC1600	140-220	30-52	30-55	48-85

Arch Fenders

Arch Fenders

NDA-A Super Arch Fenders are new generation of V type fenders. NDA-A fenders are simple and rugged which make them can be used in most severe conditions. NDA-B type super arch fender can be fitted with either UHMW-PE face pads or connected to steel panels.

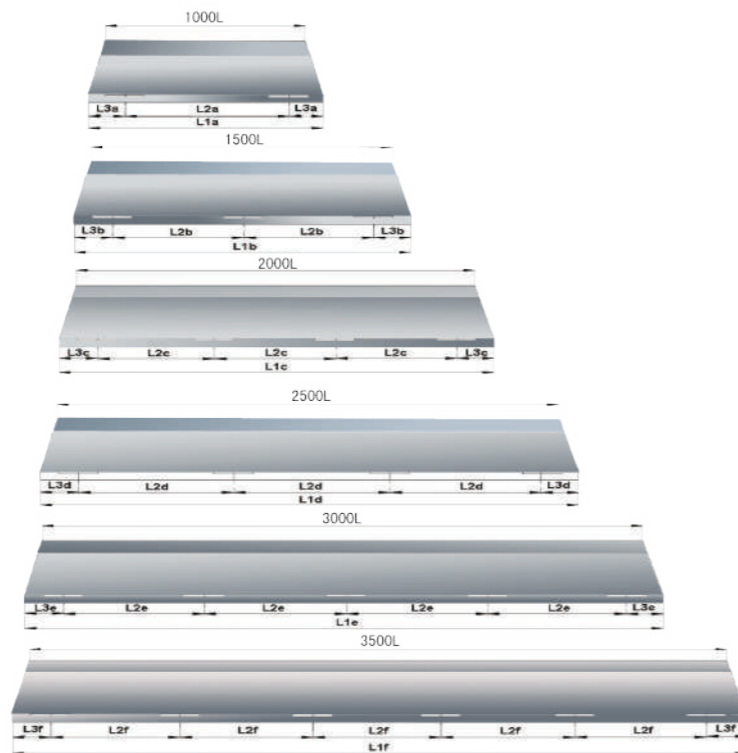
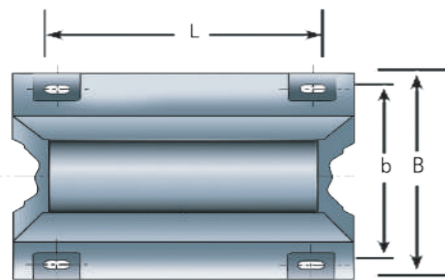


Features

1. High energy absorption and low reaction force
2. Easy to install and maintain
3. Excellent shear performance
4. Wide ranges of sizes

Applications

1. Ro-Ro berths
2. General cargo
3. Workboat harbours
4. Barge and tug berths
5. Fishing Port
6. Yacht Harbor



Specification

Model	B (mm)	b (mm)	c (mm)	d (mm)	H (mm)	h (mm)
NDA-A200	400	320	130	128	200	30
NDA -A250	500	410	164	160	250	33
NDA -A300	600	490	225	196	300	33
NDA -A400	800	670	300	260	400	40
NDA -A500	1000	840	375	325	500	45
NDA -A600	1200	1010	450	390	600	54
NDA -A800	1600	1340	600	520	800	72
NDA -A1000	2000	1680	750	650	1000	90

1000L			
Model	L1a (mm)	L2a (mm)	L3a (mm)
NDA-A200-1000L	1100	860	120
NDA-A250-1000L	1125	865	130
NDA-A300-1000L	1150	870	140
NDA-A400-1000L	1200	900	150
NDA-A500-1000L	1250	930	160
NDA-A600-1000L	1300	960	170
NDA-A800-1000L	1400	1040	180
NDA-A1000-1000L	1500	1100	200

2500L			
Model	L1d (mm)	L2d (mm)	L3d (mm)
NDA-A200-2500L	2600	785	122.5
NDA-A250-2500L	2625	790	127.5
NDA-A300-2500L	2650	790	140
NDA-A400-2500L	2700	800	150
NDA-A500-2500L	2750	840	160
NDA-A600-2500L	2800	820	170
NDA-A800-2500L	2900	845	182.5
NDA-A1000-2500L	3000	865	202.5

1500L			
Model	L1b (mm)	L2b (mm)	L3b (mm)
NDA-A200-1500L	1600	680	120
NDA-A250-1500L	1625	685	132.5
NDA-A300-1500L	1650	685	140
NDA-A400-1500L	1700	700	150
NDA-A500-1500L	1750	715	160
NDA-A600-1500L	1800	730	170
NDA-A800-1500L	1900	770	180
NDA-A1000-1500L	2000	800	200

3000L			
Model	L1e (mm)	L2e (mm)	L3e (mm)
NDA-A200-3000L	3100	715	120
NDA-A250-3000L	3125	715	132.5
NDA-A300-3000L	3150	715	140
NDA-A400-3000L	3200	725	150
NDA-A500-3000L	3250	730	160
NDA-A600-3000L	3300	740	170
NDA-A800-3000L	3400	760	180
NDA-A1000-3000L	3500	775	200

2000L			
Model	L1c (mm)	L2c (mm)	L3c (mm)
NDA-A200-2000L	2100	620	120
NDA-A250-2000L	2125	620	132.5
NDA-A300-2000L	2150	625	137.5
NDA-A400-2000L	2200	635	147.5
NDA-A500-2000L	2250	645	157.5
NDA-A600-2000L	2300	655	167.5
NDA-A800-2000L	2400	680	180
NDA-A1000-2000L	2500	700	200

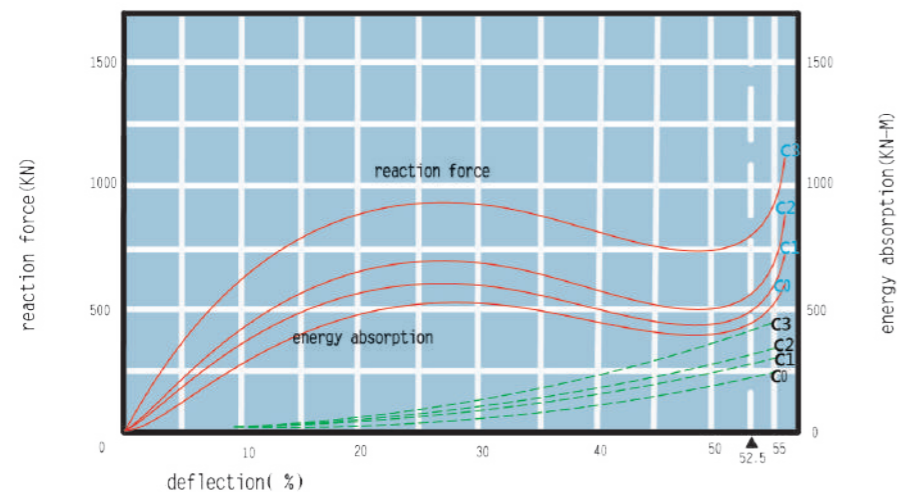
3500L			
Model	L1f (mm)	L2f (mm)	L3f (mm)
NDA-A200-3500L	3600	672	120
NDA-A250-3500L	3625	673	130
NDA-A300-3500L	3650	674	140
NDA-A400-3500L	3700	680	150
NDA-A500-3500L	3750	686	160
NDA-A600-3500L	3800	692	170
NDA-A800-3500L	3900	708	180
NDA-A1000-3500L	4000	720	200

Performance List

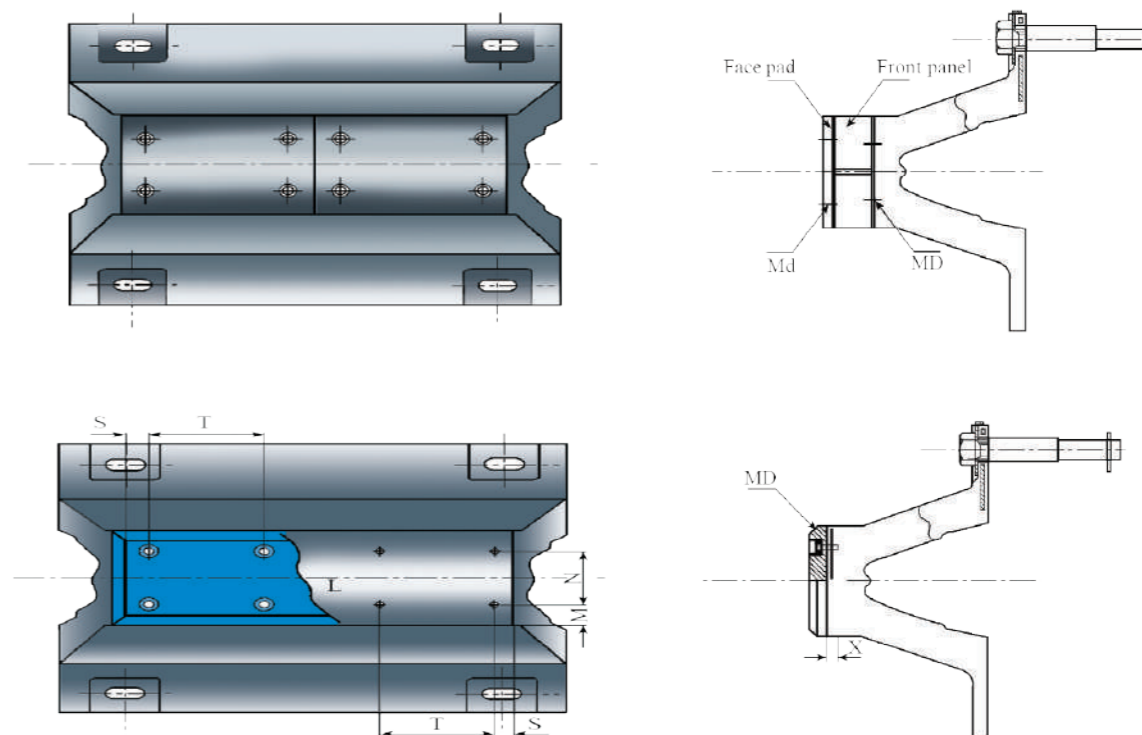
Grade	C3 Super Reaction Force				C2 Reaction Force				C1 Standard Reaction Force				C0 Low Reaction Force			
	52.5%		55%		52.5%		55%		52.5%		55%		52.5%		55%	
	R(KN)	E(KN-M)	R(KN)	E(KN-M)	R(KN)	E(KN-M)	R(KN)	E(KN-M)	R(KN)	E(KN-M)	R(KN)	E(KN-M)	R(KN)	E(KN-M)	R(KN)	E(KN-M)
NDA-A200-1000L	170	11	231	15	149	11	199	10	110	9	149	8	74	5	99	6
NDA-A200-1500L	254	17	344	20	225	14	298	17	168	11	224	12	112	7	149	9
NDA-A200-2000L	341	20	452	28	300	20	400	25	330	17	229	17	148	9	200	11
NDA-A200-2500L	424	25	575	35	375	24	499	29	275	20	376	20	187	11	248	14
NDA-A200-3000L	511	30	650	41	450	28	600	34	330	24	451	26	224	14	300	18
NDA-A200-3500L	580	35	800	50	524	35	700	41	384	26	525	28	261	16	348	20
NDA-A250-1000L	211	16	278	20	180	17	249	18	138	12	190	15	963	8	118	9
NDA-A250-1500L	315	25	420	31	274	24	376	25	211	19	286	21	141	12	178	13
NDA-A250-2000L	422	32	561	39	361	32	500	37	284	23	380	28	187	15	241	17
NDA-A250-2500L	520	40	700	50	450	39	621	46	351	30	475	36	236	20	300	20
NDA-A250-3000L	625	49	839	58	540	48	748	53	421	36	570	41	281	24	361	24
NDA-A250-3500L	735	57	981	69	631	58	874	65	498	41	666	48	328	28	416	28
NDA-A300-1000L	324	41	450	44	249	31	346	33	206	26	286	28	177	22	246	24
NDA-A300-1500L	486	62	675	66	374	47	519	50	309	39	429	42	266	33	369	36
NDA-A300-2000L	684	82	900	88	498	62	692	66	412	52	572	56	354	44	492	48
NDA-A300-2500L	810	103	1125	110	623	78	865	83	515	65	715	70	443	55	615	60
NDA-A300-3000L	972	123	1350	132	747	93	1038	99	618	78	855	84	531	66	738	72
NDA-A300-3500L	1134	144	1575	154	872	109	1211	116	721	91	1000	98	620	77	860	84
NDA-A400-1000L	432	73	600	79	332	56	462	61	276	45	383	48	235	40	328	43
NDA-A400-1500L	649	109	900	116	499	83	693	89	413	68	573	73	355	61	493	66
NDA-A400-2000L	865	145	1200	155	665	110	923	119	550	93	765	99	472	80	655	87
NDA-A400-2500L	1082	182	1501	195	831	138	1152	148	687	116	956	120	589	99	820	107
NDA-A400-3000L	1299	218	1802	233	996	170	1382	178	825	138	1145	145	709	120	984	128
NDA-A400-3500L	1512	256	2100	273	1160	195	1612	211	962	161	1337	172	817	140	1149	150
NDA-A500-1000L	540	113	751	121	414	85	575	92	345	72	478	77	292	62	411	66
NDA-A500-1500L	810	171	1123	180	622	130	860	140	515	108	717	116	444	92	614	98
NDA-A500-2000L	1082	225	1500	242	831	175	1150	186	688	145	956	154	591	125	820	133
NDA-A500-2500L	1345	283	1874	300	1036	215	1442	231	834	180	1192	193	738	156	1025	164
NDA-A500-3000L	1610	338	2250	363	1240	252	1726	270	1032	216	1434	231	885	185	1232	202
NDA-A500-3500L	1890	398	2625	424	1453	306	2014	326	1204	252	1672	270	1032	217	1432	230
NDA-A600-1000L	646	162	890	170	478	125	692	131	412	104	572	111	350	90	492	96
NDA-A600-1500L	970	243	1348	260	747	187	1032	199	618	156	858	167	526	138	736	150
NDA-A600-2000L	1290	325	1798	350	999	250	1378	265	824	208	1144	222	702	180	981	197
NDA-A600-2500L	1618	408	2248	438	1245	315	1725	339	1030	260	1430	278	889	222	1225	239
NDA-A600-3000L	1940	488	2690	525	1490	377	2077	406	1236	312	1716	333	1062	267	1476	286
NDA-A600-3500L	2265	571	3147	613	1742	442	2421	470	1442	364	2002	389	1239	311	1721	332
NDA-A800-1000L	864	290	1200	310	662	222	921	240	550	185	764	198	471	159	655	171
NDA-A800-1500L	1290	430	1800	466	996	335	1382	360	825	278	1146	297	704	238	982	252
NDA-A800-2000L	1720	578	2400	622	1328	444	1840	470	1100	370	1528	396	942	317	1311	339
NDA-A800-2500L	2158	725	3000	777	1661	550	2300	590	1375	463	1910	495	1180	397	1642	418
NDA-A800-3000L	2590	869	3600	930	1990	667	2700	714	1650	555	2292	594	1410	476	1996	511
NDA-A800-3500L	2800	970	3800	1060	2130	745	2900	810	1921	660	2620	710	1600	562	2210	620
NDA-A1000-1000L	1080	453	1500	487	831	349	1152	370	688	289	956	310	590	247	818	262
NDA-A1000-1500L	1680	680	2245	726	1243	522	1723	560	1032	434	1434	466	883	371	1225	389
NDA-A1000-2000L	2158	907	3000	970	1664	698	2300	746	1376	578	1912	620	1178	493	1630	530

1.Performance tolerance:±10%
2.Other performance are available on customer's request

Performance Curve



NDA-B



Specification

Specification	UHMW connect with UHMW face pad		connect with front panel					Length		
	M	N	S	T	S	T	MD		Md	X
NDA-B150	49	0	60	300-400	125	250-300	M22	M16	35	1000-3500
NDA-B200	65.5	0	60	300-400	125	250-300	M24	M16	35	1000-3500
NDA-B250	50	64	60-85	300-400	125	250-300	M27	M16	35	1000-3500
NDA-B300	60	105	65-85	300-400	125	250-300	M30	M16	40	1000-3500
NDA-B400	60	180	65-85	300-400	125	250-300	M36	M16	45-50	1000-3500
NDA-B500	65	245	65-85	300-400	125	250-300	M42	M16	50-55	1000-3500
NDA-B600	70	310	65-85	300-400	125	250-300	M48	M16	50-55	1000-3500
NDA-B800	80	440	65-85	300-400	125	250-300	M64	M16	55-60	1000-3000
NDA-B1000	90	570	65-85	300-400	125	250-300	M65	M16	60-70	1000-2000

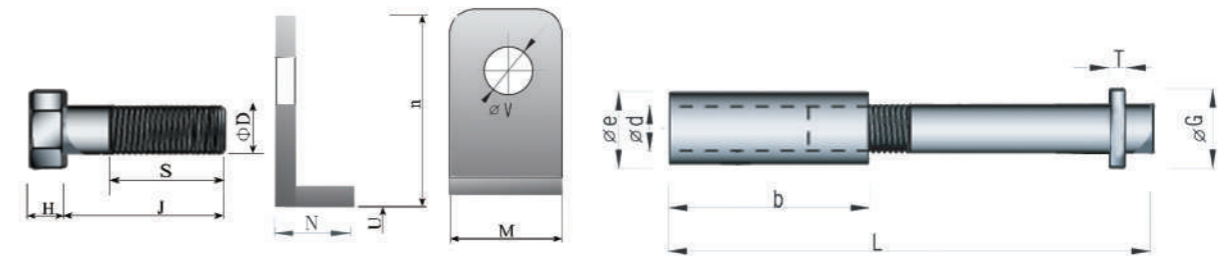
Performance List

Specification	ComperSSION deflection 50%							
	Super High Reaction Force C3		High Reaction Force C2		Standard Reaction Force C1		Low Reaction Force C0	
	Force	Absorption	Force	Absorption	Force	Absorption	Force	Absorption
NDA-B150	181	7	155	7	116	5	78	3
NDA-B200	241	13	208	11	157	8	103	6
NDA-B250	257	24	196	19	165	15	144	12
NDA-B300	326	35	242	24	200	21	158	16
NDA-B400	413	64	316	49	261	41	229	31
NDA-B500	511	102	401	78	354	64	269	54
NDA-B600	613	133	462	108	386	83	299	71
NDA-B800	831	265	621	200	510	150	456	126
NDA-B1000	1015	417	788	312	259	262	539	221



Accessories

Fender length(meter)	1.0	1.5	2.0	2.5	3.0	3.5
Bolts(PCS)	4	6	8	8	10	12



Specification	Bolt					Washer					Nut&foot rod				
	D	J	S	H	M	n	N	U	V	d	e	b	L	T	G
NDA-A150H	22	55	50	14	68	55	12	5	24	22	28	75	165	6	50
NDA-A200H	24	65	59	15	74	75	14	5	26	24	32	85	180	6	55
NDA-A250H	27	65	60	17	88	90	16	5	30	27	34	90	200	10	55
NDA-A300H	30	85	70	19	100	110	19	5	37	30	42	120	300	10	80
NDA-A400H	36	95	80	23	119	126	22	6	43	36	50	125	360	10	85
NDA-A500H	42	110	90	26	127	145	25	6	49	42	60	140	420	12	110
NDA-A600H	48	110	100	30	139	165	29	6	52	48	65	145	480	12	115
NDA-A800H	64	150	120	40	195	266	32	8	70	64	80	190	640	16	130
NDA-A1000H	64	150	120	40	215	306	36	8	70	64	80	190	640	16	130

Engineering Applications



NDMV Rubber Fender

NDMV rubber fender

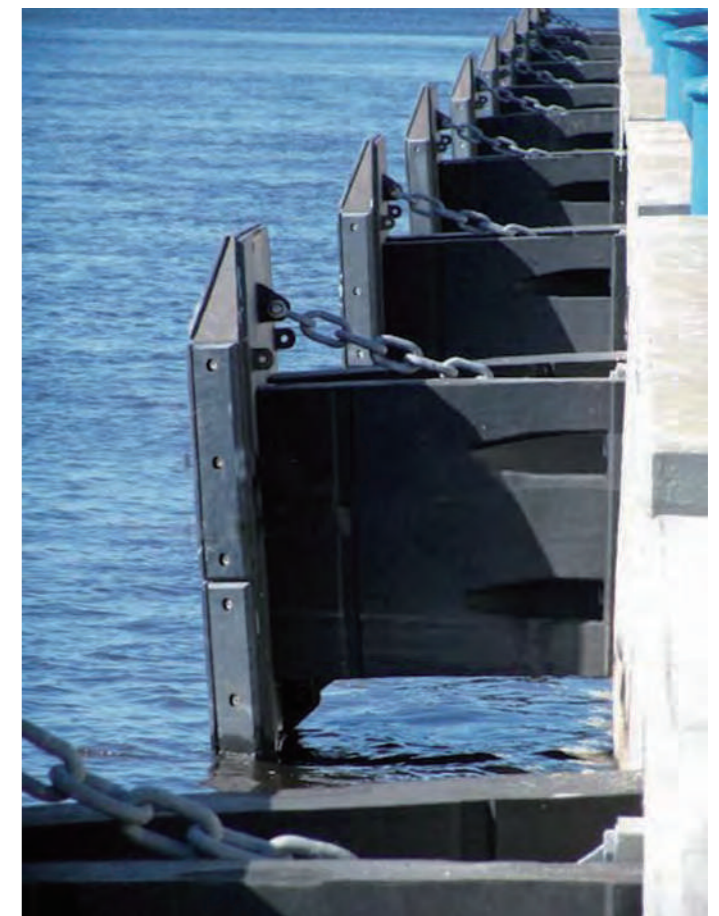
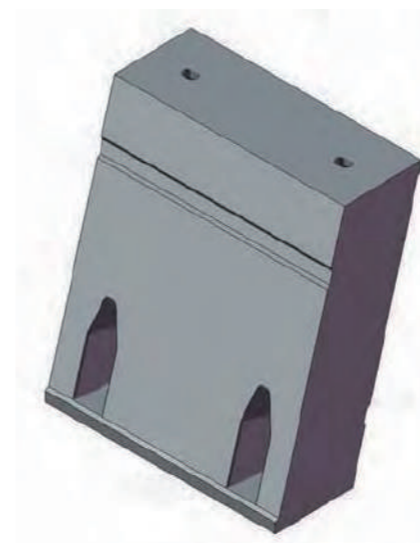
NDMV fenders have very high performance. They are versatile and can be combined in unlimited combinations of lengths and directions can meet various berthing conditions.

Features

- 1.Highly efficient shape
- 2.Strong in lengthwise shear
- 3.Large range of performance

Application

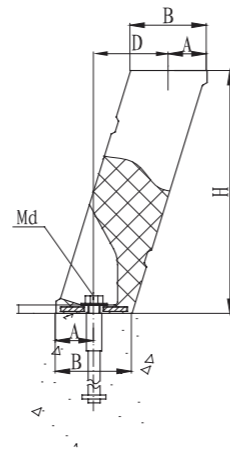
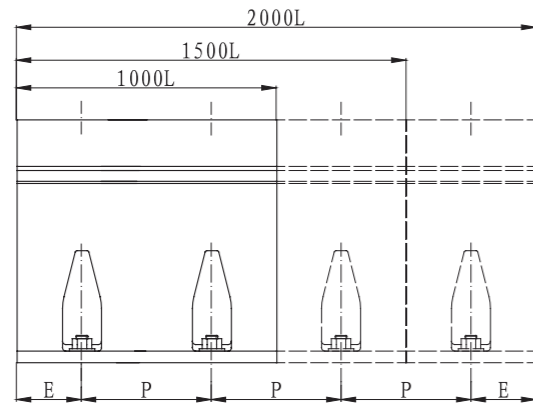
- 1.Container terminals
- 2.Tanker berths
- 3.Ro-Ro and cruise ships
- 4.Bulk and general cargo berths



Specification

[Unit: mm]

	H	A	B	D	Md	E	P
NDMV300	300	47	94	94	M20	250	500
NDMV400	400	63	125	124	M24	250	500
NDMV500	500	87	158	142	M30	250	500
NDMV550	550	87	172	170	M30	250	500
NDMV600	600	87	188	199	M30	250	500
NDMV750	750	118	235	230	M36	250	500
NDMV800	800	129	250	240	M36	250	500
NDMV1000	1000	162	322	310	M42	250	500
NDMV1250	1250	202	451	388	M48	250	500
NDMV1450	1450	228	454	454	M48	250	500
NDMV1600	1600	257	500	480	M56	250	500



Length

	600	750	900	1000	1200	1500	1800	MAX
NDMV300	○	●	○	●	○	●	○	2000
NDMV400		●	○	●	○	●	○	2000
NDMV500		●	○	●	○	●		1500
NDMV550		●	○	●	○	●		1500
NDMV600		●	○	●	○	●	○	2000
NDMV750		●	○	●	○	●	○	2000
NDMV800		●	○	●	○	●	○	2000
NDMV1000			○	●	○	●		1500
NDMV1250			○	●	○	●		1500
NDMV1400			○	●	○	●	○	2000
NDMV1600				●	○	●	○	2000

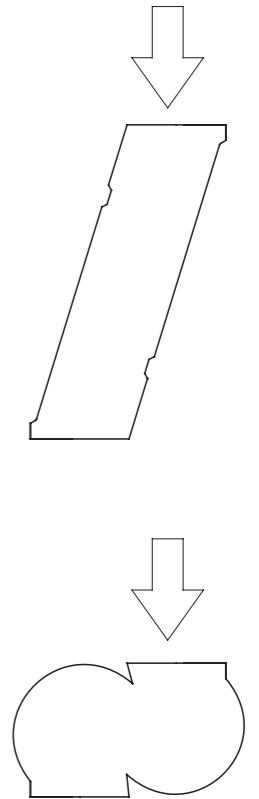
● preferred lengths

○ typical non-standard lengths

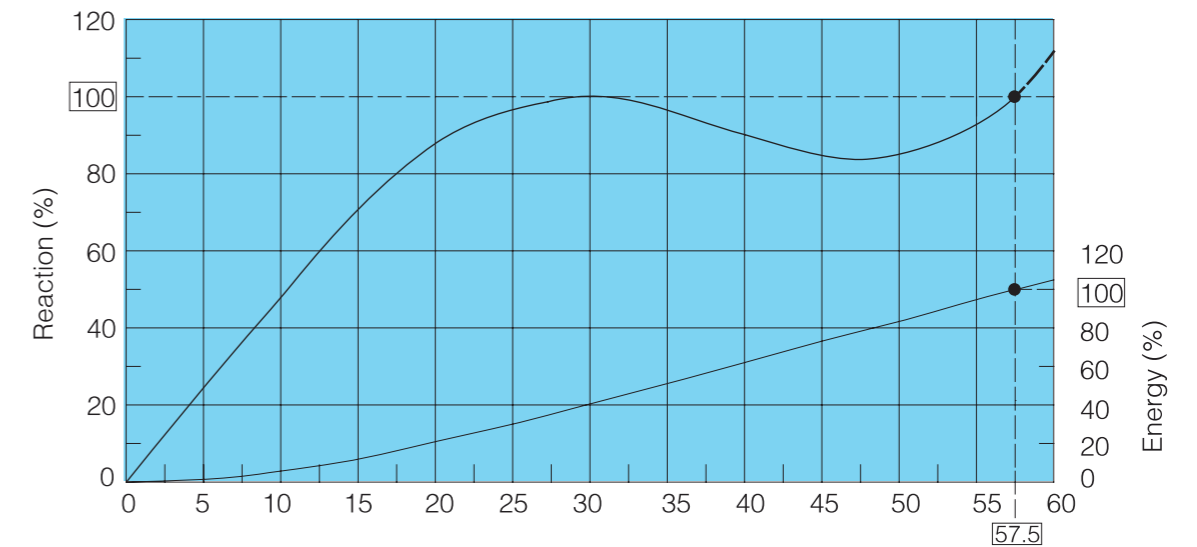
Performance

	Rated Deflection 57.5%			
	C1		C2	
	Reaction force	Energy absorption	Reaction force	Energy absorption
NDMV300	110	15	161	22
NDMV400	150	27	214	39
NDMV500	187	43	267	61
NDMV550	206	52	294	75
NDMV600	224	62	320	89
NDMV750	282	96	402	137
NDMV800	299	110	428	157
NDMV1000	374	172	534	245
MDMV1250	467	268	667	383
MDMV1450	543	361	775	516
NDMV1600	599	440	855	628

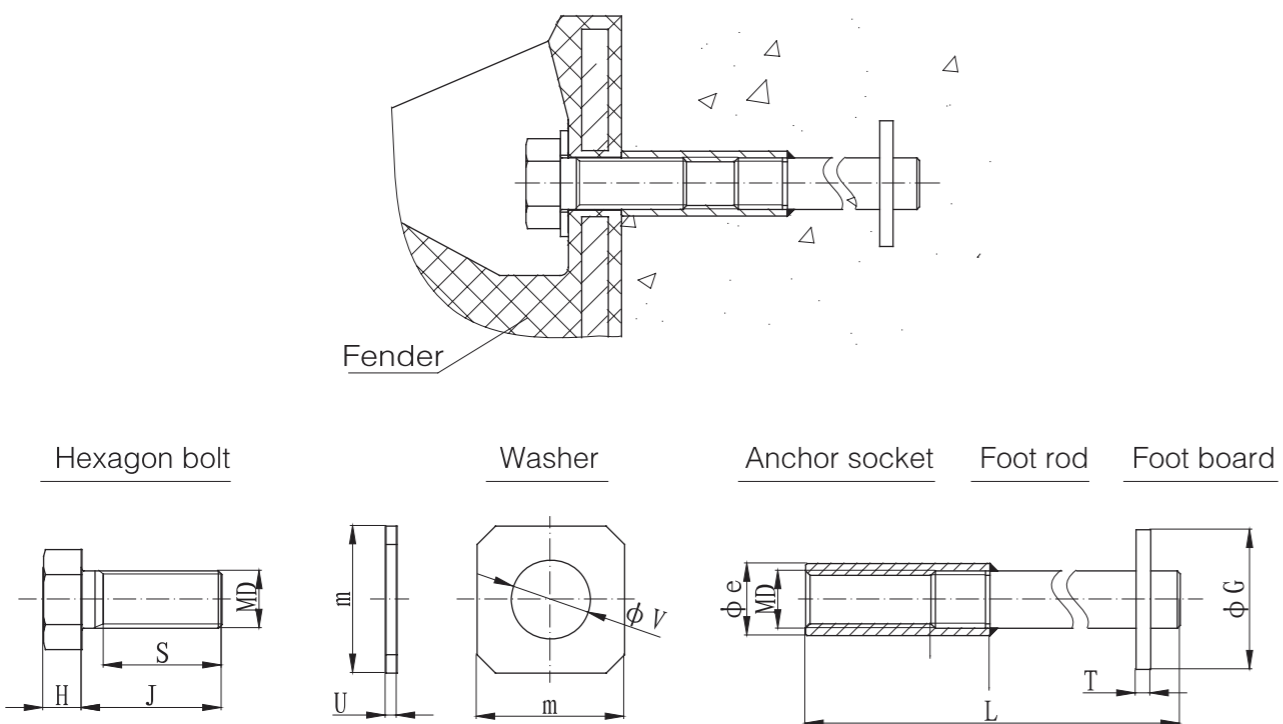
1.Performance tolerance:±10%
2.Other performance are available on customer's request



Performance Curve



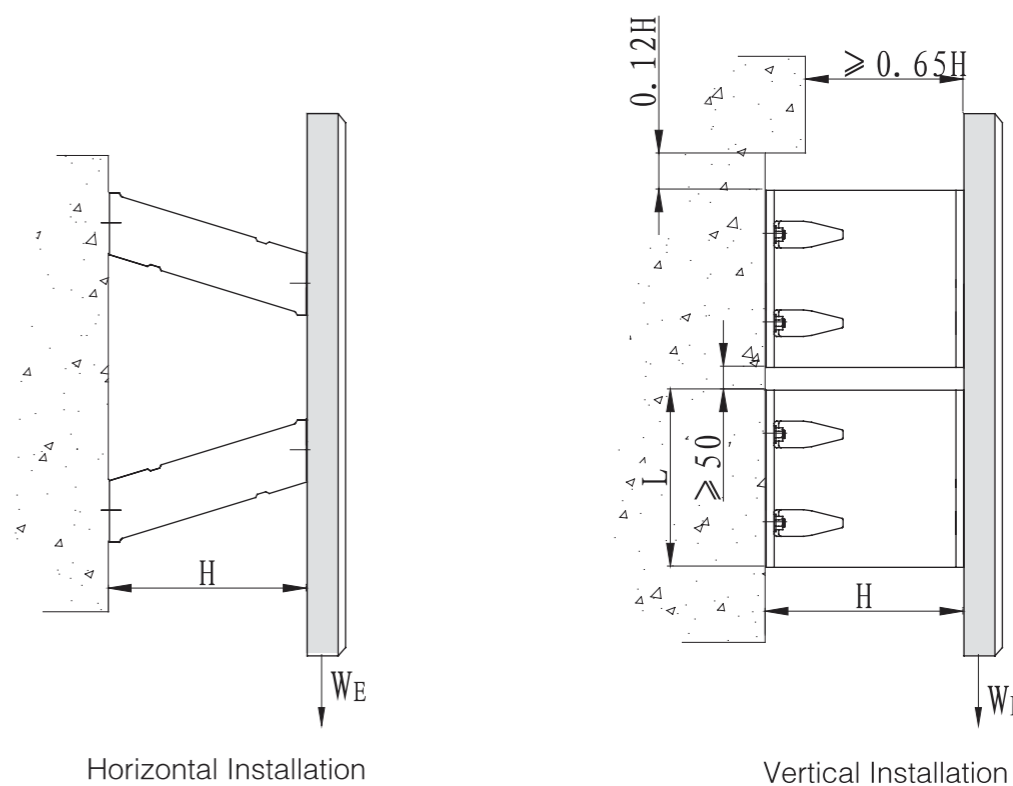
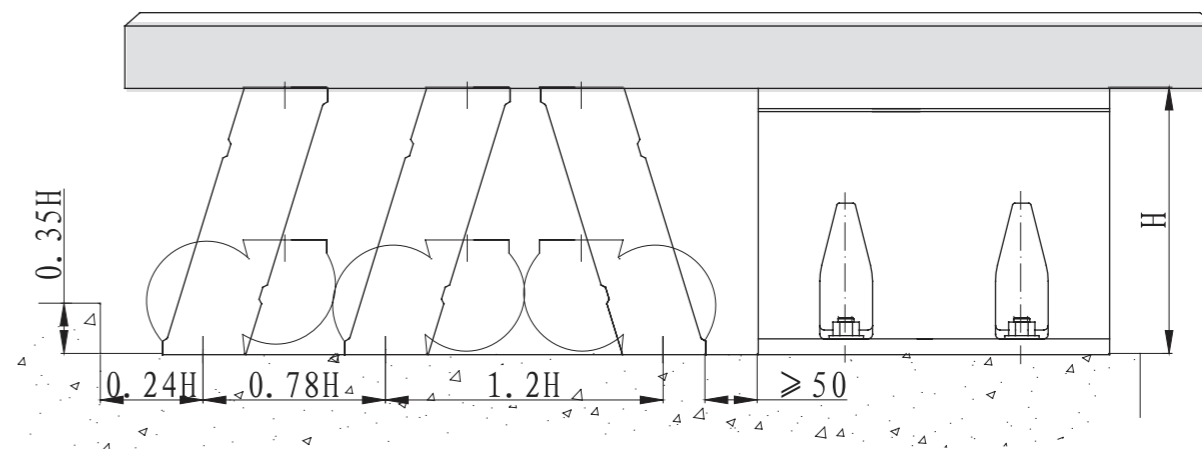
Accessories



[Unit: mm]

	MD	Hexagon Bolt			Washer			Anchor Socket	Foot Rod Foot Board		
		H	J	S	m	U	V	e	G	T	L
NDMV300	M24	17	60	45	55	5	28	34	70	6	240
NDMV400		17	60	45	55	5	28	34	70	6	240
NDMV500	M30	19	70	60	65	5	34	39	80	10	300
NDMV550		19	70	60	65	5	34	39	80	10	300
NDMV600		19	70	60	65	6	34	39	80	10	300
NDMV750	M36	23	85	70	75	6	40	47	85	12	360
NDMV800		23	85	70	75	6	40	47	85	12	360
NDMV1000	M42	26	95	75	90	6	46	54	100	14	420
NDMV1250	M48	30	105	85	100	8	52	64	130	16	480
NMDV1450		30	110	85	100	8	52	64	130	16	480
NMDV1600	M56	35	135	100	120	10	62	74	130	18	560

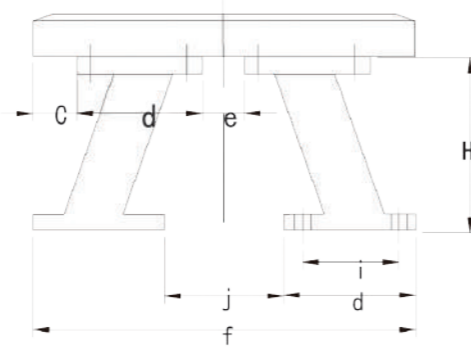
Allowable minimum space between the cone fenders and the minimum space of anchor bolts to concrete edge



Type T Fenders

Features

Large contact area, little surface pressure;
High energy absorption low reaction force
Easy for installation



Specification

Model	H (mm)	c (mm)	d (mm)	e (mm)	f (mm)	i (mm)	j (mm)
ND-T600	600	150	500	65	1500	370	500
ND-T800	800	150	600	100	1700	460	500
ND-T1000	1000	250	700	100	2000	550	600
ND-T1250	1250	325	800	200	2450	650	850
ND-T1400	1400	325	900	200	2700	730	900
ND-T1700	1700	350	1050	200	3150	860	1050
ND-T2000	2000	400	1300	200	3700	1000	1300
ND-T2250	2250	550	1350	300	4000	1150	1300

Length



Specification	L=1000			L=1500			L=2000			L=2500		
	D	Q	n	D	Q	n	D	Q	n	D	Q	n
T600-T2250	700	150	1	600	150	2	850	150	2	700	200	3

Performance List

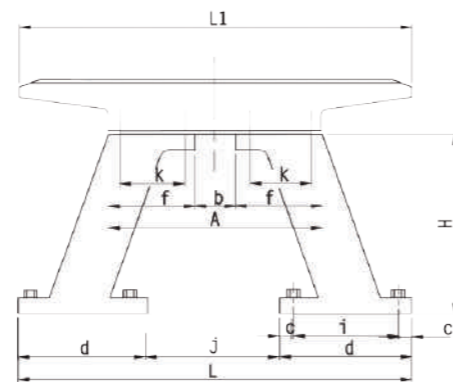
Performance	Low Reaction Force		Standard Reaction Force		High Reaction Force		Super High Reaction Force	
	C0		C1		C2		C3	
Model	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)
ND-T800	432	132	518	158	605	185	650	199
ND-T1000	540	225	650	270	755	314	810	338
ND-T1250	679	350	810	420	945	490	1010	526
ND-T1400	758	440	910	528	1060	615	1130	660
ND-T1700	920	648	1100	708	1290	906	1380	970
ND-T2000	1080	898	1298	1080	1510	1258	1620	1345
ND-T2250	1216	1133	1460	1360	1700	1588	1820	1700

1. Deflection: 57.5%
2. Performance tolerance: ±10%
3. Other performance are available on customer's request

Type SPI Fender

Features

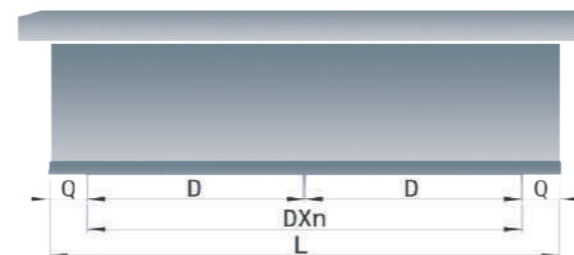
- Large contact area, little surface pressure;
- High energy absorption low reaction force
- Easy for installation



Specification

Model	H (mm)	L (mm)	L1 (mm)	A (mm)	b (mm)	c (mm)	d (mm)	f (mm)	g (mm)	i (mm)	j (mm)	k (mm)
H600	600	1400	1500	760	100	65	500	330	600	370	400	200
H800	800	1700	1500	920	100	70	600	410	700	460	500	270
H1000	1000	2000	2000	1060	100	75	700	480	800	550	600	330
H1250	1250	2300	2000	1220	100	75	800	560	900	650	700	400
H1400	1400	2600	2500	1360	100	85	900	630	1000	730	800	460
H1700	1700	3100	3000	1650	100	95	1050	750	1200	860	1000	550
H2000	2000	3600	3500	1920	200	100	1200	860	1400	1000	1200	660
H2250	2500	4250	4500	2240	200	100	1400	1020	1600	1200	1450	810

Length



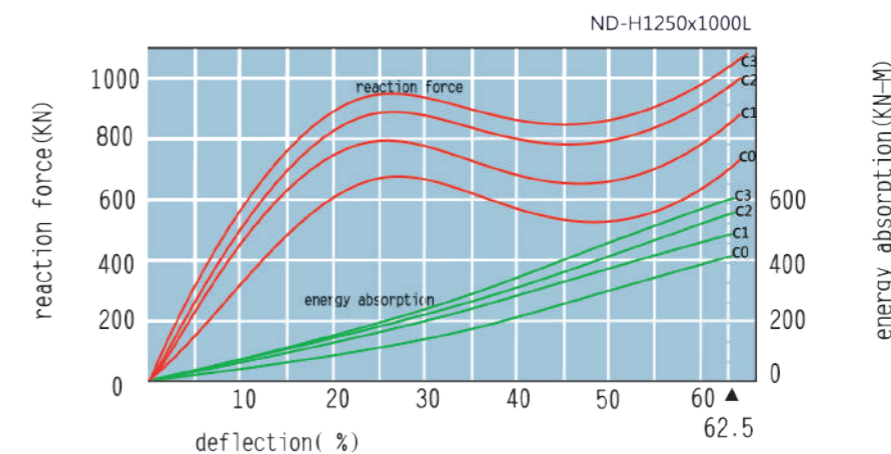
Specification	L=1000			L=1500			L=2000			L=2500		
	D	Q	n	D	Q	n	D	Q	n	D	Q	n
H600-H2250	700	150	1	600	150	2	850	150	2	700	200	3



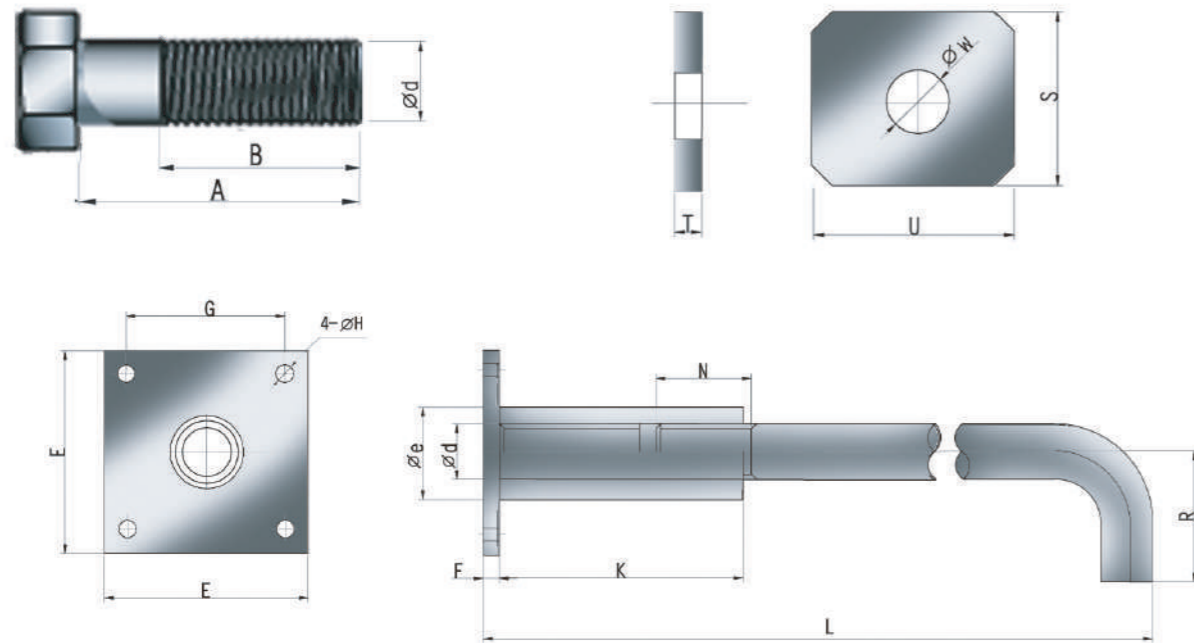
Performance List

Performance	Low Reaction Force(C0)				Standard Reaction Force(C1)				High Reaction Force(C2)				Super High Reaction Force(C3)			
	60%		62.50%		60%		62.50%		60%		62.50%		60%		62.50%	
	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)	(KN)	(KN-M)
H600	312	87	337	92	374	105	404	111	437	122	742	129	468	131	505	138
H800	416	156	970	240	490	187	537	190	582	218	629	229	624	233	674	246
H1000	520	243	562	256	624	292	674	307	728	340	786	358	780	365	842	384
H1250	650	380	700	400	780	456	842	480	910	530	982	560	975	570	1053	600
H1400	728	476	786	502	874	572	944	602	1019	667	1101	702	1092	714	1179	753
H1700	884	702	955	740	1061	846	1146	888	1238	983	1337	1036	1326	1053	1434	1110
H2000	1040	976	1123	1024	1248	1166	1348	1229	1456	1361	1572	1434	1560	1458	1685	1536
H2250	1300	1519	1404	1600	1560	1823	1685	1920	1820	2126	1966	2240	1950	2278	2106	2400

Performance Curve



Fixing Accessories



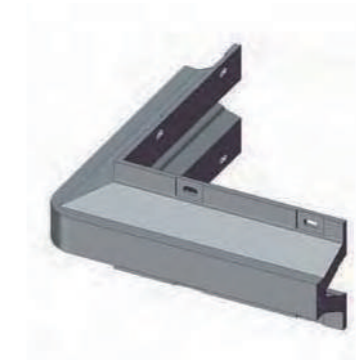
Specification

Specification	Bolt			Anchor Plug									Washer			
	d	A	B	e	E	F	G	H	K	L	N	R	S	U	T	W
H600-H800	38	100	80	48	120	9	100	6	140	290	50	80	75	100	6	41
H1000-H1400	45	120	90	55	130	12	110	6	150	340	60	90	90	150	9	48
H1700-H2000	50	140	100	60	150	12	130	8	180	410	70	100	100	150	9	55
H2500	64	150	110	80	170	12	150	8	195	440	75	140	140	75	9	69

Corner Fenders

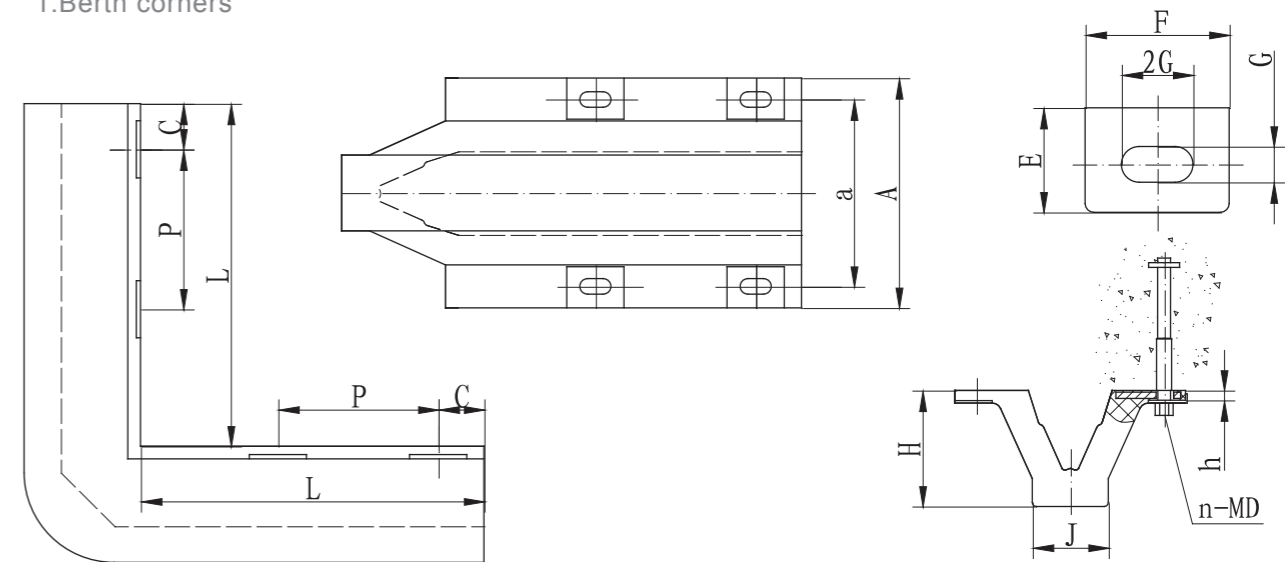
Features

- 1.90°angle design
- 2.Easy to install



Application

- 1.Berth corners



Specification

[Unit:mm]

	H	L	A	a	J	h	C	P	F	G	E	n-MD
NDA250*750L	250	750	500	410	164	20.5	100	350	125	32	90	8-M27
NDA250*1000L	250	1000	500	410	164	20.5	150	550	125	32	90	8-M27
NDA300*1000L	300	1000	600	490	225	24	140	575	140	35	105	8-M30

Other type corner fenders are available on requests.

Roller Fenders

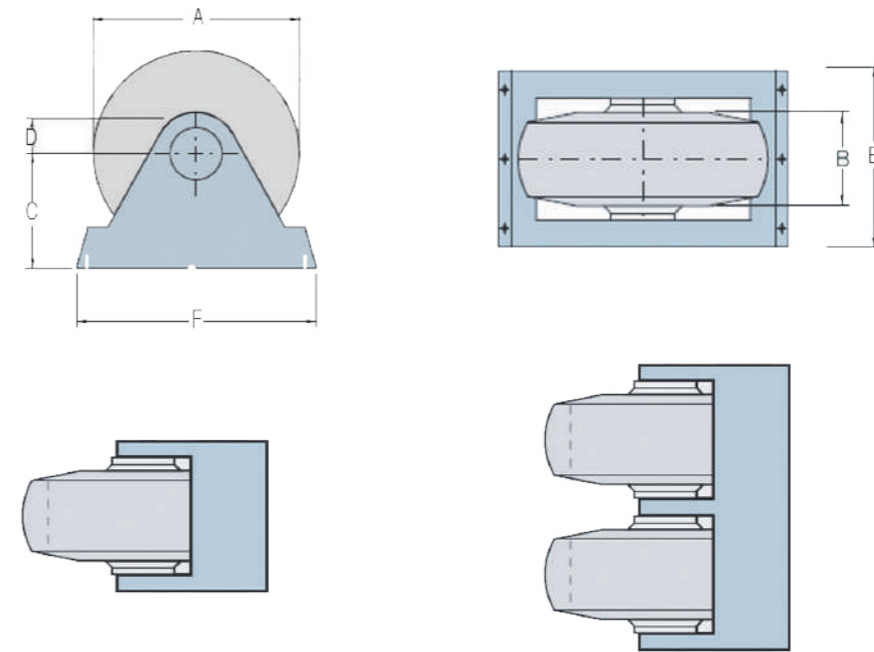
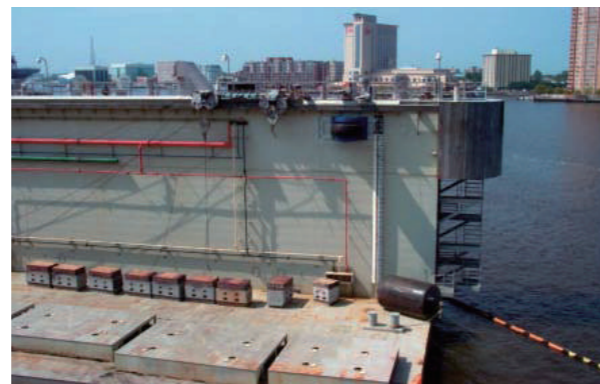
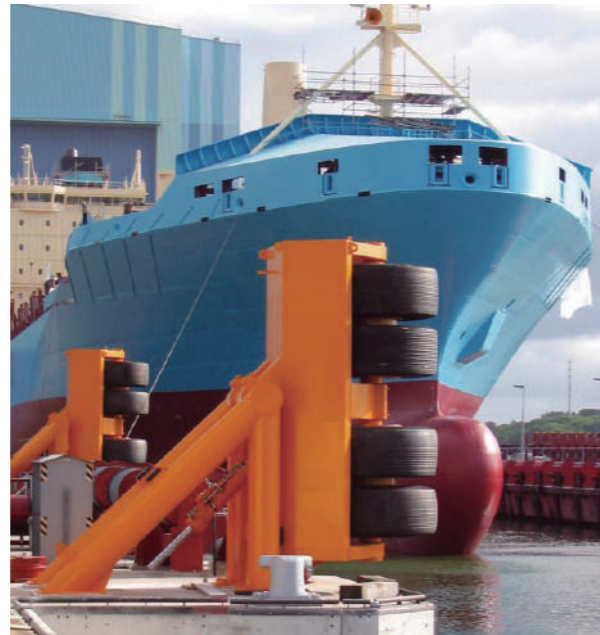
Roller Fenders are usually installed to guide ships in restricted spaces like walls of dry docks. They can also be used on corners and lock entrances where low energies are needed. Roller Fenders use metal steel and bearings which give a very low rolling resistance and require virtually zero maintenance.

Features

- ▮ Good energy absorption
- ▮ Gentle contact face
- ▮ Low rolling resistance
- ▮ Use singly or in multiple stacks
- ▮ Composite and stainless steel bearings
- ▮ Low maintenance frame design

Applications

- ▮ Dry-dock entrances and walls
- ▮ Lock approaches
- ▮ Some exposed corners and entrances



Specification

Model	A	B	C	D	E	F	G
	Φ (mm)	(mm)	(mm)	(mm)	(mm)	(mm)	#Turn Cells
ND1-060-20	600	200	320	110	420	695	1
ND1-075-25	750	250	400	140	510	870	1
ND1-090-30	900	300	480	165	610	1040	1
ND1-120-40	1200	400	640	220	820	1380	1
ND1-150-50	1500	500	800	275	1010	1740	1
ND1-180-60	1800	600	960	330	1210	2080	1
ND1-210-70	2100	700	1155	385	1410	2440	1
ND1-240-80	2400	800	1280	440	1610	2770	1
ND2-060-20	600	200	320	110	770	695	2
ND2-075-25	750	250	400	140	935	870	2
ND2-090-30	900	300	480	165	1120	1040	2
ND2-120-40	1200	400	640	220	1500	1380	2
ND2-150-50	1500	500	800	275	1850	1740	2
ND2-180-60	1800	600	960	330	2215	2080	2
ND2-210-70	2100	700	1155	385	2590	2440	2
ND2-240-80	2400	800	1280	440	2950	2770	2
ND3-060-20	600	200	320	110	1120	695	3
ND3-075-25	750	250	400	140	1360	870	3
ND3-090-30	900	300	480	165	1630	1040	3
ND3-120-40	1200	400	640	220	2180	1380	3
ND3-150-50	1500	500	800	275	2690	1740	3
ND3-180-60	1800	600	960	330	3220	2080	3
ND3-210-70	2100	700	1155	385	3770	2440	3
ND3-240-80	2400	800	1280	440	4290	2770	3



TUG FENDERS

Tug Fender

Tug fender are installed on tug boats and work longer and under extreme conditions.

There are mainly three types of fenders,each type serving a particular application.

- 1.TUG BOAT FENDERS
- 2.Pushing fenders
 - M fenders
 - W fenders
- 3.Side beltings
 - DD fenders
 - DO fenders
 - SO fenders



TUG BOAT FENDERS

Tug cylindrical

Tug cylindrical fenders have a wide range dimension and length,due to they can be curved in a suitable length,they are often used as the primary pushing fenders on the bow or stern of most type tug boats.

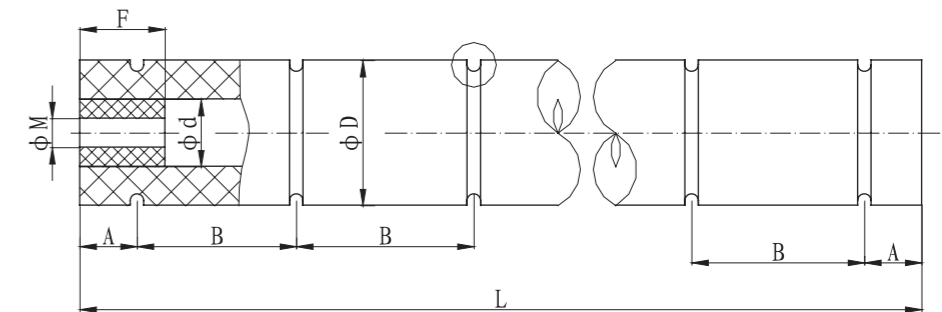
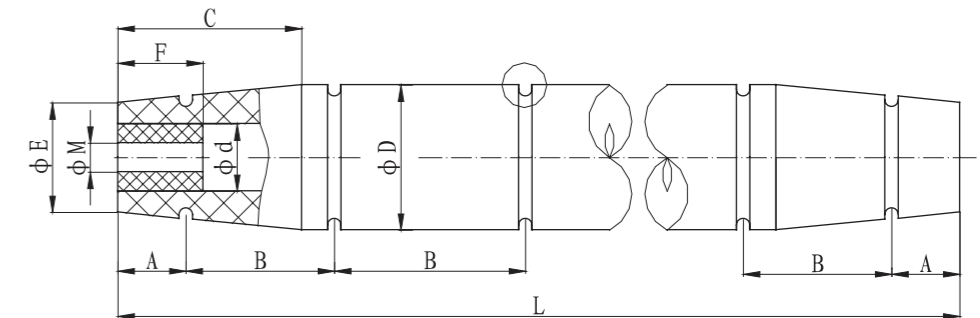


Features

- 1.Simple design and econoic
- 2.Reasonable structure,practical
- 3.Any lengths

Applications

- 1.Tug boat
- 2.Workboat
- 3.Flatboat





Specification

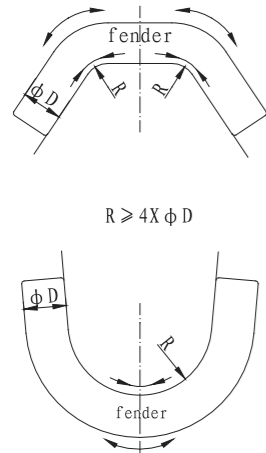
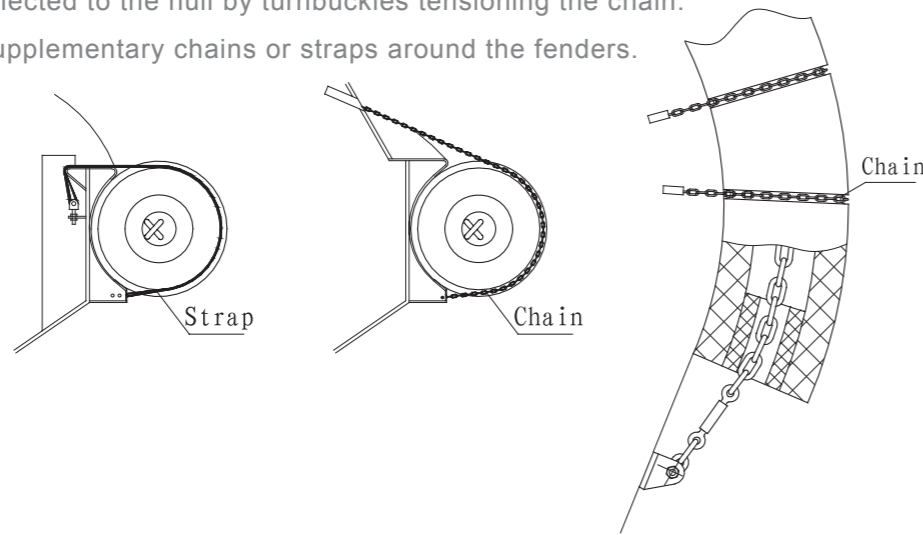
[Unit:mm]

D*d	E	A _{max}	B _{max}	C	M	F
250*125	190	200	570	500	75	300
300*150	225	225	600	700	75	350
380*190	280	225	650	800	100	400
400*200	300	250	670	800	100	400
450*225	350	250	700	850	100	400
480*240	350	250	700	850	100	400
500*250	375	280	730	900	100	400
540*270	375	280	730	900	100	400
600*300	450	300	800	900	125	500
700*350	500	350	870	950	125	500
800*400	600	350	930	1000	125	500
900*450	675	350	1000	1100	150	500

Installation

Smaller fenders (OD≤500mm) are usually fixed by a longitudinal chain through the bore of the fender, connected to the hull by turnbuckles tensioning the chain.

Larger fenders often use supplementary chains or straps around the fenders.



Tug Cylindrical fenders are made in straight lengths, but can be pulled around the bow or stern radius. The outside of the fender will be pulled, inside will be compressed. The outside is easily torn by sharp materials. To avoid damage, have to pay attention on the curve diameter R=4XφD.



M Fenders

M Fenders

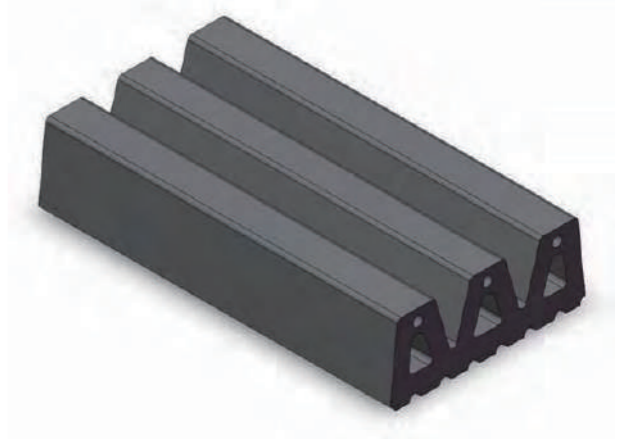
M fenders have a large and flexible contact face which exerts a low pressure during push. The grooves provide extra grip and the triple legs give a strong attachment to the tug.

Features

- 1. Heavy-duty design
- 2. Grooved for extra grip

Application

- 1. Tug boats



Specification

[Unit:mm]

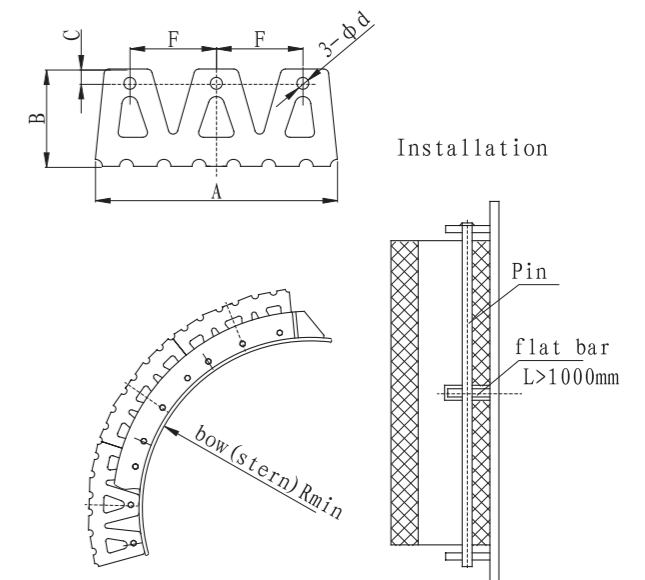
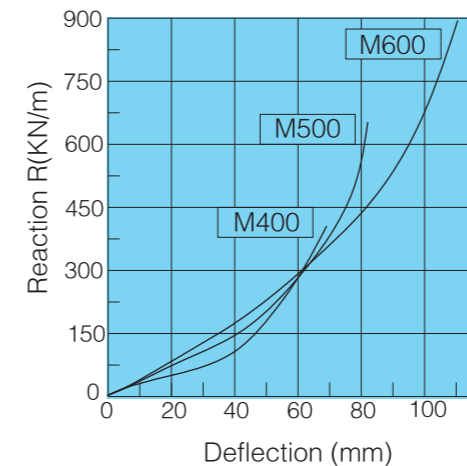
	A	B	C	d	F	L _{max}
M400	400	200	40	23	150	2000
M500	500	250	50	27	190	2000
M600	600	300	60	33	230	2000

Fixings

[Unit:mm]

Pin	Flat bar	R _{min}
φ 20	100*16	450
φ 24	125*20	550
φ 30	150*20	650

Performance Curve



W Fenders

W Fenders

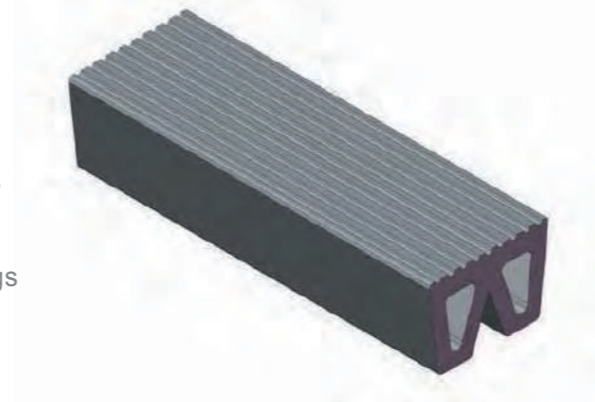
W fenders are made for the most extreme operation conditions. It has unique open bore design which makes installation very simple, the flexible legs allow W-Fenders to be curved around most hull shapes.

Features

1. Extreme-duty design
2. Open bore for easy installation
3. Grooved for extra grip

Application

1. Ocean-going tugs
2. Icebreakers
3. Large harbour tugs



Specification

[Unit:mm]

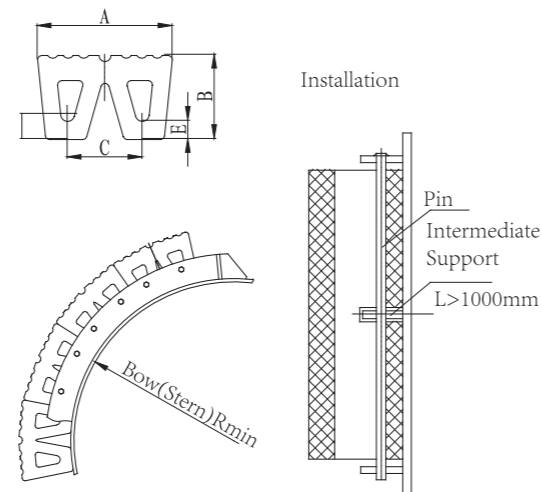
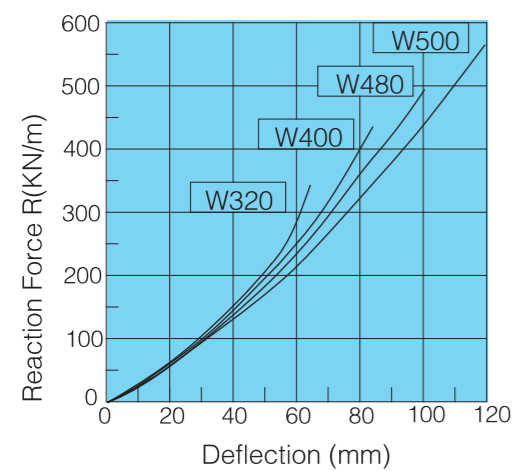
Type	A	B	C	E	Lmax
W320-200	320	200	180	50	2000
W400-250	400	250	220	55	2000
W480-300	480	300	245	58	2000
W500-330	500	330	248	65	2000
W500-400	500	400	270	74	2000

Accessories

[Unit:mm]

Pin	Flat bar	Rmin
φ 25	100*20	600
φ 30	120*20	800
φ 40	140*20	900
φ 40	150*20	1000

Performance Curve



D Fender

D Fender

D fenders are simple rubber fender profiles, usually attached with bolts to the structure.

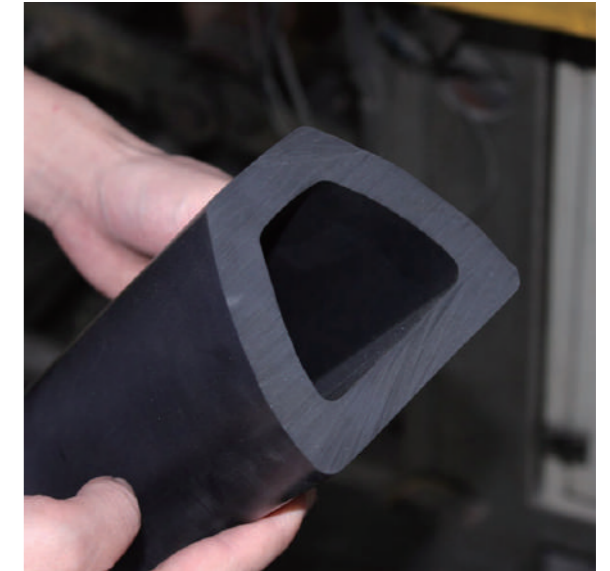
Any length could be available for these fenders, then cut and drilled to suitable applications.

Features

1. All kinds of standard size
2. Any length could be available
3. Varies fixing methods
4. Black or grey color

Applications

1. Jetties and wharves for small craft
2. Tugs and workboats
3. Pontoon protection
4. Inland waterways
5. General purpose fendering



■ EXTRUDED FENDER

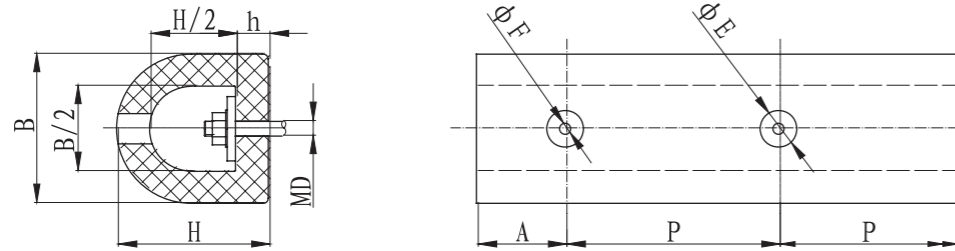


■ Grey/No Mark Fender



DD series

Type A



Specification

[Unit: mm]

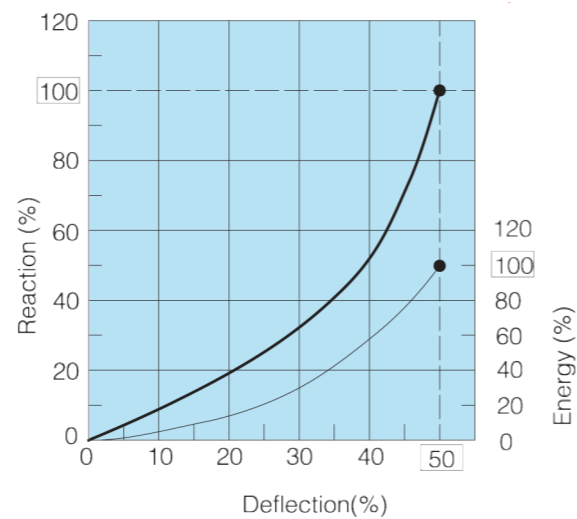
Size	B	H	h	A	P	MD	E	F
NDD100	100	100	30	100-150	400-500	M20	25	60
NDD150	150	150	35	100-150	400-500	M22	27	60
NDD200	200	200	50	100-150	400-500	M24	30	60
NDD250	250	250	62.5	100-200	400-500	M27	33	65
NDD300	300	300	75	100-200	400-600	M30	35	65
NDD350	350	350	87.5	100-200	400-600	M33	38	80
NDD400	400	400	100	100-200	400-600	M36	40	80
NDD500	500	500	125	100-200	400-600	M42	45	95

Performance

Size	Rated Deflection:50%	
	R:KN	E:KN.M
NDD100	77	1.4
NDD150	115	3.2
NDD200	153	5.7
NDD250	191	8.9
NDD300	230	12.9
NDD350	268	17.6
NDD400	306	23
NDD500	383	35.9

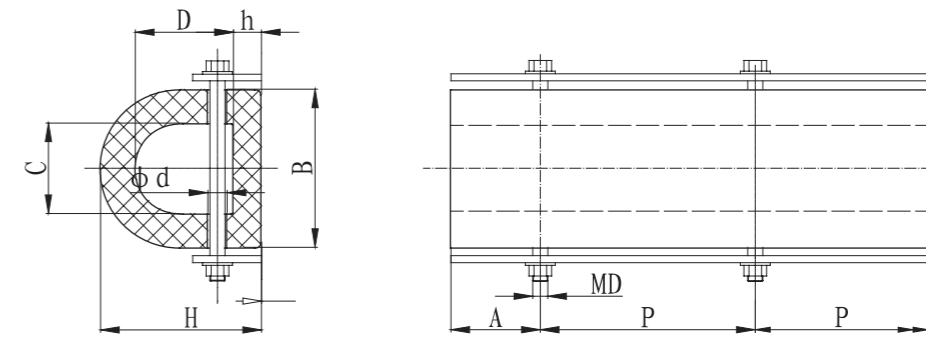
1. Performance tolerance: $\pm 10\%$
2. Values are per meter

Performance Curve



DD series

Type B



Specification

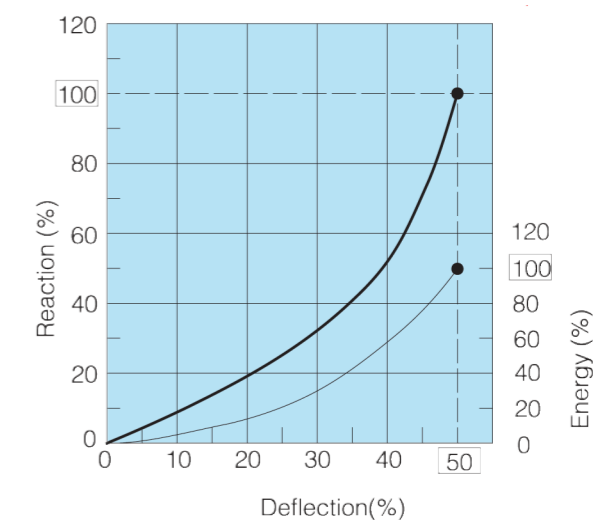
Size	B	H	h	A	P	MD
NDD100	100	100	30	100-150	400-500	M20
NDD150	150	150	35	100-150	400-500	M22
NDD200	200	200	50	100-150	400-500	M24
NDD250	250	250	62.5	100-200	400-500	M27
NDD300	300	300	75	100-200	400-600	M30
NDD350	350	350	87.5	100-200	400-600	M33
NDD400	400	400	100	100-200	400-600	M36

Performance

Size	Rated Deflection:50%	
	R:KN	E:KN.M
NDD100	77	1.4
NDD150	115	3.2
NDD200	153	5.7
NDD250	191	8.9
NDD300	230	12.9
NDD350	268	17.6
NDD400	306	23

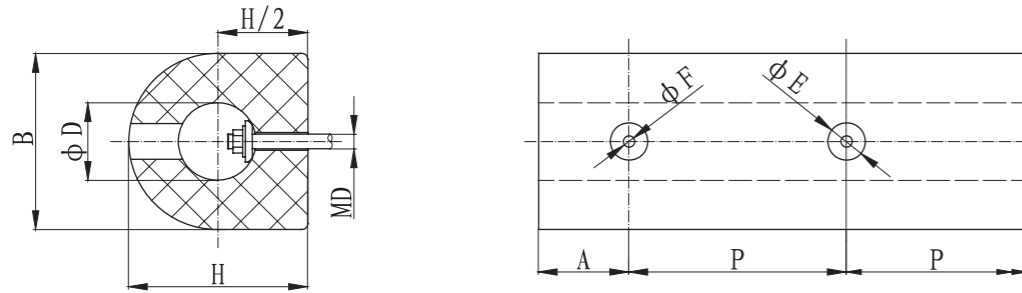
1. Performance tolerance: $\pm 10\%$
2. Values are per meter

Performance Curve



DO series

Type A



Specification

[Unit: mm]

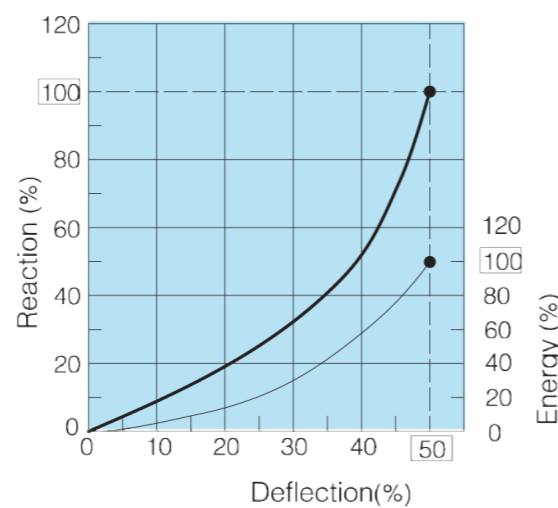
Size	B	H	D	A	P	MD	E	F
NDD100	100	100	50	100-150	400-500	M20	25	60
NDD150	150	150	75	100-150	400-500	M22	27	60
NDD200	200	200	100	100-150	400-500	M24	30	60
NDD250	250	250	125	100-200	400-500	M27	33	65
NDD300	300	300	150	100-200	400-600	M30	35	65
NDD350	350	350	175	100-200	400-600	M33	38	80
NDD400	400	400	200	100-200	400-600	M36	40	80
NDD500	500	500	250	100-200	500-700	M42	45	95

Performance

Size	Rated Deflection:50%	
	R:KN	E:KN.M
NDO100	157	1.9
NDO150	235	4.2
NDO200	314	7.5
NDO250	392	11.7
NDO300	471	16.9
NDO350	549	22.9
NDO400	628	29.4
NDO500	785	46

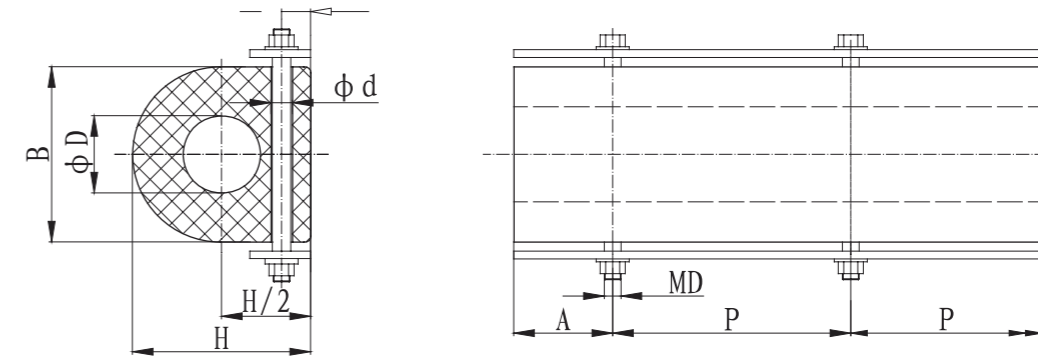
1. Performance tolerance: $\pm 10\%$
2. Values are per meter

Performance Curve



DO series

Type B



Specification

[Unit: mm]

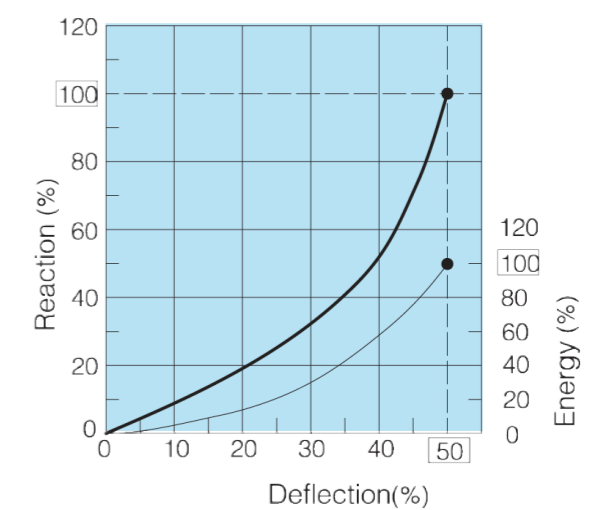
Size	B	H	D	T	d	A	P	MD
NDD100	100	100	30	25	20	100-150	400-500	M20
NDD150	150	150	65	30	27	100-150	400-500	M22
NDD200	200	200	75	35	30	100-150	400-500	M24
NDD250	250	250	100	45	33	100-200	400-500	M27
NDD300	300	300	125	55	36	100-200	400-600	M30
NDD350	350	350	175	65	40	100-200	400-600	M33
NDD400	400	400	200	75	45	100-200	400-600	M36
NDD500	500	500	250	95	50	150-250	500-700	M42

Performance

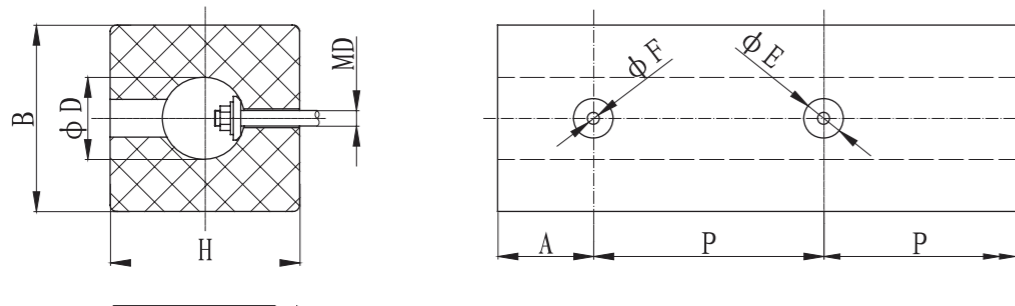
Size	Rated Deflection:50%	
	R:KN	E:KN.M
NDO100	157	1.9
NDO150	235	4.2
NDO200	314	7.5
NDO250	392	11.7
NDO300	471	16.9
NDO350	549	22.9
NDO400	628	29.4
NDO500	785	46

1. Performance tolerance: $\pm 10\%$
2. Values are per meter

Performance Curve



SO series
Type A



Specification

[Unit: mm]

Size	B	H	D	A	P	MD	F	E
NDSO150	150	150	75	100 ~ 150	400 ~ 500	M22	28	60
NDSO200	200	200	100	100 ~ 150	400 ~ 500	M24	30	60
NDSO250	250	250	125	100 ~ 200	400 ~ 500	M27	33	65
NDSO300	300	300	150	100 ~ 200	400 ~ 600	M30	35	65
NDSO350	350	350	175	100 ~ 200	400 ~ 600	M33	38	80
NDSO400	400	400	200	100 ~ 200	400 ~ 600	M36	40	80
NDSO500	500	500	250	100 ~ 200	500 ~ 700	M42	45	95

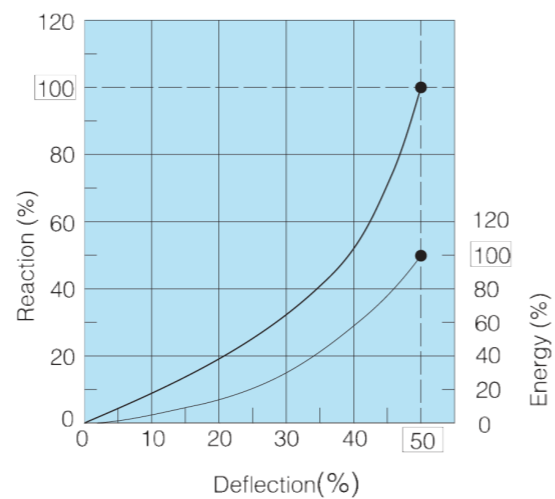
Other dimensions are available on requests

Performance

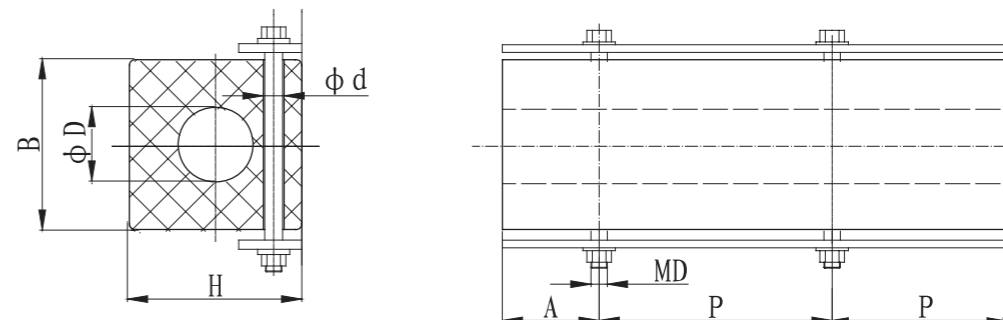
Size	Rated Deflection 50%	
	R:KN	E:KNm
NDSO150	259	6.4
NDSO200	345	11.3
NDSO250	431	17.7
NDSO300	518	25.5
NDSO350	604	34.3
NDSO400	690	45.1
NDSO500	863	70.5

1. Performance tolerance: ± 10%.
2. Values are per meter

Performance Curve



SO series
Type B



Specification

[Unit: mm]

Size	B	H	D	d	A	P	MD
NDSO150	150	150	75	27	100 ~ 150	400 ~ 500	M22
NDSO200	200	200	100	30	100 ~ 150	400 ~ 500	M24
NDSO250	250	250	125	33	100 ~ 200	400 ~ 500	M27
NDSO300	300	300	150	36	100 ~ 200	400 ~ 600	M30
NDSO350	350	350	175	40	100 ~ 200	400 ~ 600	M33
NDSO400	400	400	200	45	100 ~ 200	400 ~ 600	M36
NDSO500	500	500	250	50	100 ~ 200	500 ~ 700	M42

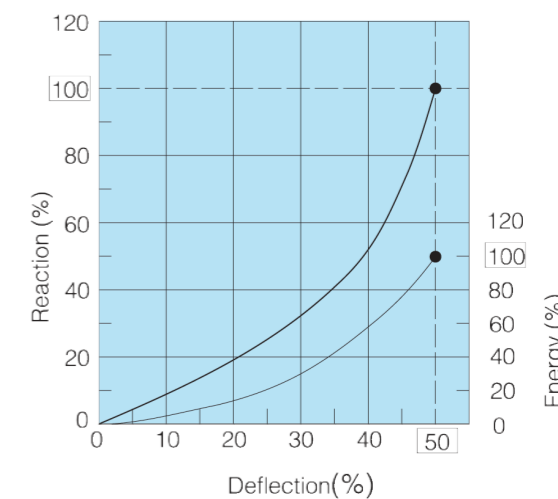
Other dimensions are available on requests

Performance

Size	Rated deflection 50%	
	R:KN	E:KNm
NDSO150	259	6.4
NDSO200	345	11.3
NDSO250	431	17.7
NDSO300	518	25.5
NDSO350	604	34.3
NDSO400	690	45.1
NDSO500	863	70.5

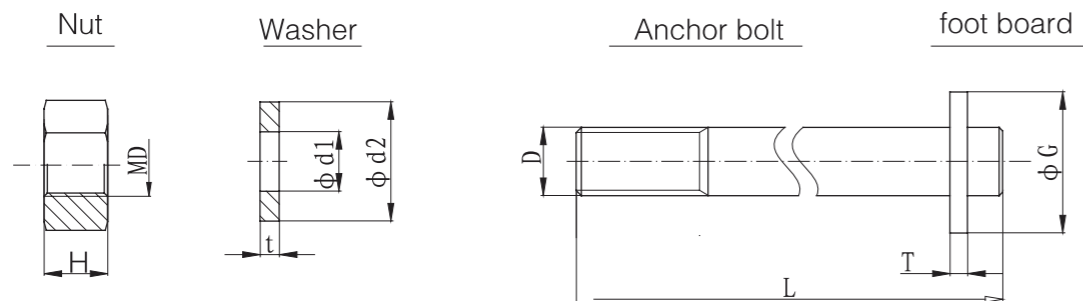
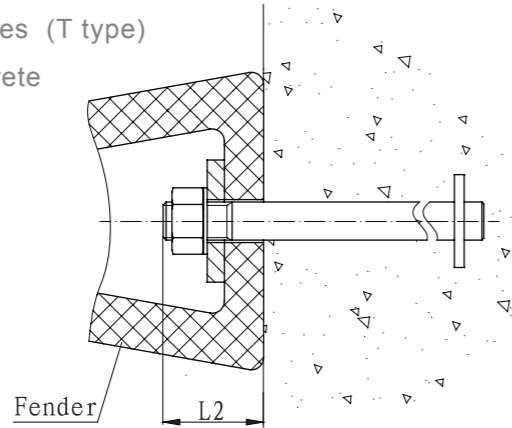
1. Performance tolerance: ± 10%.
2. Values are per meter

Performance Curve



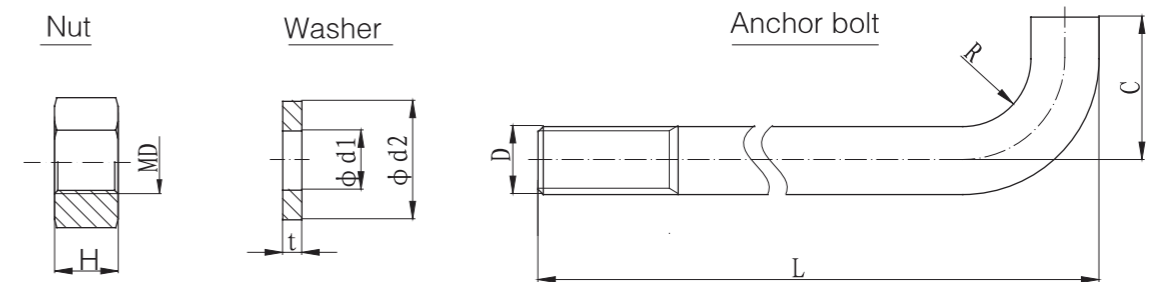
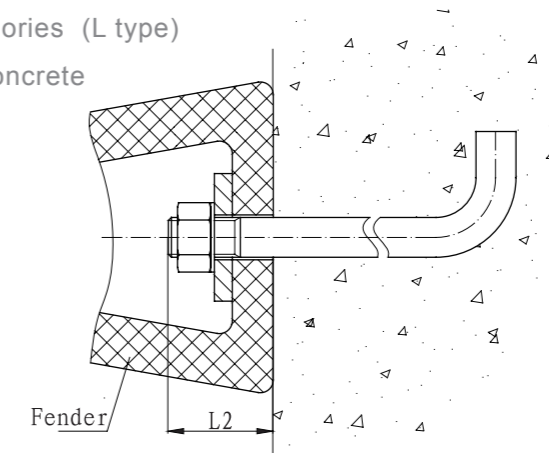
Fixing Accessories

D fenders fFixing Accessories (T type)
Install fenders to new concrete



Size	MD	Nut	Washer					Foot board	
		H	d1	d2	t	L	L2	G	T
D200	M24	22	26	44	4	330	85	55	8-10
D250	M24	22	26	44	4	330	85	55	8-10
D300	M30	26	33	56	4	400	100	80	8-10
D350	M30	26	33	56	4	400	100	80	8-10
D400	M36	30	40	72	6	500	125	85	10-12
D500	M42	34	45	78	8	600	165	100	10-12

D fenders Fixing Accessories (L type)
Install fenders to new concrete



Size	MD	Nut	Washer					Foot board	
		H	d1	d2	t	L	C	R	L2
D200	M24	22	26	44	4	330	55	30	85
D250	M24	22	26	44	4	330	55	30	85
D300	M30	26	33	56	4	400	85	35	100
D350	M30	26	33	56	4	400	85	35	100
D400	M36	30	40	72	6	500	85	40	125
D500	M42	34	45	78	8	600	100	50	165

GD Type Rubber Fenders

GD Type Rubber Fenders

GD type rubber fenders are improved products based on D type fenders, double wing installation, can be used under the most severe conditions.

Features

- 1.Simple one-piece design
- 2.Strong and hard wearing
- 3.sy installation

Application

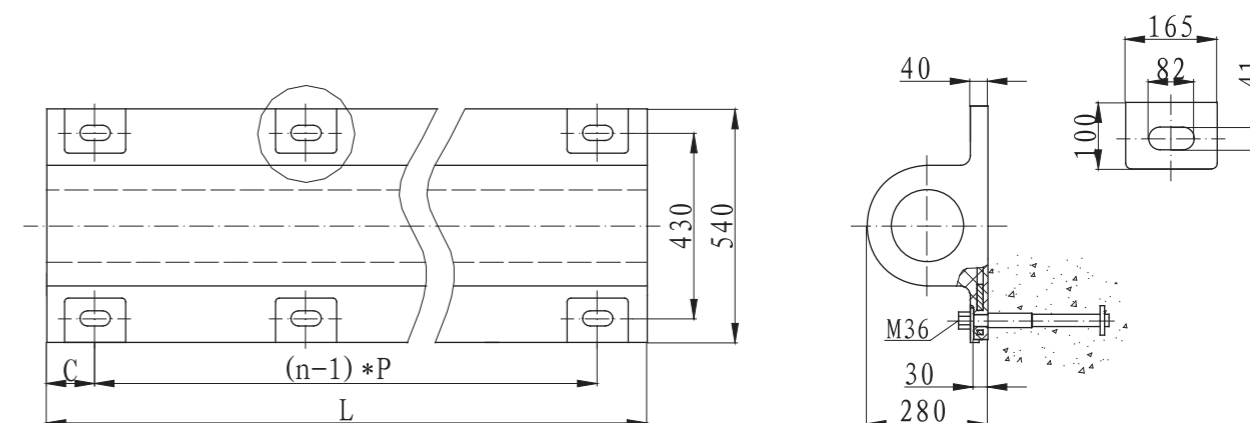
- 1.Jetties and wharves for small craft
- 2.Workboat harbours
- 3.General cargo
- 4.Inland waterway



Specification

[Unit: mm]

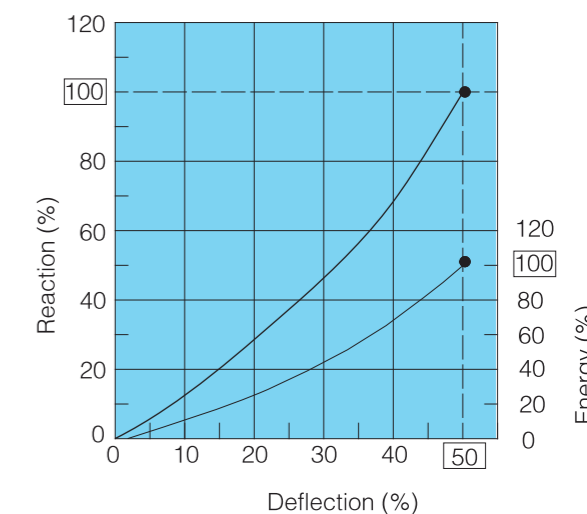
	C	P	L	n
NDGD280*540*1000	150	700	1000	2
NDGD280*540*1500	150	600	1500	3
NDGD280*540*2000	145	570	2000	4
NDGD280*540*2500	150	550	2500	5
NDGD280*540*3000	150	540	3000	6



Performance

	Rated Deflection 50%	
	R: KN	E: KNm
NDGD280*540*1000	375	14
NDGD280*540*1500	565	21
NDGD280*540*2000	750	28
NDGD280*540*2500	940	35
NDGD280*540*3000	1130	42

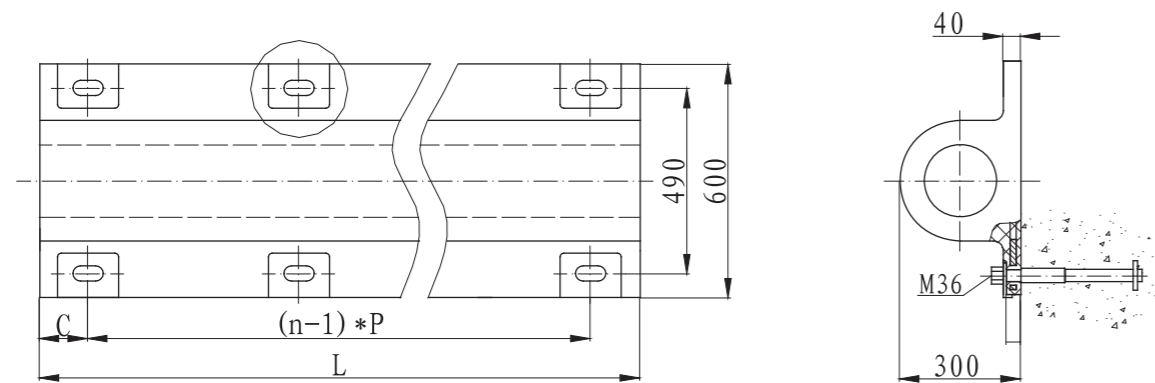
Performance Curve



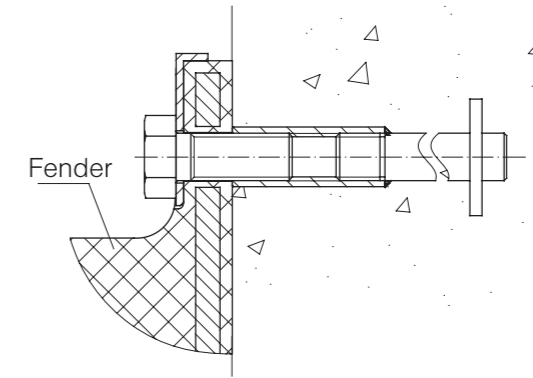
Specification

[Unit: mm]

	C	P	L	n
NDGD300*600*1000	150	700	1000	2
NDGD300*600*1500	150	600	1500	3
NDGD300*600*2000	145	570	2000	4
NDGD300*600*2500	150	550	2500	5
NDGD300*600*3000	150	540	3000	6



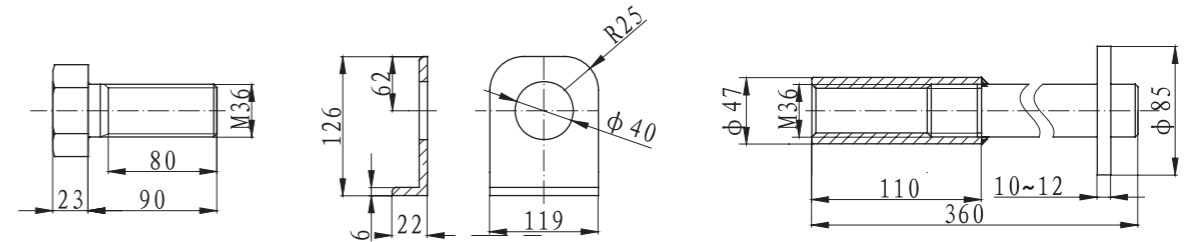
Accessories



Hexagon bolt

Washer

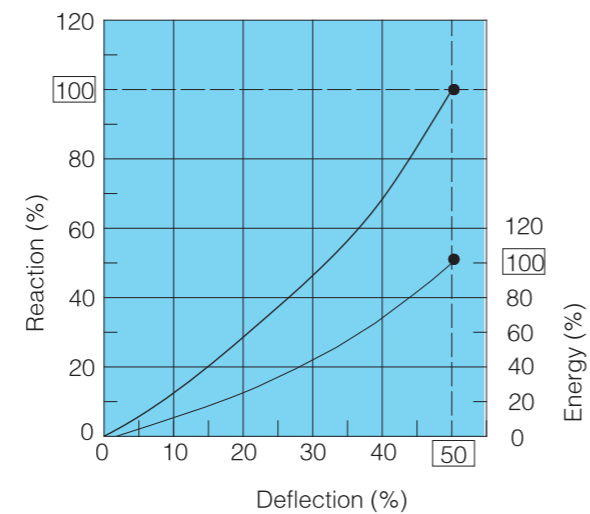
Anchor socket Foot rod Foot board



Performance

	Rated Deflection 50%	
	R: KN	E: KNm
NDGD300*600*1000	450	18
NDGD300*600*1500	675	27
NDGD300*600*2000	900	36
NDGD300*600*2500	1125	45
NDGD300*600*3000	1350	54

Performance Curve



Keyhole Fender

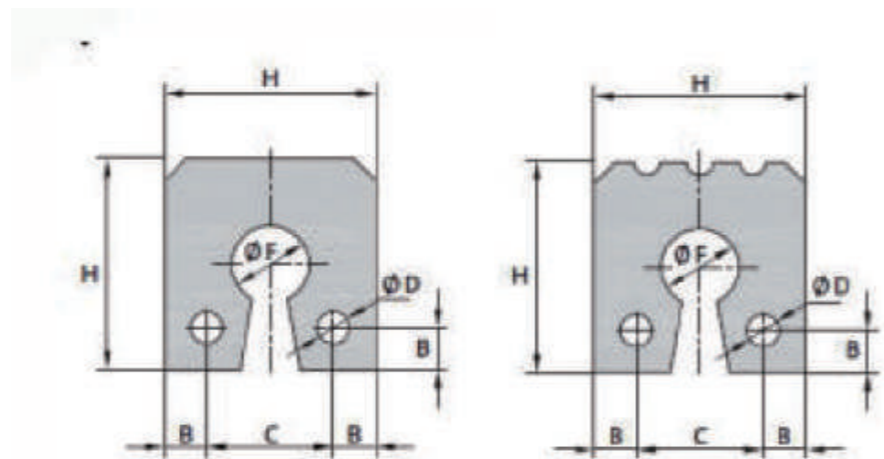
Description

Keyhole fenders are used for protecting at the bow and stern of vessels, which are strong and ideal for heavy-duty applications. Grooved or flat face fenders depend on the required friction levels.



Features

- Heavy-duty design
- Traditional, prove shape
- Grooved or smooth face



Specification

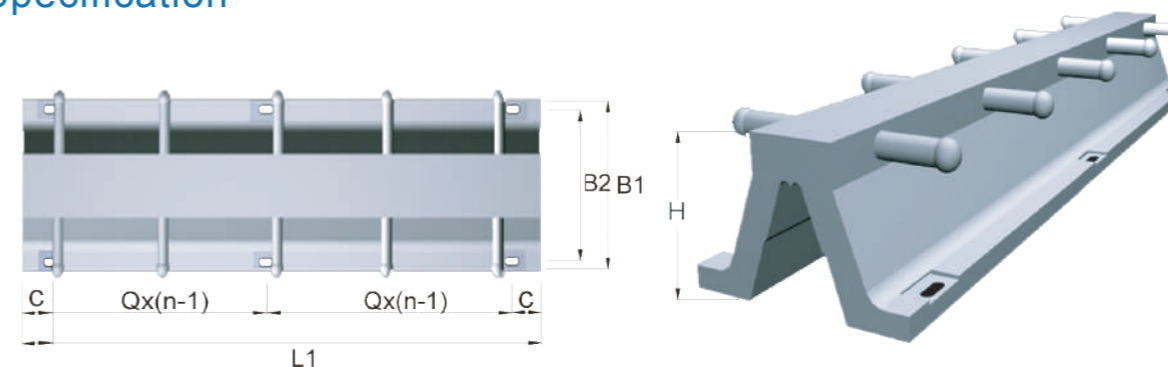
Model	H	B	C	ϕD	ϕF	L	Pin
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
NDK200	200	35	130	28	90	2000	25
NDK250	250	50	150	33	100	2000	30
NDK300	300	60	180	33	115	2000	30
NDK350	350	70	210	33	125	2000	30

Rubber Ladder

Features

- Works both as fender and ladder;
- More durable than steel ladder
- Low maintenance

Specification



Specification

Model	L1 (mm)	L (mm)	Q (mm)	c (mm)	B1 (mm)	B2 (mm)	H (mm)	J (mm)	K Type	n # Fastening Points
H200*1500	1500	1500	650	100	400	320	200	270	M24	3
H200*1800	1800	1800	800	100	400	320	200	270	M24	3
H200*2100	2100	2100	750	100	400	320	200	270	M24	4
H200*2400	2400	2400	850	100	400	320	200	270	M24	4
H200*2700	2700	2700	850	100	400	320	200	270	M24	4
H200*3000	3000	3000	700	100	400	320	200	270	M24	5
H300*1000	1150	1000	870	140	600	490	300	300	M30	2
H300*1500	1650	1500	685	140	600	490	300	300	M30	3
H300*2000	2150	2000	625	140	600	490	300	300	M30	4
H300*2500	2650	2500	790	140	600	490	300	300	M30	4
H300*3000	3150	3000	725	140	600	490	300	300	M30	5
H300*3500	3650	3500	674	140	600	490	300	300	M30	6
H400*1000	1200	1000	900	150	800	670	400	360	M36	2
H400*1500	1700	1500	700	150	800	670	400	360	M36	3
H400*2000	2200	2000	635	150	800	670	400	360	M36	4
H400*2500	2700	2500	800	150	800	670	400	360	M36	4
H400*3000	3200	3000	725	150	800	670	400	360	M36	5
H400*3500	3700	3500	680	150	800	670	400	360	M36	6

Floating Fenders

Pneumatic rubber fender

Pneumatic fender is the advanced anti-collision device for marine applications in the world. It uses compressed air as medium to absorb the impact energy when ship-to-ship contact (STS) and ship-to-berthing (STB).The Larger fender are commonly fitted with chain net for added protection. For navy ships, grey body is also available.

Type-I

Net type fenders

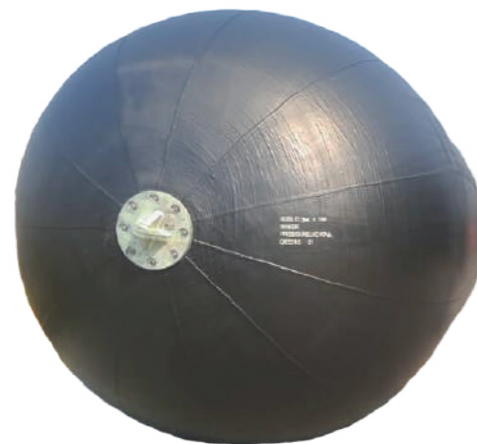
Pneumatic rubber fender is covered and protected by wire, fiber or steel chain with rubber sleeves or tires.



Type-II

Type-II: Sling type fenders

Pneumatic rubber fender is not protected by tires-net. It's simple and light weight.



Features:

- 1.Easy to install and maintain
- 2.Low reaction and hull pressure
- 3.More suitable for small and large tidal ranges
- 4.Lower maintenance cost
- 5.Maintains large clearances between hull and structure

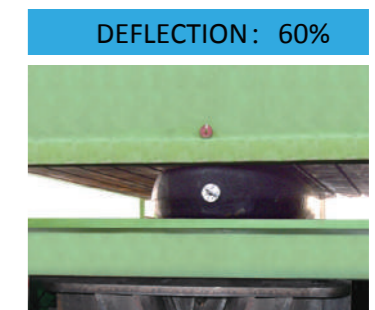
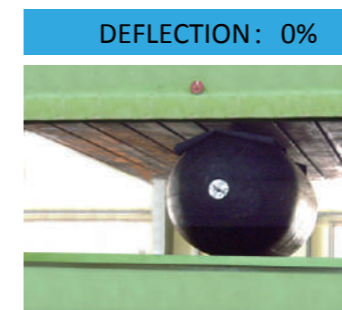
Applications

- 1.Oil and gas tankers
- 2.Fast ferries and aluminium vessels
- 3.LPG vessels, ocean platforms, large docks
- 4.Harbors and wharfs

Specification

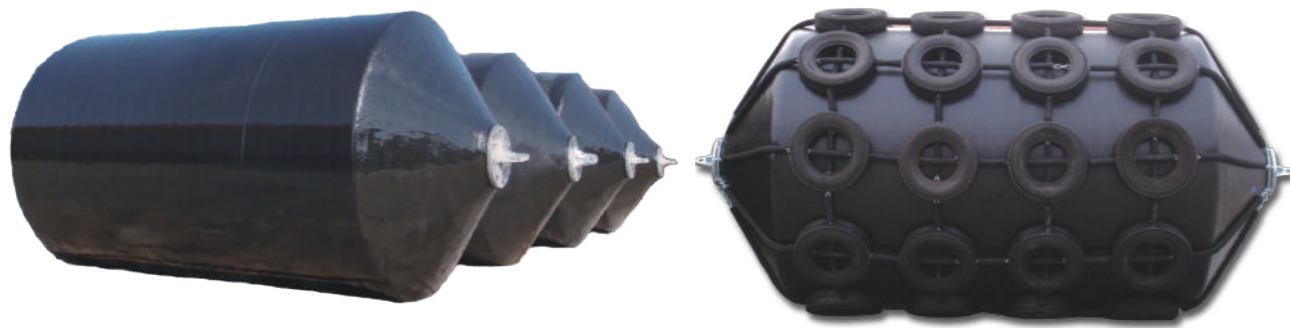
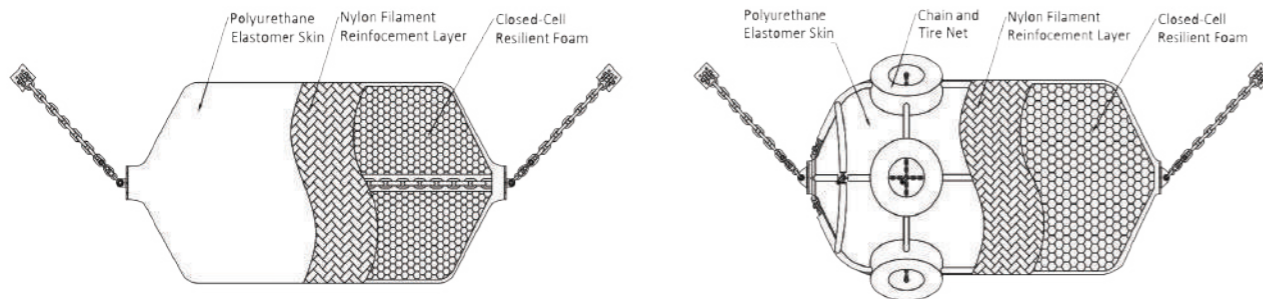
Normal Size		inner pressure:50Kpa,60%deflection			inner pressure:80Kpa,60%deflection		
(mm)	(mm)	(KN)	(KN.M)	(Kpa)	(KN)	(KN.M)	(Kpa)
Diameter	Length	Reaction force	energy absorption	hull pressure	Reaction force	energy absorption	hull pressure
500	1000	64	6	132	85	8	174
600	1000	74	8	126	98	11	166
700	1500	137	17	135	180	24	177
1000	1500	182	32	122	239	45	160
1000	2000	257	45	132	338	63	174
1200	2000	297	63	126	390	88	166
1350	2500	427	102	130	561	142	170
1500	3000	579	153	132	731	214	174
1700	3000	639	191	128	840	267	168
2000	3500	875	308	128	1150	430	168
2500	4000	1381	663	137	1815	925	180
2500	5500	2019	943	148	2653	1317	195
3300	4500	1884	1175	130	2476	1640	171
3300	6500	3015	1814	146	3961	2532	191
3300	10600	5121	3090	171	6612	4294	220
4500	7000	4660	3816	186	5866	4945	233
4500	9000	5747	4752	146	7551	6633	192
4500	12000	7984	6473	154	10490	9037	202

Compression Test



Foam Filled Fender

Foam filled fender is high performance and heavy-duty floating fender system. Foam fender is made of polyurethane elastomer skin or rubber skin and closed-cell resilient foam. It has high energy absorption and low reaction force.



Features

1. Easy to install and maintain
2. low reaction force and high energy absorption
3. heavy-duty, unsinkable, impact-resistant
4. available colors

Application

1. Yachts
2. Cruise ships
3. Container vessels
4. Bulk cargo
5. RoRo and ferries
6. Oil and gas tankers
7. Navy berths
8. Ship-to-ship transfers



Specification

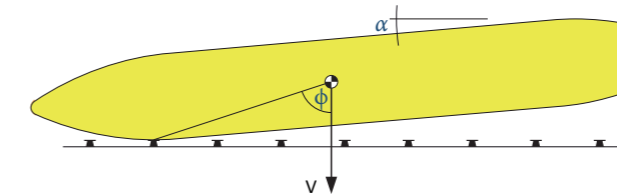
Normal Size		Performance at 60% deflection	
(mm)	(mm)	(KN)	(KN.M)
Diameter	Length	Reaction force	Energy absorption
700	1500	13	3
1000	1500	17	5
1000	2000	26	7
1200	2000	28	10
1350	2500	42	16
1500	3000	59	24
1700	3000	63	29
2000	3500	86	47
2000	4000	102	56
2500	4000	118	64
2500	5500	122	82
3000	6000	182	123
3300	4500	234	189
3300	6500	172	153
3300	6500	279	248

Fender System Test Method

Property	Testing Standard	Condition	Requirement
Tensile Strength	JIS K6251 – Dumbbell No. 5; ASTM D412 – Die C; ISO 37 – S1; BS 903, Part A2 – S1	Original	16 MPa (min)
		Aged for 96 hours at 70°C	12.8 MPa (min)
	DIN 53504	Original	15 MPa (min)
		Aged for 168 hours at 70°C	12.75 MPa (min)
Elongation at Break	JIS K6251 – Dumbbell No. 5	Original	350 % (min)
		Aged for 96 hours at 70°C	280 % (min)
	ASTM D412 – Die C; ISO 37 – S1; BS 903, Part A2 – S1	Original	400 % (min)
		Aged for 96 hours at 70°C	320 % (min)
	DIN 53504	Original	300 % (min)
		Aged for 168 hours at 70°C	280 % (min)
Hardness	JIS K6253 – Shore A	Original	72° (max)
		Aged for 96 hours at 70°C	Original Value + 8° points increase (max)
	ASTM D2240 – Shore A; ISO 7619 – Shore A; BS 903, Part A57 – Shore A	Original	78° (max)
		Aged for 96 hours at 70°C	Original Value + 6° points increase (max)
	DIN 53505 – Shore A	Original	75° (max)
		Aged for 168 hours at 70°C	Original Value + 5° points increase (max)
Compression Set	JIS K6262; ASTM D395 – Method B; BS 903, Part A6; ISO 815	Aged for 22 hours at 70°C	30 % (max)
		Aged for 24 hours at 70°C	40 % (max)
	DIN 53517	Aged for 24 hours at 70°C	40 % (max)
Tear Resistance	JIS K6252 – Crescent Type; ASTM D624 – Die B; BS 903, Part A3 – Method C; ISO 34-1 – Method C	Crescent Type	70 kN/m (min)
			80 N/cm (min)
	DIN 53507		80 N/cm (min)
Ozone Resistance	JIS K6259; ASTM D1149; ISO 1431-1; BS 903.A43; DIN53509	50 pphm at 20 % strain at 40°C for 100 hours	No cracking visible by eye
Oil Resistance	ASTM D471;	Industrial Gasoline: ± 60%	Aged at 23°C X 22 hours
	BS 903, Part A19 – Method A	Heavy Oil: ± 20%	
Abrasion Resistance	BS 903, Part A9 – Method A;	1,000 revolutions	Volume Loss 0.5 cc (max)
	DIN 53516; ISO 4649 – Method A;		100 mm³ (max)
	ASTM D5963 – Method A		

Berthing Modes

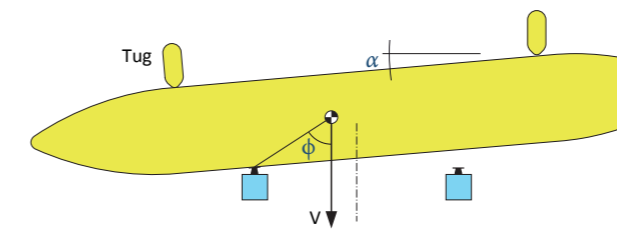
Side berthing



Typical values

$0^\circ \leq \alpha \leq 15^\circ$
$100\text{mm/s} \leq V \leq 300\text{mm/s}$
$60^\circ \leq \phi \leq 90^\circ$

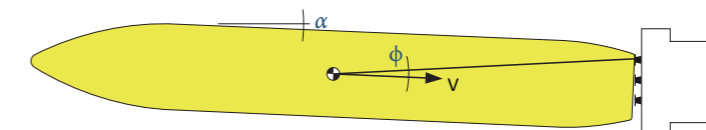
Dolphin berthing



Typical values

$0^\circ \leq \alpha \leq 10^\circ$
$100\text{mm/s} \leq V \leq 200\text{mm/s}$
$30^\circ \leq \phi \leq 90^\circ$

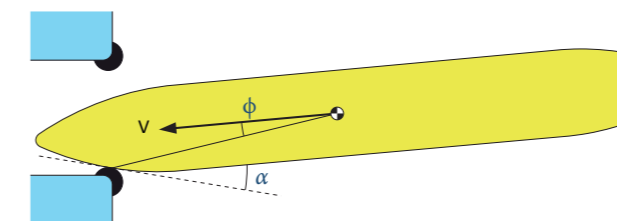
End berthing



Typical values

$0^\circ \leq \alpha \leq 10^\circ$
$200\text{mm/s} \leq V \leq 500\text{mm/s}$
$0^\circ \leq \phi \leq 10^\circ$

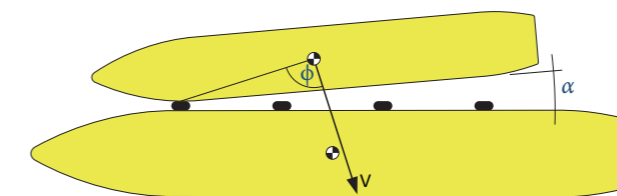
Lock entrances



Typical values

$0^\circ \leq \alpha \leq 30^\circ$
$300\text{mm/s} \leq V \leq 2000\text{mm/s}$
$0^\circ \leq \phi \leq 30^\circ$

Ship-to-ship berthing



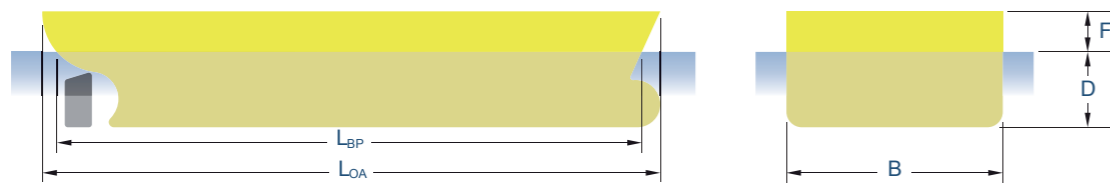
Typical values

$0^\circ \leq \alpha \leq 15^\circ$
$150\text{mm/s} \leq V \leq 500\text{mm/s}$
$60^\circ \leq \phi \leq 90^\circ$

Project Requirements

PROJECT DETAILS	
Port	
Project	
Designer	
Contractor	

PROJECT STATUS	
<input type="checkbox"/> Preliminary	
<input type="checkbox"/> Detail design	
<input type="checkbox"/> Tender	



LARGEST VESSEL	
Vessel type	
Deadweight (t)	
Displacement (t)	
Length overall (L _{OA}) (m)	
Length between perps (L _{BP}) (m)	
Beam (B) (m)	
Draft (D) (m)	
Freeboard (F) (m)	
Hull pressure (P) (t/m ²)	

SMALLEST VESSEL	
Vessel type	
Deadweight (t)	
Displacement (t)	
Length overall (L _{OA}) (m)	
Length between perps (L _{BP}) (m)	
Beam (B) (m)	
Draft (D) (m)	
Freeboard (F) (m)	
Hull pressure (P) (t/m ²)	

BERTH DETAILS			
<input type="checkbox"/> Closed structure	<input type="checkbox"/> Semi-open structure	<input type="checkbox"/> Open structure	<input type="checkbox"/> Other (please describe)

Structure		Tide levels	
Length of berth (m)		Tidal range (m)	
Fender/dolphin spacing (m)		Highest astronomic tide (HAT) (m)	
Permitted fender reaction (kN/m)		Mean high water spring (MHWS) (m)	
Quay level (m)		Mean sea level (MSL) (m)	
Cope thickness (m)		Mean low water spring (MLWS) (m)	
Seabed level (m)		Lowest astronomic tide (LAT) (m)	

BERTHING MODE	
<input type="checkbox"/> Side berthing	
<input type="checkbox"/> Dolphin berthing incl. RoRo mode b)	
<input type="checkbox"/> End berthing	
<input type="checkbox"/> Lock or dock entrance	
<input type="checkbox"/> Ship-to-ship berthing	
<input type="checkbox"/> RoRo mode c)	

BERTHING APPROACH	
Approach conditions	
<input type="checkbox"/> a) easy berthing, sheltered	
<input type="checkbox"/> b) difficult berthing, sheltered	
<input type="checkbox"/> c) easy berthing, exposed	
<input type="checkbox"/> d) good berthing, exposed	
<input type="checkbox"/> e) difficult berthing, exposed	
Largest ship	
Berthing speed (m/s)	
Berthing angle (deg)	
Abnormal impact factor	
Smallest ship	
Berthing speed (m/s)	
Berthing angle (deg)	
Abnormal impact factor	

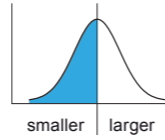
ENVIRONMENT	
Operating temperature	
Minimum _____ (°C)	
Maximum _____ (°C)	
Corrosivity	
<input type="checkbox"/> low	<input type="checkbox"/> medium <input type="checkbox"/> high <input type="checkbox"/> extreme

QUALITY	SAFETY
<input type="radio"/> Highest quality	<input type="radio"/> Maximum safety
<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>
<input type="radio"/> Lowest price	<input type="radio"/> Not safety-critical

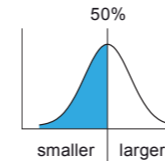
FURTHER DETAILS AVAILABLE FROM	
Name	Tel
Company	Fax
Position	Mobile
Address	Email
	Web



Ship Tables



Type	DWT/GRT	Displacement M ₅₀	L _{OA}	L _{BP}	B	F _L	D _L	Wind area			
								Lateral		Front	
								Full Load	Ballast	Full Load	Ballast
General cargo ship	1000	1580	63	58	10.3	1.6	3.6	227	292	59	88
	2000	3040	78	72	12.4	1.9	4.5	348	463	94	134
	3000	4460	88	82	13.9	2.1	5.1	447	605	123	172
	5000	7210	104	96	16.0	2.3	6.1	612	849	173	236
	7000	9900	115	107	17.6	2.5	6.8	754	1060	216	290
	10000	13900	128	120	19.5	2.7	7.6	940	1340	274	361
	15000	20300	146	136	21.8	3.0	8.7	1210	1760	359	463
	20000	26600	159	149	23.6	3.1	9.6	1440	2130	435	552
	30000	39000	181	170	26.4	3.5	10.9	1850	2780	569	709
	40000	51100	197	186	28.6	3.7	12.0	2210	3370	690	846
Bulk carrier	5000	6740	106	98	15.0	2.3	6.1	615	850	205	231
	7000	9270	116	108	16.6	2.6	6.7	710	1010	232	271
	10000	13000	129	120	18.5	2.9	7.5	830	1230	264	320
	15000	19100	145	135	21.0	3.3	8.4	980	1520	307	387
	20000	25000	157	148	23.0	3.6	9.2	1110	1770	341	443
	30000	36700	176	167	26.1	4.1	10.3	1320	2190	397	536
	50000	59600	204	194	32.3	4.8	12.0	1640	2870	479	682
	70000	81900	224	215	32.3	5.3	13.3	1890	3440	542	798
	100000	115000	248	239	37.9	5.9	14.8	2200	4150	619	940
	150000	168000	279	270	43.0	6.6	16.7	2610	5140	719	1140
	200000	221000	303	294	47.0	7.2	18.2	2950	5990	800	1310
250000	273000	322	314	50.4	7.8	19.4	3240	6740	868	1450	
Container ship	7000	10200	116	108	19.6	2.4	6.9	1320	1360	300	396
	10000	14300	134	125	21.6	3.0	7.7	1690	1700	373	477
	15000	21100	157	147	24.1	3.9	8.7	2250	2190	478	591
	20000	27800	176	165	26.1	4.6	9.5	2750	2620	569	687
	25000	34300	192	180	27.7	5.2	10.2	3220	3010	652	770
	30000	40800	206	194	29.1	5.8	10.7	3660	3370	729	850
	40000	53700	231	218	32.3	6.8	11.7	4480	4040	870	990
	50000	66500	252	238	32.3	7.7	12.5	5230	4640	990	1110
	60000	79100	271	256	35.2	8.5	13.2	5950	5200	1110	1220
Oil tanker	1000	1450	59	54	9.7	0.5	3.8	170	266	78	80
	2000	2810	73	68	12.1	0.7	4.7	251	401	108	117
	3000	4140	83	77	13.7	1.0	5.3	315	509	131	146
	5000	6740	97	91	16.0	1.4	6.1	419	689	167	194
	7000	9300	108	102	17.8	1.7	6.7	505	841	196	233
	10000	13100	121	114	19.9	2.0	7.5	617	1040	232	284
	15000	19200	138	130	22.5	2.6	8.4	770	1320	281	355
	20000	25300	151	143	24.6	3.1	9.1	910	1560	322	416
	30000	37300	171	163	27.9	3.7	10.3	1140	1990	390	520
	50000	60800	201	192	32.3	4.9	11.9	1510	2690	497	689
	70000	83900	224	214	36.3	5.7	13.2	1830	3280	583	829
	100000	118000	250	240	40.6	6.8	14.6	2230	4050	690	1010
	150000	174000	284	273	46.0	8.3	16.4	2800	5150	840	1260
	200000	229000	311	300	50.3	9.4	17.9	3290	6110	960	1480
	300000	337000	354	342	57.0	11.4	20.1	4120	7770	1160	1850



Type	DWT/GRT	Displacement M ₅₀	L _{OA}	L _{BP}	B	F _L	D _L	Wind area			
								Lateral		Front	
								Full Load	Ballast	Full Load	Ballast
RoRo ship	1000	1970	66	60	13.2	2.0	3.2	700	810	216	217
	2000	3730	85	78	15.6	2.9	4.1	970	1110	292	301
	3000	5430	99	90	17.2	3.6	4.8	1170	1340	348	364
	5000	8710	119	109	19.5	4.7	5.8	1480	1690	435	464
	7000	11900	135	123	21.2	5.5	6.6	1730	1970	503	544
	10000	16500	153	141	23.1	6.7	7.5	2040	2320	587	643
	15000	24000	178	163	25.6	8.2	8.7	2460	2790	701	779
	20000	31300	198	182	27.4	9.5	9.7	2810	3180	794	890
	30000	45600	229	211	30.3	11.7	11.3	3400	3820	950	1080
Passenger (cruise) ship	1000	850	60	54	11.4	2.2	1.9	426	452	167	175
	2000	1580	76	68	13.6	2.8	2.5	683	717	225	234
	3000	2270	87	78	15.1	3.2	3.0	900	940	267	277
	5000	3580	104	92	17.1	3.9	3.6	1270	1320	332	344
	7000	4830	117	103	18.6	4.5	4.1	1600	1650	383	396
	10000	6640	133	116	20.4	5.0	4.8	2040	2090	446	459
	15000	9530	153	132	22.5	5.9	5.6	2690	2740	530	545
	20000	12300	169	146	24.2	5.2	7.6	3270	3320	599	614
	30000	17700	194	166	26.8	7.3	7.6	4310	4350	712	728
	50000	27900	231	197	30.5	10.6	7.6	6090	6120	880	900
	70000	37600	260	220	33.1	13.1	7.6	7660	7660	1020	1040
Ferry	1000	810	59	54	12.7	1.9	2.7	387	404	141	145
	2000	1600	76	69	15.1	2.5	3.3	617	646	196	203
	3000	2390	88	80	16.7	2.8	3.7	811	851	237	247
	5000	3940	106	97	19.0	3.3	4.3	1150	1200	302	316
	7000	5480	119	110	20.6	3.7	4.8	1440	1510	354	372
	10000	7770	135	125	22.6	4.2	5.3	1830	1930	419	442
	15000	11600	157	145	25.0	4.7	6.0	2400	2540	508	537
	20000	15300	174	162	26.8	5.2	6.5	2920	3090	582	618
	30000	22800	201	188	29.7	5.9	7.4	3830	4070	705	752
	40000	30300	223	209	31.9	6.5	8.0	4660	4940	810	860
Gas carrier	1000	2210	68	63	11.1	1.0	4.3	350	436	121	139
	2000	4080	84	78	13.7	1.6	5.2	535	662	177	203
	3000	5830	95	89	15.4	2.0	5.8	686	846	222	254
	5000	9100	112	104	17.9	2.7	6.7	940	1150	295	335
	7000	12300	124	116	19.8	3.2	7.4	1150	1410	355	403
	10000	16900	138	130	22.0	3.8	8.2	1430	1750	432	490
	15000	24100	157	147	24.8	4.6	9.3	1840	2240	541	612
	20000	31100	171	161	27.1	5.4	10.0	2190	2660	634	716
	30000	44400	194	183	30.5	6.1	11.7	2810	3400	794	894
	50000	69700	227	216	35.5	9.6	11.7	3850	4630	1050	1180
	70000	94000	252	240	39.3	12.3	11.7	4730	5670	1270	1420
100000	128000	282	268	43.7	15.6	11.7	5880	7030	1550	1730	

Ship Features

Bow flares		Common on container vessels and cruise ships. Big flare angles may affect fender performance. Larger fender may be required to maintain clearance from the quay structure, cranes, etc.	
Bulbous bows		Most modern ships have bulbous bows. Care is needed at large berthing angles or with widely spaced fenders to ensure the bulbous bow does not catch behind the fender or hit structural piles.	
Beltings & strakes		Almost every class of ship could be fitted with beltings or strakes. They are most common on RoRo ships or ferries, but may even appear on container ships or gas carriers. Tugs and offshore supply boats have very large beltings.	
Flying bridge		Cruise and RoRo ships often have flying bridges. In locks, or when tides are large, care is needed to avoid the bridge sitting on top of the fender during a falling tide.	
Low freeboard		Barges, small tankers and general cargo ships can have a small freeboard. Fenders should extend down so that vessels cannot catch underneath at low tides and when fully laden.	
Stern & side doors		RoRo ships, car carriers and some navy vessels have large doors for vehicle access. These are often recessed and can snag fenders – especially in locks or when warping along the berth.	
High freeboard		Ships with high freeboard include ferries, cruise and container ships, as well as many lightly loaded vessels. Strong winds can cause sudden, large increases in berthing speeds.	
Low hull pressure		Many modern ships, but especially tankers and gas carriers, require very low hull contact pressures, which are achieved using large fender panels or floating fenders.	
Aluminium hulls		High speed catamarans and monohulls are often built from aluminium. They can only accept loads from fenders at special positions: usually reinforced beltings set very low or many metres above the waterline.	
Special features		Many ships are modified during their lifetime with little regard to the effect these changes may have on berthing or fenders. Protrusions can snag fenders but risks are reduced by large bevels and chamfers on the frontal panels.	

Testing Procedures

Nanjing Deers testing procedures for 'solid-type' rubber fenders comply with PIANC 'Guidelines for the Design of Fender Systems: 2002: Appendix A: Section 6: Verification/Quality Assurance Testing'. The Constant Velocity (CV) test method is used for NDSC, NDCN, NDHC, NDA-A/NDA-B. NDMV fender is tested using the Decreasing Velocity (DV) method on the dedicated high speed test press. All other fender types are tested on special request.

Compression Test Method

- || All fenders will be given a unique manufacturing serial number for traceability.
 - || Sampling is 1 in 10 fenders (rounded up to a unit) unless otherwise agreed.
 - || No additional break-in cycles are carried out unless otherwise agreed.
 - || Performance will be measured at 0° compression angle.
 - || Readings shall be taken at intervals of between 0.01H to 0.05H (where H = nominal fender height).
 - || Fender temperature will be stabilised to 23°C ± 5°C for at least 24 hours before compression testing.
 - || Minimum temperature stabilisation time will be calculated as $t_{min} = 20x^{1.5}$ (where 'x' is the thickness of the fender body in metres).
 - || Stabilising time (t_{min}) can include the time taken for 'break-in' and 'recovery'.
 - || 'Break in' the fender by deflecting it three times to rated deflection.
 - || Remove load from the fender and allow 'recovery' for at least 1 hour.
 - || Stop testing when deflection reaches rated deflection or RPD² is achieved.
- CV only:
- || Deflect the fender once at a constant deflection speed of 0.0003–0.0013m/s (2–8cm/min) and record reaction and deflection.
- DV only:
- || Deflect the fender once at a linearly-decreasing or sinusoidally decreasing variable velocity with initial velocity of 0.15m/s (or other speed as agreed) and final velocity ≤0.005m/s.

Where testing of cylindrical, Arch, element and similar fenders over 2.0m long is required, please contact us to discuss exact requirements.

Test Apparatus & Reporting

The test apparatus shall be equipped with a calibrated³ load cell system and linear transducer(s) for measuring displacement. These will provide continuous real-time monitoring of fender performance. Test reports shall include the following as a minimum:

- || Serial Number and description of test fender.
- || Date of test, name of test supervisor and signature of Quality Manager.
- || Table and graph of reaction (R_T) versus deflection and energy (E_T) versus deflection.

Pass Criteria⁴

Fenders have passed verification testing if they meet the following conditions:

$$R_{VT} \leq R_{RPD} \times 1.1 \times VF \times TF$$

$$E_{VT} \geq E_{RPD} \times 0.9 \times VF \times TF$$

Where,

- R_{VT} = reaction from verification testing
 - R_{RPD} = Rated Performance Data (or customer's required reaction)
 - E_{VT} = energy from verification testing
 - E_{RPD} = Rated Performance Data (or customer's required energy)
 - TF = Temperature factor when test sample is above or below 23°C ± 5°C
- CV only:
- VF = velocity factor for actual test speed/time (or 1.0 unless otherwise stated)
- DV only:
- VF = velocity factor for test speeds other than 0.15m/s (or 1.0 unless otherwise stated)

Notes

- 1 Standard PIANC Verification Testing of 10% of fender order (rounded up to the nearest unit) is included within the price for the fender types listed. Additional tests, third-party witnessing and special procedures will incur extra charges. For load-sensitive structures, a single break-in deflection for all fenders with reaction of 100t or more is included in the fender price if notified at the time of order.
- 2 Rated Performance Data (RPD) is defined in the relevant product sections of this catalogue.
- 3 All measuring equipment shall be calibrated and certified accurate to within ±1% in accordance with ISO or equivalent JIS or ASTM requirements. Calibration shall be traceable to national/international standard and shall be performed annually by an accredited third party organization.
- 4 Pass criteria as defined by PIANC 'Guidelines for the Design of Fender Systems: 2002: Appendix A'. Deflection is not considered to be a pass/fail criterion by PIANC. Non-compliant units will be clearly marked and segregated.

Conversion Tables

		m	ft	in
Length	m	1	3.281	39.37
	ft	0.3048	1	12
	in	0.0245	0.0833	1

		m ²	ft ²	in ²
Area	m ²	1	10.764	1550
	ft ²	0.0929	1	144
	in ²	645.2 × 10 ⁻⁶	6.944 × 10 ⁻³	1

		m ³	ft ³	in ³
Volume	m ³	1	35.315	61024
	ft ³	0.0283	1	1728
	in ³	16.387 × 10 ⁻⁶	578.7 × 10 ⁻⁶	1

		tonne	kip
Mass	tonne	1	2.2046
	kip	0.4536	1

		kN	tonne-f	kip-f
Force	kN	1	0.102	0.225
	tonne-f	9.81	1	2.2046
	kip-f	4.45	0.454	1

		kNm	tf-m	kip-ft
Energy	kNm	1	0.102	0.7376
	tf-m	9.81	1	0.205
	kip-ft	1.36	4.88	1

1kJ = 1kNm

		kN/m ²	t/m ²	kip/ft ²
Pressure	kN/m ²	1	0.102	0.0209
	t/m ²	9.81	1	0.205
	kip/ft ²	47.9	4.88	1

1ksf = 1kip/ft²

		tonne/m ³	kip/ft ³
Density	tonne/m ³	1	0.0624
	kip/ft ³	16.018	1

		N/mm ²	psi
Stress	N/mm ²	1	145.04
	psi	6.895 × 10 ⁻³	1

1MPa = 1N/mm²

		m/s	ft/s	km/h	mph	knot
Velocity	m/s	1	3.2808	3.600	2.2369	1.9438
	ft/s	0.3048	1	1.0973	0.6818	0.5925
	km/h	0.2778	0.9113	1	0.6214	0.5400
	mph	0.4470	1.4667	1.6093	1	0.8690
	knot	0.5144	1.6878	1.8520	1.1508	1

		g	m/s ²	ft/s ²
Acceleration	g	1	9.807	32.17
	m/s ²	0.102	1	3.281
	ft/s ²	6.895 × 10 ⁻³	0.3048	1

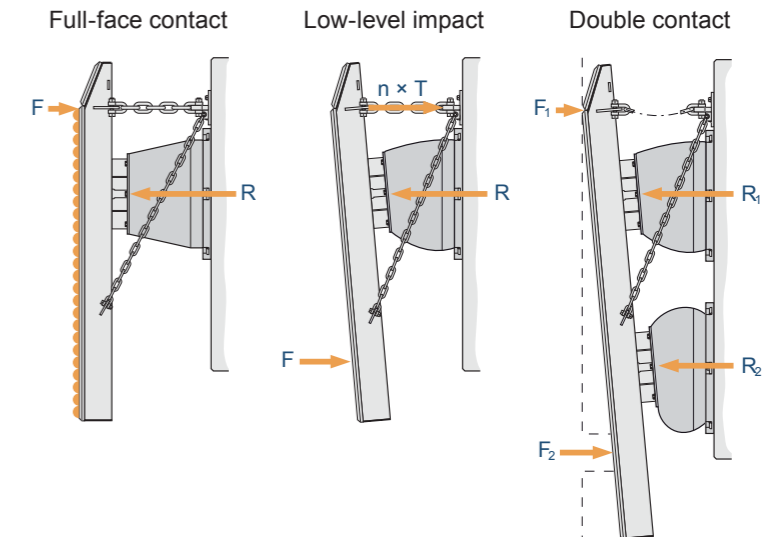
		degree	radian
Angle	degree	1	17.45 × 10 ⁻³
	radian	57.3	1

Fender Panel Design

Fender panels are used to distribute reaction forces into the hulls of berthing vessels. The panel design should consider many factors including:

- Hull pressures and tidal range
- Lead-in bevels and chamfers
- Bending moment and shear
- Local buckling
- Limit state load factors
- Steel grade
- Permissible stresses
- Weld sizes and types
- Effects of fatigue and cyclic loads
- Pressure test method
- Rubber fender connections
- UHMW-PE attachment
- Chain connections
- Lifting points
- Paint systems
- Corrosion allowance
- Maintenance and service life

3 design cases



Steel Properties

Standard	Grade	Yield Strength (min)		Tensile Strength (min)		Temperature	
		N/mm ²	psi	N/mm ²	psi	°C	°F
EN 10025	S235JR (1.0038)	235	34 000	360	52 000	-	-
	S275JR (1.0044)	275	40 000	420	61 000	-	-
	S355J2 (1.0570)	355	51 000	510	74 000	-20	-4
	S355J0 (1.0553)	355	51 000	510	74 000	0	32
JIS G-3101	SS41	235	34 000	402	58 000	0	32
	SS50	275	40 000	402	58 000	0	32
	SM50	314	46 000	490	71 000	0	32
ASTM	A-36	250	36 000	400	58 000	0	32
	A-572	345	50 000	450	65 000	0	32

The national standards of France and Germany have been replaced by EN 10025. In the UK, BS4360 has been replaced by BS EN 10025. The table above is for guidance only and is not comprehensive. Actual specifications should be consulted in all cases for the full specifications of steel grades listed and other similar grades.

PIANC steel thicknesses

PIANC recommends the following minimum steel thicknesses for fender panel construction:

Exposed both faces	≥12mm
Exposed one face	≥9mm
Internal (not exposed)	≥8mm

Source: PIANC 2002; Section 4.1.6. Corresponding minimum panel thickness will be 140–160mm (excluding UHMW-PE face pads) and often much greater.

Typical panel weights

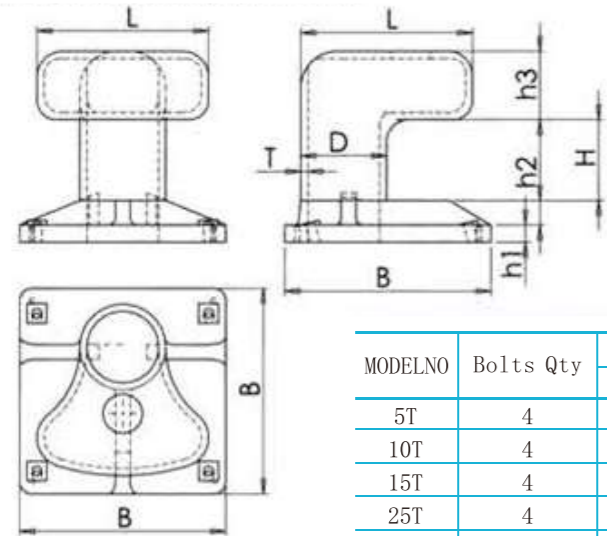
The table can be used as a guide to minimum average panel weight (excluding UHMW-PE face pads) for different service conditions:

Light duty	200–250kg/m ²
Medium duty	250–300kg/m ²
Heavy duty	300–400kg/m ²
Extreme duty	≥400kg/m ²

Note: Above values are for reference only.

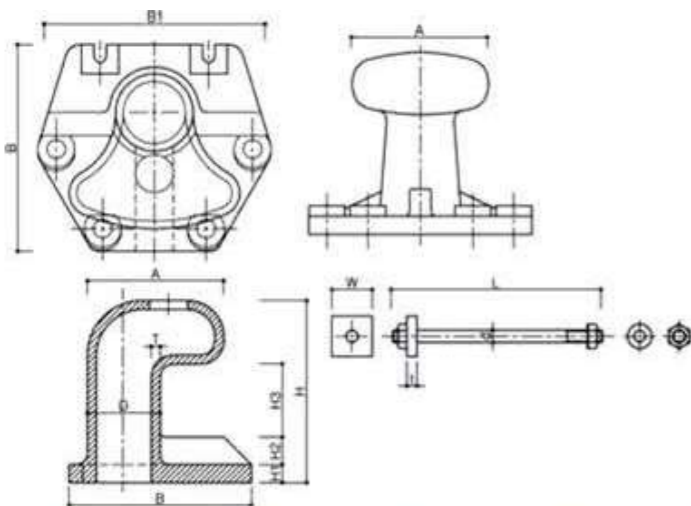


CURVED BOLLARD (TYPE A)



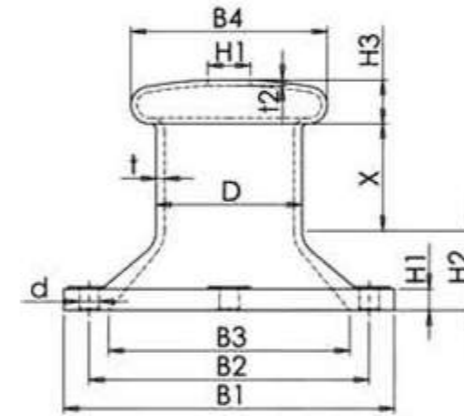
MODELNO	Bolts Qty	SIZE (mm)							
		D	H	T	L	B	h1	h2	h3
5T	4	150	170	20	300	350	30	60	120
10T	4	200	210	20	400	480	40	70	160
15T	4	250	250	20	500	600	50	80	200
25T	4	300	290	21	600	720	65	95	240
35T	4	300	290	25	600	810	65	95	240
50T	4	350	330	29	700	945	70	100	280
75T	4	400	370	33	800	1130	90	120	320
100T	4	450	410	39	900	1365	95	125	360

CURVED BOLLARD (TYPE B)



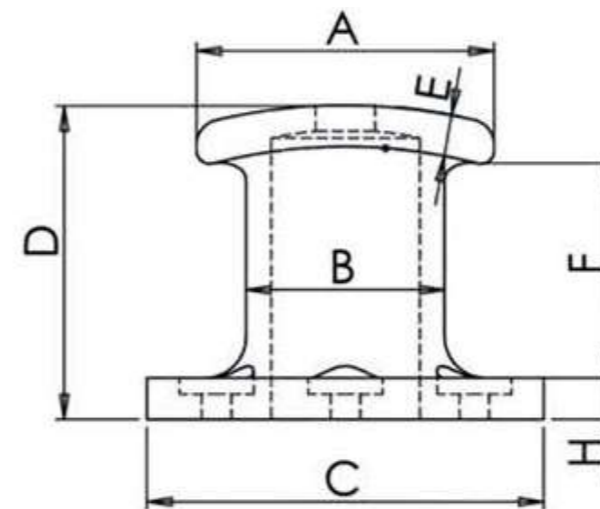
MODELNO	Bolts Qty	SIZE (mm)												
		Bollard									Bolt		Plant	
		D	A	B	B1	H	H1	H2	H3	T	d	L	W	t
5	4	150	300	360	-	380	30	60	170	20	20	450	80	16
10	4	200	400	480	-	480	40	70	210	20	27	600	108	22
15	4	250	500	600	-	580	50	80	250	20	33	700	132	25
25	4	300	600	700	-	690	65	95	290	21	42	850	168	35
35	6	300	600	720	810	690	65	95	290	25	42	850	168	35
50	6	350	700	840	945	780	70	100	330	29	48	1000	192	40
70	6	400	800	1000	1130	900	90	120	370	33	56	1150	225	45
100	6	450	900	1200	1365	990	95	125	410	39	64	1360	256	55
150	6	550	1100	1600	1765	1260	120	145	490	49	80	1450	300	65

SINGLE-BITE BOLLARD (JIS TYPE)



MODELNO	SIZE (mm)												KG
	D	X	t	B4	H3	t2	H1	H2	B3	B1	B2	d	
15T	250	290	20	400	87	25	45	100	430	600	500	43	130
25T	300	290	20	480	105	15	60	130	510	725	600	55	220
35T	300	290	25	480	105	16	60	130	510	725	600	55	230
50T	350	330	27	550	122	18	70	160	600	810	700	66	350
70T	400	380	30	610	140	23	80	190	680	900	800	74	530
100T	450	410	35	720	157	25	80	270	860	1180	1000	74	893
150T	530	510	40	880	192	29	100	340	1010	1440	1220	91	1450
200T	750	550	43	1030	227	30	110	410	1240	1700	1440	101	2230

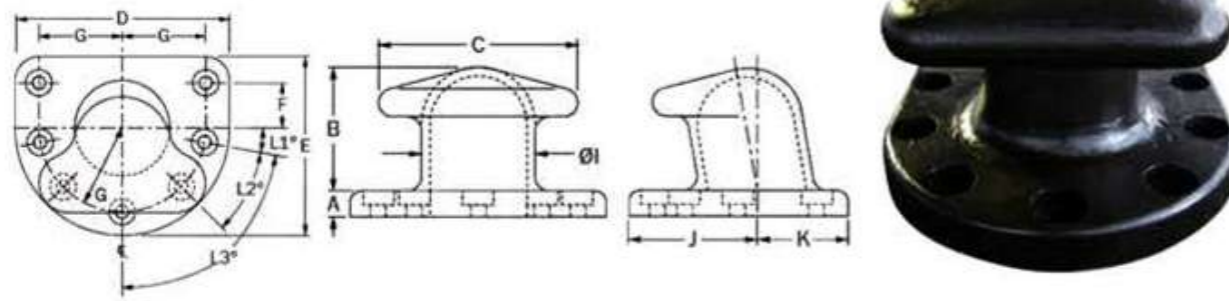
J TYPE DOCK BOLLARD



MODELNO	Bolts Qty	T	SIZE (mm)							
			A	B	C	D	E	F	G	H
J-01	4	10	180	120	240	190	25	140	180	25
J-02	4	15	215	150	290	220	25	160	220	35
J-03	4	20	280	200	360	260	25	200	280	35
J-04	6	50	460	230	460	380	40	244	340	50

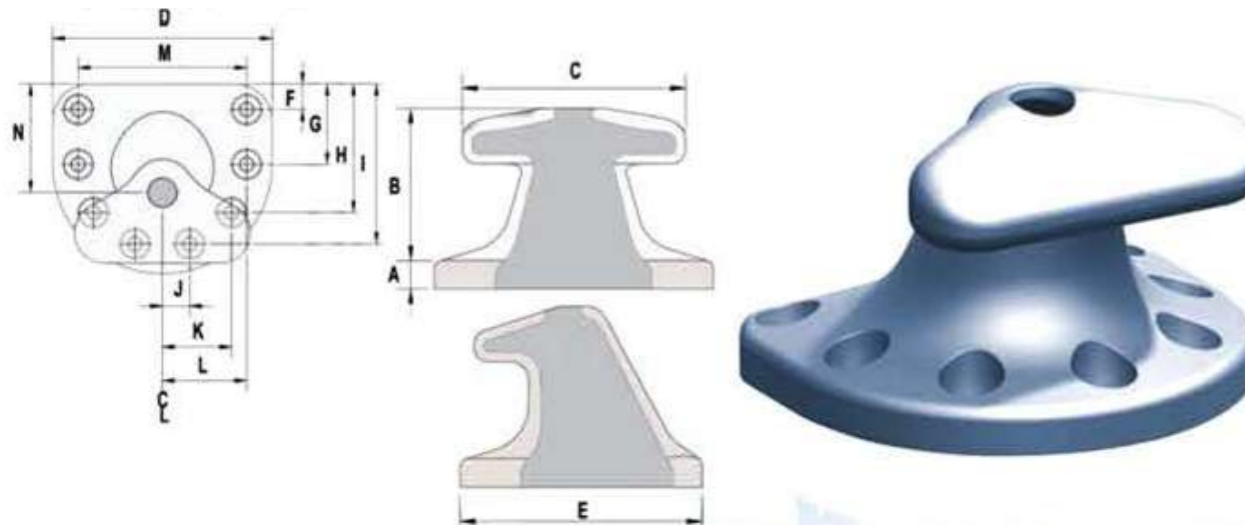


TEE BOLLARD



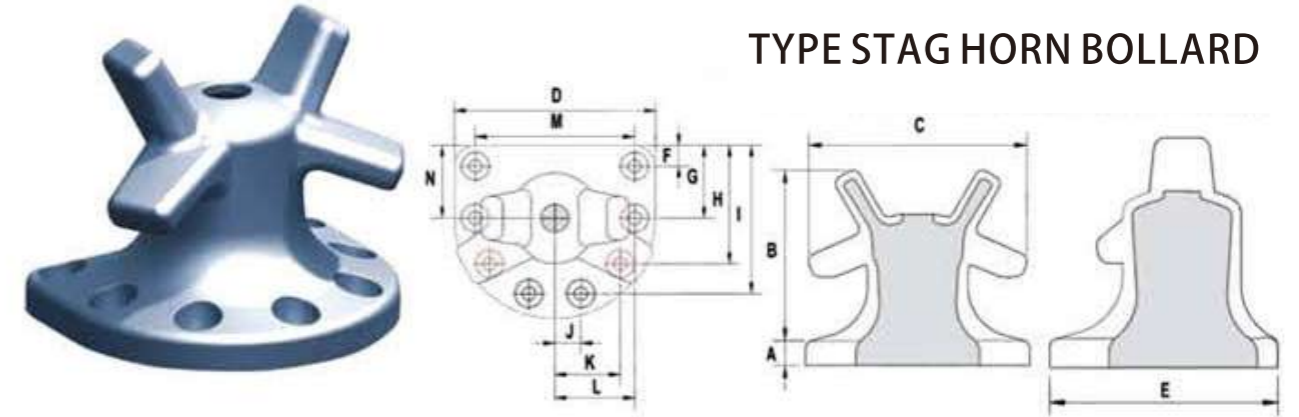
MODELNO	SIZE (mm)													Bolt size	Bolt Length	P*	Qty
	A	B	C	D	E	F	G	ØI	J	K	L1*	L2*	L3*				
15T	40	235	340	410	335	80	155	160	205	130	30	/	60	M24	500	55	5
30T	40	255	350	450	375	100	175	200	225	150	30	/	60	M30	500	55	5
50T	50	350	500	640	540	150	250	260	320	220	30	/	60	M36	500	65	5
80T	70	380	550	640	550	160	250	280	320	230	15	45	N/A	M42	800	85	6
100T	80	410	600	790	640	175	325	350	395	245	10	40	80	M42	800	95	7
150T	90	435	700	900	750	200	350	400	450	300	10	40	80	M48	1000	105	7
200T	90	500	800	1000	850	225	375	450	500	350	0	36	72	M56	1000	105	8

T-HEAD BOLLARD



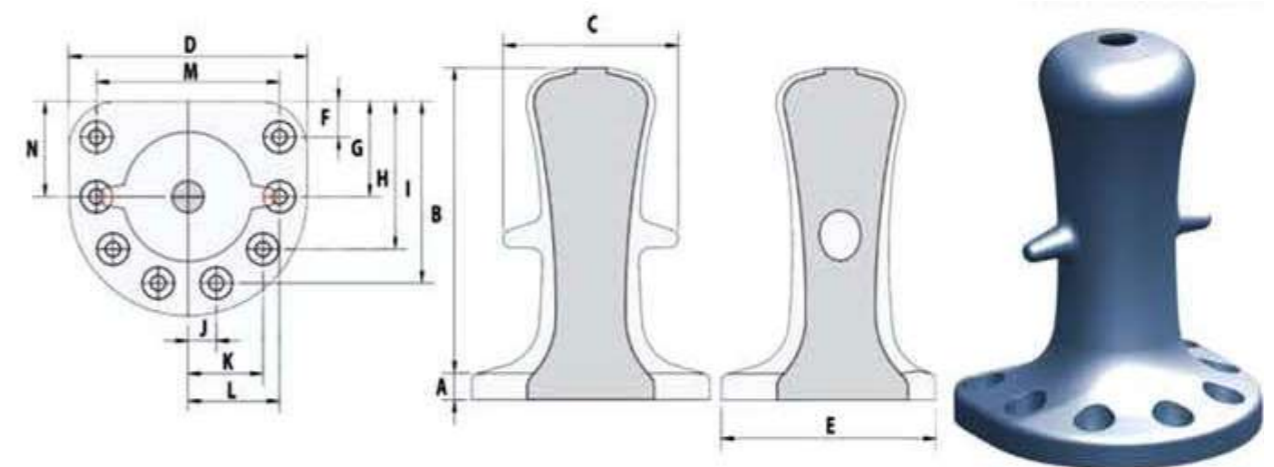
MODELNO	SIZE (mm)														Bolt size	Bolt Length	Qty
	A	B	C	D	E	F	G	H	I	J	K	L	M	N			
MT10	47	199	305	381	330	44	-	-	243	103	-	-	292	189	M24	450	4
MT15	52	219	335	419	363	49	-	-	267	114	-	-	321	208	M24	450	4
MT20	54	240	351	438	380	51	-	232	329	0	152	-	336	217	M24	450	5
MT30	57	250	366	457	396	53	-	242	343	0	159	-	351	226	M30	450	5
MT50	70	308	451	564	489	66	-	298	423	0	196	-	432	279	M36	600	5
MT75	80	354	518	648	561	76	-	298	463	105	241	-	497	321	M42	600	6
MT100	80	413	610	762	660	89	305	496	572	0	195	291	584	377	M42	600	7
MT125	87	458	671	838	726	98	335	546	629	0	215	320	643	415	M48	750	7
MT150	93	492	719	899	779	105	360	586	674	0	231	343	689	445	M48	750	7
MT200	97	521	762	952	826	111	349	559	694	119	299	365	730	472	M56	915	8

TYPE STAG HORN BOLLARD



MODELNO	SIZE (mm)														Bolt size	Bolt Length	Qty
	A	B	C	D	E	F	G	H	I	J	K	L	M	N			
10T	41	291	348	381	330	44	/	/	243	103	/	/	291	140	M24	450	4
15T	45	320	394	419	363	49	/	/	267	114	/	/	320	154	M24	450	4
20T	49	349	430	442	381	46	/	234	335	0	159	/	349	160	M24	450	5
30T	55	392	483	497	429	51	/	263	377	0	179	/	393	180	M30	450	5
50T	59	419	516	530	457	55	/	281	402	0	191	/	419	192	M36	600	5
75T	71	489	627	645	556	67	/	287	459	120	250	/	509	233	M42	600	6
100T	81	559	717	737	635	76	292	484	559	0	195	291	582	267	M42	600	7
125T	90	615	788	810	699	84	321	532	615	0	215	320	640	293	M48	750	7
150T	98	671	860	884	762	91	351	581	671	0	235	349	698	320	M48	750	7
200T	102	699	896	921	794	95	333	543	679	119	299	365	727	333	M56	915	8

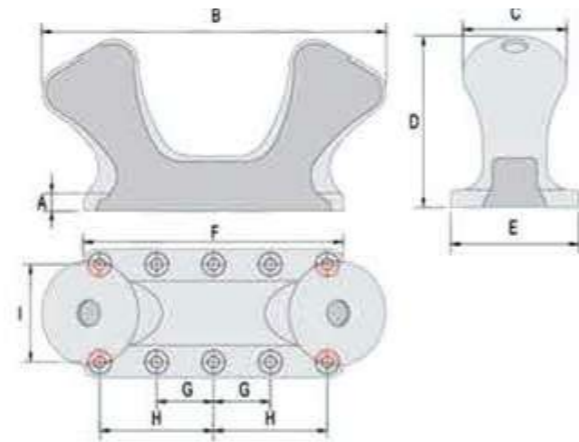
SINGLE BITT (TYPE A)



MODELNO	SIZE (mm)														Bolt size	Bolt Length	Qty
	A	B	C	D	E	F	G	H	I	J	K	L	M	N			
10T	44	390	224	325	284	46	/	/	205	83	/	/	234	122	M24	450	4
15T	44	429	246	358	313	50	/	/	225	91	/	/	257	134	M24	450	4
20T	54	454	263	358	322	54	/	201	281	0	124	/	275	143	M24	450	5
30T	60	540	307	419	377	63	/	236	328	0	146	/	321	168	M30	450	5
50T	70	686	391	533	480	80	/	256	394	96	200	/	409	213	M36	600	6
75T	82	829	475	648	583	97	/	311	478	117	243	/	497	259	M42	600	6
100T	89	925	559	762	686	114	330	522	597	0	195	291	584	305	M48	750	7
125T	92	1057	604	823	741	123	357	564	645	0	211	314	631	329	M48	750	7
150T	98	1153	659	899	809	135	390	616	704	0	231	343	689	360	M56	915	7
200T	111	1270	726	991	892	149	396	614	755	124	311	380	759	396	M56	915	8

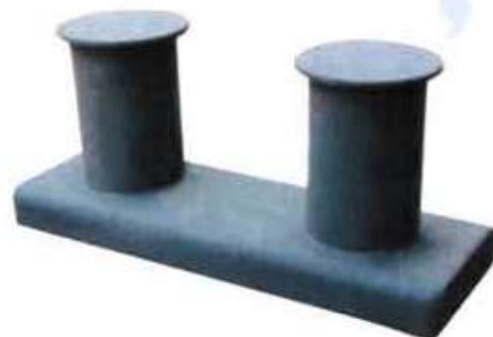
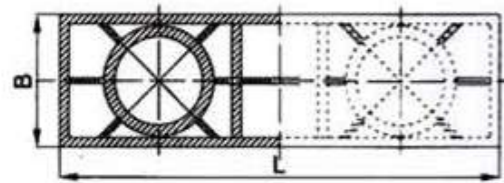
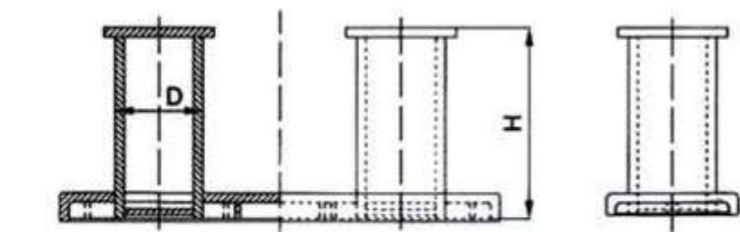


DOUBLE BOLLARD



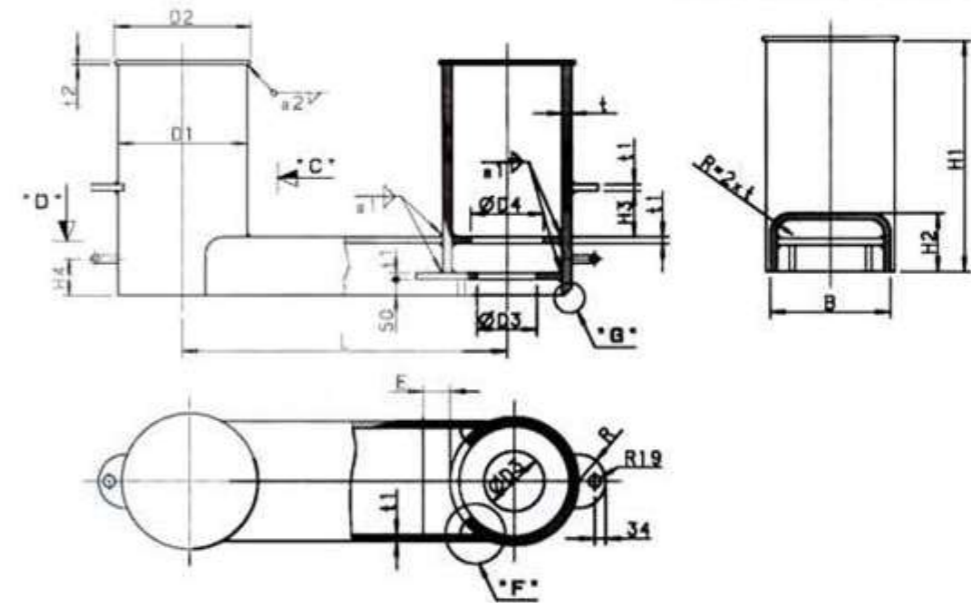
MODELNO	SIZE (mm)									Bolt size	Bolt Length	Qty
	A	B	C	D	E	F	G	H	I			
20T	38	673	204	335	267	533	70	222	191	M20	300	8
30T	46	781	236	389	302	604	81	258	221	M22	300	8
50T	56	942	285	469	356	711	98	311	267	M30	450	8
75T	62	1144	346	570	432	864	189	378	324	M36	450	10
100T	3	1346	407	670	508	1016	222	444	381	M42	600	10
125T	80	1548	468	771	584	1168	256	512	438	M42	600	10
150T	91	1683	509	838	635	1270	278	556	476	M48	750	10
200T	98	1885	570	938	702	1422	311	622	533	M56	915	10

GB554-83 BOLLARD



MODELNO	WEICHT (KG)	SIZE (mm)			
		D	L	B	H
100	19	114	445	165	196
125	29	140	540	195	246
160	45	168	670	225	316
200	80	219	860	290	378
250	141	273	1065	360	470
315	264	325	1300	430	597
355	358	351	1475	480	663
400	499	402	1630	550	749
450	680	450	1840	620	841
500	911	508	1040	690	928
560	1208	560	2240	750	1025
630	1601	610	2510	820	1152
710	2252	712	2840	960	1294
800	3071	813	3240	1100	1480

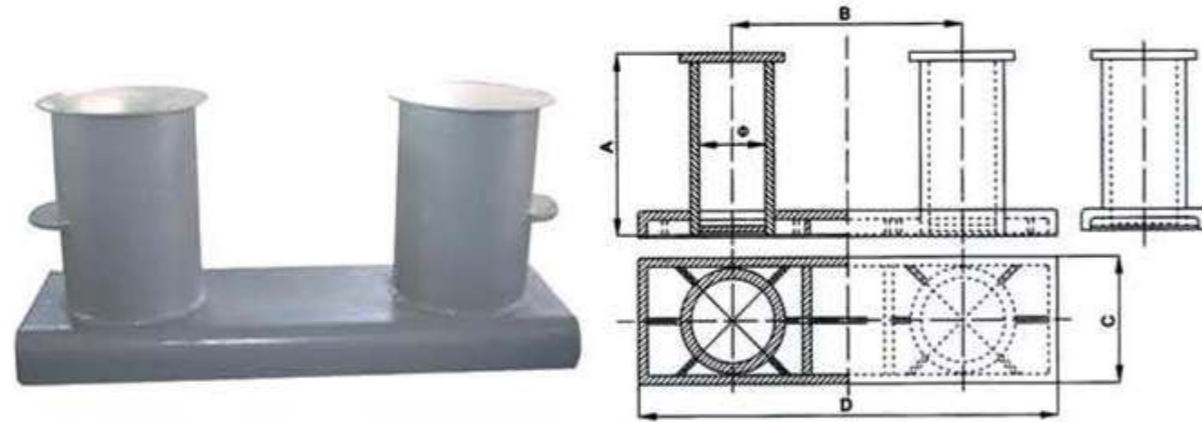
ISO13795 BOLLARD(TYPE A)



MODELNO	SIZE (mm)									SWL (T)	WEICHT (KG)
	D1	D2	D3	D4	H1	H2	B	L	E		
150	165.2	185	-	80	330	90	155	400	-	5T	29
200	216.3	240	-	130	395	115	205	500	-	6.7T	46
250A	267.4	290	-	160	505	135	250	630	-	14T	107
250B	267.4	290	-	160	505	135	250	630	-	11T	91
300A	318.5	340	150	185	600	150	290	800	300	31T	281
300B	318.5	340	150	185	600	175	290	800	300	16T	166
350A	355.6	380	170	200	685	175	340	890	350	43T	431
350B	355.6	380	170	220	685	185	340	890	350	22T	241
400A	406.4	430	190	230	730	185	380	1000	380	53T	570
400B	406.4	430	190	250	730	195	380	1000	380	27T	322
450A	457.2	480	210	265	770	195	425	1100	410	62T	712
450B	457.2	480	210	285	770	230	425	1100	410	30T	379
500A	508	530	235	295	830	230	480	1250	460	77T	960
500B	508	580	235	320	830	270	480	1250	460	33T	465
550A	558.8	580	255	330	900	270	520	1380	540	83T	1123
550B	558.8	580	255	350	900	270	520	1380	540	55T	787
600	609.4	630	280	365	950	300	560	1550	600	97T	1391



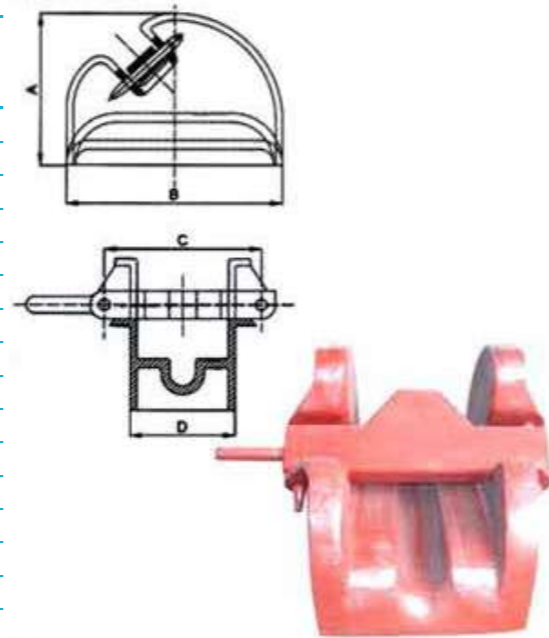
JIS F 2001-1990 BOLLARD



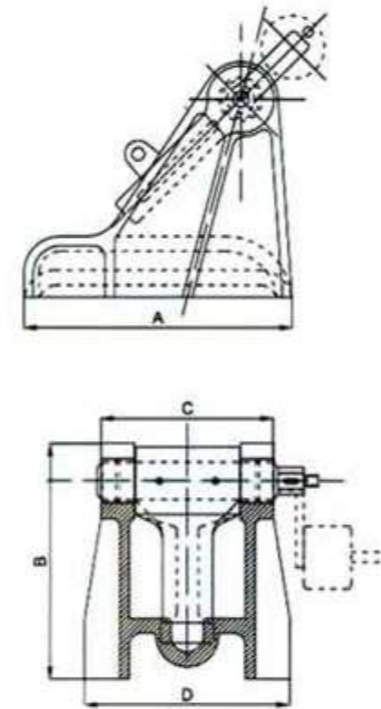
MODELNO	MODELNO	SIZE (mm)					Φ
		A	B	C	D		
100	18.9	196	250	165	445	114.3	
125	29.4	246	315	195	540	139.8	
160	44.7	316	400	225	670	165.2	
200	79.5	378	500	290	860	216.3	
250	139	470	630	360	1065	267.4	
315	261	597	800	430	1300	318.5	
355	361	663	890	480	1475	355.6	
400	502	749	1000	550	1630	406.4	
450	685	841	1130	620	1840	457.2	
500	911	928	1250	690	2040	508	
560	1208	1025	1380	750	2240	558.8	
630	1601	1152	1570	820	2510	609.6	
710	2252	1294	1750	960	2840	711.2	
800	3071	1480	2000	1100	3240	812.8	

JIS F 2015 CAST STEEL BAR TYPE CHAIN CABLE STOPPERS

MODELNO	MONINAL DIA. OF ANCHOR CHAUN	SIZE (mm)				WEICHT (KG)
		A	B	C	D	
19	17~19	190	270	200	134	17
22	20~22	216	310	226	153	24
25	23~25	241	345	256	175	33
28	26~28	270	385	280	193	44
32	29~32	305	435	320	220	68
36	34~36	342	490	354	246	92
40	38~40	378	540	390	336	111
44	42~44	412	590	424	366	139
48	46~48	450	640	460	397	176
52	50~52	491	695	494	428	216
56	54~56	528	745	530	457	261
60	58~60	564	795	564	488	319
64	62~64	600	850	600	517	380
68	66~68	635	900	636	547	452
73	70~73	675	960	678	582	561
78	76~78	715	1020	720	617	682

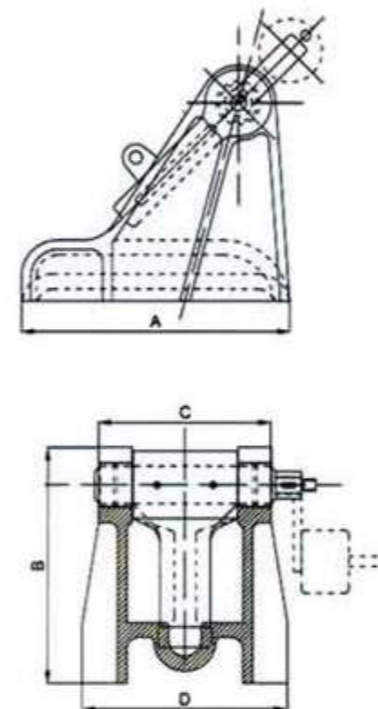


JIS F 2016-1987 CAST STEEL PAWL TYPE CHAIN STOPPERS FOR GRADE 2 CHAINS

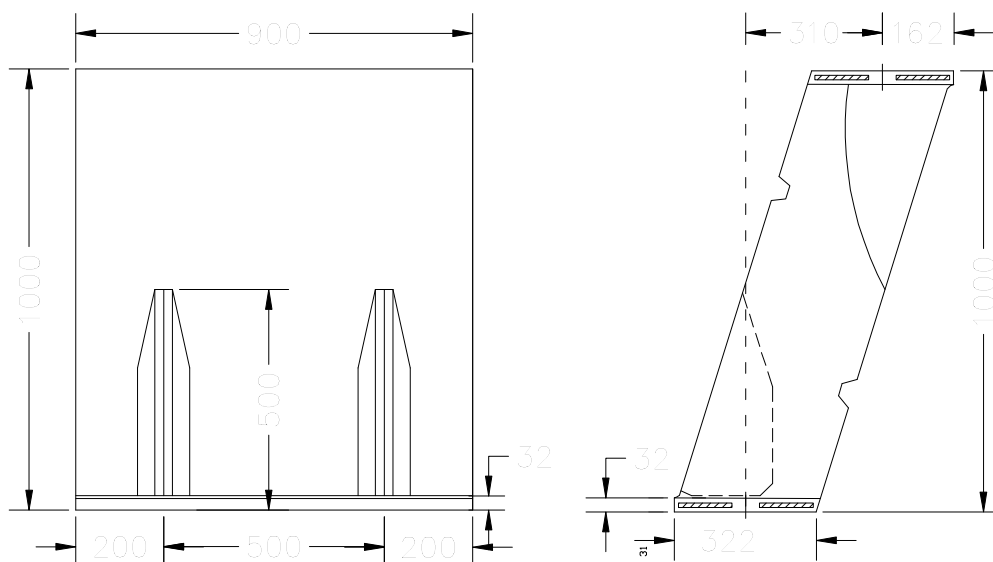


MODELNO	MONINAL DIA. OF ANCHOR CHAUN	SIZE (mm)				WEICHT (KG)
		A	B	C	D	
60	58~60	780	670	506	600	306
64	62~64	835	710	538	630	385
68	66~68	885	750	568	660	464
73	70~73	900	801	604	700	549
78	76~78	1015	852	641	750	674
84	81~84	1095	911	686	800	806
90	87~90	1170	969	732	850	1002
95	92~95	1235	1021	768	900	1165
102	97~102	1350	1090	816	950	1443
107	105~107	1400	1148	857	1000	1636
114	111~114	1480	1207	902	1050	1933
120	117~120	1585	1280	956	1120	2239

JIS F 2016-1987 CAST STEEL PAWL TYPE CHAIN STOPPERS FOR GRADE 3 CHAINS



MODELNO	MONINAL DIA. OF ANCHOR CHAUN	SIZE (mm)				WEICHT (KG)
		A	B	C	D	
42	36~42	530	494	357	422	210
46	42~46	620	538	404	480	396
51	48~51	680	599	438	520	429
56	52~56	730	638	472	560	465
60	58~60	780	670	506	600	480
64	62~64	835	710	538	630	500
68	66~68	885	750	568	660	567
73	70~73	950	801	604	700	682
78	76~78	1015	852	641	750	818
84	81~84	1095	911	686	800	1030
90	87~90	1170	969	732	850	1220
95	92~95	1235	1021	768	900	1420
102	97~102	1350	1090	816	950	1830
107	105~107	1400	1148	857	1000	2130
114	111~114	1480	1207	902	1050	2410
120	117~122	1585	1280	956	1120	2900



MODELO	FABRICANTE	1 ELEMENTO		2 ELEMENTOS	
		R	E	R	E
NDMV 1000x900-C2	NANJIG DEERS	480.6	220.5	961.2	441

NOTAS:

1. SISTEMA DE DEFENSAS BERÇO 204 a 216 - APPA:

3. PERFORMANCE REQUERIDA:

E=DEFLEXÃO 57,5% E=408KNm, R=888KN, TOLERANCIA 10%

4. VALOR DE ENERGIA E REAÇÃO PARA PAR DE DEFENSA.

5. Fabricante: Nanjing Deers

6. MATERIAL: ASTM A36/BORRACHA

Fabricante: Nanjing Deers



AJM Infraestrutura
www.ajminfra.com.br
 (47) 99187-1920
contato@ajminfra.com.br

**ITEM 40 -Elemento de Borracha Modular
 MV1000Hx1000L**

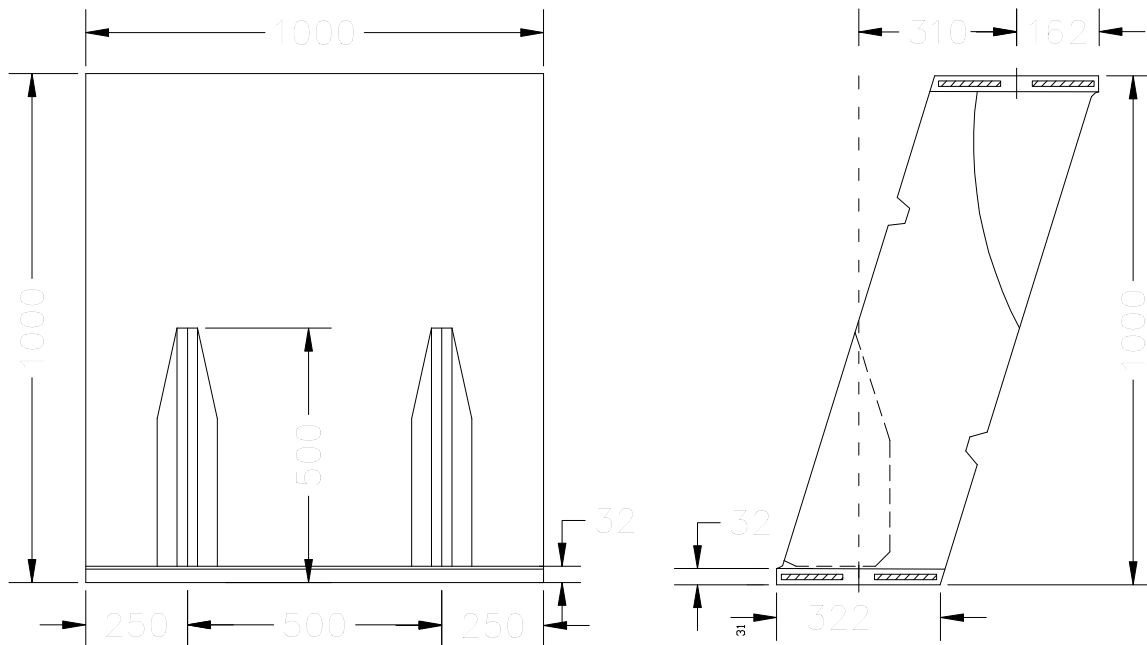
PORTOS DO PARANÁ - APPA

PARANAGUÁ - PR

PREGÃO ELETRÔNICO 153/2024

REGISTRO DE PREÇO.
 HABILITAÇÃO TÉCNICA

ENG. CIVIL ALBERTO J. MARCATTO
 CREA 052910-0



MODELO	FABRICANTE	1 ELEMENTO		2 ELEMENTOS	
		R	E	R	E
NDMV 1000x1000-C2	NANJING DEERS	534	245	1068	490

NOTAS:

1. SISTEMA DE DEFENSAS BERÇO 204 a 216 - APPA;
3. PERFORMANCE REQUERIDA:
E=DEFLEXÃO 57,5% E=408KNm, R=888KN, TOLERANCIA 10%
4. VALOR DE ENERGIA E REAÇÃO PARA PAR DE DEFENSA.
5. Fabricante: Nanjing Deers
6. MATERIAL: ASTM A36/BORRACHA

Fabricante: Nanjing Deers



AJM Infraestrutura
www.ajminfra.com.br
(47) 99187-1920
contato@ajminfra.com.br

**ITEM 41 -Elemento de Borracha Modular
MV1000Hx900L**

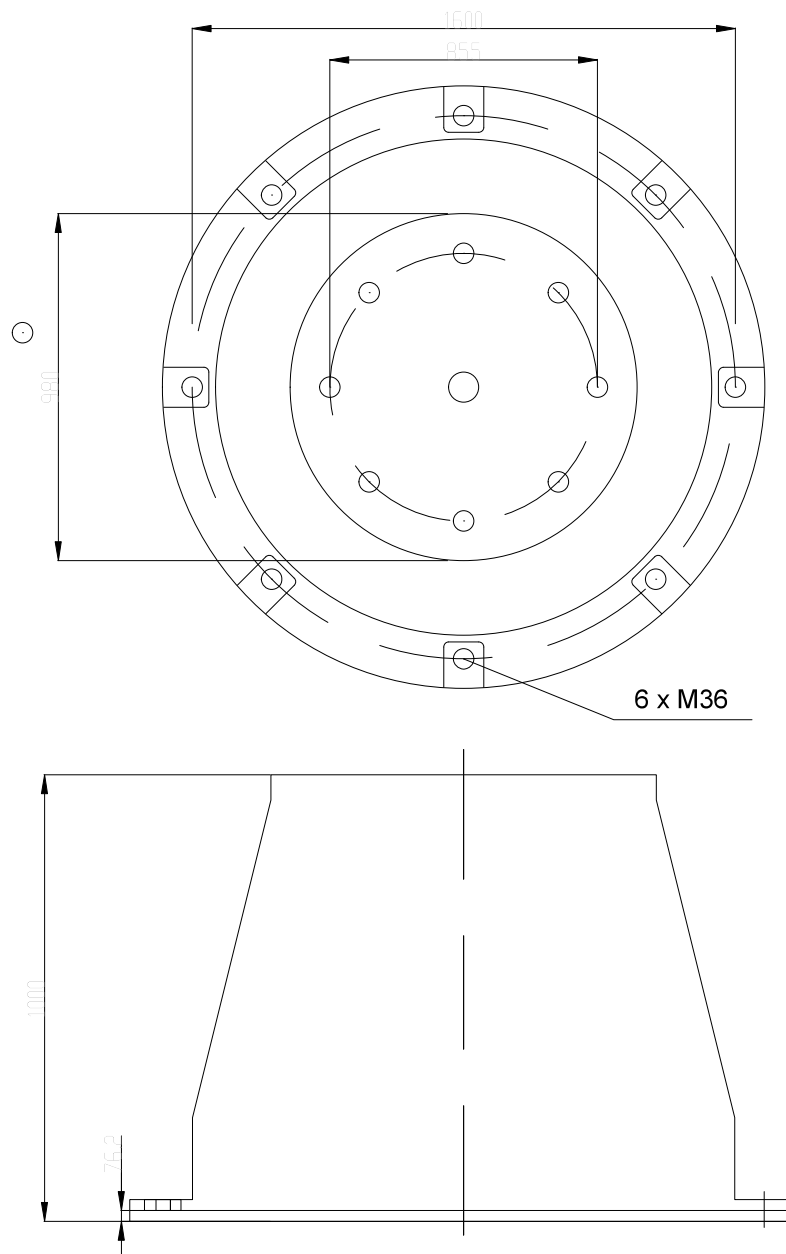
PORTOS DO PARANÁ - APPA

PARANAGUÁ - PR

PREGÃO ELETRONICO 153/2024

REGISTRO DE PREÇO.
HABILITAÇÃO TÉCNICA

ENG. CIVIL ALBERTO J. MARCATTO
CREA 052910-0



6 x M36

MODELO	FABRICANTE	1 ELEMENTO	
		E (kN.m)	R (kN)
NDCN1000 - C3	NANJING DEERS	666	1282

NOTAS:

1. SISTEMA DE DEFENSAS BERÇO 204 ao 216 - Sistema de Defesa Modular;
3. PERFORMANCE REQUERIDA:
E=DEFLEXÃO 57,5% E=1332KNm, R=2564KN, TOLERANCIA 10%
4. CALCULO ENERGIA E REAÇÃO PARA 2 ELEMENTOS
5. FABRICANTE: NANJING DEERS
6. MATERIAL: ASTM A36/BORRACHA

Fabricante: Nanjing Deers



AJM Infraestrutura
www.ajminfra.com.br
(47) 99187-1920
contato@ajminfra.com.br

ITEM 42 -Elemento de Borracha Cone SCN 1000H

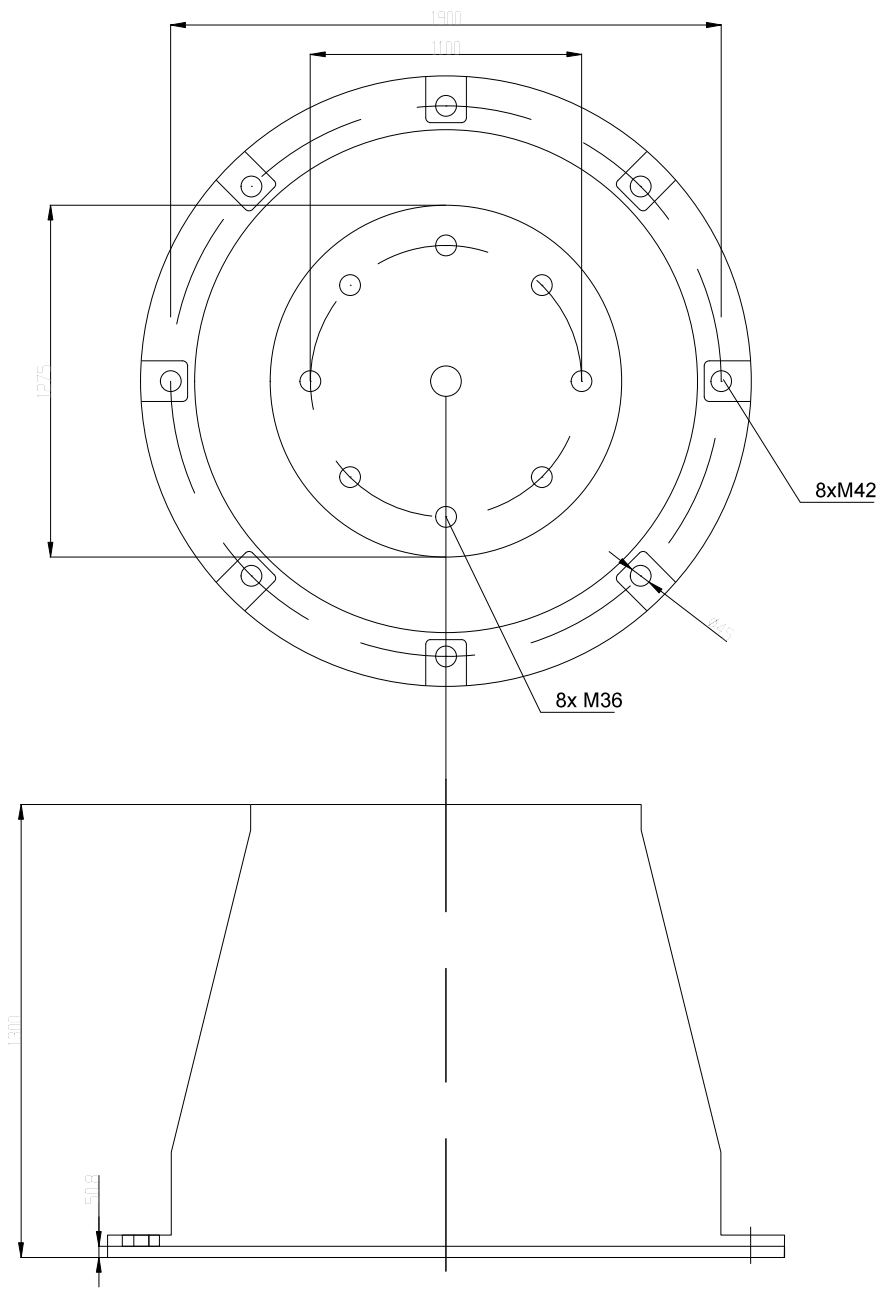
PORTOS DO PARANÁ - APPA

PARANAGUÁ - PR

PREGÃO ELETRONICO 153/2024

REGISTRO DE PREÇO.
HABILITAÇÃO TÉCNICA

ENG. CIVIL ALBERTO J. MARCATTO
CREA 052910-0



MODELO	FABRICANTE	1 ELEMENTO	
		E (kN.m)	R (kN)
NDCN1300-C1	NANJING DEERS	913	1357

- NOTAS:
1. SISTEMA DE DEFENSAS BERÇO 201 - Sistema de Defesa Cônico:
 3. PERFORMANCE REQUERIDA (REF. F1.3-TRELLEBORG):
E=DEFLEXÃO 72% E=891KNm, R=1149,2 KN, TOLERANCIA 10%
 4. FABRICANTE: NANJING DEERS
 5. MATERIAL: ASTM A36 / BORRACHA

Fabricante: Nanjing Deers



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 (47) 99187-1920
contato@ajminfra.com.br

**ITEM 42 -Elemento de Borracha Cone SCN
 1300H - F1.3**

PORTOS DO PARANÁ - APPA

PARANAGUÁ - PR

PREGÃO ELETRÔNICO 153/2024

REGISTRO DE PREÇO.
 HABILITAÇÃO TÉCNICA

ENG. CIVIL ALBERTO J. MARCATTO
 CREA 052910-0

Nº do Item (na ATA)
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DESCRIÇÃO
ARRUELA LISA Ø1" GF
ARRUELA LISA DIN 125 M36 GF
ARRUELA ESPECIAL 86 X 86 X 3/8" GF
ARRUELA ESPECIAL 125 X 170 X 3/8" GF
ARRUELA ESPECIAL 6 X 125 X 130 GF
PORCA SEXTAVADA ASTM A194 GR.2H UNC Ø1" GF
PORCA ASTM A194 GR.2H UNC Ø1.3/4" GF
CHUMBADOR (BARRA ROSCADA) UNC Ø1" X 395 GF
CHUMBADOR CONCRETO NOVO UNC Ø1" X 260 GF
CHUMBADOR CONCRETO NOVO UNC Ø1.3/4" X 360 GF
CHUMBADOR CONCRETO NOVO MA M36 X 320 GF
PARAFUSO SEXTAVADO ASTM A325 UNC Ø1.3/4" X 127 GF
PARAFUSO SEXTAVADO A325 RI UNC Ø1" X 65 GF
PARAFUSO SEXTAVADO ASTM A325 RI UNC Ø1.3/4" X 85 GF
PARAFUSO SEXTAVADO DIN 933 8.8 MA M36 X 100 GF
PARAFUSO SEXTAVADO DIN 933 8.8 MA M36 X 120 GF
PARAFUSO SEXTAVADO DIN 933 8.8 MA M36 X 80 GF
CORRENTE DE CISALHAMENTO Ø1" X 20 ELOS CONF DIN 764
CORRENTE DE CISALHAMENTO Ø1" X 09 ELOS
CORRENTE DE CISALHAMENTO Ø1" X 07 ELOS
CORRENTE DE CISALHAMENTO INFERIOR Ø1.1/2" X 10 ELOS GF
CORRENTE DE CISALHAMENTO SUPERIOR Ø1.1/2" X 9 ELOS GF
CORRENTE DE PESO Ø1" X 9 ELOS CONF DIN 764
CORRENTE DE PESO Ø1.1/4" X 12 ELOS GF
CORRENTE DE PESO Ø1.1/4" X 15 ELOS GF
ELO DE LIGAÇÃO 1" X Ø270 GF
SUORTE DE CORRENTE 120 X 340 X 25,4 GF
SUORTE DE CORRENTE U INFERIOR Ø2" X 580 GF
SUORTE DE CORRENTE U SUPERIOR Ø2" X 710 GF
SUORTE DE CORRENTE Ø1.1/2" X 580 UNC GF
AJUSTADOR DE CORRENTE Ø1.1/4" X 270 GF
AJUSTADOR DE CORRENTE Ø1.1/4" X 285 GF
TENSIONADOR DE CORRENTE Ø2" GF
MANILHA RETA COM PINO ROSCADO Ø1.1/4" GF CONF DIN 82101 TIPO C
MANILHA RETA COM PINO ROSCADO Ø1.3/4" GF
MANILHA RETA COM PINO ROSCADO Ø1" GF
PAINEL METÁLICO 1800 X 2200 C/ CHANFROS
PAINEL METÁLICO 2600 X 5500 C/ CHANFROS
PAINEL METÁLICO 4550 X 3800 C/ CHANFROS
ELEMENTO DE BORRACHA MV1000H X 1000L (A)
ELEMENTO DE BORRACHA MODULAR 1000H x 900L
ELEMENTO DE BORRACHA CONE SCN 1300H F1.3
ELEMENTO DE BORRACHA CONE SCN 1000H

MATERIAL	UANTIDAD	UM	unitario
ASTM A36	80,00	UND	R\$ 34,80
SAE 1010/1020	20,00	UND	R\$ 15,75
ASTM A36	100,00	UND	R\$ 25,40
ASTM A36	100,00	UND	R\$ 55,11
ASTM A36	48,00	UND	R\$ 29,75
SAE 1045	300,00	UND	R\$ 64,30
SAE 1045	300,00	UND	R\$ 105,80
SAE 1045	50,00	UND	R\$ 683,00
SAE 1045	18,00	UND	R\$ 930,00
SAE 1045	12,00	UND	R\$ 2.325,00
SAE 1045	48,00	UND	R\$ 1.705,00
SAE 1045	300,00	UND	R\$ 483,00
SAE 1045	18,00	UND	R\$ 65,10
SAE 1045	20,00	UND	R\$ 325,00
SAE 1045	25,00	UND	R\$ 192,96
SAE 1045	16,00	UND	R\$ 232,50
SAE 1045	25,00	UND	R\$ 158,10
GRAU 2	200,00	UND	R\$ 597,23
GRAU 2	100,00	UND	R\$ 268,75
GRAU 2	100,00	UND	R\$ 209,03
GRAU 3	10,00	UND	R\$ 685,61
GRAU 3	10,00	UND	R\$ 617,04
GRAU 2	100,00	UND	R\$ 268,75
GRAU 3	10,00	UND	R\$ 459,57
GRAU 2	100,00	UND	R\$ 574,46
ASTM A36	10,00	UND	R\$ 1.400,00
ASTM A36	150,00	UND	R\$ 1.511,25
SAE 1045	50,00	UND	R\$ 759,50
SAE 1045	50,00	UND	R\$ 1.999,50
SAE 1045	50,00	UND	R\$ 2.418,00
SAE 1045	50,00	UND	R\$ 1.233,80
SAE 1045	4,00	UND	R\$ 3.720,00
SAE 1045	10,00	UND	R\$ 3.875,00
GRAU 2	200,00	UND	R\$ 288,57
GRAU 3	20,00	UND	R\$ 900,00
GRAU 3	100,00	UND	R\$ 152,91
ASTM A36 / UHMW PE	10,00	UND	R\$ 48.370,00
ASTM A36 / UHMW PE	1,00	UND	R\$ 165.574,58
ASTM A36 / UHMW PE	4,00	UND	R\$ 191.370,00
BORRACHA / ASTM A36	20,00	UND	R\$ 18.300,00
BORRACHA / ASTM A36	65,00	UND	R\$ 16.420,00
BORRACHA / ASTM A36	2,00	UND	R\$ 139.367,61
BORRACHA	5,00	UND	R\$ 52.174,84

total	
R\$	2.784,00
R\$	315,00
R\$	2.540,00
R\$	5.511,00
R\$	1.428,00
R\$	19.290,00
R\$	31.740,00
R\$	34.150,00
R\$	16.740,00
R\$	27.900,00
R\$	81.840,00
R\$	144.900,00
R\$	1.171,80
R\$	6.500,00
R\$	4.824,00
R\$	3.720,00
R\$	3.952,50
R\$	119.446,00
R\$	26.875,00
R\$	20.903,00
R\$	6.856,10
R\$	6.170,40
R\$	26.875,00
R\$	4.595,70
R\$	57.446,00
R\$	14.000,00
R\$	226.687,50
R\$	37.975,00
R\$	99.975,00
R\$	120.900,00
R\$	61.690,00
R\$	14.880,00
R\$	38.750,00
R\$	57.714,00
R\$	18.000,00
R\$	15.291,00
R\$	483.700,00
R\$	165.574,58
R\$	765.480,00
R\$	366.000,00
R\$	1.067.300,00
R\$	278.735,22
R\$	260.874,20
R\$	4.752.000,00