

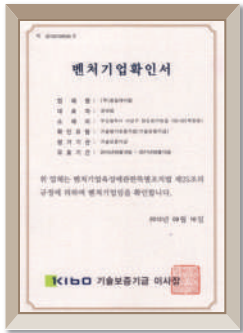
MARINE RUBBER FENDERING SYSTEM



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벤처기업확인서



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수출중소유망기업



공장 등록
증명서



KS
인증서



계선주의 시공방법
특허 10-1099692호



접안시설 모서리보호구
특허 10-1107608호



신축형 매설기구
특허 10-0953128호



우레탄램퍼 앵커
특허 10-1200546호



차량주차스톱퍼
특허 10-0660059호



방한재의 제조장치
특허 10-1584791호



발광램프 사다리
실용신안등록증



앵커볼트
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Certification status abroad



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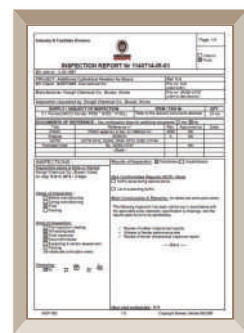
Lloyd's
TORONTO



NORAFRIKA
SUEZ CANAL



SCA
SUEZ CANAL



BV
IRAQ

연혁

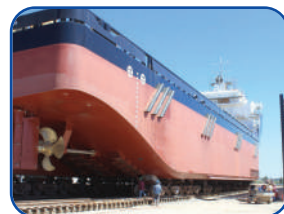
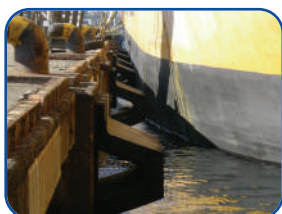
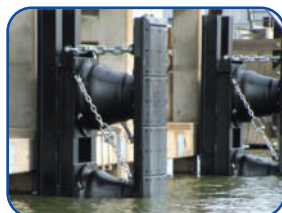
- 1994년 04월 동일화학 설립 (부산광역시 진구 부암동)
- 1997년 06월 사업장 이전 (부산광역시 사상구 주례동)
- 1998년 03월 Q마크 획득 (교량지지용 탄성 방진고무, 한국화학시험연구원)
- 2001년 02월 (주)동일케미칼 법인 전환
- 2002년 09월 ISO인증 획득 (TQCS International Group Pty Ltd)
- 2003년 04월 KS M 6709 고무 방현재 KS인증 획득 (한국표준협회)
- 2004년 06월 사업장 확장 이전 (부산광역시 사상구 학장동 722-39)
- 2006년 04월 제 2공장 증설 (부산광역시 사상구 학장동 722-42)
- 2006년 06월 유망 중소기업 지정
- 2006년 12월 '차량주차 스톱퍼' 특허 획득 (제 10-0660059호)
- 2007년 08월 제 3공장 증설 (부산광역시 사상구 학장동 723-1)
- 2008년 11월 이노비즈 인증 획득
- 2009년 09월 벤처기업 인증 획득
- 2010년 12월 IBK 패밀리기업 지정
- 2011년 12월 '계선주의 시공방법' 특허 획득 (제 10-1099692호)
- 2012년 01월 '접안시설 모서리 보호구' 특허 획득 (제 10-1107608호)
- 2012년 10월 '발광램프를 구비한 사다리' 실용신안 등록 (제 20-0463029호)
- 2012년 11월 '우레탄 댐퍼를 이용한 앵커볼트' 특허 획득 (제 10-1200546호)
- 2013년 12월 수출 100만불탑 달성
- 2014년 04월 제 4공장 증설 확정 (부산광역시 사상구 학장동 720-21)
- 2016년 01월 방현재의 제조장치 특허 획득 (제 10-1584791호)
- 2016년 06월 2016년도 수출유망중소기업지정
- 2016년 07월 부산중소기업인 대상 수상
- 2018년 02월 사업장 이전(부산광역시 녹산산단262로 50번길 15)
- 2020년 01월 '선박 접안용 충격 흡수' 특허 획득(제 10-2074500호)
- 2020년 08월 '항만 부두용 모서리 보호대' 디자인 등록(제 30-1071559호)

History

- 1994. Apr Establishment of Dong il Chemical.
- 2001. Feb Establishment of Corporation Dong il Chemical Co., LTD.
- 2002. Sep ISO award from TQCS International Group pty ltd
- 2003. Apr KS M 6709 award for Rubber Fender.
- 2008. Nov Innobiz
- 2009. Sep Venture Enterprise award.
- 2013. Dec Export Tower Award from the president of Korea.

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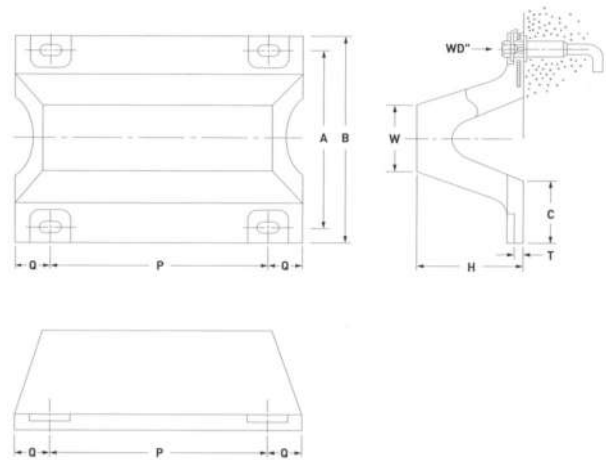
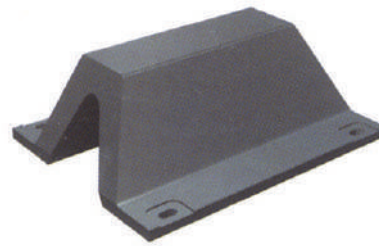


OV FENDER

Arch types are the first buckling type fenders. they are the most versatile fender in the world and reinforced by an embedded steel plate across the entire bottom of the fender. They have been installed at the berthing facilities for various sizes of vessels and have shown satisfactory results after usage for long periods.

OV Fender

OV fender is highlighted with its features of high energy absorption, low reaction force. its arch shape serves well to reduce concentration of stress when the fender is compressed. They are in good quality with four rubber grade. They also have a side selection of sizes and energy capacities, and equipped with steel mounting plates at the fender bottom and open legs make it easy install fenders at any berthing facility.



• OV Fender Dimension

[Unit:mm]

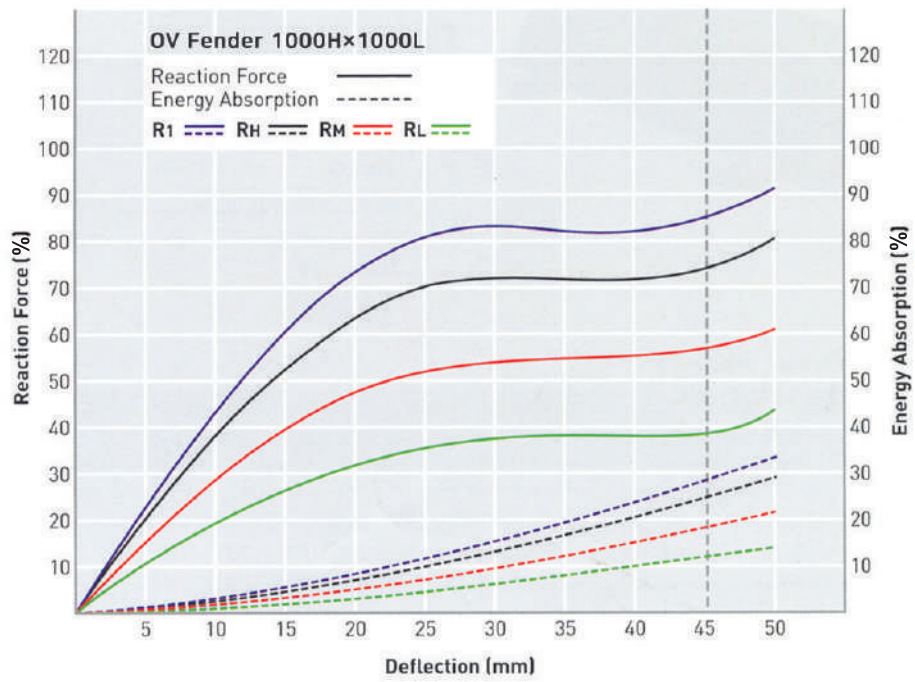
Dimension Height(H)	WD"	A	B	C	T	W	1000L		1500L		2000L		2500L		3000		3500L	
							P	Q	P	Q	P	Q	P	Q	P	Q	P	Q
150H	M22(7/8")	240	300	96	17	97.5	860	110	675×2	112.5	620×3	107.5	785×3	110	715×4	107.5	671×5	110
200H	M24(1")	320	400	128	19	130	860	120	680×2	120	620×3	120	785×3	122.5	715×4	120	672×5	120
250H	M27(1 1/8")	410	500	160	20.5	165	865	130	680×2	132.5	620×3	132.5	790×3	127.5	715×4	132.5	673×5	130
300H	M30(1 1/4")	490	600	192	23	195	870	140	685×2	140	625×3	137.5	790×3	140	715×4	145	674×5	140
400H	M36(1 1/2")	670	800	256	31	260	900	150	700×2	150	635×3	147.5	800×3	150	725×4	150	680×5	150
500H	M42(1 3/4")	840	1,000	320	34	325	930	160	715×2	160	645×3	157.5	810×3	160	730×4	165	686×5	160
600H	M48(2")	1,010	1,200	384	37	395	960	170	730×2	170	655×3	167.5	820×3	170	740×4	170	692×5	170
800H	M64(2 1/2")	1,340	1,600	501	45	525	1,040	180	770×2	180	680×3	180	845×3	182.5	760×4	180	—	—
1000H	M64(2 1/2")	1,680	2,000	626	49	655	1,100	200	800×2	200	700×3	200	865×3	202.5	775×4	200	—	—

OV

OV FENDER



• Performance Curve



• OV Fender Performance Table

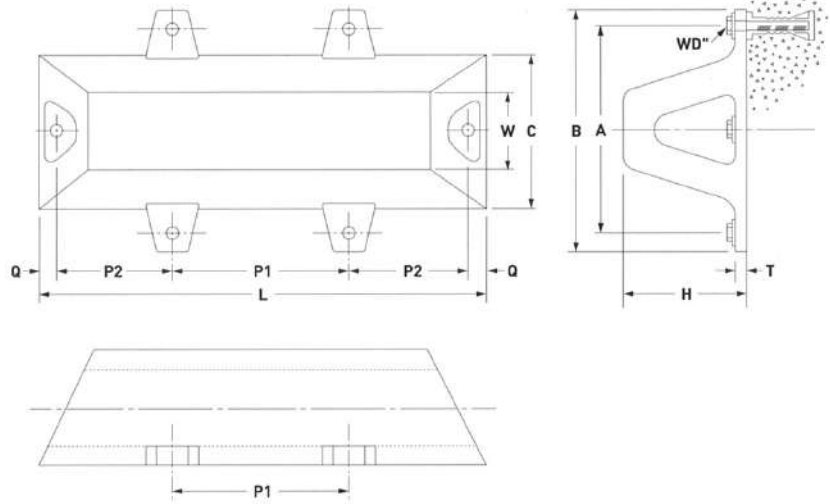
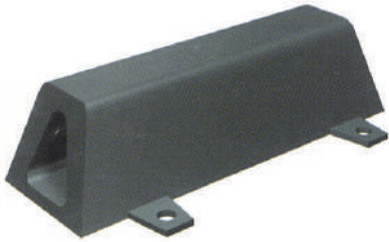
		Size								
Performance		150H	200H	250H	300H	400H	500H	600H	800H	1000H
R1	R-F(ton)	17.0	21.0	24.5	28.0	38.0	46.0	62.5	73.0	90.0
	E-A(ton-m)	0.6	1.2	1.7	2.2	3.9	6.0	8.5	15.0	24.0
RH	R-F(ton)	16.0	19.0	22.0	25.0	33.0	42.0	55.0	68.0	82.5
	E-A(ton-m)	0.5	1.0	1.5	2.0	3.6	5.5	8.0	14.0	22.5
RM	R-F(ton)	15.0	17.0	19.5	22.0	28.5	36.0	47.5	63.0	75.0
	E-A(ton-m)	0.4	0.8	1.3	1.8	3.3	5.0	7.5	13.0	21.0
RL	R-F(ton)	14.0	15.0	17.0	19.0	24.0	32.0	40.0	58.0	67.5
	E-A(ton-m)	0.3	0.6	1.1	1.6	3.0	4.5	7.0	12.0	19.5

-R · F:Reaction Force(ton) -E · A:Energy Absorption(ton-m) -Tolerance: ±10% -Deflection:45%

CV FENDER

CV Fender

CV Fender is the most versatile fender in the world. It is the first fender to be reinforced by an embedded steel plate across the entire bottom of the fender, and the first dynamically stable type fender against outer force in various directions. It is easy in handling and maintaining.



• CV Fender Dimension

[Unit:mm]

Dimension Height	WD"	A	B	C	T	W	1000L		1500L		2000L			2500L			3000L			3500L		
							P2	Q	P2	Q	P1	P2	Q	P1	P2	Q	P1	P2	Q	P1	P2	Q
200H	M24(1")	350	425	250	25	125	555	70	805	70	900	605	70	900	855	70	900×2	655	70	900×2	905	70
300H	M30(1¼")	530	645	375	35	188	600	75	850	75	1000	600	75	1000	850	75	1000×2	600	75	1000×2	850	75
400H	M36(1½")	710	840	500	40	250	640	85	890	85	1200	540	85	1200	790	85	1200×2	440	85	1200×2	690	85
500H	M42(1¾")	860	1000	625	40	315	675	100	925	100	1000	675	100	1000	925	100	1000×2	675	100	1000×2	925	100
600H	M48(2")	1050	1210	750	50	375	710	115	960	115	1020	700	115	1020	950	115	1020×2	690	115	1020×2	940	115
700H	M48(2")	1180	1380	880	55	450	635	115	885	115	1000	635	115	1000	885	115	1000×2	635	115	1000×2	885	115
800H	M64(2½")	1350	1550	1000	60	500	670	130	920	130	1050	645	130	1050	895	130	1050×2	620	130	1050×2	870	130
1000H	M64(2½")	1600	1800	1250	65	625	700	150	950	150	1200	600	150	1200	850	150	1200×2	500	150	1200×2	750	150
1300H	M72(3")	2030	2250	1625	65	815	-	-	975	200	900	775	200	900	1025	200	900×2	825	200	900×2	625	200

-WD":Anchor Size See Page 40

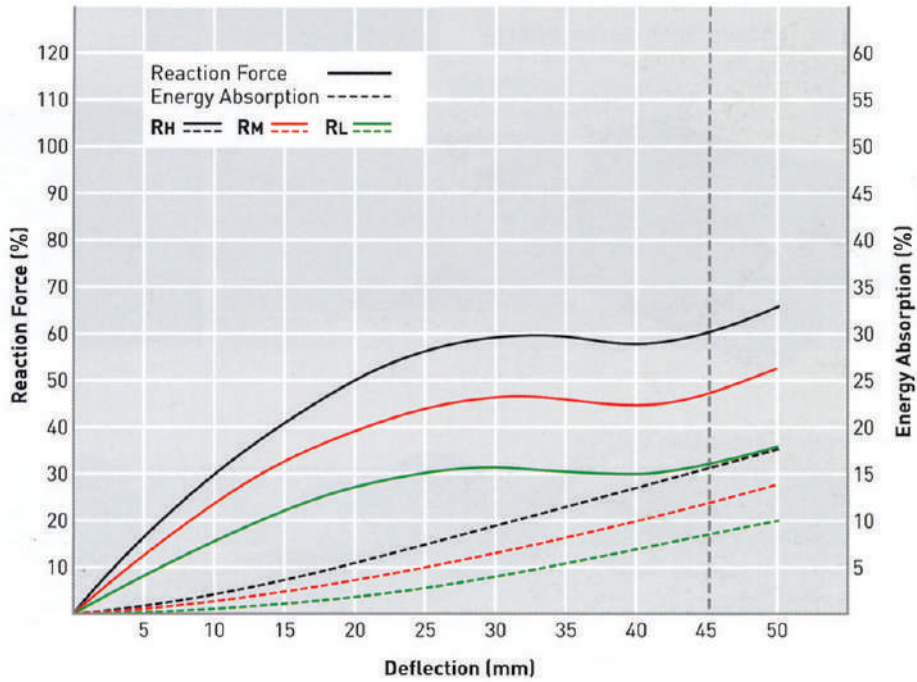


CV

CV FENDER



• Performance Curve



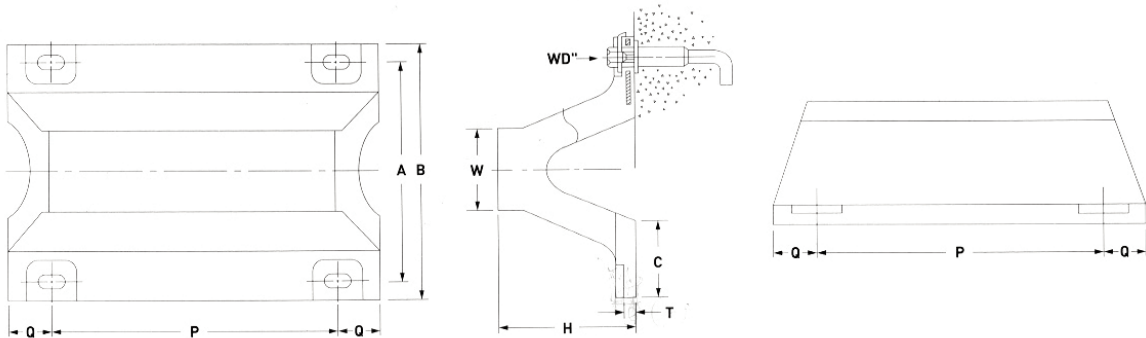
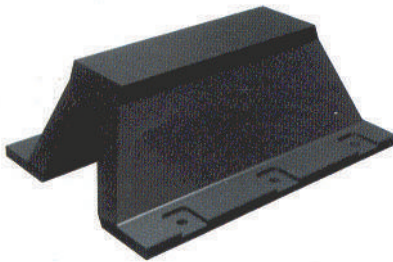
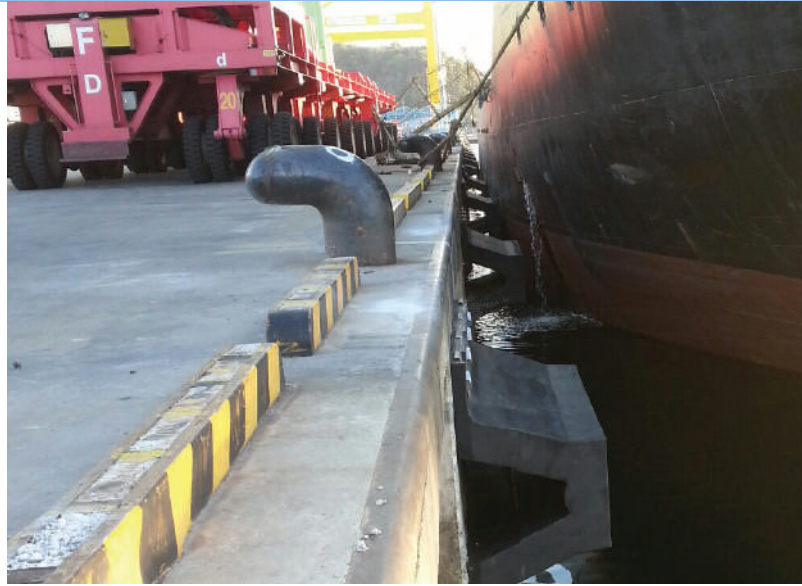
• CV Fender Performance Table

Size Performance		200H	300H	400H	500H	600H	800H	1000H	1300H
RH	R · F(ton)	15.0	25.0	33.0	42.0	45.0	68.0	75.0	98.0
	E · A(ton-m)	1.0	2.0	3.4	5.5	9.0	14.0	25.0	42.0
RM	R · F(ton)	12.0	22.0	28.5	36.0	34.0	63.0	60.0	78.0
	E · A(ton-m)	0.7	1.8	3.1	5.0	6.50	13.0	18.0	31.0
RL	R · F(ton)	8.0	19.0	24.0	32.0	24.0	58.0	38.0	49.0
	E · A(ton-m)	0.5	1.6	2.8	4.5	4.0	12.0	12.0	20.0

-R · F:Reaction Force(ton) -E · A:Energy Absorption(ton-m) -Tolerance: ±10% -Deflection:45%

NV FENDER

NV fender is newly designed with 15% increased energy absorption capacity when it is compared to other type of fenders of same size with same rubber grades. With the most suitable structures and shape design, compression capacity has been increased from 45% to 52.5%. It is easy to install and replace because it has simple structure and same Anchor bolts holes location as SOV. 17% of reaction force and 32% of surface reaction force have been decreased when SNV is compared to existing arch type fenders with same energy absorption capacity.



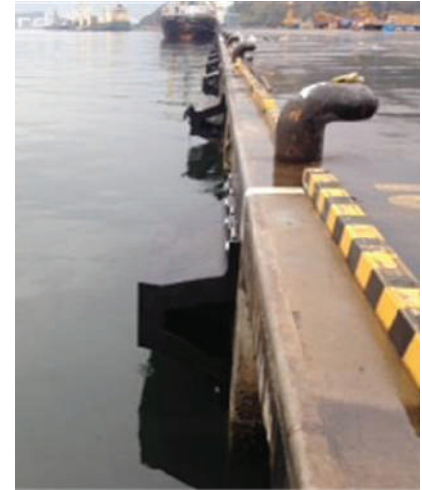
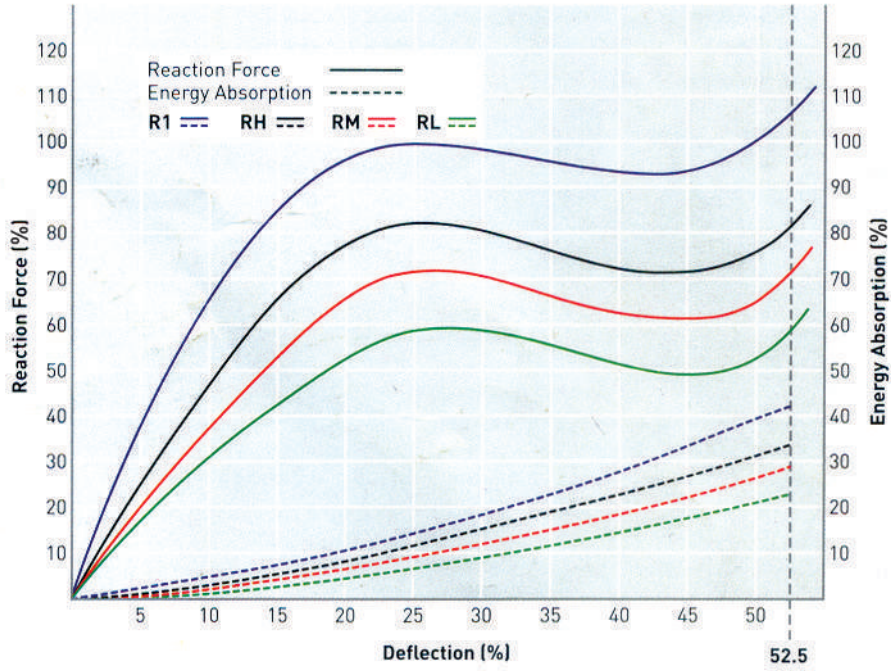
• NV Fender Dimension

[Unit:mm]

Dimension Height	WD"	A	B	C	T	W	1000L		1500L		2000L		2500L		3000L	
							P	Q	P	Q	P	Q	P	Q		
150H	M22(7/8")	240	300	93.5	17	120	855	110	675x2	112.5	620x3	107.5	785x3	110	715x4	107.5
200H	M24(1")	320	400	125	17	160	860	120	680x2	120	620x3	120	785x3	122.5	715x4	120
250H	M27(1 1/8")	410	500	156	22	200	865	130	680x2	132.5	620x3	132.5	790x3	127.5	715x4	132.5
300H	M30(1 1/4")	490	600	187.5	23	240	870	140	685x2	140	625x3	137.5	790x3	140	715x4	145
400H	M36(1 1/2")	670	800	250	28	320	900	150	700x2	150	635x3	147.5	800x3	150	725x4	150
500H	M42(1 3/4")	840	1000	312.5	32	400	930	160	715x2	160	645x3	157.5	810x3	160	730x4	165
600H	M48(2")	1010	1200	375	40	450	960	170	730x2	170	655x3	167.5	820x3	170	740x4	170
800H	M64(2 1/2")	1340	1600	512	43	600	1040	180	770x2	180	680x3	180	845x3	182.5	760x4	180
1000H	M64(2 1/2")	1680	2000	625	49	750	1100	200	800x2	200	700x3	200	865x3	202.5	775x4	200

NV FENDER

• Performance Curve



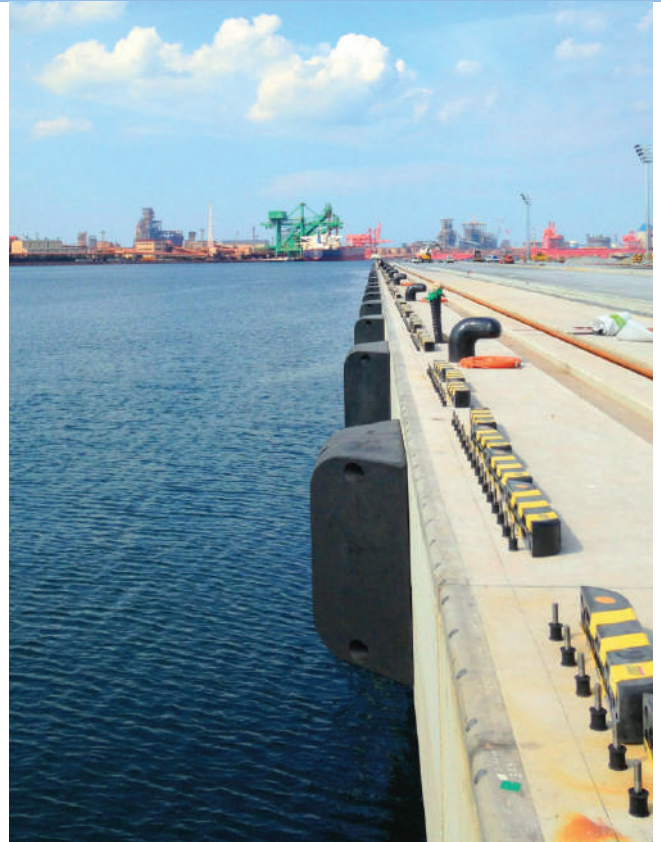
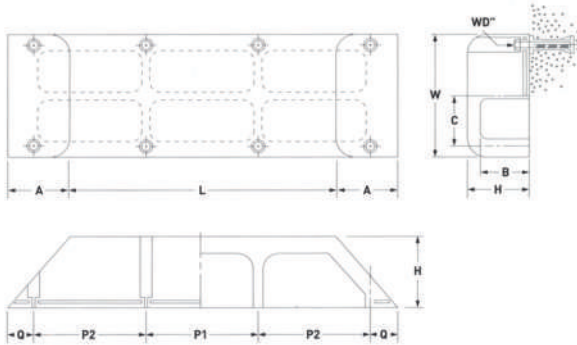
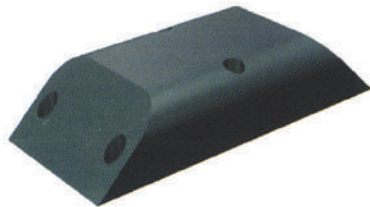
• NV Fender Performance Table

Size		150H	200H	250H	300H	400H	500H	600H	800H	1000H
Performance										
R1	R-F(ton)	13.0	18.0	22.0	26.0	35.0	43.0	52.0	69.0	86.0
	E-A(ton-m)	0.6	1.2	1.8	2.6	4.6	7.2	10.4	18.4	28.7
RH	R-F(ton)	11.0	15.0	19.0	23.0	30.0	38.0	45.0	60.0	75.0
	E-A(ton-m)	0.5	1.0	1.6	2.3	4.0	6.3	9.0	16.0	24.9
RM	R-F(ton)	9.0	12.0	14.0	17.0	23.0	29.0	34.0	46.0	57.0
	E-A(ton-m)	0.4	0.8	1.2	1.7	3.1	4.8	6.8	12.3	19.0
RL	R-F(ton)	6.0	8.0	10.0	12.0	16.0	19.0	23.0	31.0	38.0
	E-A(ton-m)	0.3	0.5	0.8	1.2	2.1	3.1	4.6	8.2	12.7

• R-F : Reaction Force(ton) • E-A : Energy Absorption(ton-m) • Tolerance : ±10% • Deflection : 45%

BP FENDER

Bumper type fender is suitable for protecting port facilities from lateral berthing load. It keeps the damage of fender at minimum due to an unbreakable shape, and has large contact area with vessel hull. It is suitable for gravity type quay.



• BP Fender Dimension

[Unit:mm]

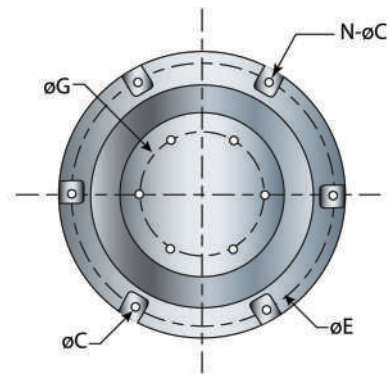
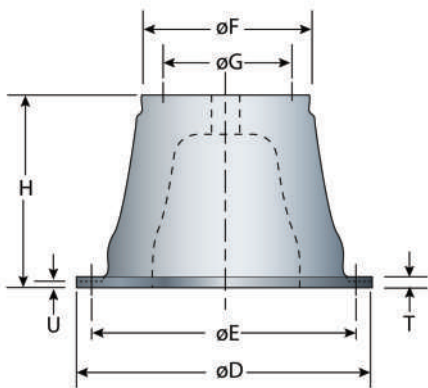
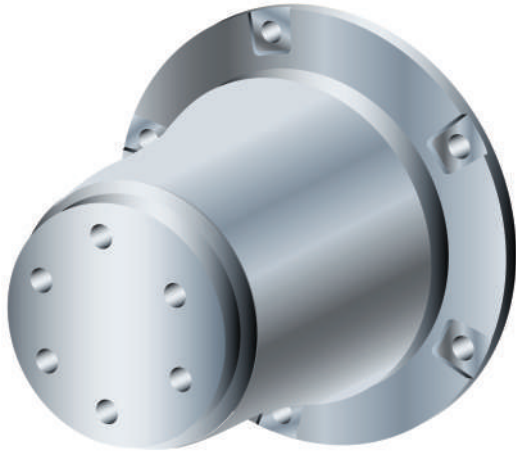
Dimension Height	WD"	A	B	C	Q	W	1000L		1500L		2000L		2500L		3000L	
							P1	P2	P1	P2	P1	P2	P1	P2		
150H	M24(1")	150	110	107.5	75	300	—	575	—	825	710	720	880	885	785×2	790
200H	M30(1¼")	200	150	145	100	400	—	600	—	850	730	735	900	900	800×2	800
250H	M30(1¼")	250	190	190	125	500	—	625	—	875	750	750	910	920	810×2	815
300H	M36(1½")	300	230	235	150	600	—	650	—	900	760	770	930	935	825×2	825
400H	M36(1½")	400	310	320	200	800	—	700	—	950	800	800	960	970	850×2	850
500H	M42(1¾")	500	380	410	250	1000	—	750	—	1000	830	835	1000	1000	875×2	875
600H	M48(2")	600	460	495	300	1200	—	800	—	1050	860	870	1030	1035	900×2	900
800H	M64(2½")	800	620	670	400	1600	—	900	—	1150	930	935	1100	1100	950×2	950
1000H	M64(2½")	1000	780	850	500	2000	—	1000	—	1250	1000	1000	1160	1170	1000×2	1000
1300H	M72(3")	1300	1020	1125	650	2600	—	1150	—	1400	1100	1100	1260	1270	1075×2	1075

BP FENDER

Dokdo
Korea's Beautiful Island



CONE FENDER



• Dimensions

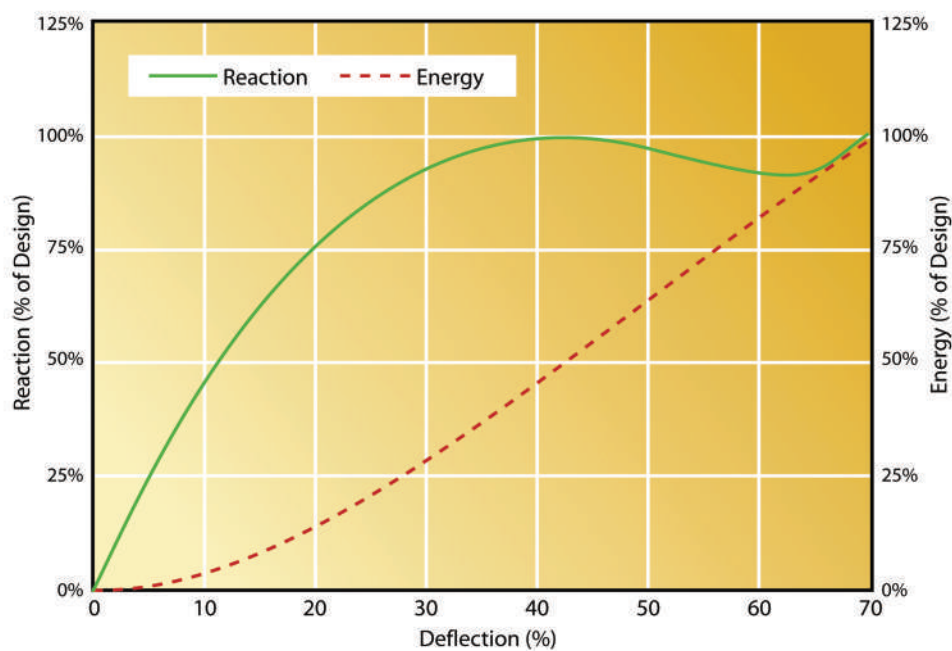
Model	Bolt Size	H	ϕ D	ϕ E PCD	ϕ F	ϕ G PCD	T	U	N - ϕ C
		mm	mm	mm	mm	mm	mm	mm	mm
CONE 500	M24	500	750	675	425	325	25	21	4-30
CONE 600	M24	600	900	810	510	390	27	22	6-30
CONE 700	M30	700	1050	945	595	455	32	26	6-38
CONE 800	M36	800	1200	1080	680	520	36	29	6-44
CONE 900	M36	900	1350	1215	765	585	41	33	6-44
CONE 1000	M42	1000	1500	1350	850	650	45	37	6-50
CONE 1100	M42	1100	1650	1485	935	715	50	42	6-50
CONE 1150	M42	1150	1725	1550	998	750	52	42	6-50
CONE 1200	M48	1200	1800	1600	1020	780	54	44	8-50
CONE 1300	M48	1300	1950	1755	1105	845	59	48	8-60
CONE 1400	M48	1400	2100	1890	1190	930	66	54	8-60
CONE 1600	M52	1600	2400	2160	1360	1060	72	58	8-70

Other sizes available. Dimensions are subject to change. Verify current dimensions with Maritime when ordering any fender.

CONE FENDER



• Performance curve



• Cone Fender Dimension

Model	Standard Rubber Grades							
	R1		RH		RM		RL	
	R	E	R	E	R	E	R	E
	ton	ton-m	ton	ton-m	ton	ton-m	ton	ton-m
CONE 500	31.3	8.3	25.0	6.6	20.0	5.6	16.0	4.5
CONE 600	45.0	14.3	36.0	11.4	28.8	9.6	23.1	7.7
CONE 700	61.3	22.8	49.1	18.3	39.2	15.3	31.4	12.2
CONE 800	80.1	34.0	64.1	27.2	51.2	22.9	41.0	18.3
CONE 900	101.3	48.4	81.0	38.8	64.9	32.6	51.8	26.0
CONE 1000	125.1	66.3	100.1	53.2	80.1	44.6	64.1	35.7
CONE 1100	151.3	88.3	121.1	70.7	96.9	59.4	77.6	47.6
CONE 1150	165.4	100.9	132.3	80.8	105.9	67.9	84.7	54.3
CONE 1200	180.1	114.7	144.1	91.8	115.3	77.1	92.2	61.7
CONE 1300	211.4	145.7	169.1	116.7	135.3	98.1	108.3	78.5
CONE 1400	245.2	182.0	196.1	145.8	156.9	122.4	125.5	98.1
CONE 1600	320.3	271.7	256.2	217.7	205.0	182.9	164.0	146.3

R=reaction E=energy Values shown are for standard 70% deflection Maximum deflection = 72.5% R=112% E=104% Tolerance = +/-10%

CELL FENDER

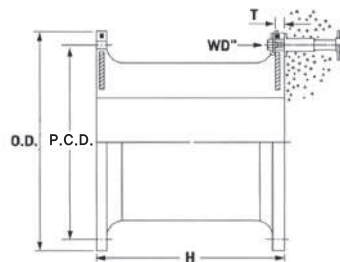
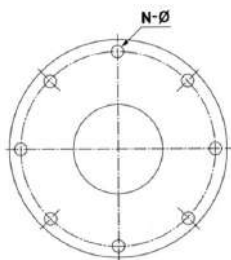


Super cell fender has been improved over the ordinary cell fender at the buckling point and in the shape of the edge of the leg. Its wider dispersion of stress has been corroborated by the Fem (finite element method)

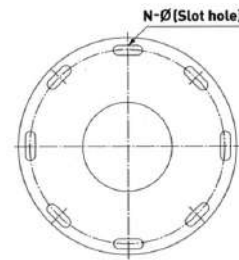
The wider dispersion of stress makes it possible to increase the design deflection from 45% to 52.5%, resulting in superior performance of the super cell fender, as well as being durable.



• Panel Side



• Wharf Side(Slot)



• Super cell Fender Dimension

[Unit:mm]

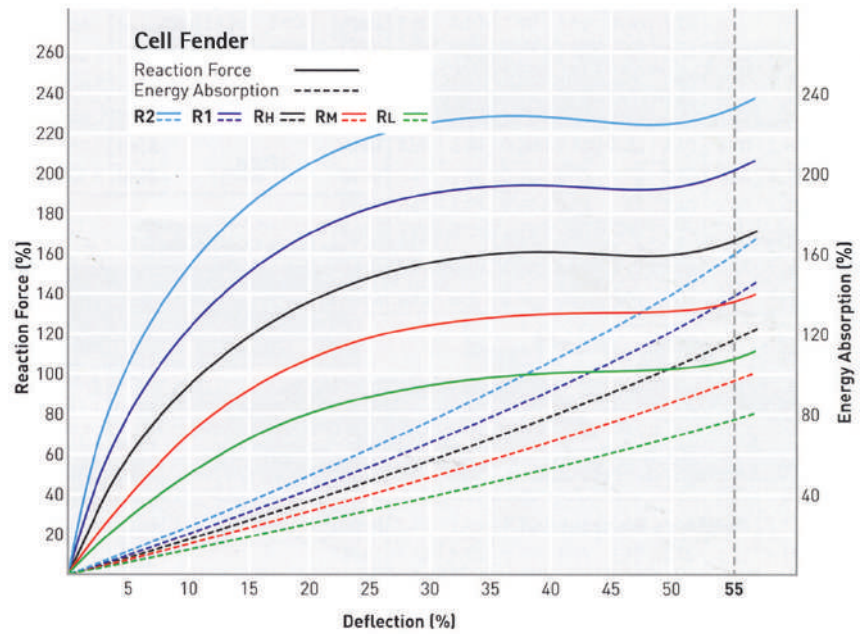
Dimension Height	WD"	O.D.	P.C.D.	N-Ø	N-Ø (Slot Hole)	T
500H	M24(1")	650	550	4-32	4-32×40	25
630H	M27(1 1/8")	840	700	4-39	4-39×49	25
650H	M27(1 1/8")	870	730	4-39	4-39×49	25
800H	M30(1 1/4")	1050	900	6-40	6-40×50	30
1000H	M36(1 1/2")	1300	1100	6-47	6-47×58	35
1150H	M42(1 3/4")	1500	1300	6-50	6-50×65	37
1200H	M42(1 3/4")	1550	1350	6-53	6-53×65	38
1250H	M42(1 3/4")	1650	1450	6-53	6-53×65	35
1400H	M48(2")	1800	1600	6-60	6-60×75	37
1450H	M48(2")	1850	1650	6-60	6-60×75	37
1600H	M48(2")	2000	1800	8-60	8-60×75	40
1700H	M56(2 1/4")	2100	1900	8-66	8-66×80	50
2000H	M64(2 1/2")	2200	2000	8-74	8-74×95	50
2250H	M64(2 1/2")	2550	2300	10-74	10-74×95	52
2500H	M64(2 1/2")	2950	2700	10-74	10-74×95	70

CELL

CELL FENDER



• Performance Curve



• Super cell Fender Performance Table

Size		500H	630H	650H	800H	1000H	1150H	1200H	1250H	1400H	1450H	1600H	1700H	2000H	2250H
R1	R-F(ton)	20	31.8	33.8	51.3	80.1	105.8	115.3	125.1	157.0	168.4	205.0	231.5	320.4	405.5
	E · A(ton-m)	4.1	8.2	9.0	16.8	32.8	50.2	56.8	64.1	90.1	100.0	134.5	161.3	262.7	374.0
RH	R-F(ton)	16.5	26.2	27.9	42.3	66.1	87.3	95.2	103.3	129.6	139.0	169.2	191.1	264.4	334.7
	E · A(ton-m)	3.5	6.9	7.6	14.2	27.7	42.6	47.9	54.1	76.1	84.5	113.5	136.1	221.7	315.7
RM	R-F(ton)	13.5	21.4	22.8	34.5	54.0	71.4	77.6	84.2	105.6	113.3	138.0	155.7	215.6	272.8
	E · A(ton-m)	2.9	5.8	6.3	11.8	23.0	35.0	39.7	45.0	63.2	70.2	94.3	113.1	184.2	262.2
RL	R-F(ton)	10.8	17.1	18.2	27.6	43.2	57.1	62.0	67.3	84.4	90.64	110.4	124.5	172.4	218.1
	E · A(ton-m)	2.3	4.6	5.0	9.4	18.4	28.0	31.7	36	50.5	56.16	75.4	90.48	147.3	209.6

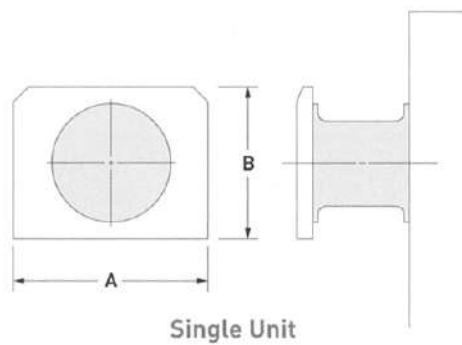
-R · F:Reaction Force(ton) -E · A:Energy Absorption(ton-m) -Tolerance: ±10% -Deflection:55%

CELL FENDER

• Single Unit



• Single Unit Performance Table



Rubber Grade Surface Pressure (ton/m ²)		RH			RM			RL		
		30	25	20	30	25	20	30	25	20
800H	A(m)	1.30	1.40	1.60	1.20	1.30	1.40	1.10	1.20	1.25
	B(m)	1.26	1.37	1.50	1.15	1.25	1.40	1.10	1.10	1.25
1000H	A(m)	1.60	1.70	1.90	1.45	1.60	1.75	1.35	1.40	1.55
	B(m)	1.55	1.70	1.85	1.40	1.50	1.70	1.35	1.35	1.50
1200H	A(m)	1.85	2.00	2.25	1.70	1.90	2.10	1.65	1.65	1.80
	B(m)	1.85	2.00	2.20	1.70	1.80	2.00	1.60	1.65	1.80
1400H	A(m)	2.15	2.35	2.60	2.00	2.15	2.45	1.90	1.90	2.10
	B(m)	2.10	2.30	2.60	1.90	2.10	2.25	1.85	1.90	2.10
1600H	A(m)	2.45	2.65	2.95	2.20	2.40	2.70	2.05	2.15	2.40
	B(m)	2.40	2.60	2.90	2.20	2.40	2.65	2.05	2.10	2.35
2000H	A(m)	3.00	3.30	3.70	2.70	2.95	3.30	2.40	2.60	2.90
	B(m)	2.95	3.20	3.60	2.70	2.90	3.25	2.40	2.60	2.90
2250H	A(m)	3.35	3.65	4.10	3.00	3.30	3.70	2.70	2.90	3.25
	B(m)	3.30	3.60	4.05	3.00	3.25	3.60	2.60	2.90	3.20

CELL FENDER

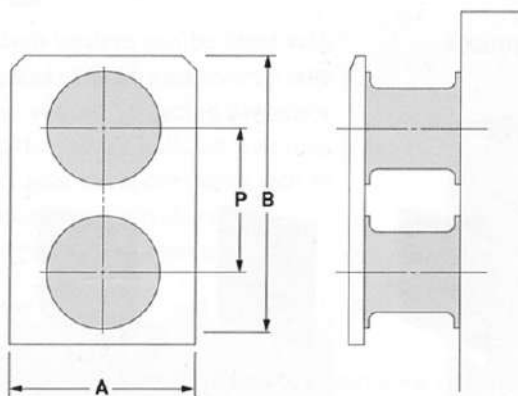
• Two Unit



• Two Units (vertically) Performance Table

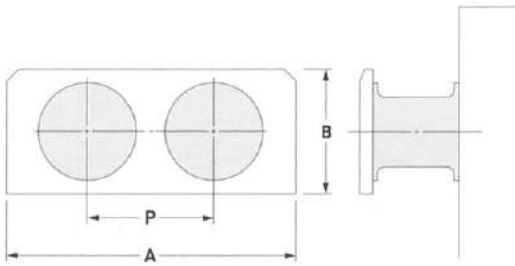
Rubber Grade Surface Pressure(ton/m ²)		RH			RM			RL		
		30	25	20	30	25	20	30	25	20
800H	A(m)	1.40	1.65	1.65	1.35	1.40	1.40	1.10	1.10	1.40
	B(m)	2.35	2.35	3.00	2.25	2.35	2.65	2.23	2.40	2.40
	P(m)	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
1000H	A(m)	1.65	1.65	2.00	1.40	1.65	1.65	1.40	1.40	1.40
	B(m)	3.00	3.60	3.60	3.00	3.00	3.30	2.85	2.85	3.00
	P(m)	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1200H	A(m)	1.95	2.25	2.55	1.70	1.95	2.85	1.65	1.65	2.00
	B(m)	3.90	3.90	4.20	3.85	3.60	3.85	3.55	3.60	3.60
	P(m)	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1400H	A(m)	2.25	2.60	2.90	2.00	2.00	2.30	1.85	2.00	2.00
	B(m)	4.20	4.50	4.80	4.20	4.50	4.80	4.15	4.15	4.50
	P(m)	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
1600H	A(m)	2.30	2.90	3.20	2.10	2.30	2.60	2.10	2.10	2.25
	B(m)	5.15	4.80	5.40	4.50	4.90	5.10	4.50	4.50	4.80
	P(m)	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
2400H	A(m)	3.20	3.50	4.10	2.60	3.20	3.60	2.30	2.60	2.90
	B(m)	5.75	6.00	6.30	5.45	5.45	5.80	5.15	5.40	5.70
	P(m)	3.00	3.00	3.00	3.00	3.00	3.00	2.90	3.00	3.00

-P: Spacing between fenders



Two Units (vertically)

CELL FENDER



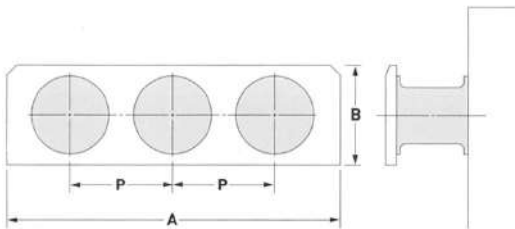
Two Units (horizontally)

• Two Units (horizontally)

Rubber Grade		RH			RM			RL		
Surface Pressure(ton/m ²)		30	25	20	30	25	20	30	25	20
Size		30	25	20	30	25	20	30	25	20
800H	A(m)	2.30	2.60	2.60	2.28	2.60	2.60	2.25	2.25	2.60
	B(m)	1.45	1.45	1.75	1.15	1.15	1.15	1.15	1.15	1.15
	P(m)	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
1000H	A(m)	2.90	3.20	3.50	2.90	3.20	3.20	2.90	2.85	3.20
	B(m)	1.75	1.75	2.00	1.40	1.40	1.75	1.30	1.40	1.40
	P(m)	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1200H	A(m)	3.80	4.10	4.70	3.55	3.80	4.10	3.55	3.55	3.80
	B(m)	2.00	2.00	2.35	1.75	1.75	2.05	1.65	1.65	1.75
	P(m)	1.90	1.90	2.00	1.90	1.90	1.90	1.90	1.90	1.90
1400H	A(m)	4.10	4.70	4.70	4.10	4.40	4.70	4.10	4.10	4.40
	B(m)	2.35	2.35	2.95	2.05	2.05	2.35	1.90	1.90	2.05
	P(m)	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
1600H	A(m)	4.75	5.05	5.05	4.55	4.45	4.90	4.40	4.40	4.40
	B(m)	2.35	2.65	3.25	2.05	2.40	2.75	2.00	2.00	2.35
	P(m)	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
2400H	A(m)	5.35	5.95	6.60	5.35	5.55	5.70	5.20	5.35	5.35
	B(m)	3.30	3.60	3.90	2.65	3.00	3.60	2.40	2.65	3.00
	P(m)	3.00	3.00	3.20	3.00	3.00	3.00	3.00	3.00	3.00

-P: Spacing between fenders

• Three Units

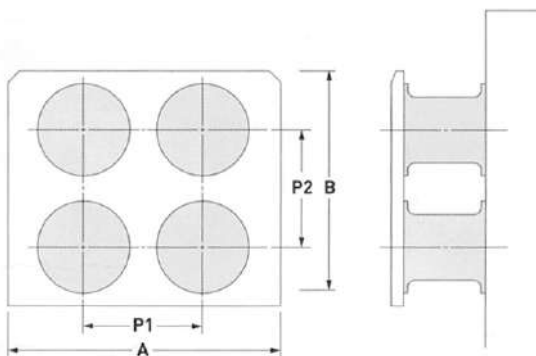


Three Units

Rubber Grade		RH			RM			RL		
Surface Pressure(ton/m ²)		30	25	20	30	25	20	30	25	20
Size		30	25	20	30	25	20	30	25	20
800H	A(m)	3.35	3.50	3.80	3.35	3.50	3.50	3.35	3.35	3.50
	B(m)	1.45	1.45	1.75	1.15	1.15	1.45	1.15	1.15	1.15
	P(m)	1.15	1.15	1.20	1.15	1.12	1.15	1.15	1.15	1.15
1000H	A(m)	4.70	4.70	5.05	4.30	4.50	4.50	4.35	4.35	4.40
	B(m)	1.45	1.75	2.05	1.45	1.45	1.80	1.30	1.45	1.45
	P(m)	1.50	1.50	1.60	1.50	1.50	1.50	1.50	1.50	1.50
1200H	A(m)	6.20	6.20	6.20	5.65	5.65	5.95	5.45	5.45	5.65
	B(m)	1.75	2.05	2.65	1.65	1.75	2.05	1.65	1.75	1.75
	P(m)	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90

-P: Spacing between fenders

• Four Units (two horizontally|two vertically)

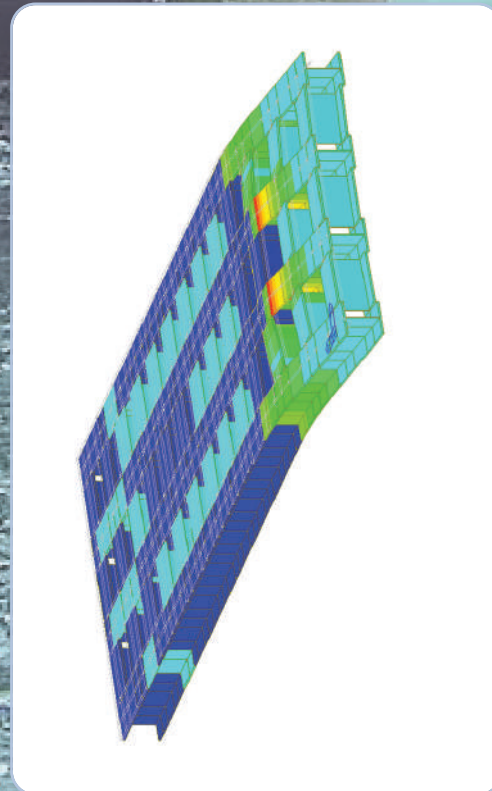
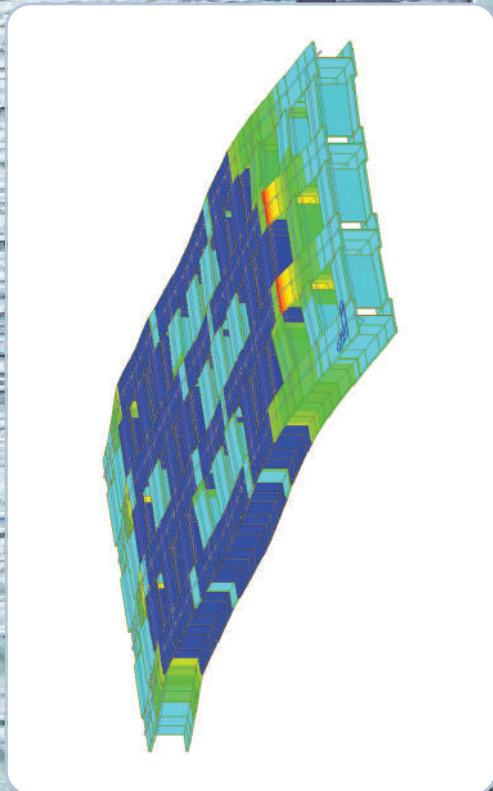
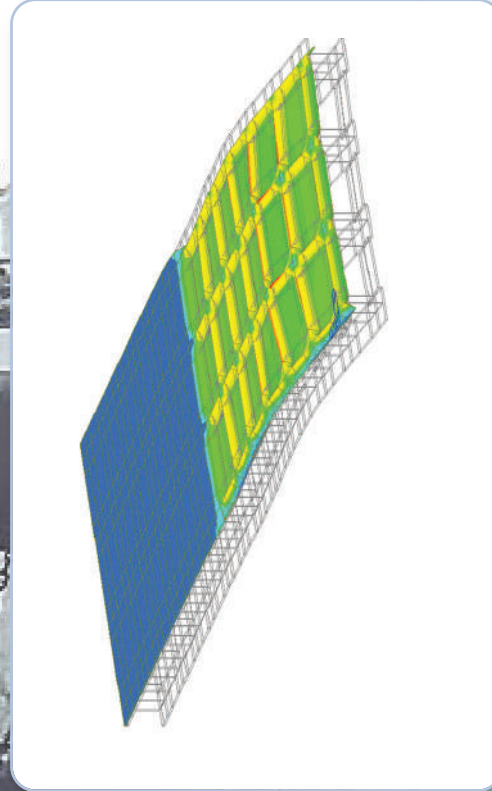
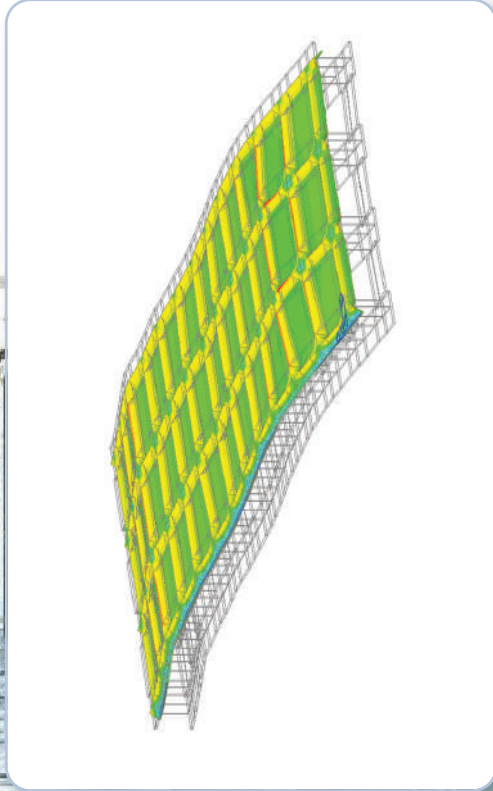


Four Units (two horizontally, two vertically)

Rubber Grade		RH			RM			RL		
Surface Pressure(ton/m ²)		30	25	20	30	25	20	30	25	20
Size		30	25	20	30	25	20	30	25	20
800H	A(m)	2.60	2.60	2.90	2.30	2.30	2.60	2.24	2.30	2.30
	B(m)	2.40	2.70	3.00	2.25	2.35	2.65	2.25	2.25	2.35
	P1(m)	1.15	1.15	1.20	1.15	1.15	1.15	1.15	1.15	1.15
	P2(m)	1.15	1.15	1.20	1.15	1.15	1.15	1.15	1.15	1.15
1000H	A(m)	3.20	3.50	3.80	2.90	2.90	3.20	2.85	2.85	2.90
	B(m)	3.00	3.30	3.60	2.80	3.00	3.30	2.85	2.85	3.00
	P1(m)	1.50	1.60	1.60	1.50	1.50	1.50	1.50	1.50	1.50
	P2(m)	1.50	1.60	1.60	1.50	1.50	1.50	1.50	1.50	1.50
1200H	A(m)	3.80	4.10	4.70	3.55	3.80	4.10	3.55	3.55	3.80
	B(m)	3.90	4.20	4.50	3.60	3.60	3.90	3.55	3.55	3.60
	P1(m)	1.90	1.90	2.00	1.90	1.90	1.90	1.90	1.90	1.90
	P2(m)	1.90	1.90	2.00	1.90	1.90	1.90	1.90	1.90	1.90
1400H	A(m)	4.40	4.70	5.35	4.10	4.10	4.70	4.10	4.10	4.10
	B(m)	4.20	4.80	5.10	4.10	4.20	4.50	4.10	4.10	4.20
	P1(m)	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
	P2(m)	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

-P1&P2: Spacing between fenders

MODELING & PROGRAM ANALYSIS



TTV FENDER

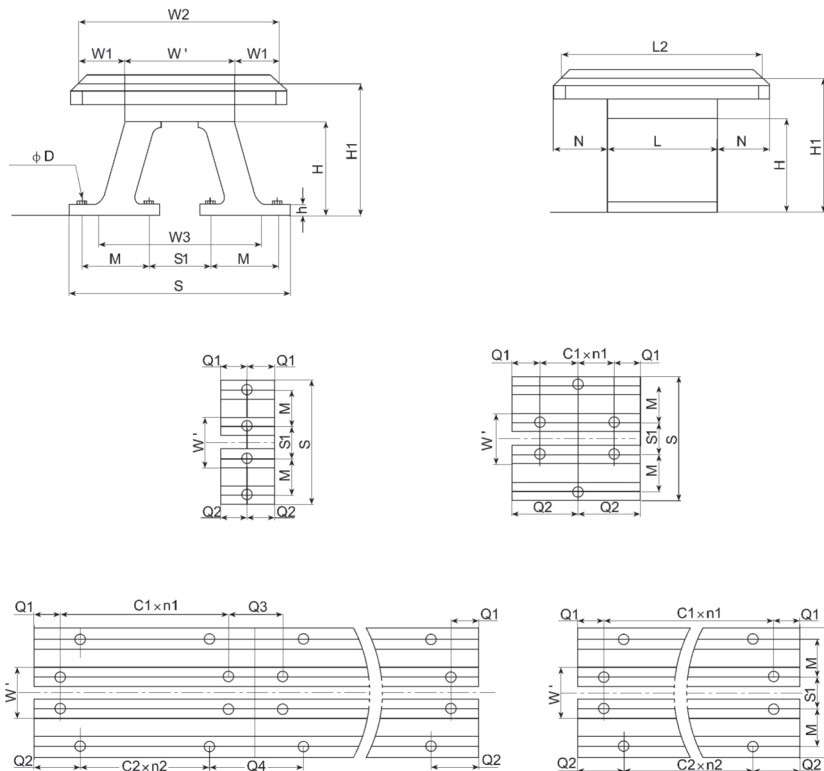
TTV fender was specially developed for use in harbours used by target vessels. These target vessels, in order to keep their weight to the minimum in pursuit of efficiency, are normally constructed with hulls of relatively thin sheet steel.

TTV Fender has a large surface contact area which will absorb a great amount of kinetic energy but will provide a low hull pressure so that the vessel may not be damaged during berthing operations. TTV Fender is also used worldwide for target vessels where there's excessive difference between the rise and fall of the tide.



TTV Fender

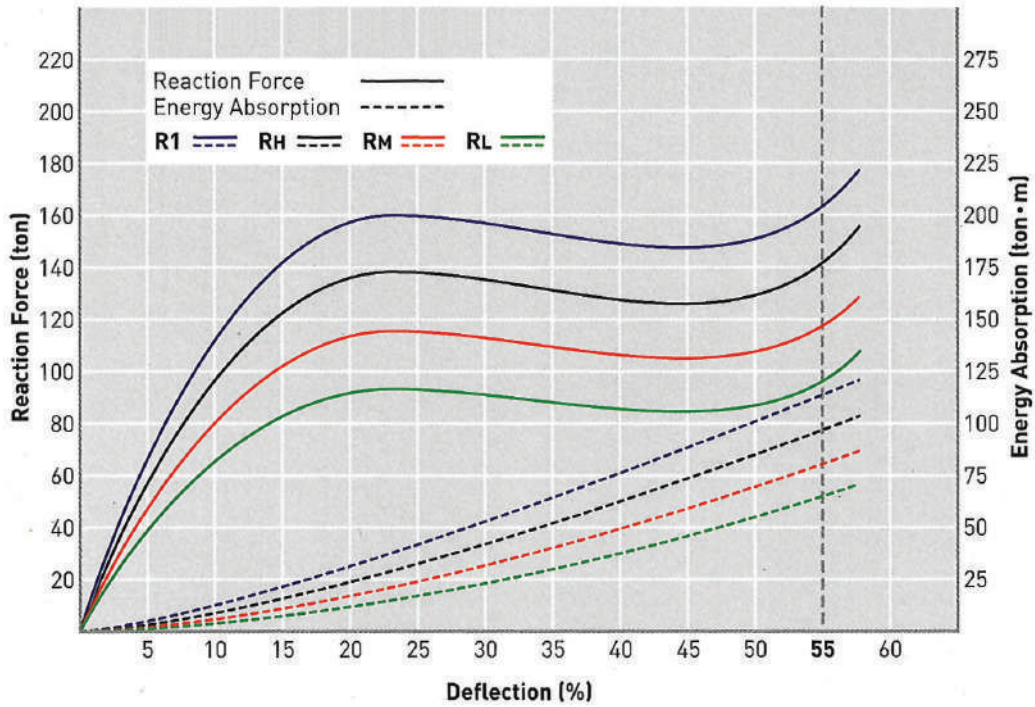
TTV fender consists of two independent legs of solid rubber bolted to a wide steel-framed rubbing board protected with square pads of high quality plastic material.





TTV FENDER

• Performance Curve



• TTV Fender Performance Table

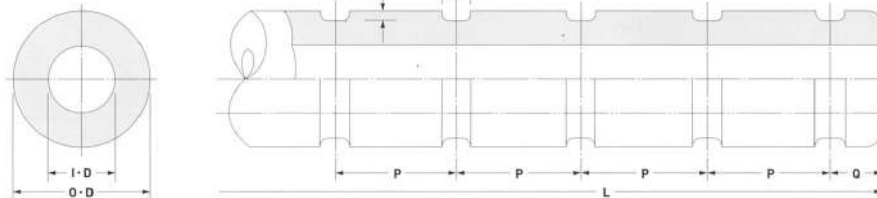
Size		1000H	1150H	1300H	1450H	1600H	1800H	2000H	2250H	2500H
Performance										
R1	R-F(ton)	102.2	117.6	133.3	148.4	163.8	184.8	204.4	229.6	256.2
	E · A(ton-m)	44.8	59.2	75.7	94.2	114.6	145	179.2	226.8	280
RH	R-F(ton)	88.0	101.0	114.0	128.0	140.0	158.0	176.0	198.0	220.0
	E · A(ton-m)	38.4	50.8	64.9	80.7	98.3	124.4	153.6	194.4	240.0
RM	R-F(ton)	73.0	84.0	95.0	106.0	117.0	132.0	146.0	164.0	183.0
	E · A(ton-m)	32.0	42.3	54.1	67.3	81.9	103.6	128.0	162.0	200.0
RL	R-F(ton)	58.0	67.0	75.0	84.0	93.5	105.0	116.0	130.0	146.0
	E · A(ton-m)	25.2	33.3	42.6	53.0	65.5	82.9	100.8	127.5	157.5

-R · F:Reaction Force(ton) -E · A:Energy Absorption(ton-m) -Tolerance:±10% -Deflection:55%

BC FENDER



Straight Type



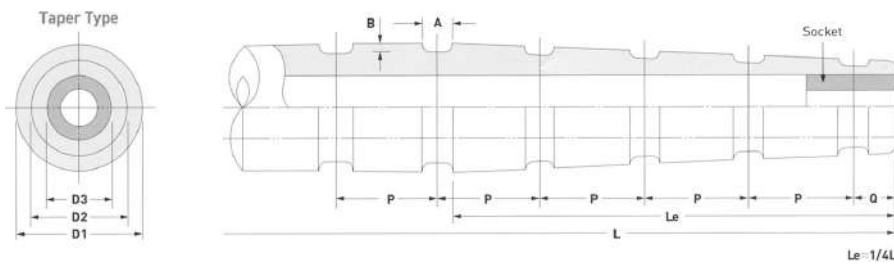
• BC-Type Fender Dimension (Use:For Side)

[Unit:mm]

Size	100Ø×50Ø	100Ø×75Ø	200Ø×100Ø	250Ø×125Ø	300Ø×150Ø	350Ø×175Ø	400Ø×200Ø	500Ø×250Ø	600Ø×300Ø	700Ø×350Ø
O·D	100	150	200	250	300	350	400	500	600	700
I·D	50	75	100	125	150	175	200	250	300	350
A	30	30	50	50	50	70	70	70	85	85
B	10	10	15	15	15	20	20	30	30	40
P	600~900	600~900	600~900	600~900	600~900	600~900	600~900	600~900	600~900	600~900
Q	100	100	150	150	200	200	200	250	250	350

–Maximum Length available is 20m

Taper Type



• BC-Type Fender Dimension (Use:For Bow and Stern)

[1m Length]

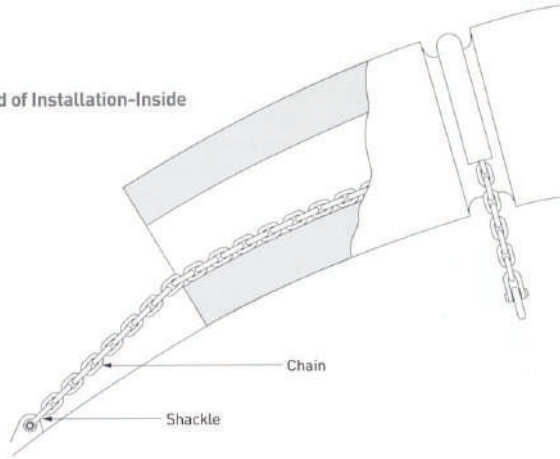
Size	200Ø×100Ø	250Ø×125Ø	300Ø×150Ø	350Ø×175Ø	400Ø×200Ø	500Ø×250Ø	600Ø×300Ø	700Ø×350Ø	1000Ø×500Ø
D1	200	250	300	350	400	500	600	700	1000
D2	150	190	225	260	300	375	450	525	750
D3	100	125	150	175	200	250	300	350	500
A	50	50	50	70	70	70	85	85	90
B	15	15	15	20	20	30	30	40	40
P	600~900	600~900	600~900	600~900	600~900	600~900	600~900	600~900	600~900
Q	150	150	200	200	200	250	250	300	300
Socket	O·D	—	—	—	202	252	303	354	505
	I·D	—	—	—	100	100	150	150	200
	Length	—	—	—	300	350	400	400	400

–Maximum Length available is 20m

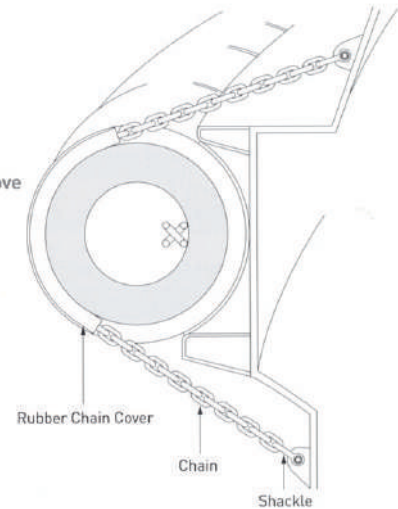
BC FENDER



Method of Installation-Inside



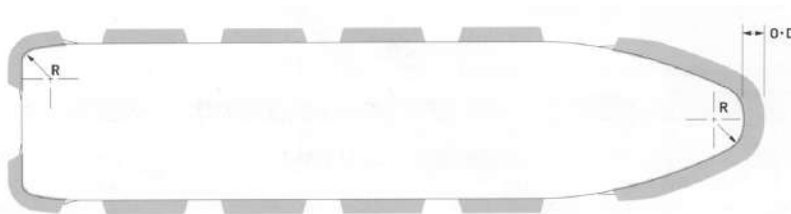
Method of Installation-Groove



• Size of Fitting

Size of Fender	Chain		Shackle	Turnbuckle
	For Inside	For Groove		
Less than 600Ø	16Ø	16Ø	SC-16	19Ø
Including and over 600Ø	19Ø	19Ø	SC-20	22Ø

-SC: Straight shackle with screwed bolt -Fittings are to be galvanized



• Bending Radius(R) should not over 4 times of outer diameter

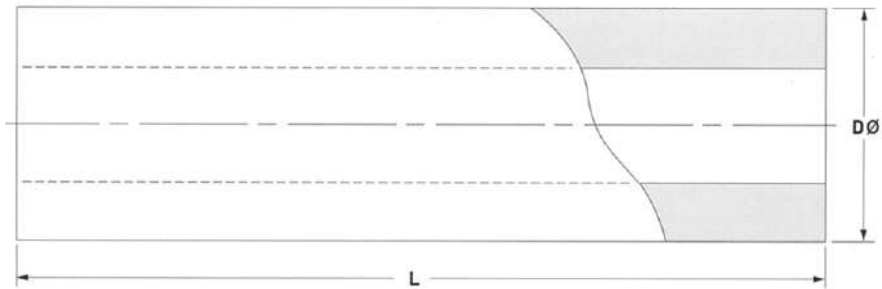
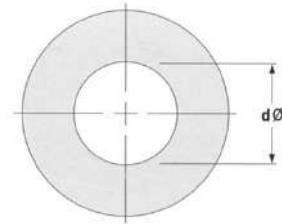
O.D	200Ø	300Ø	400Ø	500Ø	600Ø	800Ø
Permissible Bending Radius(R)	800	1200	1600	2000	2400	3200

CYLINDRICAL FENDER

Dongil Chemical has various types of fenders for various cases, various sizes of vessels.

Cylindrical Fender

It is simply cylindrical construction, and is able to withstand large compressive deformation with low reaction load. It is also freely secured without the necessity of precise anchor bolt arrangements.



• Cylindrical Fender Dimension.

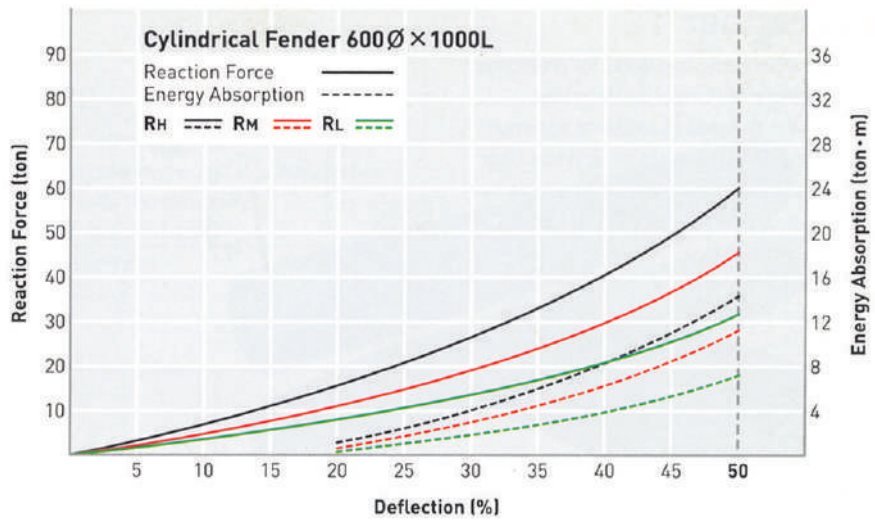
Size	150Ø ×75Ø	200Ø ×100Ø	300Ø ×150Ø	400Ø ×200Ø	500Ø ×250Ø	600Ø ×300Ø	800Ø ×400Ø	1000Ø ×500Ø	1200Ø ×600Ø	1400Ø ×700Ø	1600Ø ×800Ø
DØ	150	200	300	400	500	600	800	1000	1200	1400	1600
dØ	75	100	150	200	250	300	400	500	600	700	800



CYLINDRICAL

CYLINDRICAL FENDER

• Performance Curve

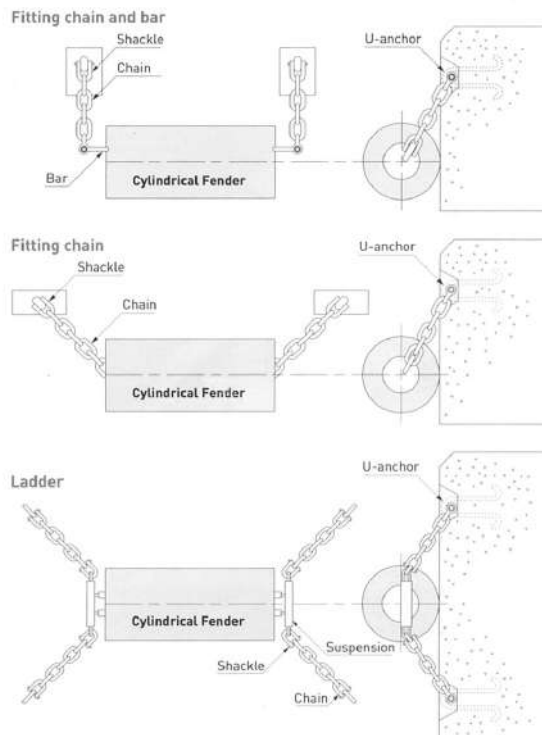


• Cylindrical Fender Performance Table

Size Performance		150Ø × 75Ø	200Ø × 100Ø	300Ø × 150Ø	400Ø × 200Ø	500Ø × 250Ø	600Ø × 300Ø	800Ø × 400Ø	1000Ø × 500Ø	1200Ø × 600Ø	1400Ø × 700Ø	1600Ø × 800Ø
RH	R · F(ton)	7.50	10.00	15.00	20.00	25.00	30.00	40.00	50.00	60.00	70.00	80.00
	E · A(ton·m)	0.22	0.40	0.90	1.60	2.50	3.60	6.40	10.00	14.40	19.60	25.60
RM	R · F(ton)	6.00	7.70	12.00	16.00	19.00	23.00	30.00	38.00	46.00	54.00	61.00
	E · A(ton·m)	0.18	0.32	0.73	1.30	2.00	2.90	5.20	8.20	11.70	15.90	20.80
RL	R · F(ton)	4.10	5.40	8.00	11.00	13.00	16.00	21.00	26.00	32.00	37.00	42.00
	E · A(ton·m)	0.12	0.21	0.48	0.84	1.32	1.90	3.40	5.30	7.60	10.40	13.50

-R · F:Reaction Force(ton) -E · A:Energy Absorption(ton·m) -Tolerance: ±10% -Deflection:50%

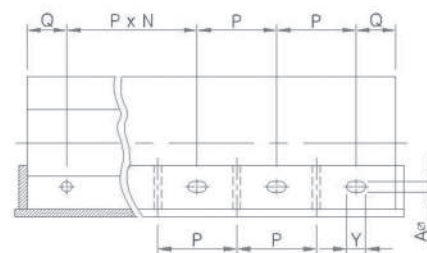
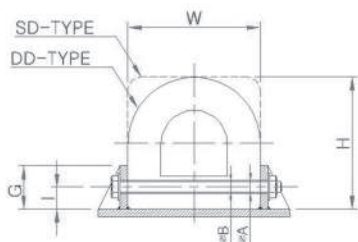
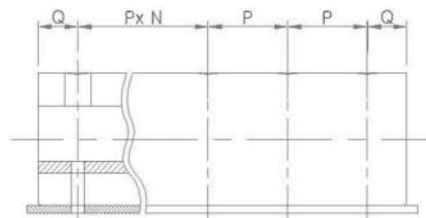
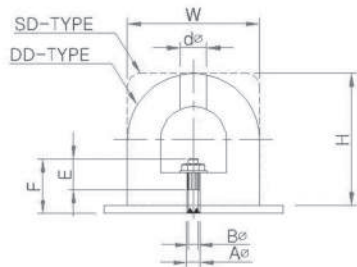
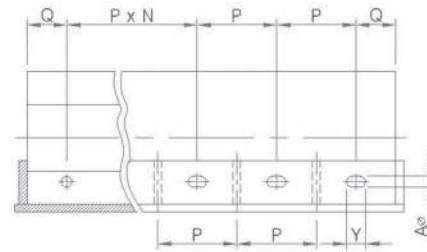
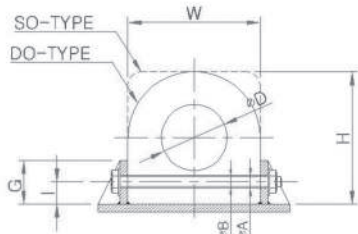
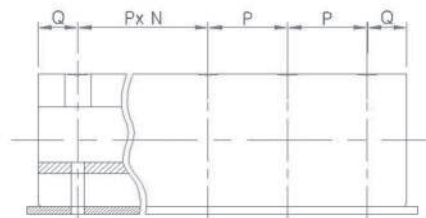
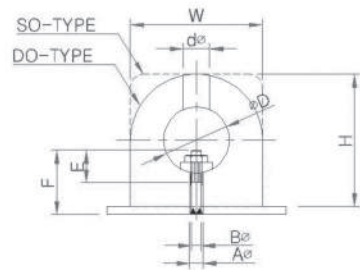
• Installation Example



D & S FENDER



The volumes of energy absorption and reaction force of this fender are greater than those of hollow cylindrical fender. The side for attachment is flat so that it can be secured more firmly than cylindrical fender. The ratio among standard dimension: height=2, width=2, inside diameter=1



D & S FENDER

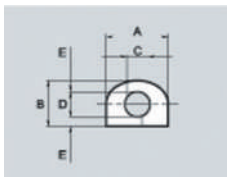


• D & S Fender Dimension

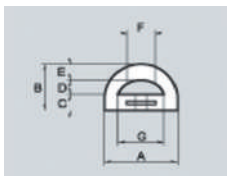
[Unit:mm]

Size		150HW	200HW	250HW	300HW	400HW	500HW	600HW
Fender	DØ	75	100	125	150	200	250	300
	dØ	55	65	70	75	90	100	115
	H	150	200	250	300	400	500	600
	W	150	200	250	300	400	500	600
Frame	AØ	20	25	28	28	36	42	46
	BØ	19	22	25	28	32	38	42
	E	40	50	60	70	80	90	100
	F	80	95	112	132	180	210	240
	Y	32	38	42	48	54	62	70
	P	250~350						
Q	150~200							

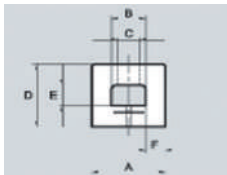
DA & D FENDER



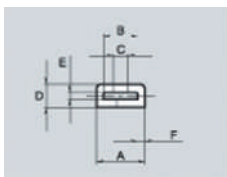
Size	A	B	C	D	E
SD 130×100	130	100	φ45	φ55	22.5
SD 150×132	150	132	φ60	φ75	28.5



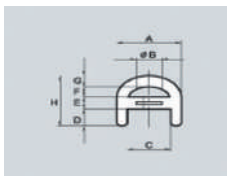
Size	A	B	C	D	E	F	G
SD 120×70	120	70	12.5	45	12.5	φ60	95
SD 150×100	150	100	35	30	35	φ60	100



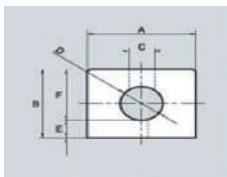
Size	A	B	C	D	E	F
SD 150×150	150	70	φ60	150	50	40



Size	A	B	C	D	E	F
SD 100×50	100	70	φ30	50	15	17.5



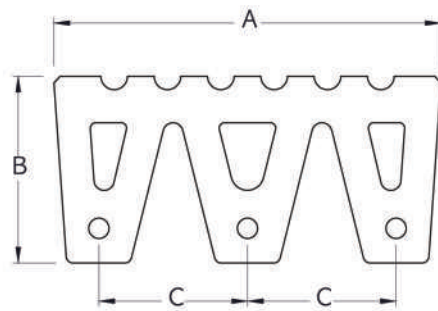
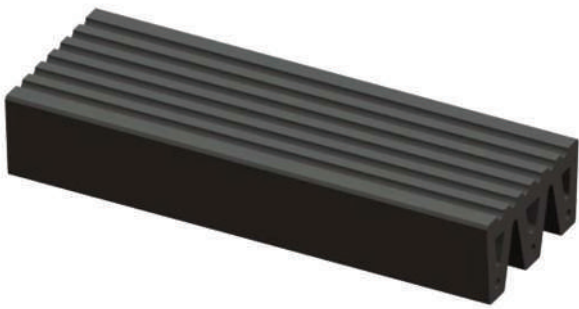
Size	A	B	C	D	E	F	G	H
SDA 100	100	φ60	75	30	12.5	40	12.5	100
SDA 150-1	150	φ60	80	50	35	30	35	150
SDA 150-2	150	φ60	100	50	35	30	35	150
SDA 200	200	φ60	150	75	30	40	30	200



Size	A	B	C	D	E	F
SD 250×200	250	200	φ60	φ100	50	150
SD 300×350	300	300	φ80	φ150		

M

M FENDER

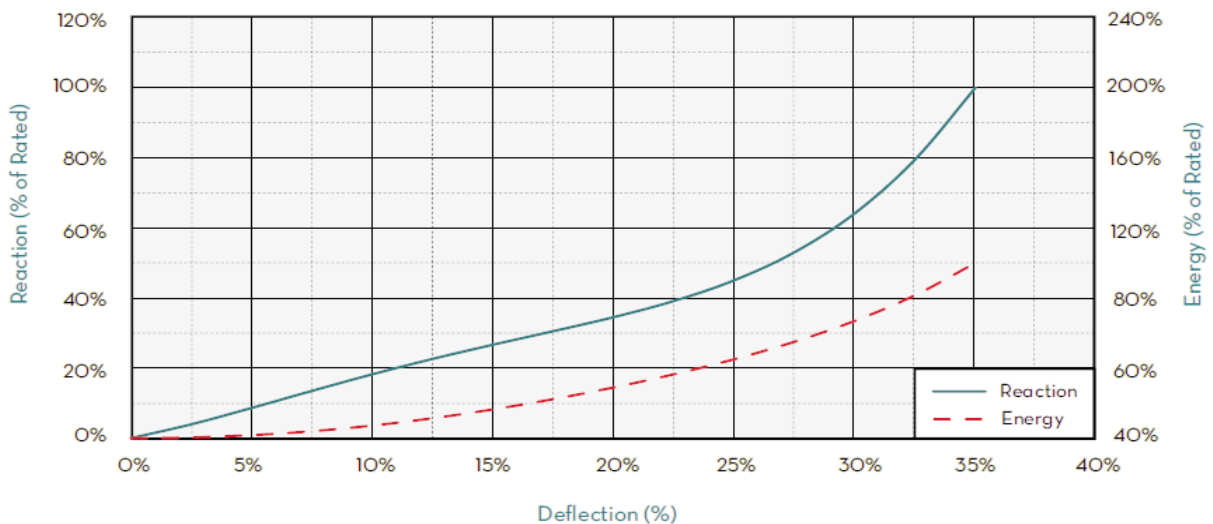


• Dimensions

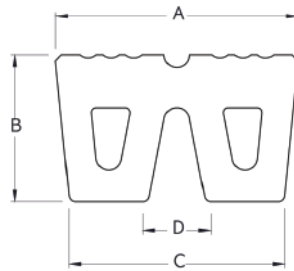
Imperial	A	15.8	19.7	23.6	31.5
	B	7.9	9.8	11.8	15.8
	C	5.9	7.5	9.1	12
	Weight(lbs)	37.6	59.8	88.7	157.9

Metric	A	400	500	600	800
	B	200	250	300	400
	C	150	190	230	305
	Weight(kg)	56	89	132	235

• M Fender - Performance Curve



W FENDER

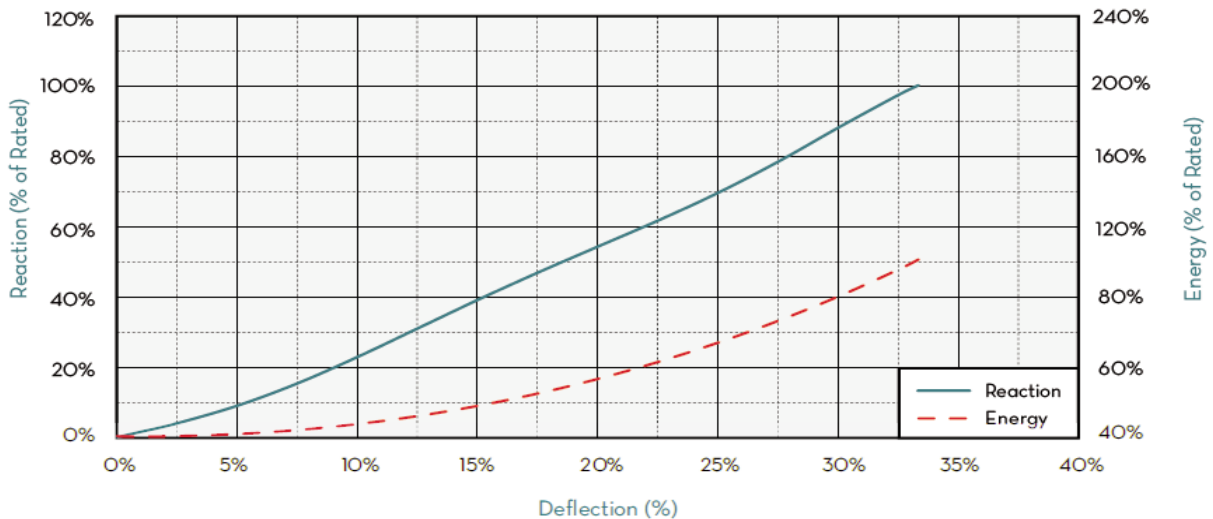


• Dimensions

Imperial	A	12.6	15.8	18.9	19.7	12	14
	B	7.9	9.8	11.8	17.7	12	14
	C	11	13.8	16.8	4.92	6	7
	D	7.1	8.7	10.6	4.92	6	7
	Weight(lbs)	34.3	54.4	80.6	121	58.82	80.11

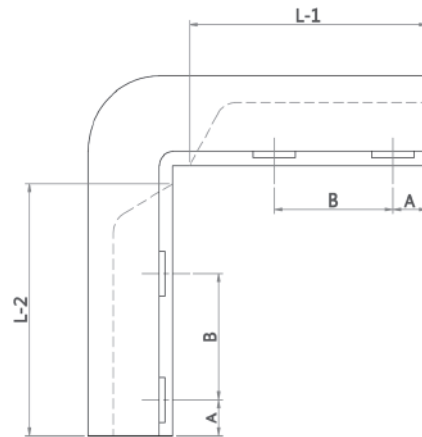
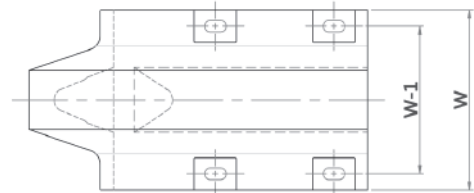
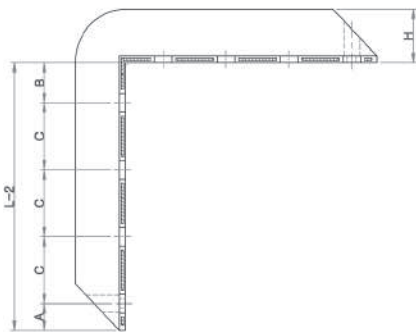
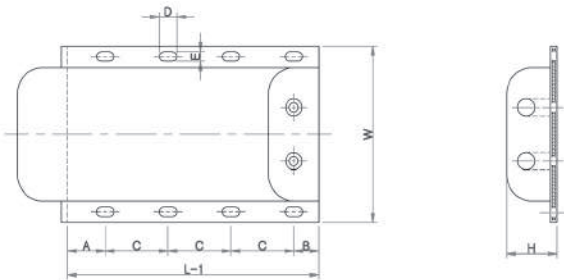
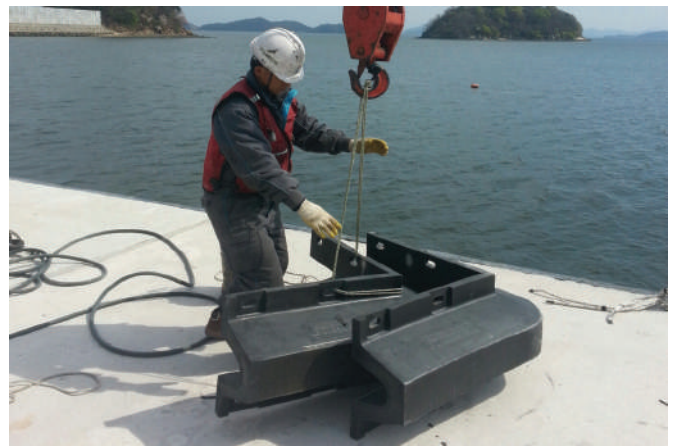
Metric	A	320	400	480	500
	B	200	250	300	450
	C	280	350	426	420
	D	180	220	269	255
	Weight(kg)	51	81	120	180

• W Fender - Performance Curve



CORNER

CORNER FENDER



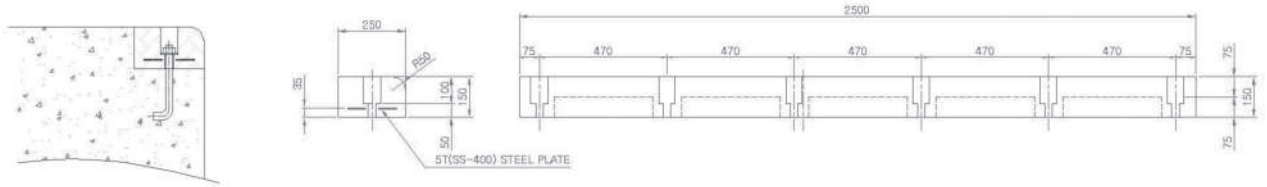
Size	A	B	C	H	L-1	L-2	W
BP-Type	100	150	250	200	1000	1000	660

Size	A	B	H	L-1	L-2	W	W-1
OV-Type	100	350	250	700	700	500	410

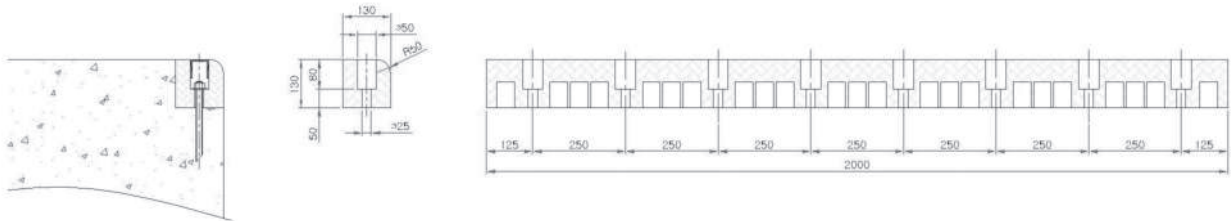
RC FENDER



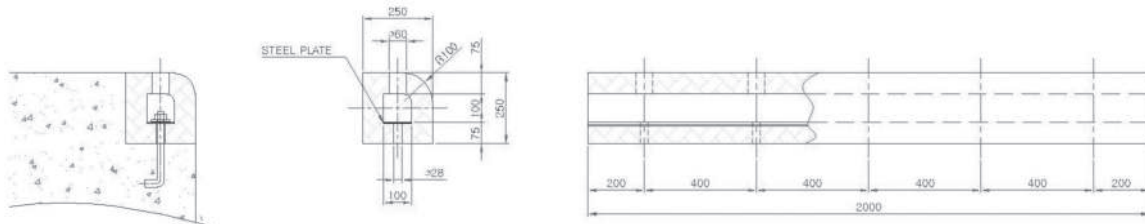
- RC-FENDER (150H×250W×2500L)



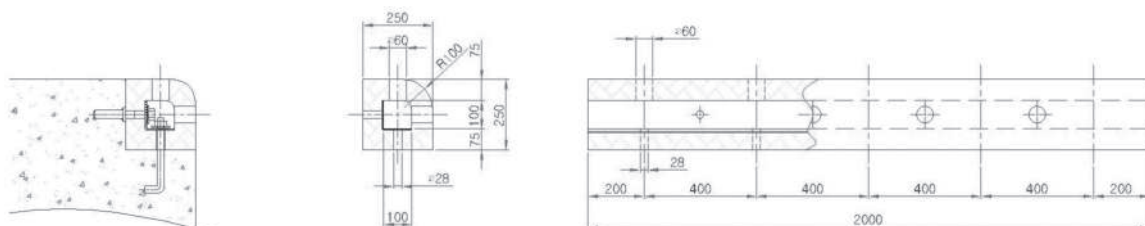
- RC-FENDER (130H.W×2000L)



- RC-FENDER (250H×250W×2000L) 5HOLE



- RC-FENDER (250H×250W×2000L) 9HOLE

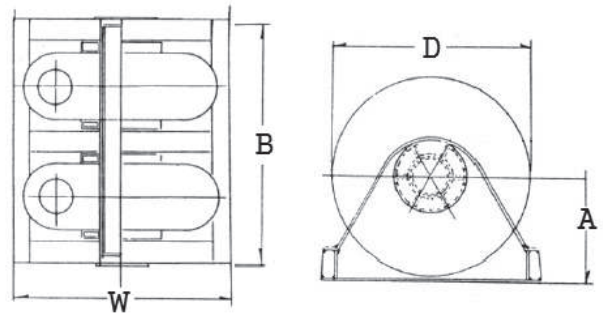
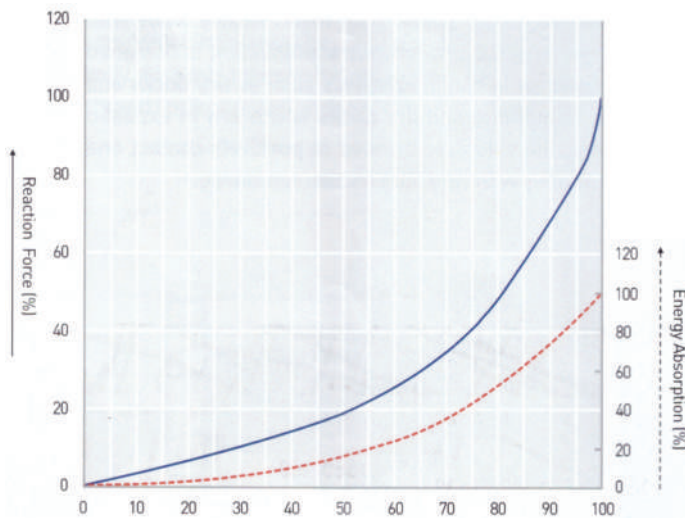


ROLLER FENDER

Roller-Type Fender

The fixed axle roller is a simple and effective fender suitable for high reactive loads with moderated deflection, and limited kinetic energy absorption characteristics. It is designed specifically for assisting in maneuvering vessels in confined spaces such as dry docks and pontoon. Units of this type are installed in building and dry docks which are in exposed conditions. With a pattern of simple rollers, the ships are allowed to positively contact one fenders, and the ship can then be rolled out safely with very little friction resistance.

• Performance Curve



• Performance Table

Type	MD	Roller Fender		Frame				
		D	H	A	W	1 Roll-B	2 Roll-B	3 Roll-B
R600	M22(7/8")	600	200	350	695	420	780	1120
R750	M22(7/8")	750	250	420	870	510	935	1360
R900	M24(1")	900	300	520	1040	610	1120	1630
R1200	M27(1 1/8")	1200	400	670	1380	820	1500	2180
R1400	M30(1 1/4")	1400	400	772	1400	820	1500	2180
R1500	M30(1 1/4")	1500	500	850	1740	1010	1850	2690
R1800	M36(1 1/2")	1800	600	960	2080	1210	2215	3220
R2100	M42(1 3/4")	2100	700	1155	2440	1410	2590	3770
R2400	M48(2")	2400	800	1280	2770	1610	2950	4290
R2700	M56(2 1/4")	2700	900	1440	3130	1810	3300	4790
R3000	M64(2 1/2")	3000	1000	1600	3480	2010	3660	5310

• Dimension

[Unit:mm,kg]

Size	Performance	R600	R750	R900	R1200	R1400	R1500	R1800	R2100	R2400	R2700	R3000
		1 Roll	R·F(ton)	7.0	11.0	15.0	27.0	40.0	43.0	62.0	84.0	110.0
	E·A(ton-m)	0.3	0.5	0.8	2.0	3.4	3.9	6.8	10.7	16.0	22.8	31.2
2 Roll	R·F(ton)	14.0	22.0	30.0	54.0	80.0	86.0	124.0	168.0	220.0	278.0	342.0
	E·A(ton-m)	0.5	1.0	1.7	4.0	6.7	7.8	13.5	21.4	32.0	45.6	62.4
3 Roll	R·F(ton)	21.0	33.0	45.0	81.0	120.0	129.0	186.0	252.0	330.0	417.0	513.0
	E·A(ton-m)	0.8	1.5	2.5	6.0	10.1	11.7	20.3	32.1	48.0	68.4	93.6

FLOATING FENDER

Excellent compressibility and elasticity

Unlike the general rubber fender using the elasticity of rubber, this one utilizes the compressibility and elasticity of air. Therefore, the shock absorption rate is substantially upgraded.

Good buoyancy and simplified handling

Floating fenders are buoyant, and they do their job at best possible position without being affected by tides. Moreover they are much lighter and easier to handle than the conventional solid rubber models due to their hollow construction.

Low reaction and high absorption energy fender with low surface pressure

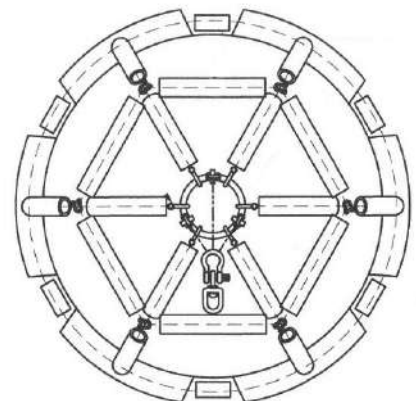
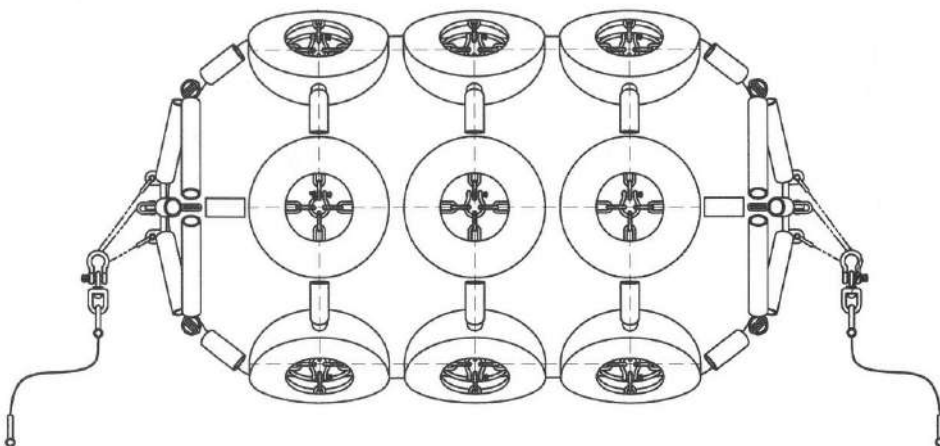
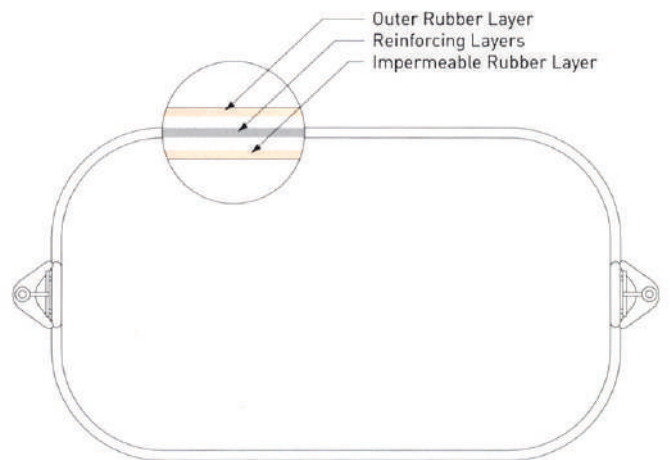
Easy of installation and repair

Maximum permissible service life



Pneumatic Fender

Light-weight and easy to handle, pneumatic fenders enable the large stand-off required for offshore cargo transfer between tankers or between factory ships and trawlers. Heavy-duty construction withstands both impact and aggressive environments, so that pneumatic fenders are a cost-effective option for intensive long-term use.

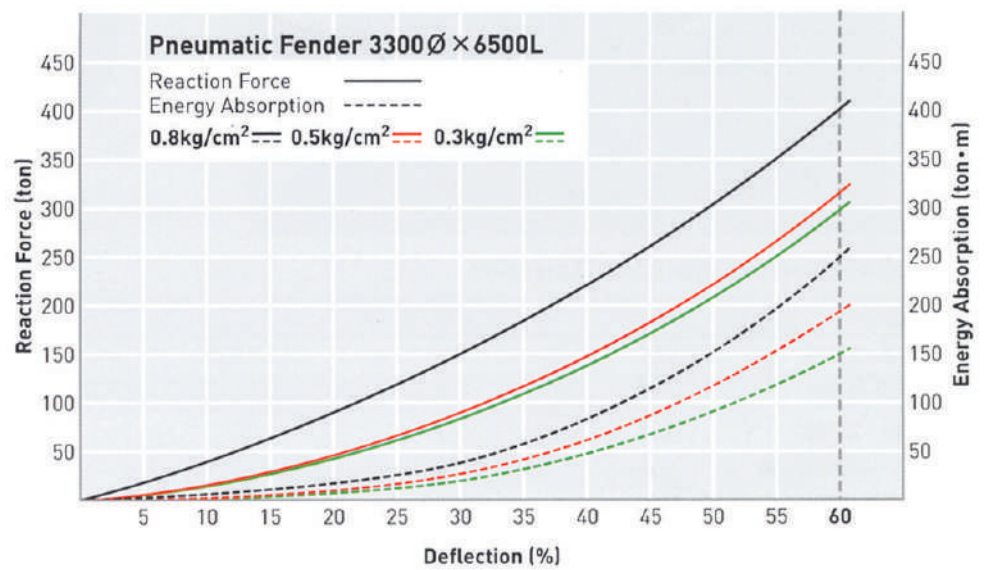


FLOATING

FLOATING FENDER



• Performance Curve



• Pneumatic Fender Performance

Diameter	300		500		800		1000		1200		1350		1500		2000		2500		3000		3300		4500	
	Length	500	600	800	1000	1200	1500	1500	2000	1800	2000	2500	2500	3000	3000	3500	6000	4000	5500	5000	4500	6500	10600	7000
Initial Inner Pressure of 0.3kg/cm ²																								
R · F(ton)	2.0	2.4	5.4	6.8	13.0	17.0	20.0	27.0	30.0	33.0	45.0	51.0	60.0	81.4	95.0	162.9	130.0	178.8	200.0	208.0	300.0	485.0	419.0	540.0
E · A(ton-m)	0.1	0.1	0.4	0.5	1.6	2.0	3.2	4.2	5.5	6.0	10.1	12.0	14.0	24.0	28.0	48.0	50.0	68.8	100.0	104.0	150.0	242.0	302.0	388.0
Initial Inner Pressure of 0.5kg/cm ²																								
R · F(ton)	2.3	2.7	6.0	7.5	14.4	19.0	22.6	30.1	32.6	36.1	50.6	56.5	67.1	90.0	105.0	180.0	151.0	207.6	225.0	224.0	323.0	527.0	475.0	612.0
E · A(ton-m)	0.13	0.15	0.58	0.73	2.20	2.80	4.1	5.5	7.1	7.9	12.7	15.5	18.6	33.0	38.5	66.0	68.8	94.6	125.0	135.0	195.0	318.0	389.0	505.0
Initial Inner Pressure of 0.8kg/cm ²																								
R · F(ton)	3.0	3.6	8.0	10.0	19.1	24.0	28.6	38.1	41.2	45.8	64.4	71.1	85.3	114.4	134.0	229.0	190.0	261.0	284.0	282.0	407.0	663.0	598.0	769.0
E · A(ton-m)	0.1	0.2	0.7	0.9	2.8	3.5	5.3	7.1	9.2	10.3	16.3	20.0	24.0	43.0	50.1	85.9	88.9	122.0	160.0	174.0	252.0	411.0	504.0	648.0

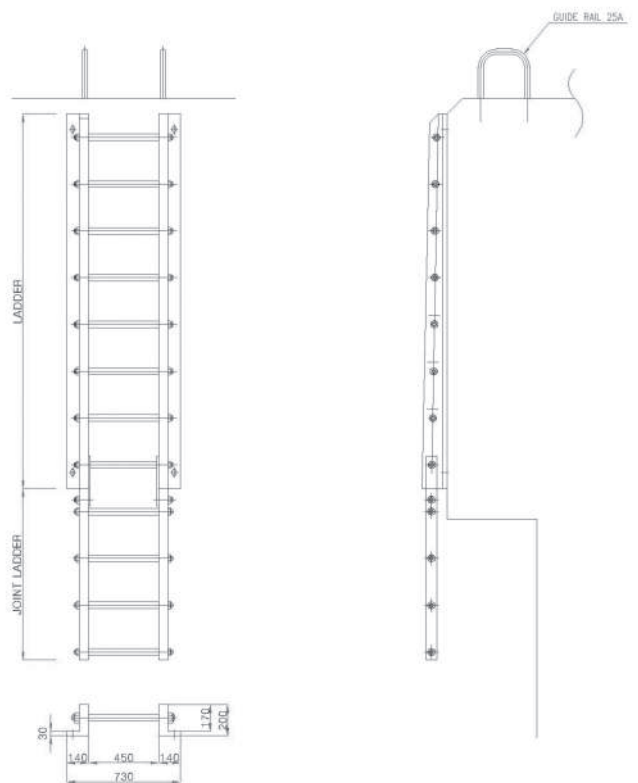
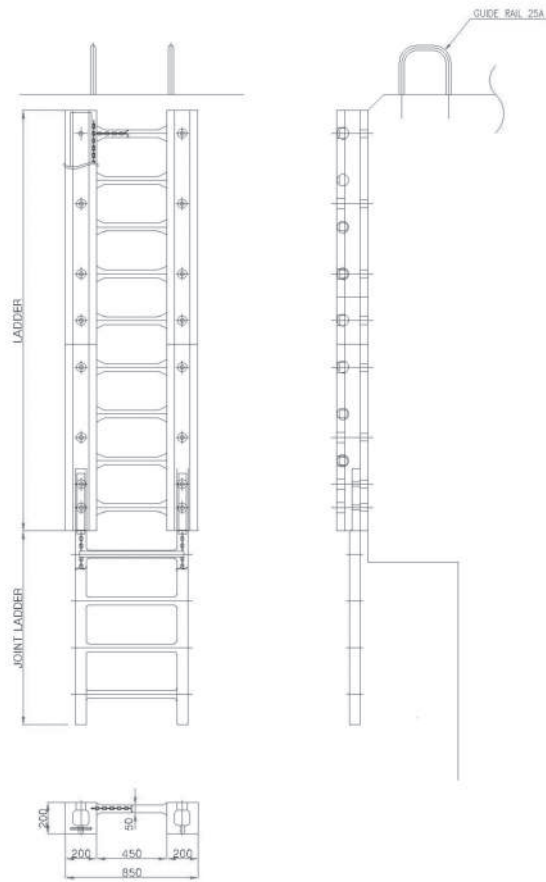
- R · F: Reaction Force(ton) - E · A: Energy Absorption(ton-m) - Tolerance: ±10% - Deflection: 60%

• Pneumatic Fender Weight

[Unit: mm, kg]

Diameter	300		500		800		1000		1200		1350		1500		2000		2500		3000		3300		4500	
	Length	500	600	800	1000	1200	1500	1500	2000	1800	2000	2500	2500	3000	3000	3500	6000	4000	5500	5000	4500	6500	10600	7000
Fender Body	10	15	25	35	75	95	140	170	180	200	270	300	350	550	650	950	1100	1350	1700	1800	2250	2800	3250	4950
Chain Net	-	-	-	-	100	110	170	200	210	220	260	400	440	880	920	1220	1510	1620	2620	2360	3120	4050	5100	6200
Total	10	15	25	35	175	205	310	370	390	420	530	700	790	1430	1570	2170	2610	2970	4320	4160	5370	6850	8350	11150

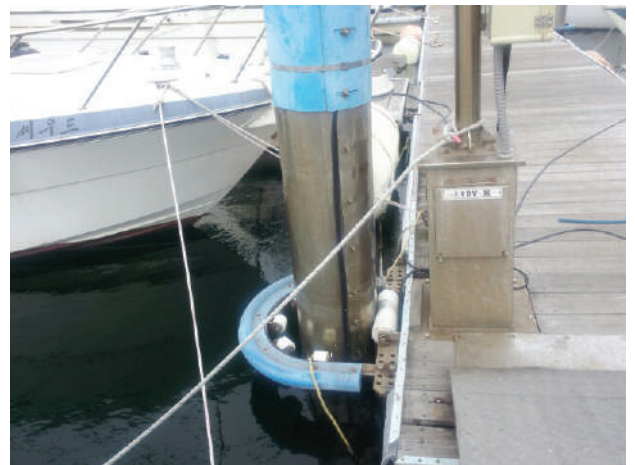
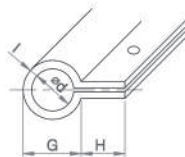
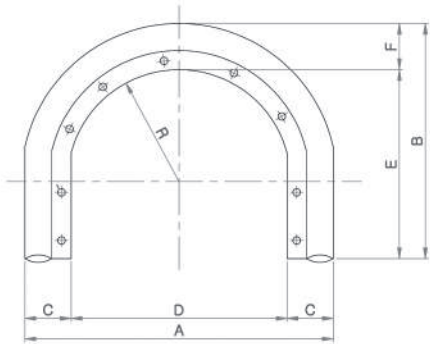
RUBBER LADDER



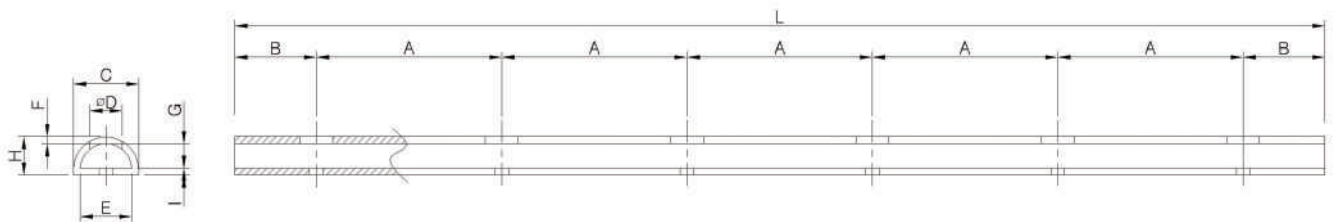
※Order for different length from standard length is possible.

RESORT

RESORT FENDER



Size	A	B	C	D	E	F	G	H	I	φd
290R	800	610	120	560	490	120	70	50	10	50
340R	940	720	140	660	575	145	70	50	10	50



Size	A	B	C	D	E	F	G	H	I
120x70	340	150	120	60	95	12.5	45	70	12.5

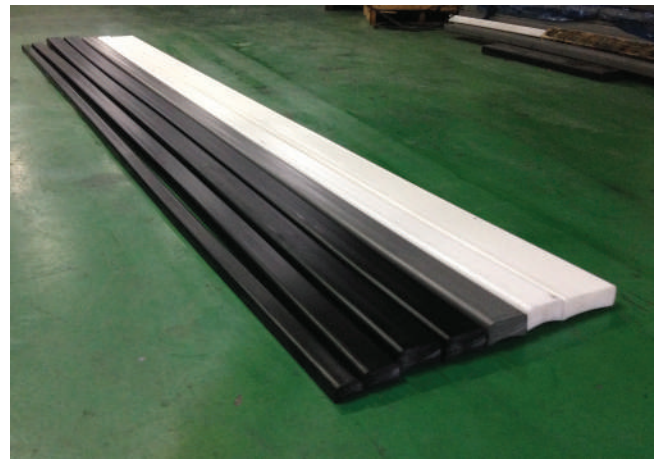
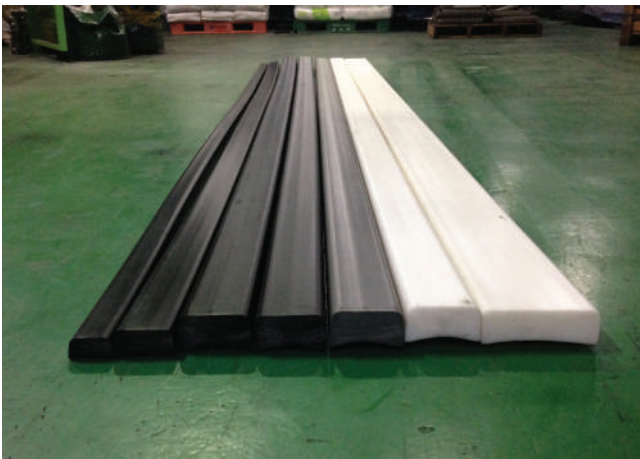
Size	A	B	C	D	E	F	G	H	I
130x45	340	150	130	60	110	10	25	45	10

※STANDARD COLOR OF RESORT FENDER – Black, Gray, Marine Blue, Red

HDPE FENDER



HDPE FENDER is ship fender developed by the high level of application to show off the special Feature of HDPE (High Density Poly Ethylene) and advantage to replace wood and stainless used for existing installation.



• HDPE Fender Dimensions

	MODEL No.	Size
HDPE FENDER	DI 2050	200W*50H*5000L
	DI 1550	150W*50H*5000L
	DI 1260	120W*60H*5000L
	DI 1050	100W*50H*5000L
	DI 8040	80W*40H*5000L
	DI 6030	60W*30H*5000L
	DI 4530	45W*30H*5000L

※STANDARD COLOR OF HDPE FENDER

—Black, White.

Order for different colors from standard colors is possible.

Order for different length from standard length is possible.

HDPE

HDPE FENDER



SLEEVE HOSE

Sleeve Hose

Dongil Chemical produces dredging sleeve Hose for transporting liquids, slurries and dry materials. This hose is used as a flexible connection in dredging applications.

Inner Rubber

Black NR/SBR rubber blend. This material is resistant to wear, cutting, weathering and seawater.

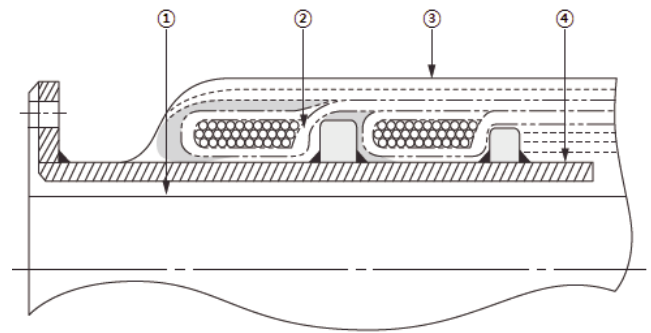
Reinforcement

Synthetic high tensile tire cord resistant to high pressure

Outer Cover Black NR/SBR rubber blend. This cover protects the reinforcement from seawater, solar radiation and mechanical damage.

Steel Flange

These include parts of nipples, flanges and suction ring. All are sandblasted to be free from rust and then chemically treated to ensure complete bonding with the rubber.



- ① Inner Rubber (Synthetic Rubber)
- ② Reinforcement
- ③ Outer Cover (Synthetic Rubber)
- ④ Steel Flange

Flange Type



Straight Type



Enlarged Type



• Pneumatic Fender Weight

Inside Diameter	Overall Length	Inner Tube Thickness	Outer Cover Thickness	Flange Thickness	Nipple Thickness
450	1300	15	5	19	9
500	1300	15	5	19	9
600	1500	20	5	22	9
650	1600	20	5	22	9
685	1600	20	5	25	9
700	1700	20	5	28	9
750	1900	20	5	28	9
800	2000	25	5	32	12
850	2000	25	5	32	12
900	2000	25	5	32	12

• Sleeve Hose Performance Table

Item		Standard	Test Condition
Resisting Pressure	Longitudinal Elongation	± 10%	Working Pressure
		± 15%	Test Pressure
	Circumferential Elongation	± 5%	Working Pressure
		± 7.5%	Test Pressure
Bending Angle (ϕ)		Min. 10°	-

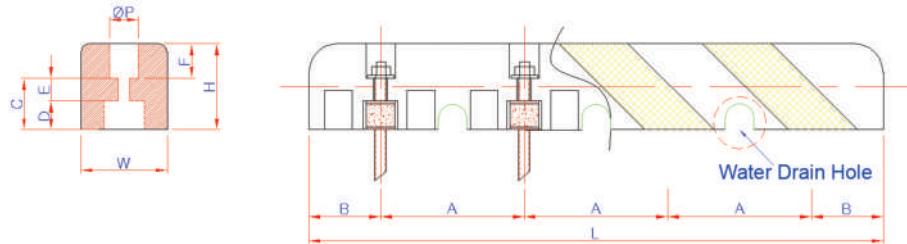
CAR STOPPER

CAR STOPPER

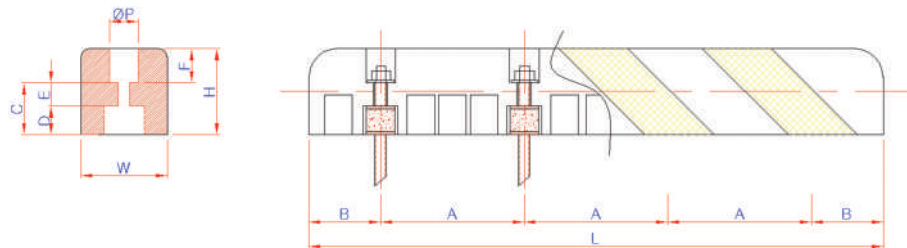
NYLON RUBBER CAR STOPPER has been developed to improve difficulties of repairing and maintenance by damage and discoloration that existing products have, and also improved sight distance at night time. By equipping with structure to absorb impact and easiness for installation and maintenance, This makes it possible to extend the span of life.



• Drainage Type



• General Type

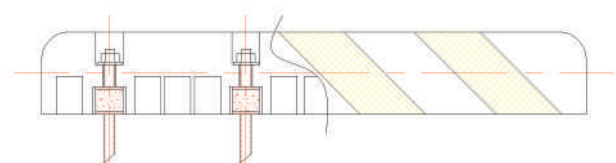
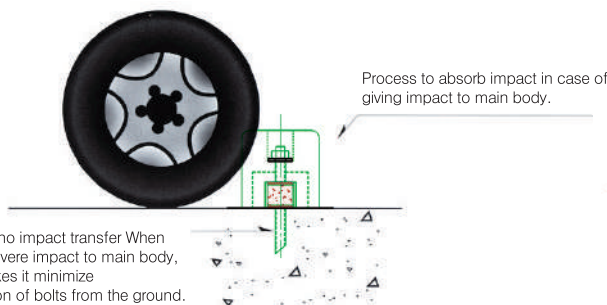


• NYLON RUBBER CAR STOPPER Dimension

Dimension Height(H)	C	D	E	F	ØP	ØS	W	1000L		1500L		2000L		2500L		3000L	
								A	B	A	B	A	B	A	B	A	B
150H	90	50	40	60	55	60	150	250	125	250	125	250	125	250	125	250	125

※ Wider Choice of size than existing products. (1000L, 1500L, 2000L, 2500L, 3000L)

This has been designed to protect against damage by recovering frame of vehicle to the same impact direction in case that Wheels are bumped through improvement for bending, damage, cutting by plastic deformation caused by consistent impact that existing products technically have.

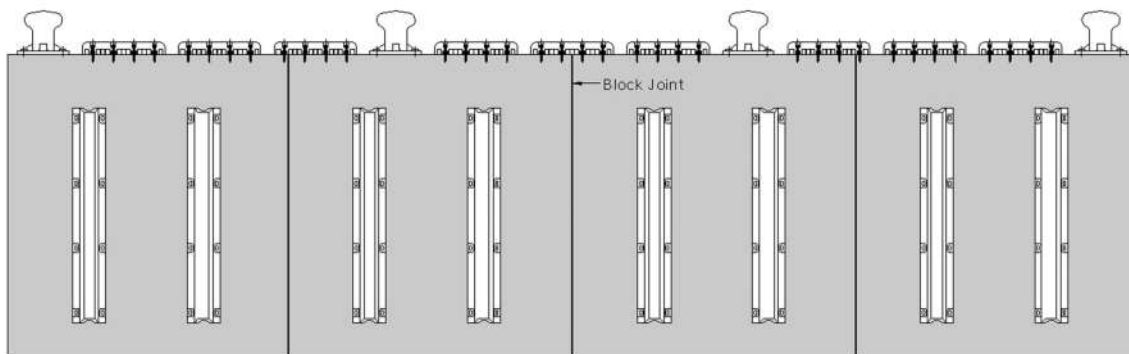


CAR STOPPER



ADVANTAGE IN CASE OF INSTALLING AT PORT.

When installing at Port, It is possible to arrange and install them regardless of position of Block Joint of port due to liquidity of Anchor bolts that are restored to prototype.



ADVANTAGE IN CASE OF PRODUCTS

• NYLON RUBBER CAR STOPPER

Car Stoppers which are made up with some different materials have their own strong points and weak points, But Nylon Rubber Car Stopper shows superior durability and cold-resistance, visual property, night discrimination to existing similar products.

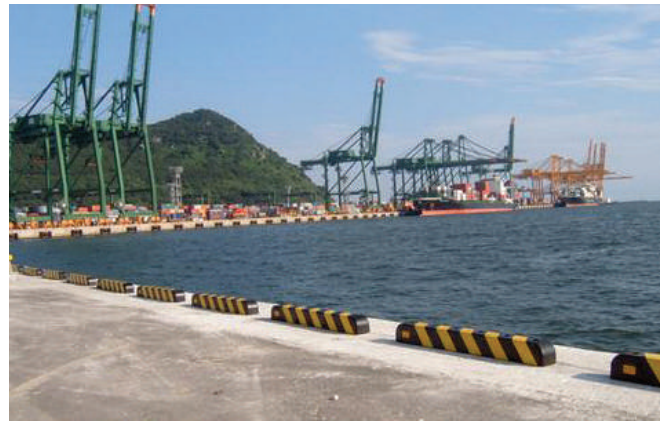
Especially, There is no discoloration from aging by using indication bend made by special structure instead of painting, this shows excellent advantage for night discrimination through reflecting plate that existing car stoppers do not have.

In case of daytime discrimination as well, It is clearly visible for boundary line so that It is more efficient to raise attentiveness and to protect against safety accident than existing similar products.

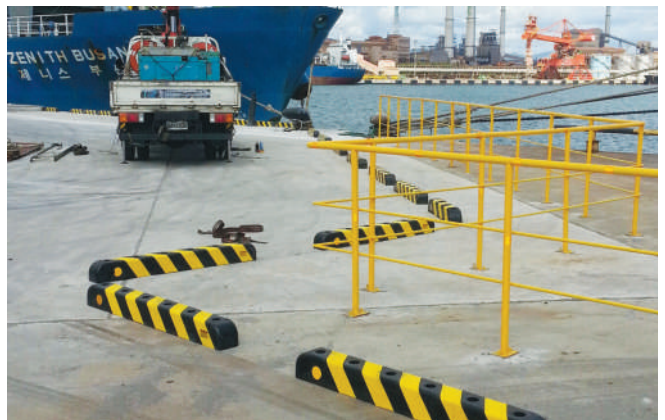


CAR STOPPER

CAR STOPPER

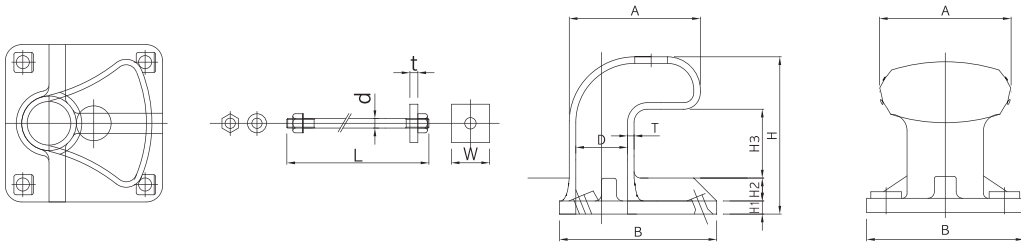


CAR STOPPER



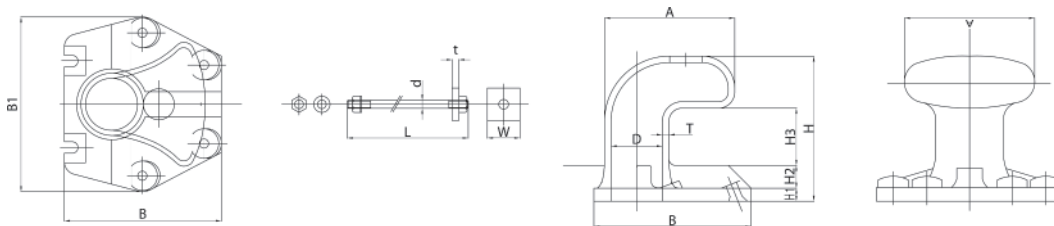
BOLLARD & BITT

BOLLARD : 5~25 Ton



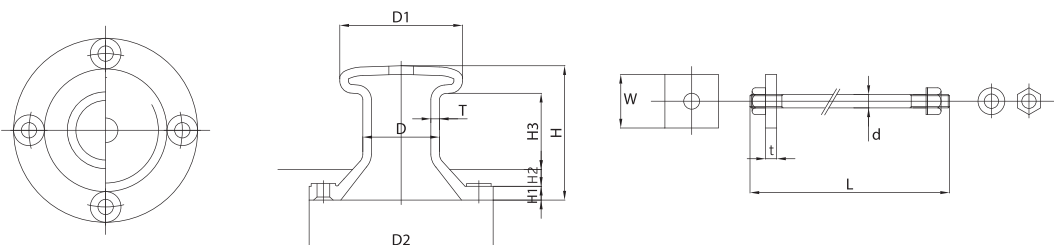
CAPACITY (TONS)	BOLLARD								ANCHOR BOLT			ANCHOR PL	
	D	A	B	H	H1	H2	H3	T	d	L	Q'TY	W	t
5	150	300	360	380	30	60	170	20	20	450	4	80	16
10	200	400	480	480	40	70	210	20	27	600	4	108	22
15	250	500	600	580	50	80	250	20	33	700	4	132	25
25	300	600	700	690	65	95	290	21	42	850	4	168	35

BOLLARD : 35~200 Ton



CAPACITY (TONS)	BOLLARD									ANCHOR BOLT			ANCHOR PL	
	D	A	B	B1	H	H1	H2	H3	T	d	L	Q'TY	W	t
35	300	600	720	810	690	65	95	290	25	42	850	6	168	35
50	350	700	840	945	780	70	100	330	29	48	1000	6	192	40
70	400	800	1000	1130	900	90	120	370	33	56	1150	6	225	45
100	450	900	1200	1365	990	95	125	410	39	64	1300	6	256	55
150	452	1100	1600	1765	1260	120	145	490	49	80	1450	6	300	65
200	580	1350	2100	2250	1550	150	160	580	60	120	1800	6	360	80

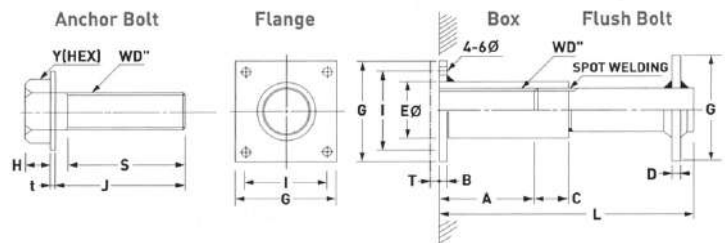
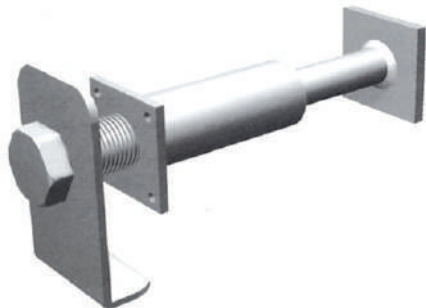
BITT : 15~200 Ton



CAPACITY (TONS)	BOLLARD								ANCHOR BOLT			ANCHOR PL	
	D	D1	D2	H	H1	H2	H3	T	d	L	Q'TY	W	t
15	250	400	600	438	45	55	250	20	36	750	4	144	28
35	300	480	720	525	60	70	290	25	48	1000	6	192	40
50	350	560	840	613	70	90	330	27	56	1150	6	225	45
70	400	640	960	700	80	110	370	30	64	1300	6	256	55
100	450	720	1180	833	90	190	405	35	72	1450	6	288	60
150	550	880	1110	1818	100	640	400	40	80	1600	8	320	65
200	650	1040	1700	1203	110	300	565	43	90	1800	8	360	75

ACCESSORIES

I-Type Anchor Bolt / J-Type Anchor Bolt



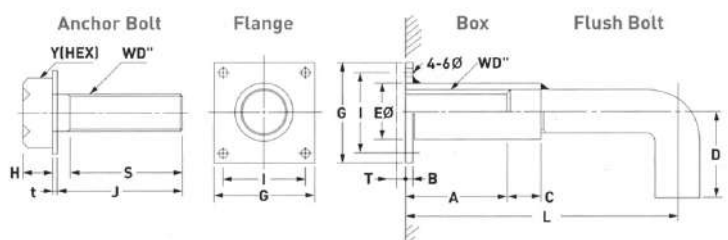
Parts	Material	Remarks
Anchor Bolt Flange, Flush Bolt Box	Rolled Steel Stainless Steel	Galvanized —

I-Type Anchor Bolt Dimension

[Unit:mm]

WD"	Anchor Bolt					Flange, Box, Flush Bolt							
	H	S	Y	Z	J	A	B	C	D	E□	G	I	L
M22(7/8")	15	J-15	35	30	t+T+Z [round up to nearest 5mm]	50	6	25	6	28	65	50	165
M24(1")	18	J-15	41	35		55	6	25	6	32	70	55	175
M27(1 1/8")	20	J-15	46	37		60	6	30	9	35	75	60	200
M30(1 1/4")	22	J-15	50	40		65	6	30	9	38	75	60	225
M36(1 1/2")	27	J-20	58	45		70	6	35	9	45	85	70	270
M42(1 3/4")	32	J-25	67	50		75	6	40	12	55	90	75	325
M48(2")	36	J-25	77	60		85	6	45	12	65	120	95	360
M64(2 1/2")	45	J-30	95	75		100	6	60	16	80	130	105	475
M72(3")	55	J-35	110	80		120	6	75	19	95	155	120	550

- T : Clamping thickness of fender or braker



Parts	Material	Remarks
Anchor Bolt Flange, Flush Bolt Box	Rolled Steel Stainless Steel	Galvanized —

J-Type Anchor Bolt Dimension

[Unit:mm]

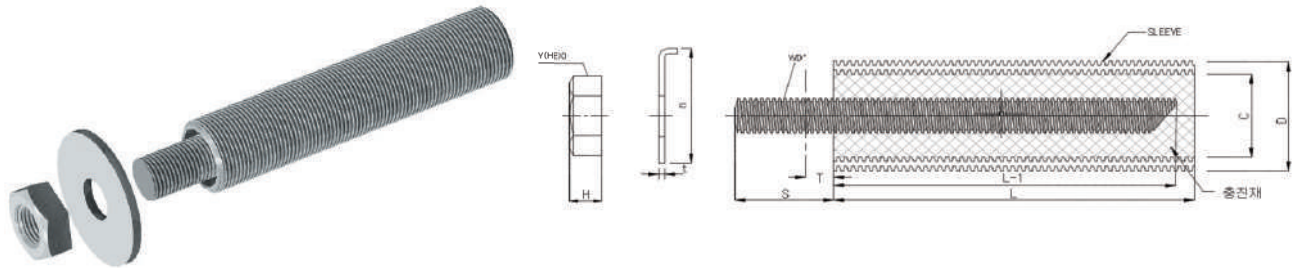
WD"	Anchor Bolt					Flange, Box, Flush Bolt							
	H	S	Y	Z	J	A	B	C	D	E□	G	I	L
M22(7/8")	15	J-15	35	30	t+T+Z [round up to nearest 5mm]	50	6	25	50	28	65	50	175
M24(1")	18	J-15	41	35		55	6	25	50	32	70	55	185
M27(1 1/8")	20	J-15	46	37		60	6	30	75	35	75	60	210
M30(1 1/4")	22	J-15	50	40		65	6	30	85	38	75	60	230
M36(1 1/2")	27	J-20	58	45		70	6	35	100	45	85	70	255
M42(1 3/4")	32	J-25	67	50		75	6	40	100	55	90	75	290
M48(2")	36	J-25	77	60		85	6	45	120	65	120	95	325
M64(2 1/2")	45	J-30	95	75		100	6	60	160	80	130	105	375

- T : Clamping thickness of fender or braker

ACCESSORIES

ACCESSORIES

Lock Type Chemical Anchor Bolts

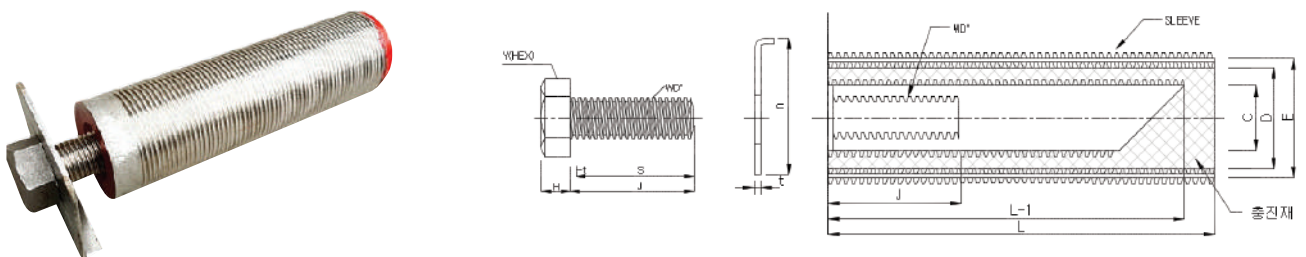


• Lock Type Chemical Anchor Bolts Dimension

[Unit:mm]

WD"	NUT		SLEEVE						SOV, NV Fender Washer					Spool Fender Washer				
	H	Y	C	D	L	L-1		Size	e	f	n	t	Size	e	f	n	t	
M22(7/8")	18	35	32	42	H+T+H	145	125	150H	23	32	59.5	4.5	-	-	-	-	-	
M24(1")	20	41	35	45		175	130	200H	33	42	79.5	4.5	500H	24	52	80.5	4.5	
M27(1 1/8")	22	46	39	49		210	165	250H	42	48	94.5	4.5	630H-650H	30	72	106.5	4.5	
M30(1 1/4")	25	50	42	52		210	180	300H	47	58	109.5	4.5	800H	30	77	111.5	4.5	
M36(1 1/2")	30	58	48	58		250	205	400H	52	68	126	6	1000H	34	102	142.0	6.0	
M42(1 3/4")	35	67	55	65		320	215	500H	56	83	145	6	1150H-1250H	39	102	147.0	6.0	
M48(2")	40	77	61	74		320	250	600H	61	98	165	6	1400H-1600H	46	102	154.0	6.0	
M64(2 1/2")	50	95	74	84		400	265	-	-	-	-	-	1700H	53	102	161.0	6.0	
M72(3")	62	110	86	96		550	330	800H	124	134	266	8	2000H	58	102	168.0	8.0	
							1000H	134	164	193	8	2250H	58	127	193.0	8.0		

Lock Type Box Anchor Bolt



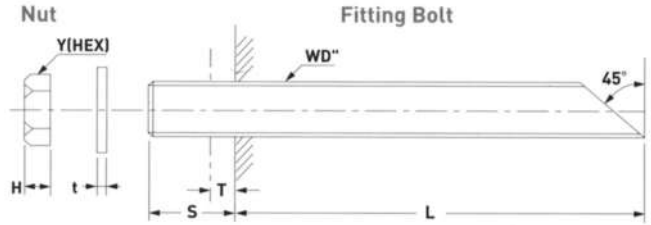
• Lock Type Chemical Anchor Bolts Dimension

[Unit:mm]

WD"	BOLT			SLEEVE						SOV, NV Fender Washer					Spool Fender Washer				
	H	Y	S	C	D	E	J	L	L-1	Size	e	f	n	t	Size	e	f	n	t
M22(7/8")	18	35	J-t	32	42	52	75	145	125	150H	23	32	59.5	4.5	-	-	-	-	-
M24(1")	20	41		35	45	55	80	175	130	200H	33	42	79.5	4.5	500H	24	52	80.5	4.5
M27(1 1/8")	22	46		39	49	59	90	210	165	250H	42	48	94.5	4.5	630H-650H	30	72	106.5	4.5
M30(1 1/4")	25	50		42	52	62	95	210	180	300H	47	58	109.5	4.5	800H	30	77	111.5	4.5
M36(1 1/2")	30	58		48	58	68	105	250	205	400H	52	68	126	6	1000H	34	102	142.0	6.0
M42(1 3/4")	35	67		55	65	75	115	320	215	500H	56	83	145	6	1150H-1250H	39	102	147.0	6.0
M48(2")	40	77		61	71	81	130	320	250	600H	61	98	165	6	1400H-1600H	46	102	154.0	6.0
M64(2 1/2")	50	95		74	84	91	160	400	265	-	-	-	-	-	1700H	53	102	161.0	6.0
M72(3")	62	110		86	96	106	170	550	330	800H	124	134	266	8	2000H	58	102	168.0	8.0
									1000H	134	164	193	8	2250H	58	127	193.0	8.0	

ACCESSORIES

Chemical Type Anchor Bolt



Parts	Material	Remarks
Anchor Bolt	Stainless Steel	—

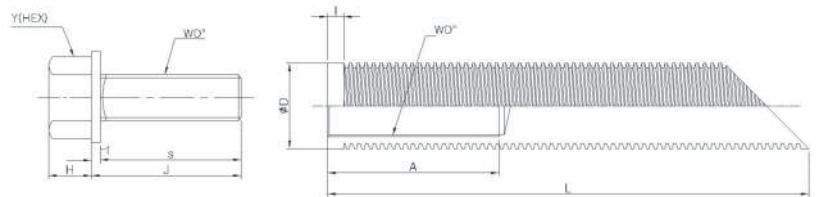
• Chemical Type Anchor Bolt Dimension

[Unit:mm]

WD"	Nut		Anchor Bolt
	H	Y	S + L
M22(7/8")	18	32	230
M24(1")	19	36	250
M27(1 1/8")	22	41	270
M30(1 1/4")	24	46	270
M36(1 1/2")	29	55	300
M42(1 3/4")	34	65	350
M48(2")	38	75	400
M64(2 1/2")	51	95	450
M72(3")	62	110	500

– T : Clamping thickness of fender or braker –Anchor Bolt shall be fixed on the Hole by using the mixed Acrylate Resin & Hardner

Box Type Chemical Anchor Bolts



• Box Type Chemical Anchor Bolt Dimension

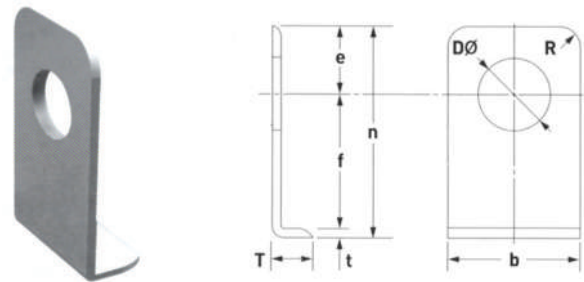
[Unit:mm]

WD"	Anchor Bolt			Box			
	H	Y	J	A	I	D	L
M24(1")	18	41	A+Z	100	15	35	250
M27(1 1/8")	20	46		100	15	40	250
M30(1 1/4")	22	50		100	15	45	250
M36(1 1/2")	27	58		120	15	55	350
M42(1 3/4")	32	67		120	15	60	400
M48(2")	36	77		120	15	65	400
M64(2 1/2")	45	95		120	15	80	450

ACCESSORIES

ACCESSORIES

L-Type Washer / Round Washer



• L-Type Washer Dimension

[Unit:mm]

WD"	SOV, NV Fender									Spool Fender								
	Size	b	D	e	f	n	R	T	t	Size	b	D	e	f	n	R	T	t
M22(7/8")	150H	68	25	23	32	59.5	10	12	4.5	—	—	—	—	—	—	—	—	—
M24(1")	200H	74	29	33	42	79.5	10	14	4.5	500H	48	29	24	52	80.5	15	18.5	4.5
M27(1 1/8")	250H	88	34	42	48	94.5	10	16	4.5	630H-650H	60	34	30	72	106.5	15	19.5	4.5
M30(1 1/4")	300H	100	37	47	58	109.5	10	19	4.5	800H	60	37	30	77	111.5	15	24.5	4.5
M36(1 1/2")	400H	119	43	52	68	126	10	22	6	1000H	68	43	34	102	142.0	25	26.0	6.0
M42(1 3/4")	500H	127	49	56	83	145	10	25	6	1150H-1250H	78	49	39	102	147.0	30	31.0	6.0
M48(2")	600H	139	56	61	98	165	10	28	6	1400H-1600H	92	56	46	102	154.0	30	34.0	6.0
	—	—	—	—	—	—	—	—	—	1700H	106	63	53	102	161.0	30	40.0	6.0
M64(2 1/2")	800H	195	70	124	134	242	10	32	8	2000H	116	70	58	102	168.0	40	38.0	8.0
M64(2 1/2")	1000H	215	70	134	164	282	10	36	8	2250H	116	70	58	127	193.0	40	43.0	8.0



• Round Washer Dimension

WD"	General, SBP			TTV Unit, SCV		
	C	D	t	C	D	t
M20(3/4")	—	—	—	80	24	6
M22(7/8")	44	26	4.5	—	—	—
M24(1")	52	28	4.5	90	28	6
M27(1 1/8")	58	31	4.5	—	—	—
M30(1 1/4")	62	35	4.5	90	34	6
M36(1 1/2")	72	41	6	130	41	9
M42(1 3/4")	82	47	6	140	47	9
M48(2")	95	54	6	160	54	12
M64(2 1/2")	115	70	8	180	70	12
M72(3")	135	82	10	180	82	12

• Rectangle Washer Dimension

MD	General				SSP-TYPE FenDer			
	m	n	D	t	m	n	D	t
M20(3/4)	50	45	24	4.5	45	40	22	4.5
M22(7/8)	70	50	26	4.5	—	—	—	—
M24(1)	75	55	28	4.5	65	50	28	4.5
M27(1 1/8)	85	60	31	4.5	85	60	31	4.5
M30(1 1/4)	100	65	35	4.5	85	60	35	4.5
M36(1 1/2)	115	75	41	6	100	65	41	6
M42(1 3/4)	140	90	47	6	105	90	47	6
M48(2)	165	100	54	6	130	110	54	6
M56(2 1/2)	185	125	62	6	120	100	62	6
M64(2 1/2)	210	135	70	8	140	110	70	8
M64(2 1/2)	—	—	—	—	160	120	70	8
M72(3)	230	150	80	10	—	—	—	—

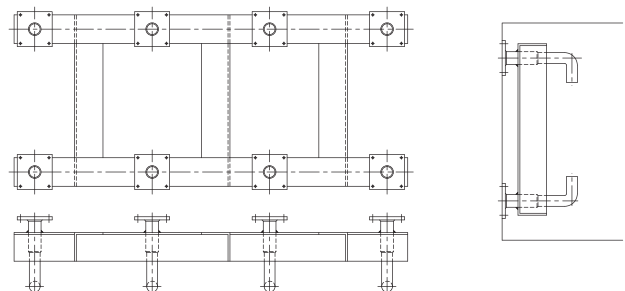
Chain & U-Anchor



• Anchor Bolt Dimension

Template

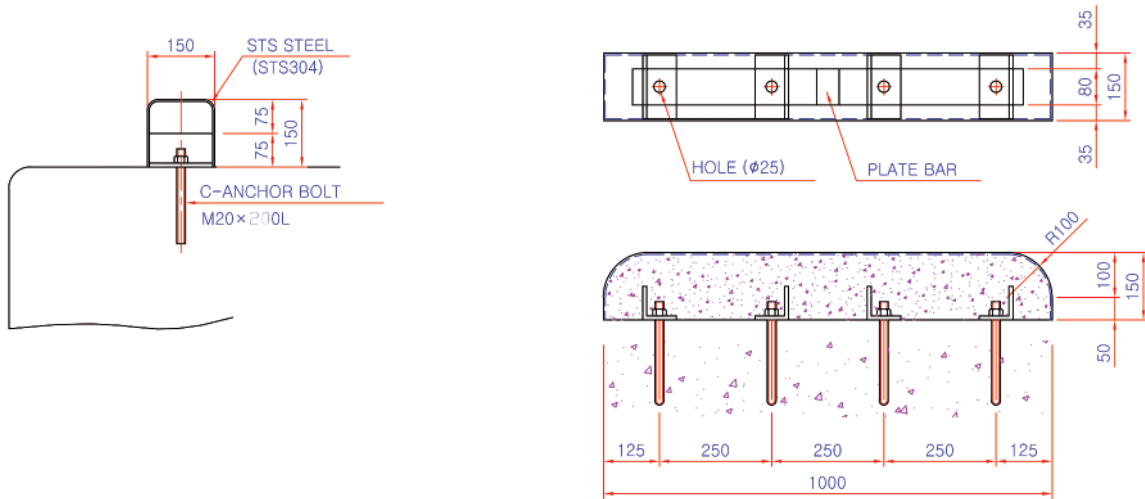
• Template can be used for all type of fender. This can be imbedded in a newly constructed dock. This would ensure precise fitting of the fenders.



STEEL STRUCTURE

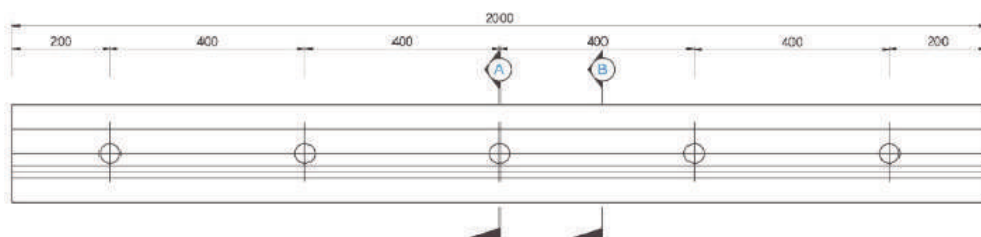
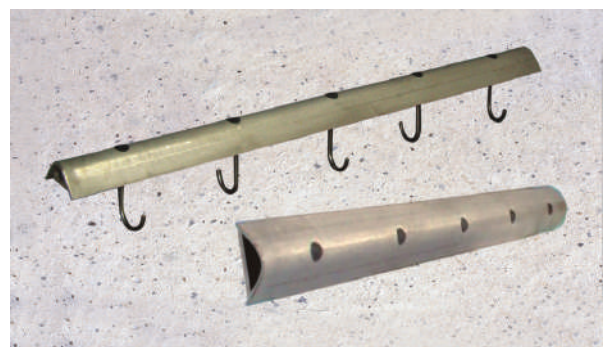
Car Stopper

No	Description	Size	Mat'l	Q' TY
1	Body	4Tx150H	STS304	1
2	Angle	9Tx75x75	SS400	4
3	C-Anchor	M20x200L	SS400	4
4	Nut	M10	SS400	4
5	Plat Bar	4Tx50x80	STS304	1



Edge protector

No	Description	Size	Mat'l	Standard	kg
1	BODY	100H.W x 9T	STS304	2M	26.4
2	ANCHOR	M12	STS304	5EA	—



LABORATORY

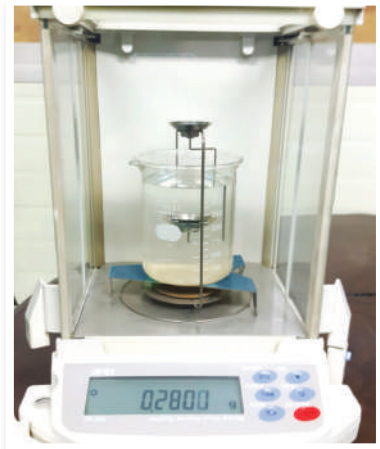
LABORATORY



Tensile testing machine



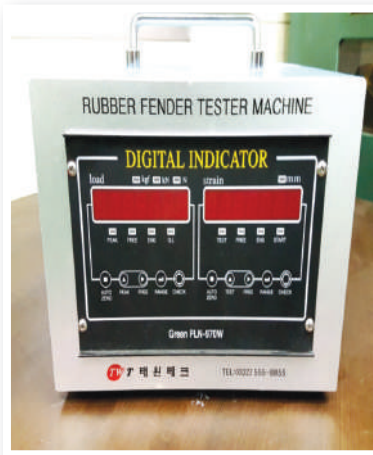
Compression repeat tester



Specific gravity tester



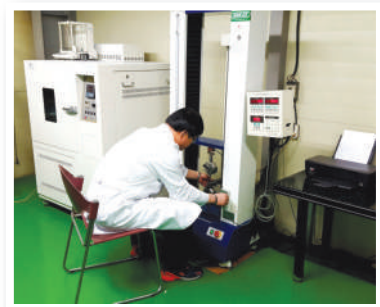
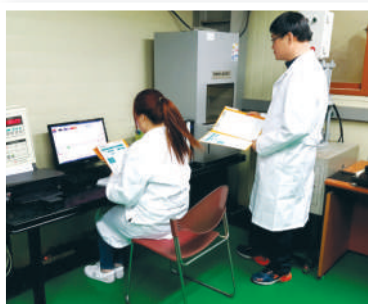
Vulcanization tester



Compression test



Aging tester



Standard Size of Vessel and Berthing Energy

• Barge

[Example]



Tonnage [GT]	Displacement	Length [m]	Breadth [m]	Depth [m]	Draft Loaded [m]	Additional Weight [ton]	Potential Weight [ton]	Berthing Energy [t-m]	
								0.20m/sec	0.30m/sec
W 100	200	24.0	6.3	2.6	2.3	102	302	0.31	0.69
S 100	200	25.0	5.3	2.5	2.5	126	326	0.33	0.75
W 200	400	29.0	7.4	3.4	3.0	210	610	0.62	1.40
S 200	400	33.0	6.6	3.3	3.3	289	689	0.70	1.58
W 300	600	32.0	8.0	4.0	3.5	315	915	0.93	2.10
S 300	600	38.5	7.2	3.6	3.6	401	1,001	1.02	2.30

• Ferry

[Example]



Tonnage [GT]	Displacement	Length [m]	Breadth [m]	Depth [m]	Draft Loaded [m]	Additional Weight [ton]	Potential Weight [ton]	Berthing Energy [t-m]	
								0.20m/sec	0.30m/sec
100	120	20.0	6.0	2.3	2.0	64	184	0.19	0.42
200	240	35.0	9.0	3.2	2.3	149	389	0.40	0.89
300	360	42.0	10.0	3.5	3.0	304	664	0.68	1.52
500	600	50.0	11.5	3.9	3.2	412	1,012	1.03	2.32
1,000	1,200	64.0	13.0	4.4	3.4	595	1,795	1.83	4.12

• Oil Tanker

[Example]



Tonnage [GT]	Displacement	Length [m]	Breadth [m]	Depth [m]	Draft Loaded [m]	Additional Weight [ton]	Potential Weight [ton]	Berthing Energy [t-m]	
								0.10m/sec	0.15m/sec
300	400	37.0	7.0	3.3	3.0	268		0.17	0.38
500	667	43.0	7.8	3.8	3.5	424		0.28	0.63
700	933	48.0	8.6	4.2	3.8	558		0.38	0.86
1,000	1,333	53.0	9.1	4.7	4.1	717		0.52	1.18
2,000	2,667	68.0	10.2	5.5	4.8	1,261		1.00	2.25
3,000	4,000	81.0	11.3	6.3	5.4	1,900		1.51	3.39
4,000	5,333	92.0	12.3	6.9	5.9	2,577		2.02	4.54
5,000	6,667	102.0	13.3	7.5	6.3	3,257		2.53	5.70
6,000	8,000	111.0	14.1	8.1	6.7	4,009		3.06	6.89
8,000	10,667	126.0	15.7	9.0	7.4	5,552		4.14	9.31
10,000	13,333	140.0	17.2	9.8	7.9	7,030		5.19	11.69
12,000	16,000	150.0	18.4	10.4	8.3	8,314		6.20	13.96
15,000	20,000	163.0	20.0	11.2	8.8	10,156		7.69	17.31
17,000	22,667	170.0	21.0	11.7	9.1	11,327		8.67	19.51
20,000	22,667	178.0	22.4	12.3	9.5	12,925		10.10	22.73
25,000	33,333	190.0	24.2	13.0	10.0	15,287		12.40	27.91
30,000	40,000	200.0	25.8	13.6	10.3	17,072		14.56	32.76
35,000	46,666	208.0	27.4	14.2	10.6	18,804		16.70	37.58
40,000	53,333	215.0	29.0	14.7	11.0	20,932		18.95	42.63
50,000	66,667	230.0	32.0	16.0	11.8	25,767		23.58	53.06
60,000	80,000	240.0	34.0	17.6	12.6	30,657		28.23	63.51
80,000	106,667	260.0	37.6	19.6	14.3	42,778		38.12	85.78
100,000	133,333	285.0	41.2	20.6	15.0	51,595		47.18	106.14
150,000	200,000	307.0	47.5	24.0	16.5	67,250		68.18	153.40

Standard Size of Vessel and Berthing Energy

• Ore Carrier

[Example]



Tonnage [GT]	Displacement	Length [m]	Breadth [m]	Depth [m]	Draft Loaded [m]	Additional Weight [ton]	Potential Weight [ton]	Berthing Energy [t-m]	
								0.10m/sec	0.15m/sec
4,000	5,333	100.0	15.5	7.0	6.3	3,193	8,526	2.18	4.89
6,000	8,000	118.0	16.6	8.3	6.9	4,520	12,520	3.19	7.19
8,000	10,667	130.0	17.6	9.5	7.4	5,728	16,395	4.18	9.41
10,000	13,333	140.0	18.5	10.5	7.9	7,030	20,363	5.19	11.69
12,000	16,000	150.0	19.4	11.2	8.5	8,720	24,720	6.31	14.19
15,000	20,000	163.0	20.7	12.0	9.0	10,623	30,623	7.81	17.58
20,000	26,667	180.0	22.8	13.0	9.7	13,627	40,294	10.28	23.13
25,000	33,333	194.0	24.7	13.8	10.3	16,560	49,893	12.73	28.64
30,000	40,000	205.0	26.5	14.3	10.7	18,884	58,884	15.02	33.80
40,000	53,333	218.0	29.5	15.6	11.3	22,397	75,730	19.32	43.47
50,000	66,667	235.0	32.0	16.5	11.9	26,776	93,442	23.84	53.63
60,000	80,000	245.0	34.5	17.6	12.5	30,801	110,801	28.27	63.60
80,000	106,667	265.0	38.0	18.0	13.8	40,605	147,272	37.57	84.53
100,000	133,333	270.0	40.0	19.5	15.0	48,879	182,212	46.48	104.59

• Cargo Boat

[Example]



Tonnage [GT]	Displacement	Length [m]	Breadth [m]	Depth [m]	Draft Loaded [m]	Additional Weight [ton]	Potential Weight [ton]	Berthing Energy (t-m)	
								0.10m/sec	0.15m/sec
700	933	50.0	8.3	4.2	3.9	612	1,545	0.39	0.89
1,000	1,333	57.0	8.7	4.4	4.2	809	2,147	0.55	1.23
2,000	2,667	75.0	10.8	5.7	4.9	1,449	4,116	1.05	2.36
3,000	4,000	89.0	12.4	6.7	5.6	2,246	6,246	1.59	3.58
4,000	5,333	101.0	13.7	7.5	6.1	3,024	8,357	2.13	4.80
5,000	6,667	111.0	14.8	8.2	6.6	3,890	10,557	2.69	6.06
6,000	8,000	119.0	15.6	8.8	7.0	4,692	12,692	3.24	7.28
7,000	9,333	126.0	16.4	9.3	7.4	5,552	14,885	3.80	8.54
8,000	10,667	132.0	17.0	9.8	7.7	6,297	16,964	4.33	9.74
9,000	12,000	137.0	17.6	10.2	8.0	7,055	19,055	4.86	10.94
10,000	13,333	142.0	18.1	10.6	8.2	7,683	21,016	5.36	12.06
12,000	16,000	150.0	19.0	11.2	8.6	8,927	24,927	6.36	14.31
15,000	20,000	160.0	20.0	11.9	9.1	10,661	30,661	7.82	17.60
17,000	22,667	164.0	20.5	12.3	9.4	11,660	34,327	8.76	19.70
20,000	26,667	170.0	21.0	12.7	9.8	13,137	39,804	10.15	22.85

• Passenger Boat

Based on 1/4 point contact. [Example]



Tonnage [GT]	Displacement	Length [m]	Breadth [m]	Depth [m]	Draft Loaded [m]	Additional Weight [ton]	Potential Weight [ton]	Berthing Energy (t-m)	
								0.10m/sec	0.15m/sec
500	500	50.0	8.2	4.5	4.0	644	1,144	0.29	0.66
1,000	1,000	65.0	10.0	5.3	4.5	1,059	2,059	0.53	1.18
2,000	2,000	95.0	12.0	6.4	5.2	1,784	3,784	0.97	2.71
3,000	3,000	95.0	13.5	7.3	5.7	2,484	5,484	1.40	3.15
4,000	4,000	105.0	14.8	8.0	6.3	3,353	7,353	1.88	4.22
5,000	5,000	113.0	15.8	8.8	6.8	4,204	9,204	2.35	5.28
6,000	6,000	121.0	16.7	9.5	7.2	5,047	11,047	2.82	6.34
7,000	7,000	127.0	17.5	10.2	7.6	5,902	12,902	3.29	7.41
8,000	8,000	135.0	18.2	10.8	8.0	6,952	14,952	3.81	8.58
10,000	10,000	145.0	19.2	12.0	8.5	8,429	18,429	4.70	10.58
15,000	15,000	165.0	21.5	13.0	8.8	10,281	25,281	6.45	14.51
20,000	20,000	180.0	23.0	13.8	9.0	11,731	31,731	8.09	18.21
30,000	30,000	210.0	26.5	15.5	9.5	15,250	45,250	11.54	25.97
50,000	50,000	245.0	30.5	18.0	10.5	21,734	71,734	18.30	41.17
80,000	80,000	290.0	36.0	21.0	11.7	31,942	111,942	28.56	64.25

※The Figures in the tables are based on the Standard therefore, Berthing energy may be differed by the condition of sea a vessel type.



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