

# PT. RBK International (Rubbex Conveyors & Engineerings)



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## Marine Fenders & Ship Launching Airbags

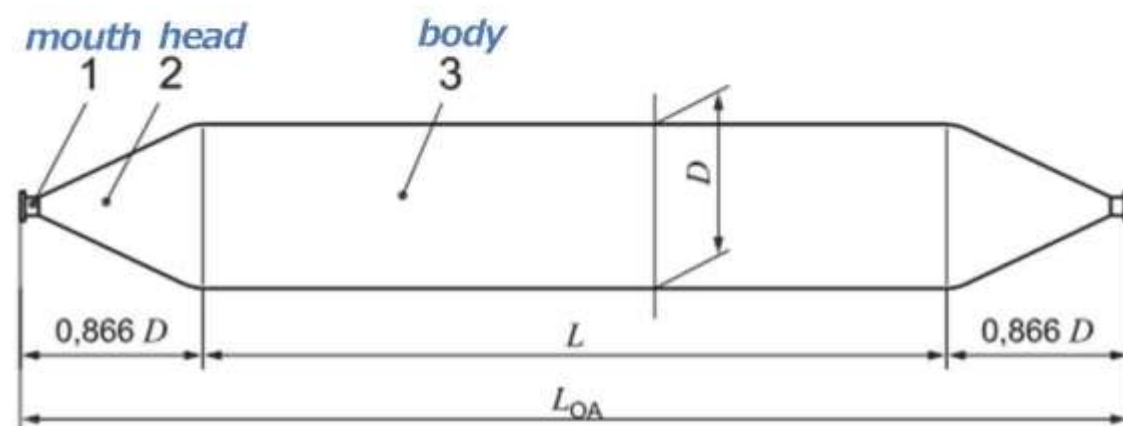


# SHIP LAUNCHING AIRBAG

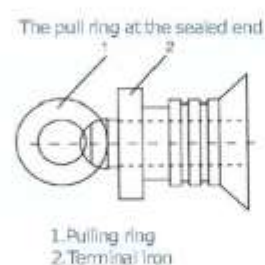
Rubbex ship rubber airbag complies with ISO 14409. Ship airbag can be used to launch and upgrade a ship up to 100,000DWT. Comparing to the traditional slipway launching method, the ship launching airbags are much environmental, because ship airbag can launch a ship at any seaside, there's no need to worry about the construction of launching facilities; besides, the marine airbags need little maintenance and can be used repeatedly.

## Structure

Please see the picture 1 of Florescence launching rubber airbag structure. It is composed by airbag body and terminal iron part. The airbag body is composed by natural rubber and strength fiber material through vulcanization processing; The terminal iron part is made of cast iron, it is combined closely with the bag body; One end is for pulling when move the airbag, and the other end is for charging and discharging the air. All the fittings in picture 2 and 3 will be supplied with airbags for free.



picture 1 Structure of ship launching airbag



picture 2



picture 3

## Features

- Airbags of different sizes are in stock
- Provide repair kit and on site instruction
- Long service life, can be reused many times
- Wear resistance and anti aging
- Good raw material and cord fabric
- Do no harm to the environment. Time & money saving
- Need no more than air compressors, winches and ropes
- Much cheaper and more portable than other methods

## Applications

- For ship launching/upgrading/docking/landing
- For salvaging sunken ship or heavy objects
- For hoisting and transporting heavy goods up to 10,000 tonnes structure on land
- For floating use purpose as improve the draft
- Pneumatic rubber core for architecture engineering (culvert making)
- Container for storing and transporting gas, chemical liquid and pure water for voyage

## Safety & Storage

### Safety precaution

- **Over Pressure Control:**  
Strictly control the operating pressure, over pressure is forbidden.
- **The Slipway Requirements**  
The slipway should be ground or cement concrete, according to the tonnage of different ships.
- **Avoid Sharp Objects:**  
Make sure no sharp objects on slipway and ship. Keep it smooth and clean to avoid puncture of airbags.
- **Avoid Distortion And Overweight**  
Avoid distortion in the length direction during rolling and avoid overweight load after air charging.

### Storage

- When the airbags are not to be used for a long time, they should be drained, cleaned, dried, coated with talcum powder.
- The airbags should be maintained in a dry ventilated room and be protected from light.
- The airbags should be in a relaxed condition free from tension, compression or other deformation.
- The airbags should be kept away from any heat source.
- The airbags should be protected from acids, alkalis, oils or organic solvents.



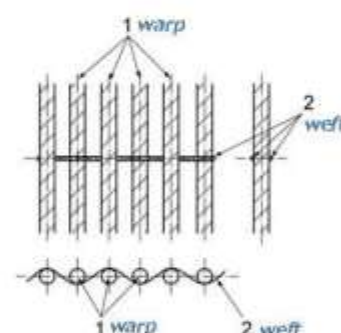




## Materials

Rubbex airbag is constructed of an outer rubber layer, one or more synthetic-tyre-cord layers, and an inner rubber layer. The arrangement of synthetic-tyre-cord reinforcement layers is shown in the picture below, all materials shall be vulcanized firmly.

Prior to the airbag production, the outer and inner rubber layers shall be tested to meet criteria in the following table in accordance with the test methods given in the international standard list in the table. While only one satisfactory sample per batch is required for test numbers 1 through 3, all others must be tested for test numbers 4 through 9 annually. If the first sample fails, two additional samples should be tested. If the additional samples pass the test requirements, the materials will be deemed to have passed the test. Otherwise, the materials will be deemed to have failed the test and another batch of materials shall be selected.



**Rubber material requirements**

No.	Test item	Required value	Test method
1	Tensile strength, MPa	$\geq 18$	ISO 37
2	Elongation at break, %	$\geq 400$	ISO 37
3	Hardness, °(Shore A)	$60 \pm 10$	ISO 7619-1
4	Tear strength, N/cm	$\geq 400$	ISO 34-1
5	Compression set, % (70°C $\pm$ 1°C, 22 h)	$\leq 30$	ISO 815-1
6	After thermal ageing at 70°C $\pm$ 1°C, 96 h	Holding of pull lengthening, %	$\geq 80$ ISO 188
7		Holding of elongation at break, %	$\geq 80$ ISO 188
8		Change of hardness, °(Shore A)	$\leq 8$ ISO 7619-1
9	Static ozone ageing at 40°C x 96 h [ozone concentration (50 $\pm$ 5) $\times 10^{-3}$ ], extension 20 %	No crack	ISO 1431-1

## Specifications

*Size Range: (Other customized sizes are also available)*

Diameter (D):	From 0.6m to 2.8m
Effective Length (EL):	From 5.0m to 28.0m
Total Length (TL):	From 7.0m to 31.0m
Standard Number of Layers:	Usually 3-12 layers

*Guaranteed working pressure*

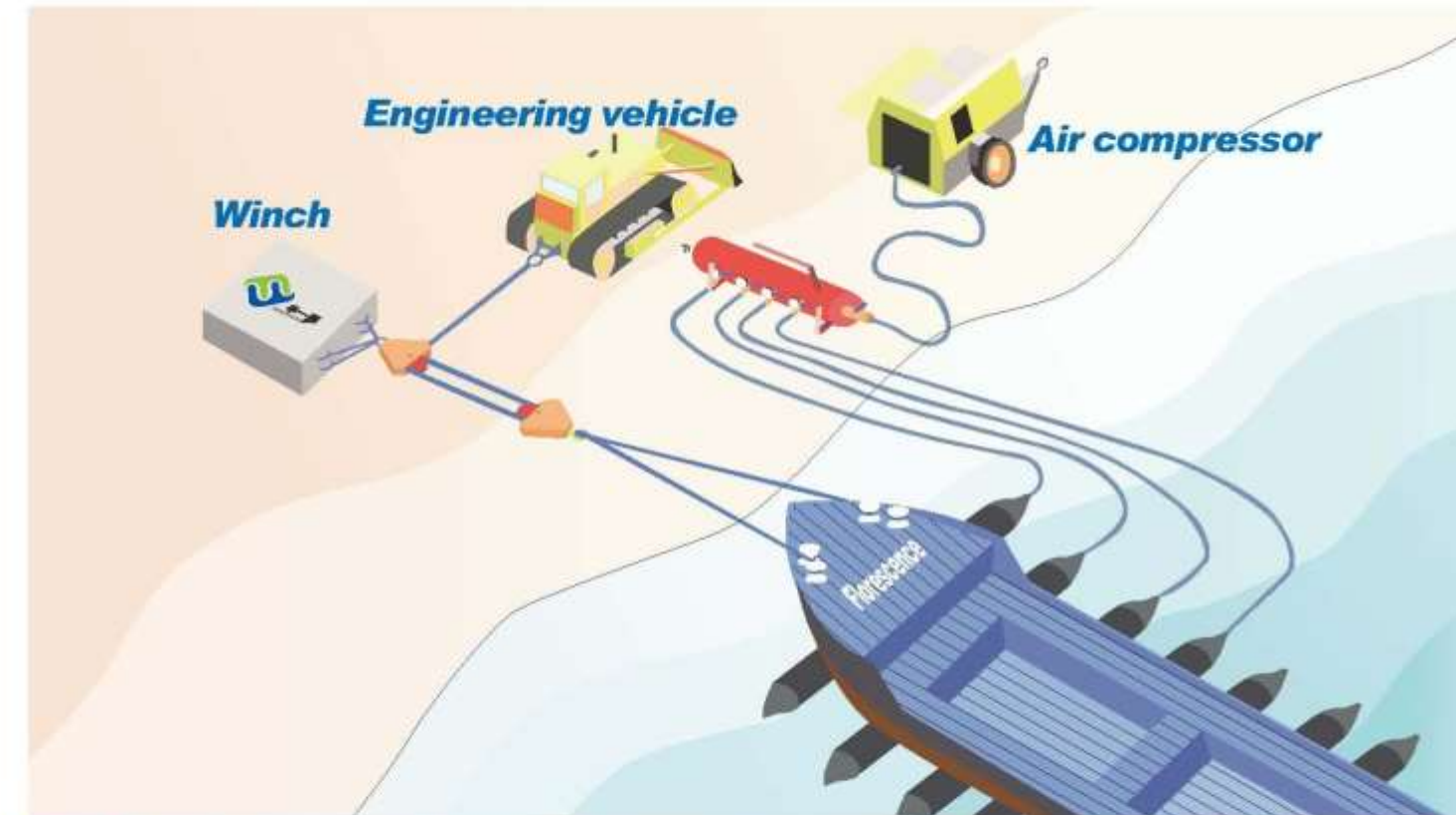
Type	D=0.8m	D=1.0m	D=1.2m	D=1.5m	D=1.8m	D=2.0m
FL3 layers	0.13Mpa	0.10Mpa	0.09Mpa	0.07Mpa	0.06Mpa	0.05Mpa
FL4 layers	0.17Mpa	0.13Mpa	0.11Mpa	0.09Mpa	0.08Mpa	0.07Mpa
FL5 layers	0.21Mpa	0.17Mpa	0.14Mpa	0.11Mpa	0.09Mpa	0.08Mpa
FL6 layers	0.25Mpa	0.20Mpa	0.17Mpa	0.13Mpa	0.11Mpa	0.10Mpa
FL7 layers	0.29Mpa	0.23Mpa	0.20Mpa	0.15Mpa	0.13Mpa	0.12Mpa
FL8 layers	0.33Mpa	0.26Mpa	0.23Mpa	0.17Mpa	0.15Mpa	0.14Mpa
FL9 layers	0.37Mpa	0.29Mpa	0.26Mpa	0.19Mpa	0.17Mpa	0.16Mpa
FL10 layers	0.41Mpa	0.32Mpa	0.29Mpa	0.21Mpa	0.19Mpa	0.18Mpa



## Requirements

### Of Launching Ships And Relevant Equipment

Ship	Ramp way	Winch	Air compressor
The engineering work under water line shall wholly be finished, especially valves and those equipment that are to be installed at the openings under ship waterline. The installation should be approved by inspection. Burrs, welds, etc. on the bottom or appendages of the ship should all be worn away. All the welds on the shell plate must pass inspection and tightness test. The main dimensions of the ship should be measured up and marked the load line. All the paint work of the shell plate has been finished.	The ramp way should be cleaned and be clear of sharp things during airbags rolling. The ramp way should be leveled and the level error from left to right should less than 80mm. The ground bearing capacity should be relatively equalized. The ramp way made of mud land, sanded land, sands or concrete, however, its bearing capacity should be twice as big as the working pressure of airbags. The slope of ramp way is to be determined according to the size of the launching ship and is generally no bigger than 1/7. Even if the airbags are at the lowest working height, the bottom of the ship should not touch the ground. The ramp way should extend into water for certain length.	In general, winch veering speed is about 9-13m/min. The moving speed of a ship must not be more than 6m/min with the control of hauling force of winch wire. If the ship weight is less than 200t, the moving speed can be increased properly. The wires must be checked and replaced regularly.	The type and capacity of the air compressor is to be selected according to the total volume of all the airbags provided for ship launching, airbag inflating time and the air pressure.



## Procedure

### Of Launching Ships By Rubber Airbags



## MARINE SALVAGE AIRBAG

Marine salvage airbag is used widely to rescue sunken ships, salvage heavy objects, float marine projects, etc.

It is evolved from ship launching airbag while improved for salvage purpose. Compared with PVC bag, it is much stronger and can be reused many times.

The salvage airbag can be used up to 30m underwater, and its buoyancy capacity is 3tons to 120tons per airbag.



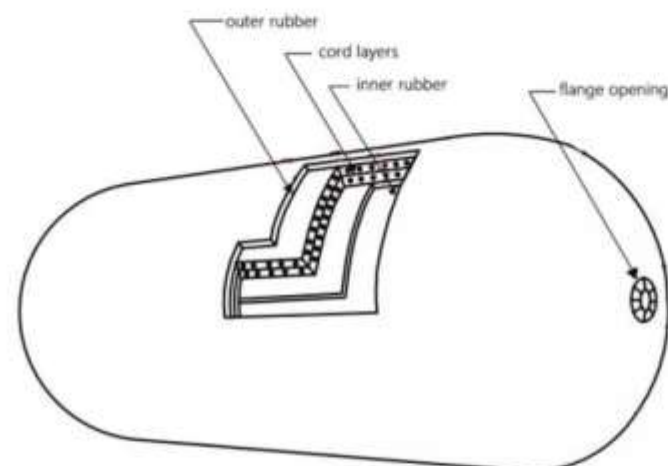


# PNEUMATIC RUBBER FENDER

Rubbex pneumatic rubber fender has been in use for around 50 years. It is the leading anti-collision device for marine application in the world. This compressed air filled rubber fender is used as a protective medium for ship to ship contact (STS), ship to quay (STQ) and ship-to-berthing (STB).

Yokohama pneumatic rubber fender can be delivered in various sizes and types. Chain and tyre net (CTN) type is usually recommended to protect the fender body, but sling type or body only is also available.

## Structure



Rubbex pneumatic rubber fenders is constructed of four parts.

### 1. Outer rubber

Rubber layer that covers the outside of the fender to protect the cord layers and the inner liner rubber from abrasion and other external forces.

### 2. Cord layers

Layer made of synthetic-tyre-cord fabric, which maintains the internal air pressure of the fender.

### 3. Inner rubber

Liner of a rubber membrane that seals the pressurized air inside the fender.

### 4. Flange opening

Steel flange which is mounted on the fender, to which an air valve or safety valve can be adapted.

## Two types

### A) Net-type

The fender is consisted of tire , chain and rubber sleeves.



### B) Sling type

The sling fender is designed for use without a protective net.



## Features

- High energy absorption with a low reaction force
- Light weight, portable and floatable, can be installed and replaced easily
- Heavy duty and long service life-over 10 years
- Supplied as sling type (body only) or with chain and tire net for protection of the fender body
- Suitable for locations with large and small tidal differences

## Applications

- Offshore platforms
- Oil and gas tankers
- Fast ferries and aluminium vessels
- Temporary and permanent installations
- Rapid response and emergencies
- In ports with extreme tidal variations
- Fishing vessel, transport shipss and ocean trawlers





### *Padding for better hull protection*

Rubber hoses are used to protect chains in order to avoid any damage to fender's and the ship's hull

### *Internal initial pressure*

Standard: 50Kpa and 80Kpa

### *Towing ring and swivel*

The fenders are fitted with a towing ring and swivel in galvanized steel

### *ISO17357 complied*

Florescence fenders comply with the requirements of ISO17357, ensuring good performance and high quality floating pneumatic fenders for safe berthing operations

### *Chain and tire net for protection*

Truck and aircraft tires are all available





## Initial Pressure

There are two initial pressure rating for Florescence Marine Pneumatic Fender:

1. Pneumatic 50  
(Initial pressure 50 Kpa)

2. Pneumatic 80  
(Initial pressure 80 Kpa)

## Specifications

Specification D*L(mm)	Initial Internal Pressure 50kpa		Initial Internal Pressure 80kpa	
	R(KN)	GEA(KJ)	R(KN)	GEA(KJ)
500*1000	64	6	85	8
600*1000	74	8	98	11
700*1500	137	17	180	24
1000*1500	182	32	239	45
1000*2000	257	45	338	63
1200*2000	297	63	390	88
1350*2500	427	102	561	142
1500*3000	579	153	761	214
1700*3000	639	191	840	267
2000*3000	750	265	985	368
2000*3500	875	308	1150	430
2500*4000	1381	663	1815	925
2500*5500	2019	943	2653	1317
3000*5000	2104	1210	2709	1571
3000*6000	2583	1485	3292	1888
3300*4500	1884	1175	2476	1640
3300*6500	3015	1814	3961	2532
3300*10600	5257	3067	6907	4281
4500*6500	4150	3432	5453	4790
4500*9000	5747	4752	7551	6633
4500*12000	7984	6473	10490	9037

FL Pneumatic Rubber Fender for Large Vessels

Vessel Tonnage (DWT)	Speed (M/S)	Energy (KJ)	Fender Size D*L (mm)
200000	0.15	1890	3300 x 6500
150000	0.15	1417	3300 x 6500
100000	0.15	945	3000 x 6000
85000	0.17	1031	3000 x 5000
50000	0.18	680	2500 x 5500
40000	0.20	672	2500 x 5500
30000	0.22	609	2500 x 4000
20000	0.25	525	2500 x 4000
15000	0.26	425	2500 x 4000
10000	0.28	329	2000 x 4000
5000	0.33	228	2000 x 3500

FL Pneumatic Rubber Fender for Medium and Small Vessels

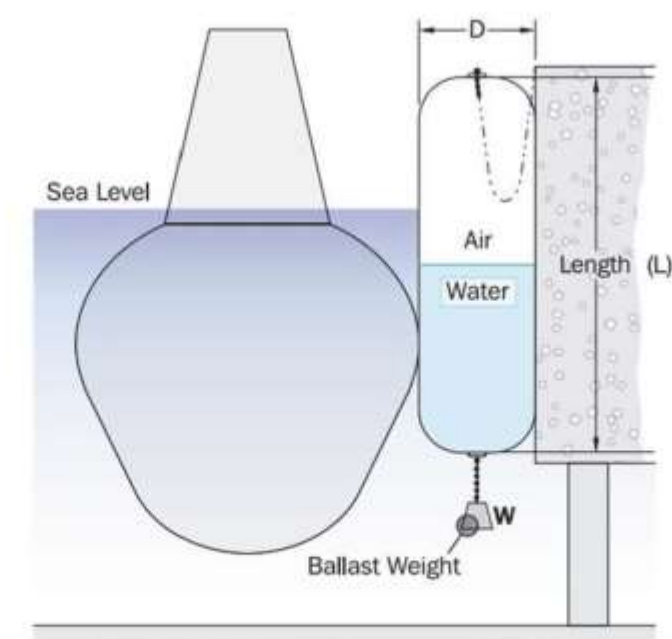
Vessel Tonnage	Size(D*L) mm	Recommend Vessel
50	500*1000	Fishing Vessel
100	700*1500-1000*1500	Fishing Vessel
200	1000*1500-1200*2000	Fishing Vessel, Tugboat
300-500	1200*2000-1500*2500	Fishing Vessel, Tugboat
1000	1500*2500-1500*3000	Tugboat, Transport Ship
3000	2000*3000-2000*3500	Ocean Trawler, Transport Ship
10000	2000*3500-2500*4000	Transport Ship



# HYDRO-PNEUMATIC FENDER



## Structure



## Specifications

Fender size (mm)	Without water 60% deflection		Filled with water 45% deflation		
	Energy (kJm)	Reaction (kN)	Ratio water/air %	Energy (kJm)	Reaction (kN)
1700x7200	560	1810	65/35	134	611
2000x6000	647	1766	65/35	155	599
2500x5500	928	2037	65/35	226	687
3300x6500	1913	3169	60/40	616	1247
3300x10600	3120	5170	55/45	589	1275

Note: other sizes can be customized, standard tolerance of  $\pm 10\%$

## Features

- Versatile
- Wide variety of sizes
- Low hull pressure
- Fast deployment and installment

## Application

- Navy use for submarine
- Catamarans
- Semi-submersible platforms
- Drilling rigs



# FOAM FILLED FENDER

Florescence polyurethane foam filled fender is the Rubbex choice for storm conditions, having the potential to outperform pneumatic units during severe weather. Additionally, since the internal construction consists of a solid foam core, there is no need to maintain air pressure, inflation, valves as pneumatic fenders. They are ideal for existing structures and certain hull types such as catamarans and cruise ships.



## Features

- High energy absorption and low reaction force.
- Many bright colors and shape available.
- Ultra-tough, unsinkable design.
- Remains fully functional even if skin is punctured.
- Low maintenance.
- Easy installation.

## Applications

- Cruise ships
- Container vessels
- Cruise ships and ferries
- Oil and gas tankers
- General cargo
- Navy berths
- Ship-to-ship transfers

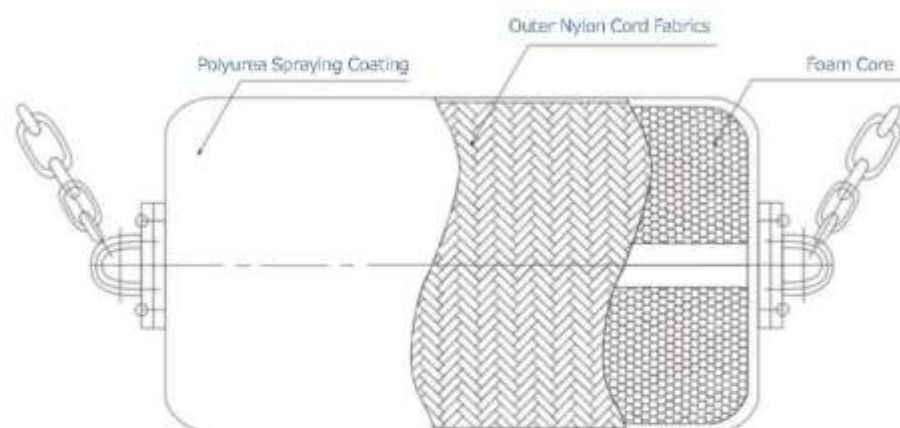
## Specifications

FL Foam Fender Size(mm)	Deflection 60%		Weight(±3%) (KG)
	Reaction Force(KN)	Energy Absorption(KJ)	
300x500	43	5	5
400x800	54	7	13
500x1000	89	32	26
700x1500	129	24	75
1000x1500	190	62	154
1000x2000	298	80	205
1200x2000	335	110	295
1350x2500	460	173	466
1500x3000	615	263	691
1700x3000	678	330	888
2000x3500	940	535	1433
2000x4000	1095	630	1638
2000x4500	1250	690	1843
2300x4000	1380	735	2166
2300x5500	1860	1133	2979
2500x4000	1455	980	2559
2500x5500	1960	1230	3519
3000x5000	2180	1755	4607
3000x6000	2455	1960	5528
3300x4500	1960	1760	5017
3300x6500	3075	2830	7247
3500x7000	3975	3162	8779

other customized sizes are also available

## Structure

The foam filled fenders are constructed of three parts each providing an important function in the construction and lifespan of the fender:



### The closed cell polyurethane foam

The closed cell polyurethane foam core used inside offers un-sink ability during operation.

### Outer nylon cord fabrics

The outer nylon cord fabrics is specifically designed to seal polyurethane foam inside ability during operation.

### Polyurea spraying coat

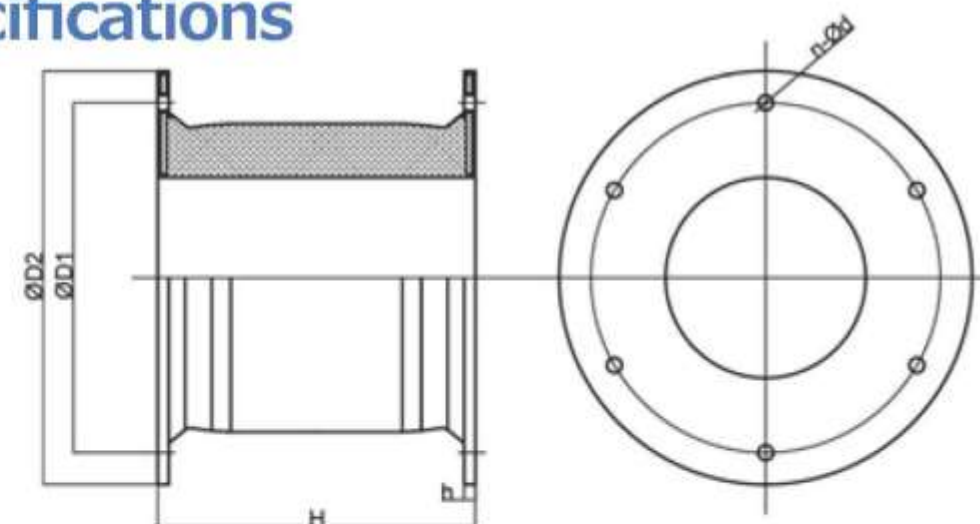
Polyurea coating is permanent spray on coatings that protect the surface of fender body. It is more durable than rubber and flexible in all weather conditions: no softening in heat or becoming brittle in cold. Dents, scratches and chemical resistant.



# CELL FENDER

The Rubbex Cell Fender is a well-developed and popular rubber fender type, with a hollow cylindrical body and fully rubber-embedded mounting flanges. The large mounting flanges distribute the fender load over the back of the fender panel frame.

## Specifications



Unit:mm

## Features

- Available in the widest range of sizes
- Good shear force resistance
- A good load distribution over the front panel
- Strong and well-proven design
- Ideal for low hull pressure systems

## Applications

- Container & Bulk Terminals
- Oil & Gas Terminals
- General Cargo Terminals
- Cruise Terminals
- Ferry & RoRo Terminals
- Monopiles and dolphins

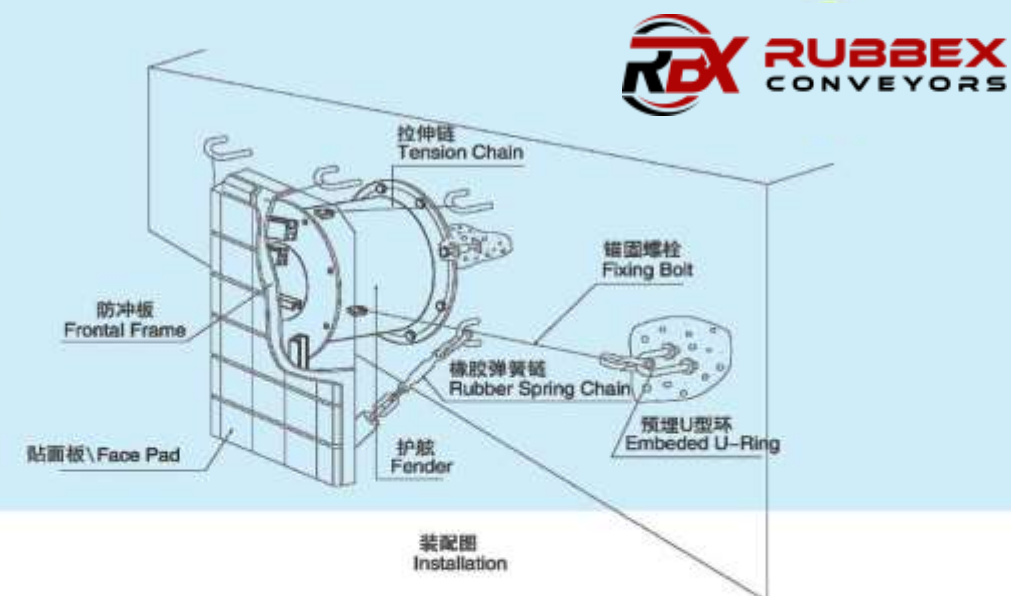
Type	H	ØD1	ØD2	h	holes	n-ØD
FLSC400H	400	550	650	25	4	φ30
FLSC500H	500	550	650	25	4	φ32
FLSC630H	630	700	840	30	4	φ39
FLSC800H	800	900	1050	30	6	φ40
FLSC1000H	1000	1100	1300	35	6	φ47
FLSC1150H	1150	1300	1500	40	6	φ50
FLSC1250H	1250	1450	1650	45	6	φ53
FLSC1450H	1450	1650	1850	47	6	φ61
FLSC1600H	1600	1800	2000	50	8	φ61
FLSC1700H	1700	1900	2100	55	8	φ66
FLSC2000H	2000	2000	2200	55	8	φ74
FLSC2250H	2250	2300	2550	60	10	φ74
FLSC2500H	2500	2700	2950	70	10	φ90
FLSC3000H	3000	3150	3350	75	12	φ90

Other customized sizes are also available





The installation method for your reference



## Performance

Rated Compression Deflection: 52.5%

Type	Supper High Reaction Force(FE)		Supper High Reaction Force(FS)		High Reaction Force(FE)		Standard Reaction Force(FO)		Low Reaction Force(FL)	
	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)
FLSC400H	112	19.4	97.9	17.3	85	14.3	65.3	11.2	52	9.2
FLSC500H	186	40.8	165	36.7	143	30.6	110	23.5	87.7	18.4
FLSC630H	296	81.6	263	73.4	229	63.2	175	47.9	141	38.8
FLSC800H	473	166	420	148	341	128	281	97.9	215.2	76.5
FLSC1000H	752	331	668	293	578	254	445	195	356	156
FLSC1150H	995	502	882	446	765	387	590	297	471	238
FLSC1250H	1176	645	1042	572	903	496	696	382	557	305
FLSC1450H	1582	1007	1404	894	1217	775	936	597	750	477
FLSC1600H	1926	1353	1710	1201	1482	1040	1139	802	912	641
FLSC1700H	2174	1623	1930	1441	1673	1249	1287	960	1029	768
FLSC2000H	3000	2643	2671	2346	2315	2034	1781	1565	1426	1252
FLSC2250H	4228	4177	3753	3701	3252	3213	2503	2473	2127	2101
FLSC2500H	5220	5730	4634	5087	4016	4408	3089	3392	2625	2883
FLSC3000H	-	-	-	-	5801	7605	4400	5790	3751	4995

Remark : Performance tolerance is  $\pm 10\%$ .

## Main Accessories and Applications

No.	Name		Applications	Material
1	Fender		Absorb ship berthing energy to protect dock and vessels	Rubber, SS400
2	Front Panel		Reduce surface pressure to avoid damage of the fenders & vessels	SS400 paint
3	Face Pad		Reduce friction coefficient to protect hull	UHMW-PE
4	Pre-built-in Sets	Pre-built-in Bolt & Nuts	Fix fenders to dock	stainless(or SS400 hot dip galvanized)
		Pre-built-in U Ring	Holding chains	SS400 paint (or hot dip galvanized)
5	Link Bolt, Nut		Connect fender and front panel, and other accessories	Stainless(or hot dip galvanized)
6	Weight Chain		Support the front panel to avoid dropping	stainless (or SS400 hot dip galvanized)
7	Tension Chain		Control the front panel to avoid over deflection of fenders	SS400 hot dip galvanized or paint
8	Shear Chain		Prevent fender system from shear deflection	SS400 hot dip galvanized or paint

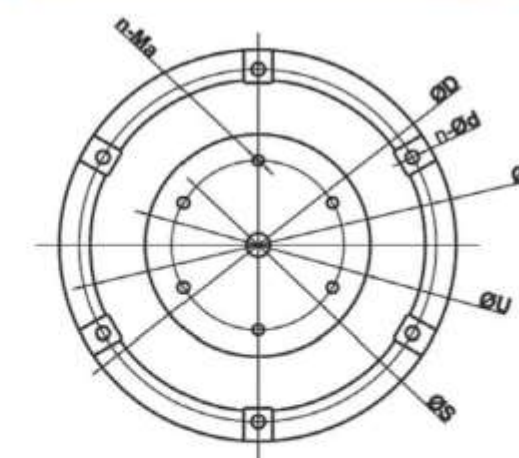
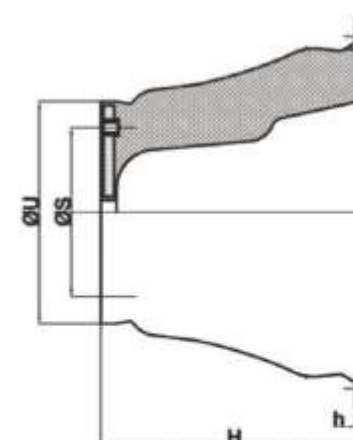
Other customized materials and accessories are also available.



# CONE FENDER

## Specifications

The Rubbex Cone Fender is the latest generation of cell fender, with outstanding performance and efficiency. The conical body shape makes the cone fender very stable even at large compression angles and provides excellent shear strength.



Unit:mm

## Features

- Excellent energy absorption to reaction force ratio
- Strong and well-proven design
- High shear stability
- Optimized fender geometry

## Applications

- Container & Bulk Terminals
- Oil & Gas Terminals
- General Cargo Terminals
- Cruise Terminals
- Ferry & RoRo Terminals
- Monopiles and dolphins

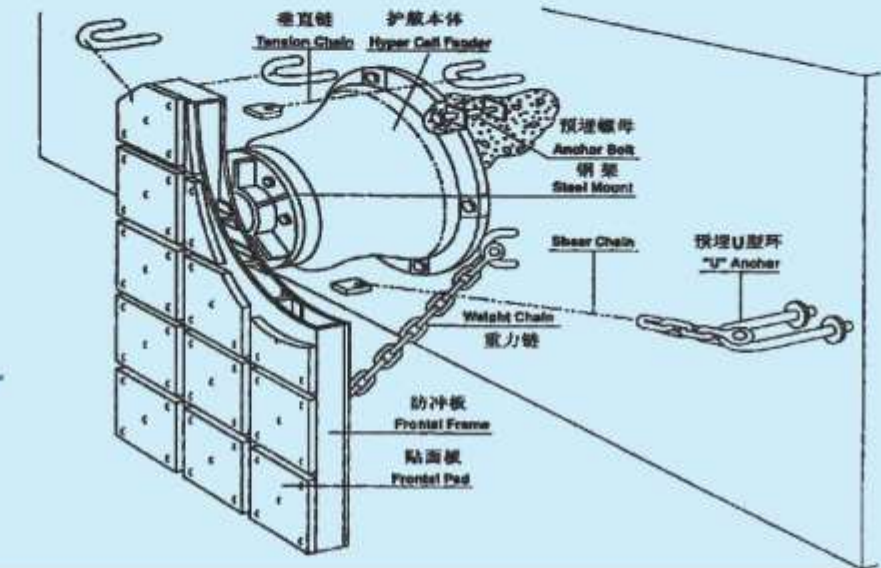
Type	H	ØU	ØS	ØP	ØD	Holes	n-Ma	n-Ød	h
FLCO500	500	425	325	675	750	4	M24	30	25
FLCO600	600	510	390	810	900	6	M24	30	27
FLCO700	700	595	455	945	1050	6	M30	38	32
FLCO800	800	680	520	1080	1200	6	M36	44	36
FLCO900	900	765	585	1215	1350	6	M36	44	41
FLCO1000	1000	850	650	1350	1500	6	M42	56	45
FLCO1100	1100	935	715	1485	1650	6	M42	50	50
FLCO1150	1150	998	750	1550	1725	6	M42	56	52
FLCO1200	1200	1020	780	1620	1800	8	M42	50	54
FLCO1300	1300	1105	845	1755	1950	8	M48	60	59
FLCO1400	1400	1190	930	1890	2100	8	M48	60	66
FLCO1600	1600	1360	1060	2160	2400	8	M48	70	72
FLCO1800	1800	1530	1190	2430	2700	10	M56	76	78

Other customized sizes are also available





Reference  
installation  
of Cone  
Rubber Fender



## Performance

Rated Compression Deflection: 52.5%

Type	Super High Reaction Force(FS)		High Reaction Force(FE)		Standard Reaction Force(FO)		Low Reaction Force(FL)	
	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)
FLCO500	342	80.6	273	64.3	204	47.9	168	37.7
FLCO600	490	160	390	130	289	95.9	230	76.5
FLCO700	665	240	532	185	320	153	314	122
FLCO800	879	375	720	300	512	229	410	183
FLCO900	1099	504	879	407	648	312	518	260
FLCO1000	1366	682	1100	552	800	505	641	357
FLCO1100	1459	847	1169	663	946	446	816	416
FLCO1150	1799	1050	1420	900	1059	679	847	543
FLCO1200	1883	1115	1526	971	1128	719	908	571
FLCO1300	2168	1617	1739	1336	1346	1064	1148	765
FLCO1400	2300	1720	1840	1376	1472	1101	1173	877
FLCO1600	3084	2467	2313	1974	1850	1579	1446	1259
FLCO1800	3825	3609	3060	2887	2449	2309	1950	1840

Remark: Performance Tolerance is  $\pm 10\%$

## Main Accessories and Applications

No.	Name		Applications	Material
1	Fender		Absorb ship berthing energy to protect dock and vessels	Rubber, SS400
2	Front Panel		Reduce surface pressure to avoid damage of the fenders & vessels	SS400 paint
3	Face Pad		Reduce friction coefficient to protect hull	UHMW-PE
4	Pre-built-in Sets	Pre-built-in Bolt & Nuts	Fix fenders to dock	stainless(or SS400 hot dip galvanized)
		Pre-built-in U Ring	Holding chains	SS400 paint (or hot dip galvanized)
5	Link Bolt, Nut		Connect fender and front panel, and other accessories	Stainless(or hot dip galvanized)
6	Weight Chain		Support the front panel to avoid dropping	stainless (or SS400 hot dip galvanized)
7	Tension Chain		Control the front panel to avoid over deflection of fenders	SS400 hot dip galvanized or paint
8	Shear Chain		Prevent fender system from shear deflection	SS400 hot dip galvanized or paint

Other customized materials and accessories are also available.



# ARCH FENDER

The Rubbex Arch Fender (V type) is a robust and simple molded one-piece rubber fender type. It can be fitted with either UHMW-PE face pads or connected to a steel panel.

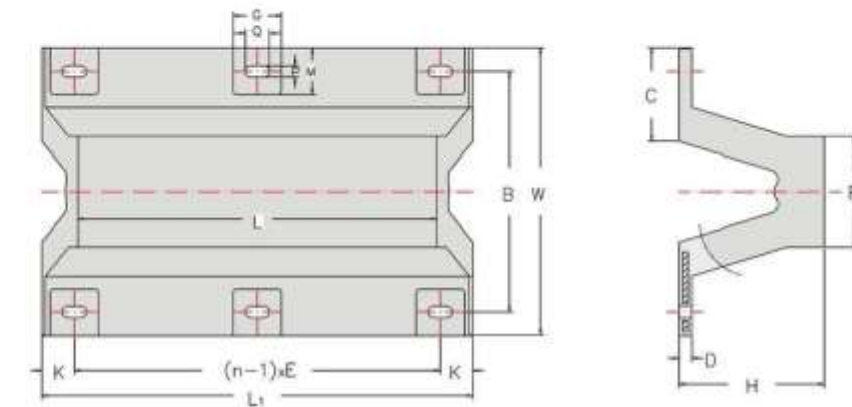
## Features

- Simple one-piece design
- Wide range of standard sizes
- High shear resistance
- Very robust and low maintenance

## Applications

- Ferry & RoRo Terminals
- Barge and tug berths
- General cargo
- Multi-Purpose Terminals

## Specifications



Specification	H	W	B	F	C	D	P	Q	M	G
FLA150H	150	300	240	98	96	22.5	25	50	55	95
FLA200H	200	400	320	150	128	24	29	58	75	105
FLA250H	250	500	410	164	160	30	32	64	90	125
FLA300H	300	600	490	225	195	33	35	70	105	140
FLA400H	400	800	670	300	260	40	41	82	120	165
FLA500H	500	1000	840	375	325	45	47	94	140	180
FLA600H	600	1200	1001	450	390	54	50	100	160	195
FLA800H	800	1600	1340	600	520	72	68	136	260	270
FLA1000H	1000	2000	1680	750	650	90	68	136	300	290

The length range is 1-3 meters, other customized sizes are also available

## Performance

Rubber Grade	Super High Reaction Force(FS)				High Reaction Force(FH)				Standard Reaction Force(FO)				Low Reaction Force(FL)			
Deflection	52.5%		55%		52.5%		55%		52.5%		55%		52.5%		55%	
Performance Type	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)	Reaction Force(KN)	Energy Absorption (KN-M)
FLA150H	135	7.1	182	8.4	147	6.1	157	7.1	87	4.1	117	5.1	58	3.1	79.6	4.1
FLA200H	176	11.2	240	14.3	156	11.2	208	12.2	114	8.2	156	9.2	78.5	5.1	104	6.1
FLA250H	281	29	391	41.2	216	22.8	300	24	179	18.8	249	19.8	154	16.6	213	17.7
FLA300H	330	41.8	460	44.8	254	31.6	353	33.7	2.9	25.5	300	27.4	181	22.4	251	24.5
FLA400H	441	74.4	612	79.4	339	57.1	469	6.12	281	46.9	361	50	241	40.8	334	43.9
FLA500H	551	115	765	123	423	89.5	588	94.9	351	73.4	487	78.5	301	69.4	418	67.3
FLA600H	660	166	917	179	508	129	706	138	420	106	590	113	361	90.7	502	97
FLA800H	881	296	1224	317	677	228	940	254	561	189	779	202	481	162	669	173
FLA1000	1101	463	1529	496	846	356	1176	381	703	295	975	317	602	253	835	271

REMARK: Performance tolerance is  $\pm 10\%$ .



# D FENDER



The Rubbex D Fender has a D shaped outer form and either a D shaped center (DD Fender) or cylindrical center bore (DC Fender). There is another D fender type with wings, called GD fender.

## Features

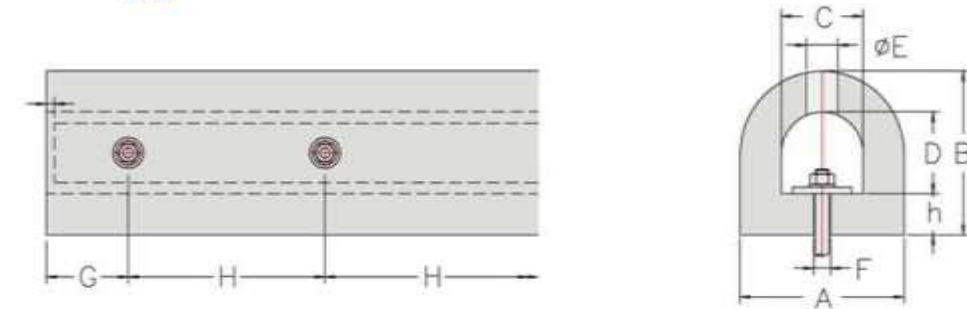
- Simple & easy installation
- Customized sizes
- Wide range of applications

## Applications

- Tugs and workboats
- Pontoon protection
- Inland waterways
- General purpose fendering



## DD/DC Type Fender



Specification	A	B	C	D	h	ΦE	ΦF	G	H
FLD100	100	100	50	50	25	40	20	100-150	200-300
FLD150	150	150	75	75	37.5	50	25	100-150	200-400
FLD200	200	200	100	100	50	60	30	100-150	300-500
FLD250	250	250	125	125	62.5	65	33	100-200	300-500
FLD300	300	300	150	150	75	65	35	100-200	300-600
FLD350	350	350	175	175	87.5	80	38	100-250	300-600
FLD400	400	400	200	200	100	80	40	100-250	300-600
FLD500	500	500	250	250	250	95	45	100-250	400-600

The length range is 1-3 meters, other customized sizes are also available

## Performance

Type	Deflection	Rection Force(KN)	Energy Absorption(KN-M)
FLD150x150x1000	50%	115	3.2
FLD200x200x1000	50%	211	8.6
FLD250x250x1000	50%	252	9.2
FLD300x300x1000	50%	300	12
FLD300x360x1000	50%	330	14.28
FLD400x400x1000	50%	390	20
FLD500x500x1000	50%	460	32

Remark: Performance tolerance is ±10%.



# CYLINDRICAL FENDER

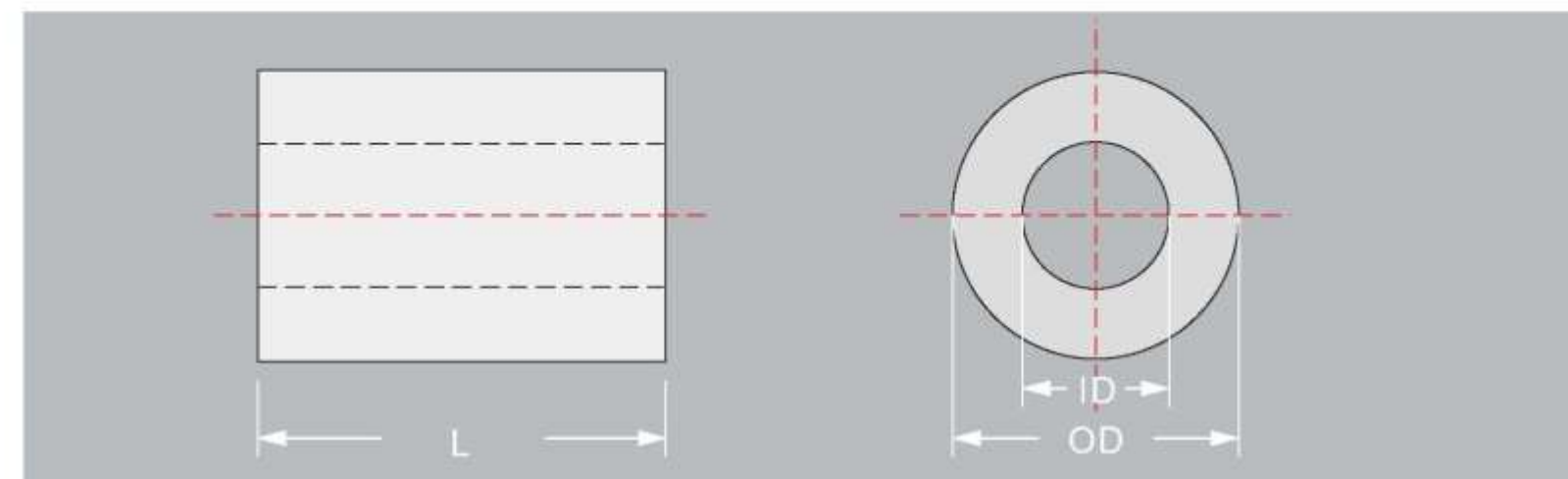
The Rubbex Cylindrical Fender is a simple and versatile fender type and can be easily installed.

## Features

- Very robust and simple design
- Easy to install and maintain
- High abrasion resistance
- Wide range of standard sizes

## Applications

- Barge and tug berths
- General Cargo Terminals
- RoRo and ferry Terminals
- Fishing and workboat berths
- Multi-Purpose Terminals



## Specifications

Type	Outer Dia. (mm)	Inner Dia. (mm)	Length	Rated Compression
FLCY 150	150	75	All length can be supplied to meet your request.	50%
FLCY 200	200	100		
FLCY 250	250	125		
FLCY 300	300	150		
FLCY 350	350	175		
FLCY 400	400	200		
FLCY 450	450	225		
FLCY 500	500	250		
FLCY 600	600	300		
FLCY 700	700	350		
FLCY 800	800	400		
FLCY 900	900	450		
FLCY 1000	1000	500		
FLCY 1100	1100	550		
FLCY 1200	1200	600		
FLCY 1300	1300	650		
FLCY 1400	1400	700		
FLCY 1500	1500	750		
FLCY 1600	1600	800		
FLCY 1800	1800	900		
FLCY 2000	2000	1000		

Other customized sizes are also available



# CYLINDRICAL FENDER

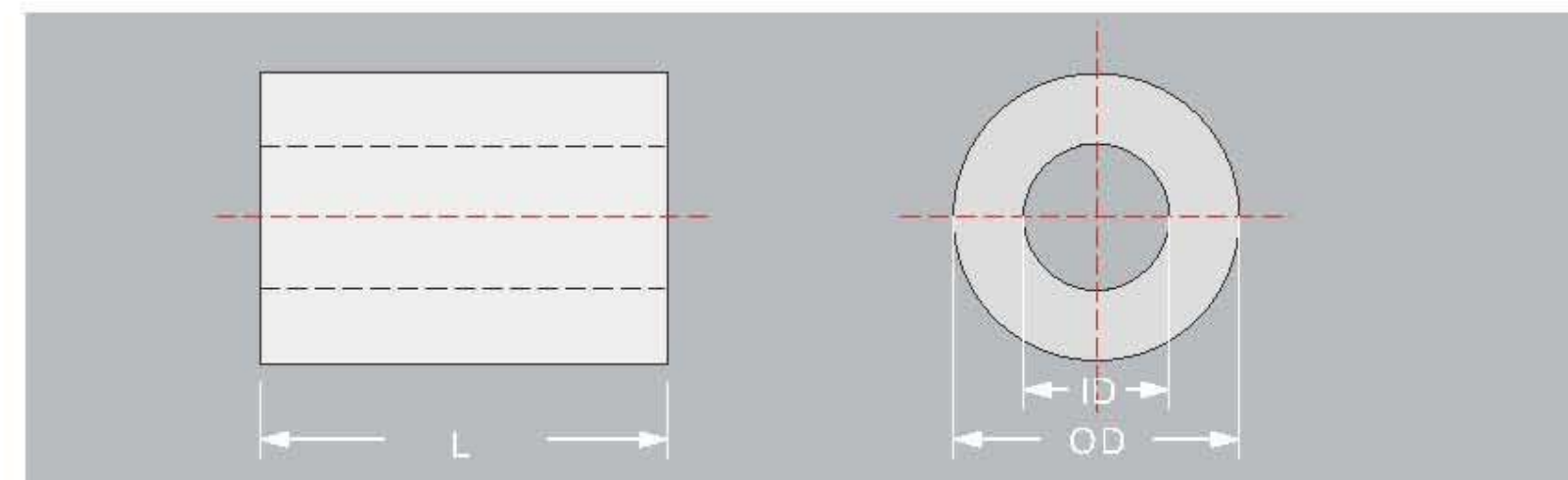
The Rubbex Cylindrical Fender is a simple and versatile fender type and can be easily installed.

## Features

- Very robust and simple design
- Easy to install and maintain
- High abrasion resistance
- Wide range of standard sizes

## Applications

- Barge and tug berths
- General Cargo Terminals
- RoRo and ferry Terminals
- Fishing and workboat berths
- Multi-Purpose Terminals



## Specifications

Type	Outer Dia. (mm)	Inner Dia. (mm)	Length	Rated Compression
FLCY 150	150	75	All length can be supplied to meet your request.	50%
FLCY 200	200	100		
FLCY 250	250	125		
FLCY 300	300	150		
FLCY 350	350	175		
FLCY 400	400	200		
FLCY 450	450	225		
FLCY 500	500	250		
FLCY 600	600	300		
FLCY 700	700	350		
FLCY 800	800	400		
FLCY 900	900	450		
FLCY 1000	1000	500		
FLCY 1100	1100	550		
FLCY 1200	1200	600		
FLCY 1300	1300	650		
FLCY 1400	1400	700		
FLCY 1500	1500	750		
FLCY 1600	1600	800		
FLCY 1800	1800	900		
FLCY 2000	2000	1000		

Other customized sizes are also available



## Performance

Specification	Rated Compression Reflection 50%			
	Reaction Force(KN)		Energy Absorption(KN-M)	
	Standard Type(FO)	High Type (FH)	Standard Type(FO)	High Type (FH)
FLCY150	45	75	1.5	2
FLCY200	61	97	2.7	4
FLCY250	77	122	4.1	6.6
FLCY300	91	146	6.1	9
FLCY350	106	170	8.2	13
FLCY400	121	195	10.2	17
FLCY500	151	244	16.3	26.5
FLCY600	183	292	24.5	27.5
FLCY700	212	341	31.6	51
FLCY800	242	391	41.8	67.3
FLCY900	273	439	53	85.7
FLCY1000	303	489	65.3	105
FLCY1100	338	539	78.5	132
FLCY1200	370	585	96.9	155
FLCY1300	400	635	110	183
FLCY1400	430	683	131	212
FLCY1500	460	732	150	243
FLCY1600	491	792	180	288
FLCY1700	521	840	210	345
FLCY1800	552	889	252	414
FLCY1900	581	938	294	497
FLCY2000	666	1075	327	596
REMARK: Performance tolerance is ±10%				

## TUGBOAT FENDER CYLINDRICAL FENDER

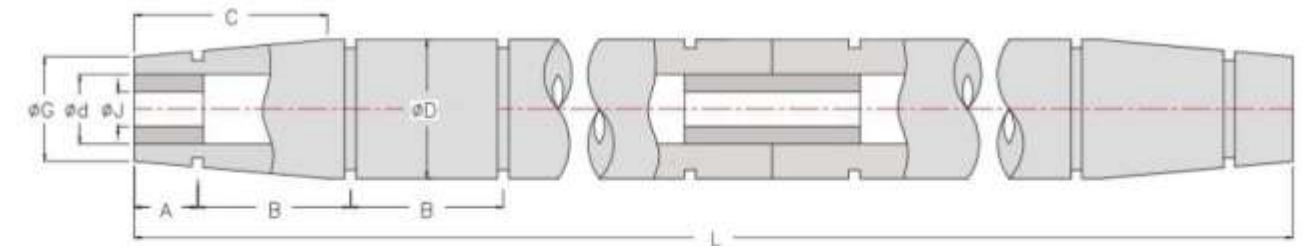
The Rubbex Tug Cylindrical Tender is made for extreme conditions. It is often used as the primary pushing fender on the bow or stem of tug. Tapered ends are also available.

### Features

- Heavy-duty design
- Soft and flexible body
- Grooved for extra grip
- Fits around tight bends

### Applications

- All types of tugs
- Pontoon protection
- Special corner fenders
- Bridge and pile protection



Φ D	Φ d	A max	B max	C	Φ G	Φ J
FLCT 250	125	200	570	500	190	75
FLCT 300	150	225	600	700	225	75
FLCT 350	175	250	650	800	250	85
FLCT 400	200	300	670	800	300	100
FLCT 450	225	300	700	850	350	100
FLCT 500	250	300	730	900	375	100
FLCT 600	300	350	800	900	450	125
FLCT 800	400	350	930	1000	600	125
FLCT 900	450	350	1000	1100	675	150
FLCT 1000	500	350	1060	1200	750	150



# TUGBOAT FENDER

## W FENDER



The Rubbex W Fender is one of the world most popular tug fender design, the W Fender is built for extreme conditions. Its open-bore design makes installation very simple. The flexible legs allow W-Fenders to be curved around most hull shapes.



### Features

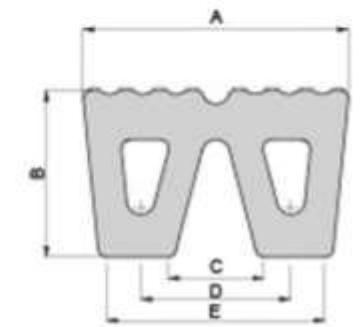
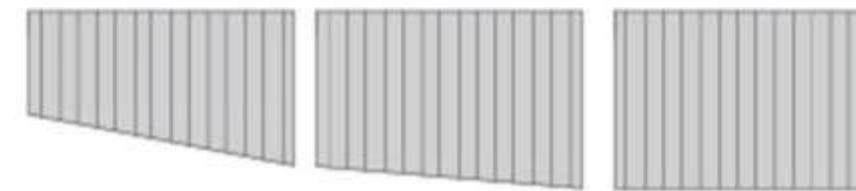
- Extreme-duty design
- Twin-leg attachment
- Grooved for extra grip
- Fits around tight bends
- Open bore for easy installation

### Applications

- Icebreaker
- Ocean-going tugs
- Large harbor tugs
- Bridge and pile protection



### Specifications



Type(mm)	A	B	C	D	E
W320	320	200	100	180	280
W400	400	250	110	220	350
W480	480	300	135	265	420
W500	500	360	125	265	390
W500	500	450	90	250	420



# SQUARE FENDER

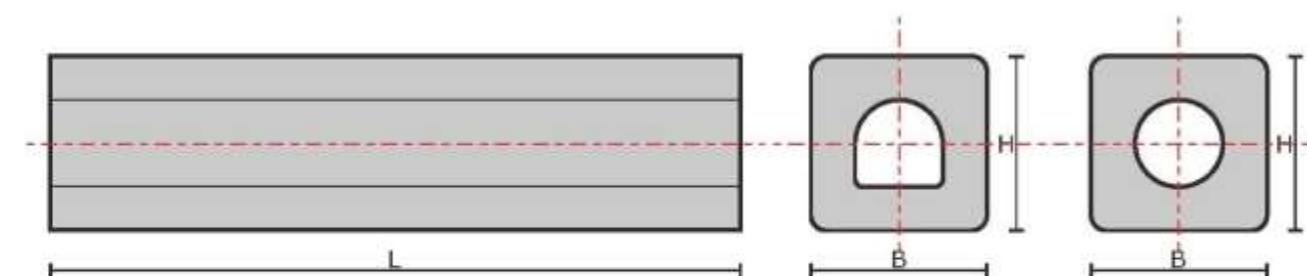


The Rubbex Square Fender has a Square shaped outer form and either a D shaped center (SD Fender) or cylindrical center bore (SC Fender). We can also produce solid square fender.



## Applications Features

- Simple & easy installation
- Customized sizes
- Optional UHMW-PE face pad.
- Tugs and workboats
- Pontoon and bridge protection
- Multiple purpose fendering



Item	150HB	200HB	250HB	300HB	350HB	400HB	500HB	600HB
H(mm)	150	200	250	300	350	400	500	600
B(mm)	150	200	250	300	350	400	500	600
ΦD	75	100	125	150	175	200	250	300
Bolt	M22	M26	M30	M32	M36	M38	M45	M52
Reaction Force (KN)	117	156	195	234	273	312	390	468
Energy Absorption(KN-M)	3.83	6.85	10.6	15.4	20.9	27.4	42.8	61.6
Other customized sizes are also available								





# OTHER FENDERS



# ACCESSORIES



L-Washer



U Ring



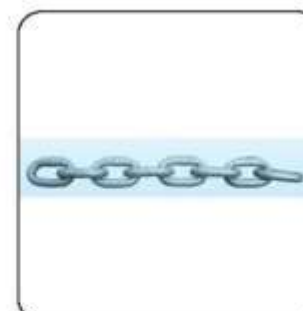
U Plate



Steel Bar



Frontal Panel



Chain



Nut



Bolt



Resin Bolt



Dogbone Shackle



UHMW-PE Pad



Shackle



Flat Bar



Round Washer



Cast-in Nut



Swivel