JAN'S

RUBBER FENDERS HANDBOOK

www.CastleHills.no

Castle Hills
BY JAN VINDENES

JAN'S
Rubber Fenders
HANDBOOK

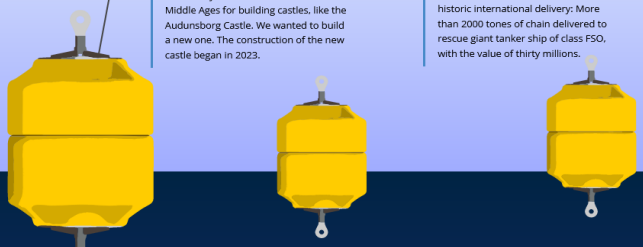
Lead Editor: Daniel Díaz Ramos

Contact: Madrid@CastleHills.no

Present: Breaking Records

2023 - Building The Castle - A new Head Office for Castle Hills
Our Family has been famous since the Middle Ages for building castles, like the Audunsborg Castle. We wanted to build a new one. The construction of the new castle began in 2023.

2022 - Delivering over 2000 tones of Chain to Rescue a Tanker Ship
In the year 2022 Castle Hills made a historic international delivery: More than 2000 tones of chain delivered to rescue giant tanker ship of class FSO, with the value of thirty millions.



2010 – 2020: Rise to Fame

2020 - Norwegian Prime Minister and TV visits Jan Vindenes' Monument
After discovering the dead "plastic whale" in 2017, a shocking sign of ocean pollution, 3 years later Jan built a monument as a reminder. This event was omnipresent in television.

2017 - Dumping 25 Tones of Chains in the Tax Office
The rise to fame of Jan Vindenes began way earlier than 2017, but this year shocked global newspapers for his particular protest against wealth tax: Paying tax with 25 tones of ship chain.

1980 – 2010: A Family Firm

2010s - Strong Presence in the maritime market
After half a lifetime in the maritime industry, the Vindenes' Family Firm, was unmistakeably an expert and leading supplier of maritime equipment for ships and offshore rigs.

1980s - The Vindenes Family starts it's own Corporation
With the sudden rise of the Oil & Gas Industry, an extremely high demand for maritime equipment made suppliers very profitable. Because of this, Jarle, Jan's father, decided to join the market.

1960 – 1970: Hard Times

1970s - A Freight Ship named Mona joins the Vindenes Family
Life in Norway was hard at the time, and one fishing boat wasn't enough. Karl Olai acquired a freight ship and gave it the name "Mona" this boat was essential for bringing food to the family.

1960s - A Humble, Hard Working Family dedicated to Fishing
On the times of Jan's Grandfather the family worked in fishing. Thanks to owning a fishing boat, Karl Olai Vindenes he could feed his 11 siblings, after the early death of his father.

1300 – 1900: Strile People

1900s - The Peak of the relevance of the Strile People
In the 1900s the Strile People peaked in population, maintaining the 600 years lasting Stril Trade Route that supplied fish to the city of Bergen, directly from the cold seas of Sotra.

1300s - The Origin and Heritage of the Strile People, our people
Strile People refer to humble and hard working fishermen and sailors who lived in the island of Sotra and nearby. We can trace 13 generations of hard working Strils, up to Rasmus Vindenes.

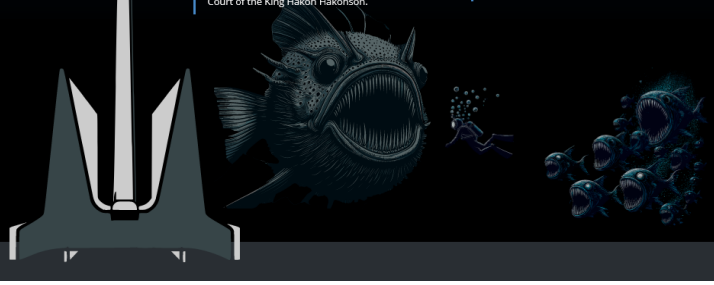
1100 – 1300: The Origins

1300s - Our Family's Castle and our Ancestors in Nobility
Our obsession with building castles began around 700 years ago. Our ancestor, the Duke of Iceland, Audun Hugleiksson built our first castle, the Audunsborg Castle, near Bergen.

1260s - Reign of Magnus VI Haakonsson, our Relative
The Legacy of our family can be traced back to Magnus VI, King of Norway, and one of our family relatives. He was called "The Legislator" for enacting an array of legal changes in the nation.

1200s - The oldest known ancestors of the Vindenes Family
Hugleik from Ålhus was a noble with the title of "Lord" and was a prominent businessman and magnate with over 30 farms in Jølster, Norway. He lived in the Court of the King Håkon Håkonson.

1100s - Post Viking Era in Sotra, our parent island
After the Fall of the Vikings, our ancestors in Sotra focused on fishing and farming. Large stone monuments are kept from this time, and their purpose is still uncertain.



Jan Vindenes – Our Founder

Jan Vindenes is known as Mr. Anchor & Chain after 30 years in the industry. He started working at his fathers local scrap trading company in 1992 and made the company world famous. His Anchor & Chain handbook was printed in 75,000 copies and is in daily use within the whole maritime sector. In Norway he became an legend when he loaded a truck with 25 tons of chains and dumped it at the tax collector as a payment of his capital tax.

In 2016 he made the world first Pokemon Go Statue and made a video that was published all over the world from REUTERS, REDDIT and hundreds of others. In 2020 he raised a whale monument in his hometown Vindenes, at Sotra, to honor the “plastic whale” that stranded on the beach. SKY NEWS made a documentary with Mr. Jan Vindenes to focus the problem with plastic in ocean, aired worldwide in 160 countries.

Top Stories:

Jan and his famous monument, the first Pokemon Go Statue

Jan and the Prime Minister at the Plastic Whale Monument

Jan covering the local Tax Office with 25 tons of chain

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ABOUT US

Anchors

Chains

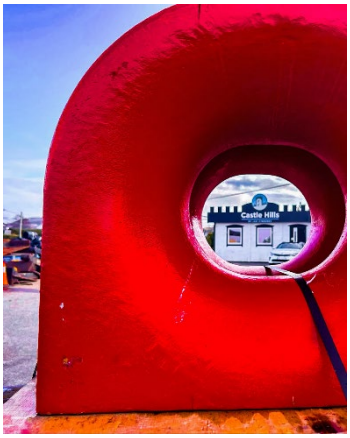
Fenders

Bollards

Buoys

D Fenders

Oil Rig Anchors



Panama Chocks

Chain Gypsies

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ABOUT US

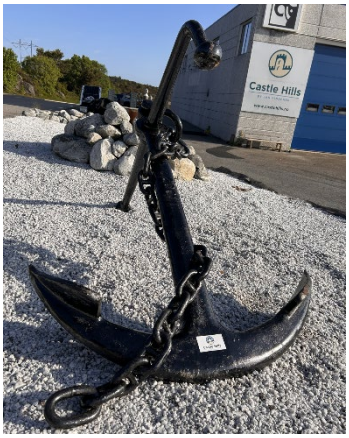
Decking

Winches

Wire Rope

Shackles

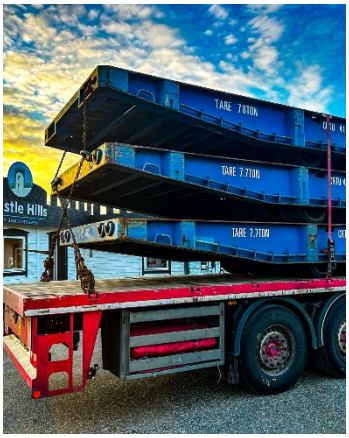
Swivels



Decoration

Chain Sinkers

ISO Tank Containers



MAFI Roll Trailers

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FENDERS

Yokohama

Sling

D Fenders

Foam

Submarine

Roller

Cylinder

Arch

PVC

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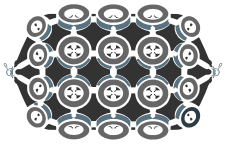
Maritime Fenders

Yokohama



Sling

D

Foam

U-Boat

Roller

Cylinder

Arch

Buy or Rent

Buy or rent maritime fenders from us.

In Stock

Maritime Fenders in Stock in Norway, Europe, and Asia Pacific locations.

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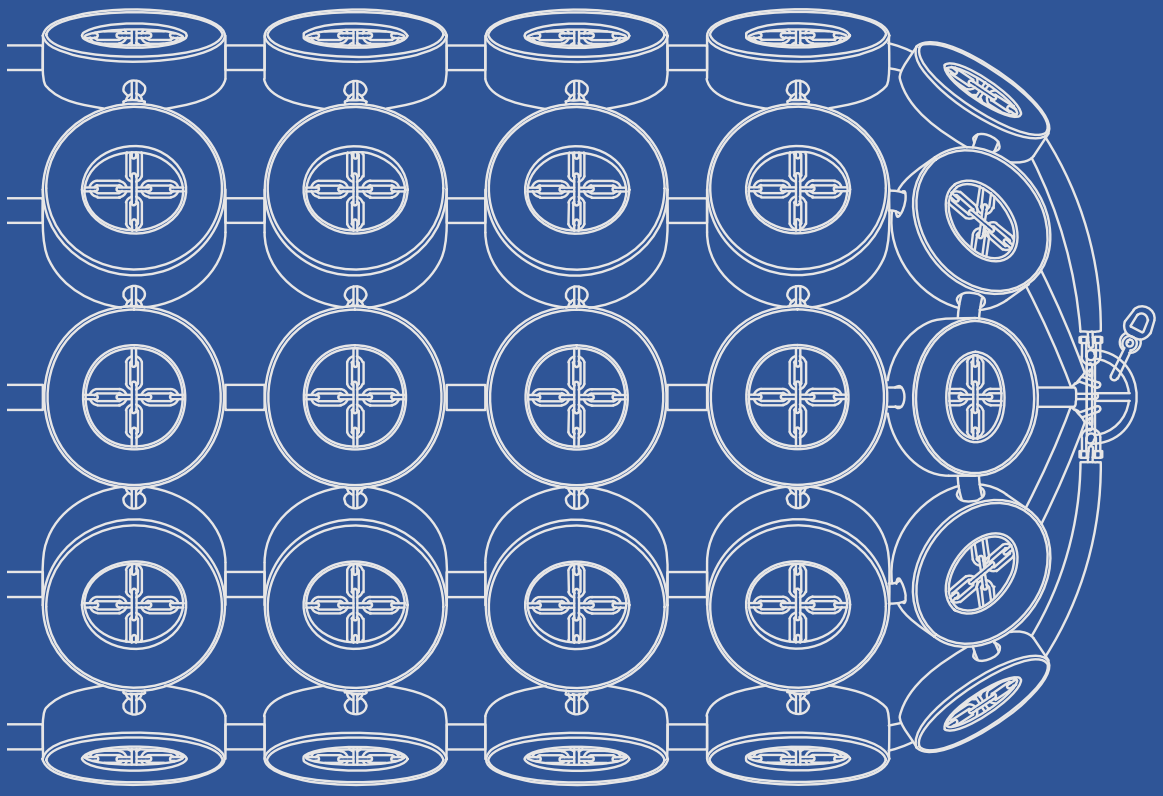
PNEUMATIC FENDERS



Pneumatic Fenders – **Chart**

50 kPa

Size	Energy Absorption	Reaction Force	Weight
Mm	kNm	kN	kg
700 x 1500	17	137	133
1000 x 1500	32	182	210
1000 x 2000	45	257	235
1200 x 2000	63	297	285
1500 x 3000	153	579	485
2000 x 3500	308	875	885
2500 x 3500	580	1208	1287
2500 x 4000	663	1380	1380
2500 x 5500	932	2010	1865
3000 x 5000	1050	2030	2266
3000 x 6000	1315	2488	2644
3300 x 4500	1180	1885	3180
3300 x 6500	1814	3015	3780
4500 x 6500	3432	4150	4982
4500 x 9000	4752	5747	6672

80 kPa

Size	Energy Absorption	Reaction Force	Weight
Mm	kNm	kN	kg
700 x 1500	21	171	143
1000 x 1500	40	266	226
1000 x 2000	56	321	255
1200 x 2000	79	371	309
1500 x 3000	191	724	549
2000 x 3500	385	1094	1003
2500 x 3500	726	1408	1405
2500 x 4000	829	1725	1580
2500 x 5500	1165	2513	2145
3000 x 5000	1313	2538	2626
3000 x 6000	1644	3110	3084
3300 x 4500	1640	2647	3560
3300 x 6500	2268	3769	4320
4500 x 6500	4518	4998	5990
4500 x 9000	6633	7551	9722

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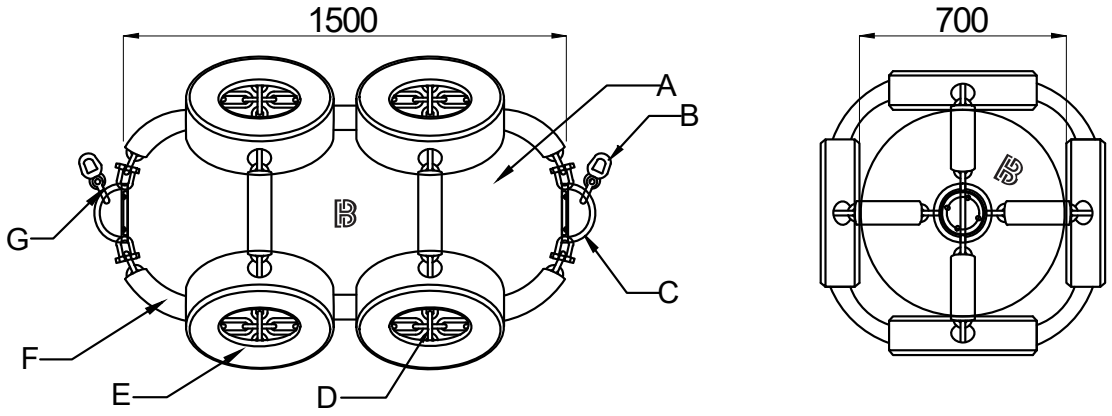
700 x 1500 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	17 kNm	Energy Absorption	21 kNm
Reaction Force	137 kN	Reaction Force	171 kN
Weight	133 kgs	Weight	143 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Swivel	B	Swivel
C	Pull Ring	C	Pull Ring
D	Chain	D	Chain
E	Tires	E	Tires
F	Rubber Sleves	F	Rubber Sleves
G	Shackle	G	Shackle

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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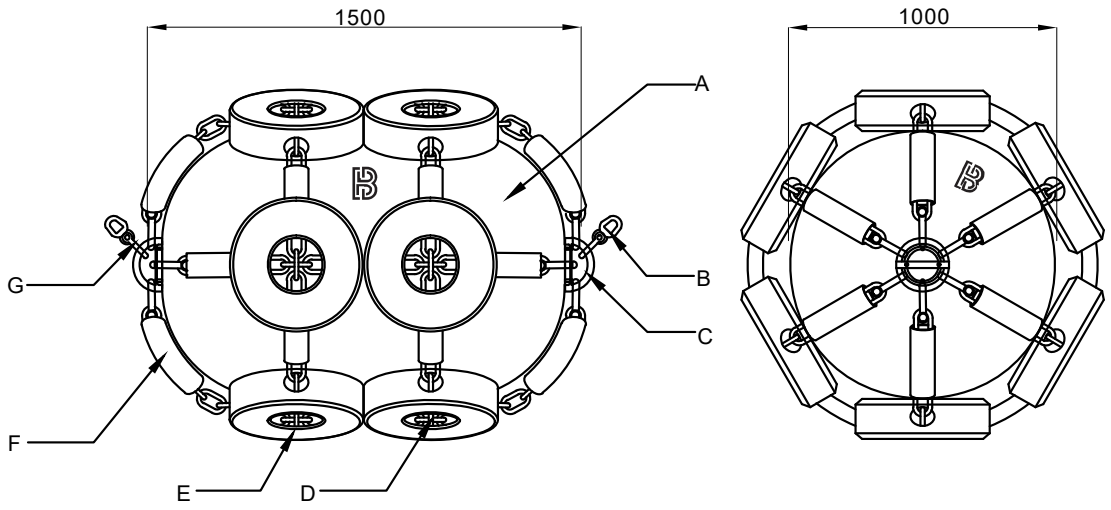
Pneumatic Fender – **1000 x 1500**



50 kPa	Value	80 kPa	Value
Energy Absorption	32 kNm	Energy Absorption	40 kNm
Reaction Force	181 kN	Reaction Force	266 kN
Weight	210 kgs	Weight	226 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Swivel	B	Swivel
C	Pull Ring	C	Pull Ring
D	Chain	D	Chain
E	Tires	E	Tires
F	Rubber Sleves	F	Rubber Sleves
G	Shackle	G	Shackle

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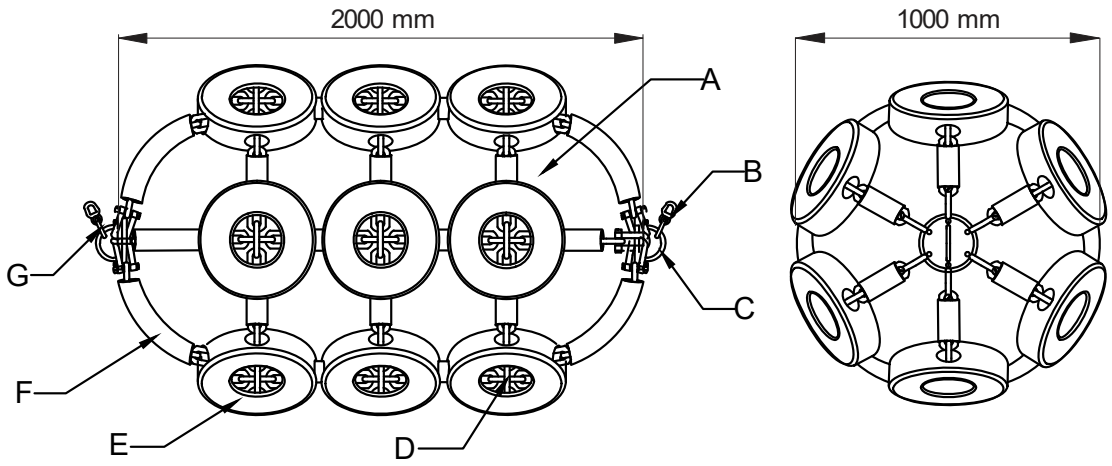
1000 x 2000 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	45 kNm	Energy Absorption	56 kNm
Reaction Force	257 kN	Reaction Force	321 kN
Weight	235 kgs	Weight	255 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Swivel	B	Swivel
C	Pull Ring	C	Pull Ring
D	Chain	D	Chain
E	Tires	E	Tires
F	Rubber Sleves	F	Rubber Sleves
G	Shackle	G	Shackle

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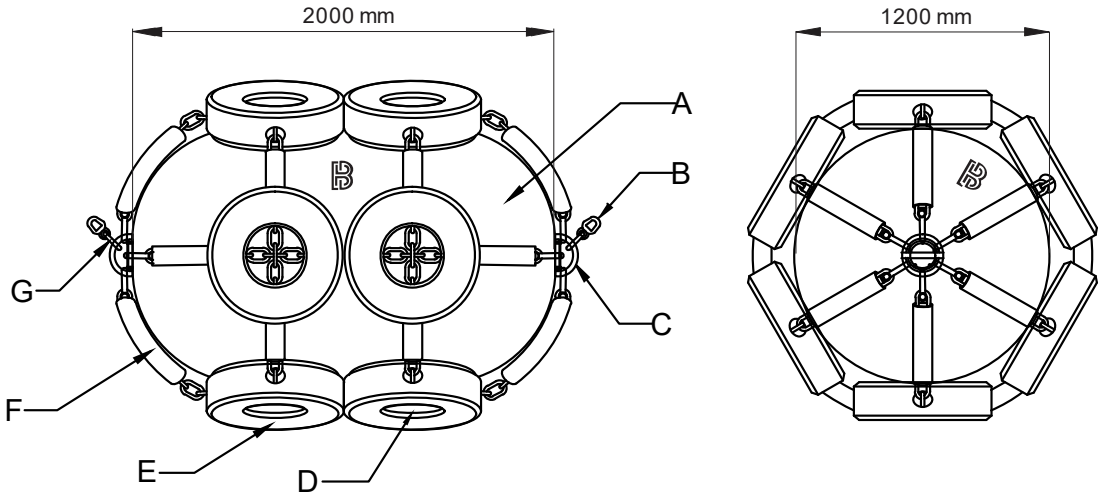
Pneumatic Fender – **1200 x 2000**



50 kPa	Value	80 kPa	Value
Energy Absorption	63 kNm	Energy Absorption	79 kNm
Reaction Force	297 kN	Reaction Force	371 kN
Weight	285 kgs	Weight	309 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Swivel	B	Swivel
C	Pull Ring	C	Pull Ring
D	Chain	D	Chain
E	Tires	E	Tires
F	Rubber Sleves	F	Rubber Sleves
G	Shackle	G	Shackle

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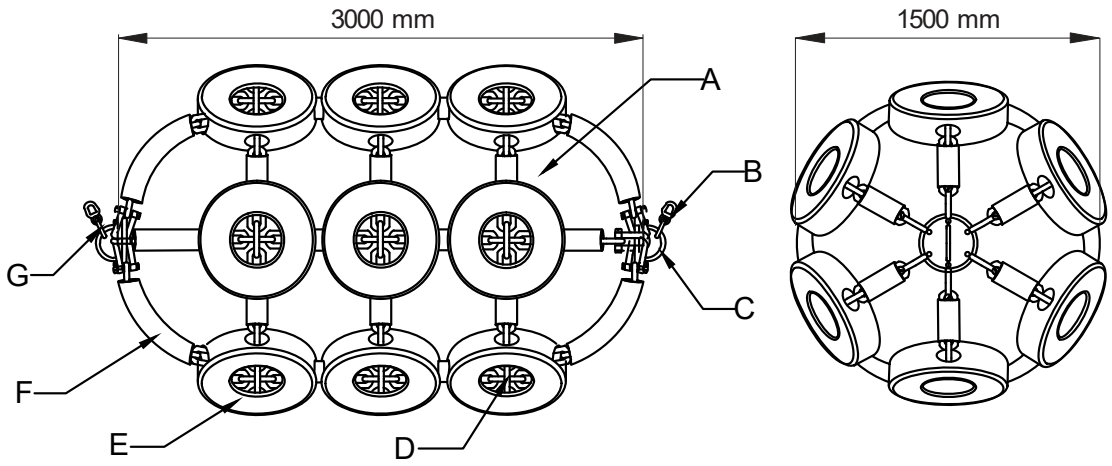
1500 x 3000 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	153 kNm	Energy Absorption	191 kNm
Reaction Force	579 kN	Reaction Force	724 kN
Weight	485 kgs	Weight	549 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Swivel	B	Swivel
C	Pull Ring	C	Pull Ring
D	Chain	D	Chain
E	Tires	E	Tires
F	Rubber Sleves	F	Rubber Sleves
G	Shackle	G	Shackle

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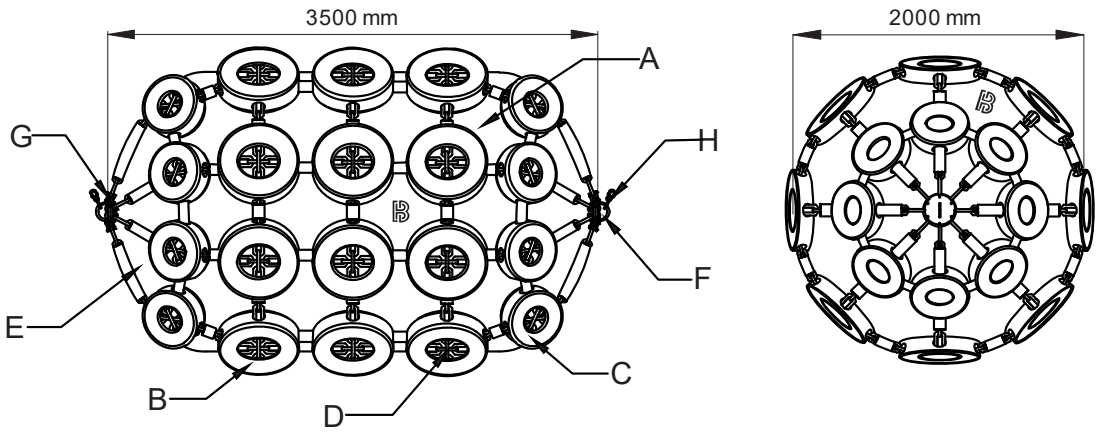
Pneumatic Fender – **2000 x 3500**



50 kPa	Value	80 kPa	Value
Energy Absorption	308 kNm	Energy Absorption	385 kNm
Reaction Force	875 kN	Reaction Force	1094 kN
Weight	885 kgs	Weight	1003 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

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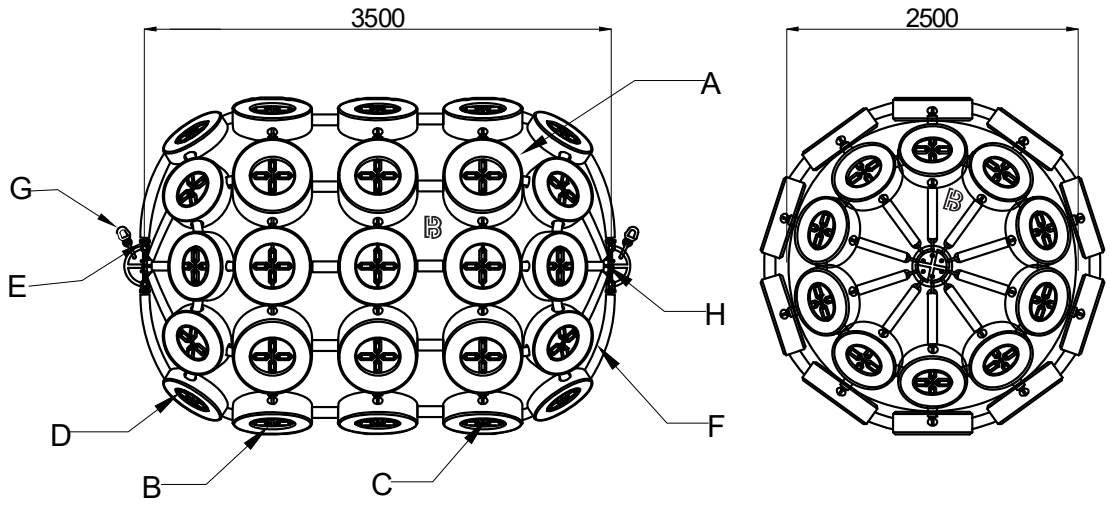
2500 x 3500 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	580 kNm	Energy Absorption	726 kNm
Reaction Force	1208 kN	Reaction Force	1408 kN
Weight	1287 kgs	Weight	1405 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Chain	C	Chain
D	Shoulder Tires	D	Shoulder Tires
E	Shackle	E	Shackle
F	Rubber Sleeves	F	Rubber Sleeves
G	Swivel	G	Swivel
H	Pull Ring	H	Pull Ring

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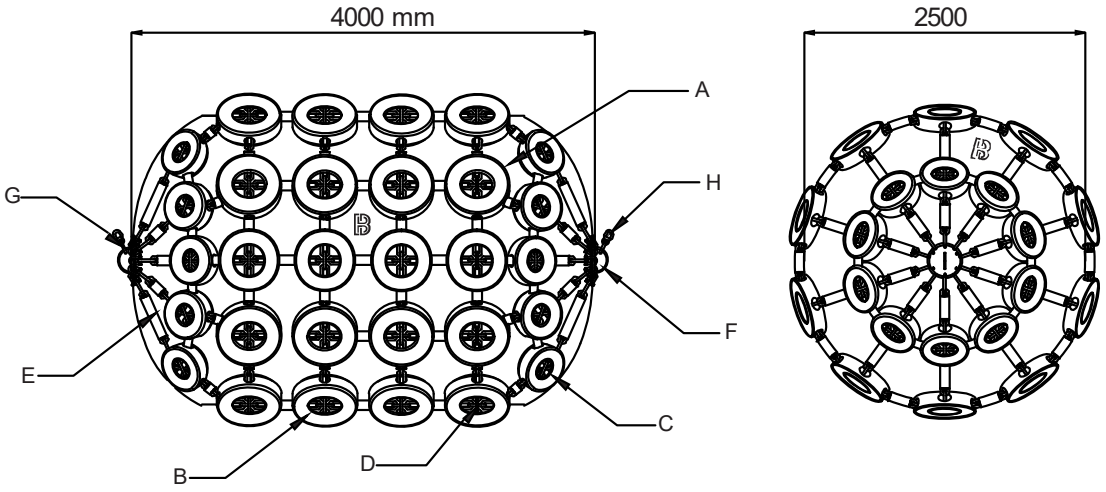
Pneumatic Fender – **2500 x 4000**



50 kPa	Value	80 kPa	Value
Energy Absorption	663 kNm	Energy Absorption	829 kNm
Reaction Force	1380 kN	Reaction Force	1725 kN
Weight	1380 kgs	Weight	1580 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

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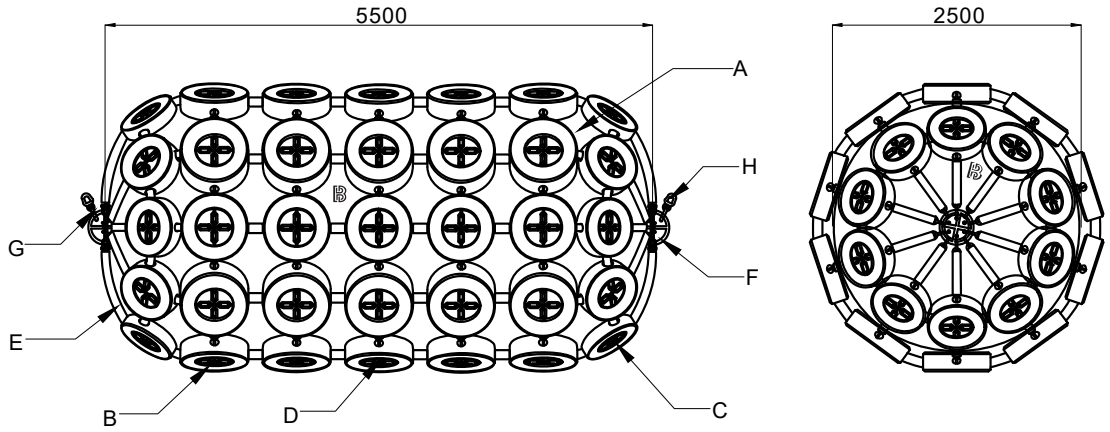
2500 x 5500 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	932 kNm	Energy Absorption	1165 kNm
Reaction Force	2010 kN	Reaction Force	2513 kN
Weight	1865 kgs	Weight	2145 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

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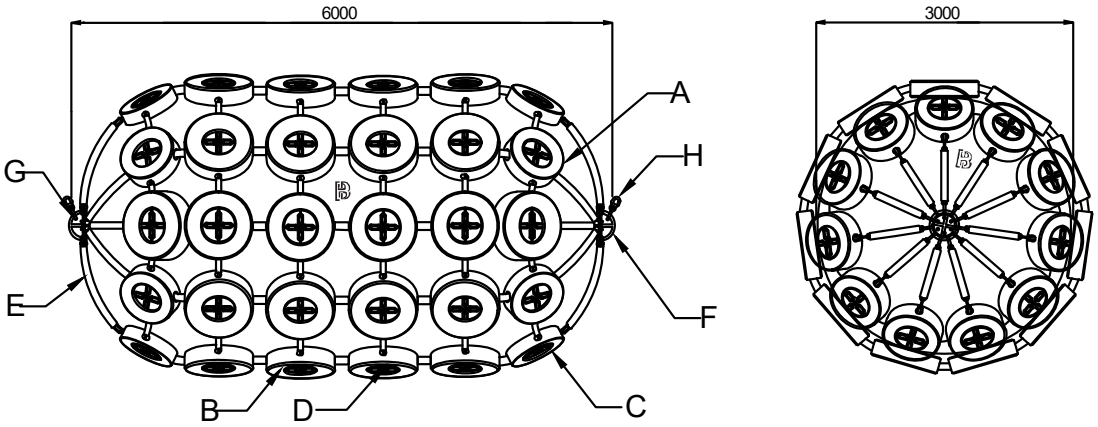
Pneumatic Fender – **3000 x 6000**



50 kPa	Value	80 kPa	Value
Energy Absorption	1315 kNm	Energy Absorption	1644 kNm
Reaction Force	2488 kN	Reaction Force	3110 kN
Weight	2644 kgs	Weight	3084 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

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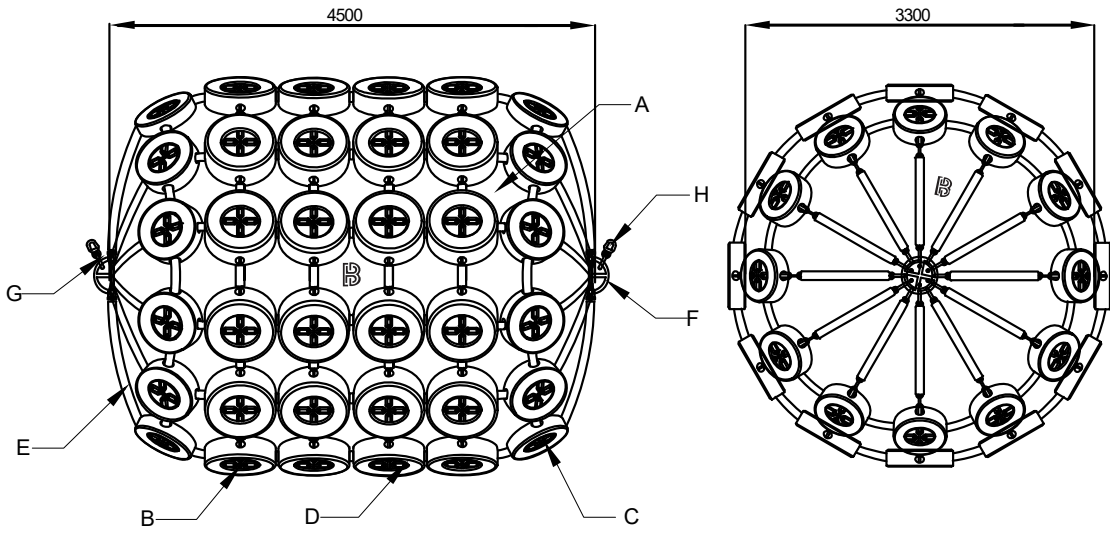
3300 x 4500 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	1175 kNm	Energy Absorption	1640 kNm
Reaction Force	1884 kN	Reaction Force	2467 kN
Weight	3180 kgs	Weight	3560 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

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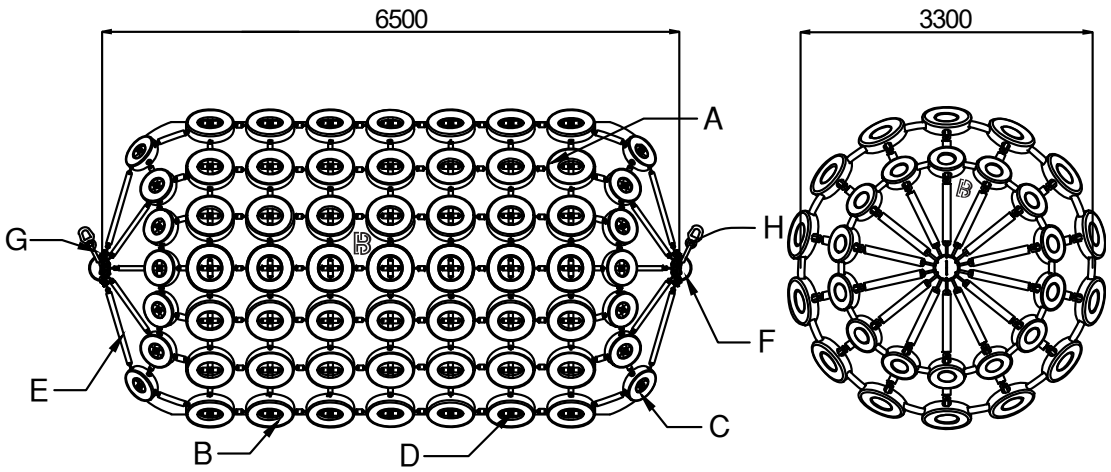
Pneumatic Fender – **3300 x 6500**



50 kPa	Value	80 kPa	Value
Energy Absorption	1814 kNm	Energy Absorption	2268 kNm
Reaction Force	3015 kN	Reaction Force	3769 kN
Weight	3780 kgs	Weight	4320 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
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H	Swivel	H	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

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Castle Hills
BY JAN VINDENES

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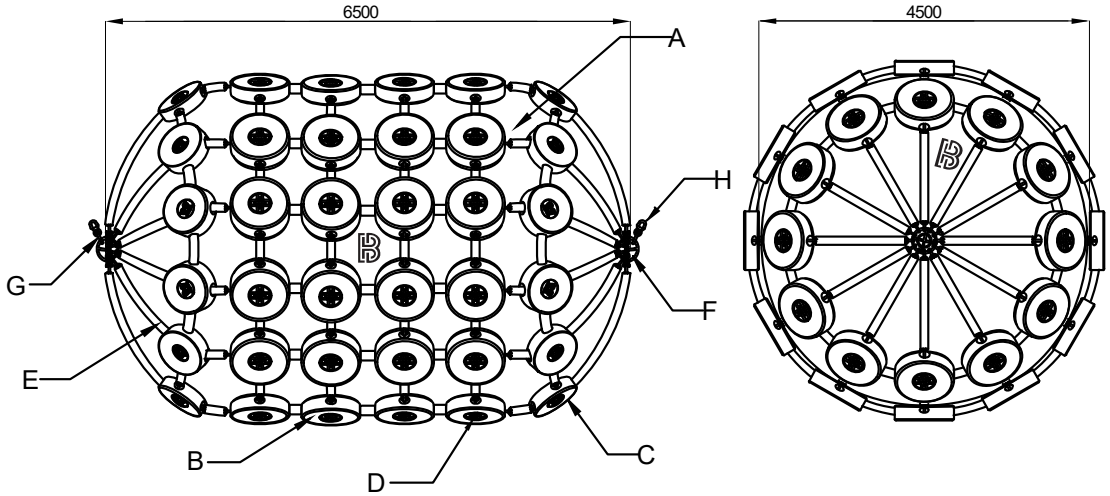
4500 x 6500 – Pneumatic Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	3432 kNm	Energy Absorption	4518 kNm
Reaction Force	4150 kN	Reaction Force	4998 kN
Weight	4982 kgs	Weight	5990 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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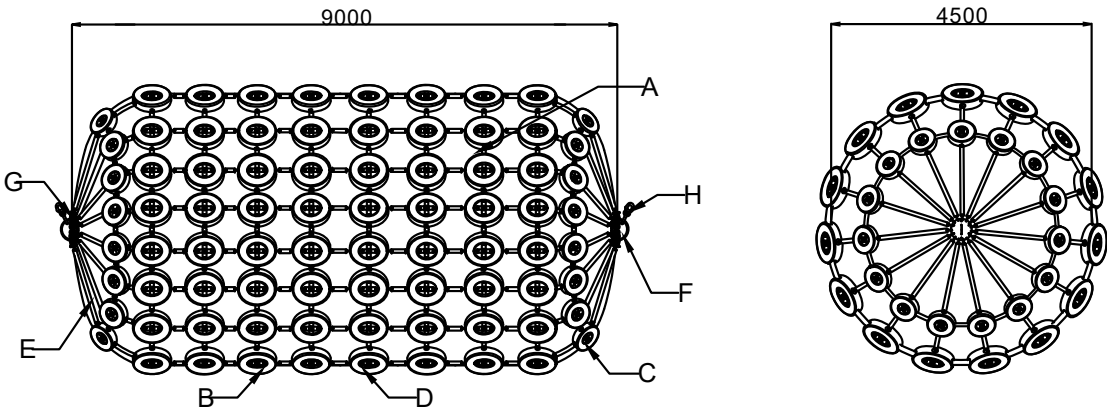
Pneumatic Fender – **4500 x 9000**



50 kPa	Value	80 kPa	Value
Energy Absorption	4752 kNm	Energy Absorption	6633 kNm
Reaction Force	5747 kN	Reaction Force	7551 kN
Weight	6672 kgs	Weight	9722 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Tires	B	Tires
C	Shoulder Tires	C	Shoulder Tires
D	Chain	D	Chain
E	Rubber Sleeves	E	Rubber Sleeves
F	Pull Ring	F	Pull Ring
G	Shackle	G	Shackle
H	Swivel	H	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

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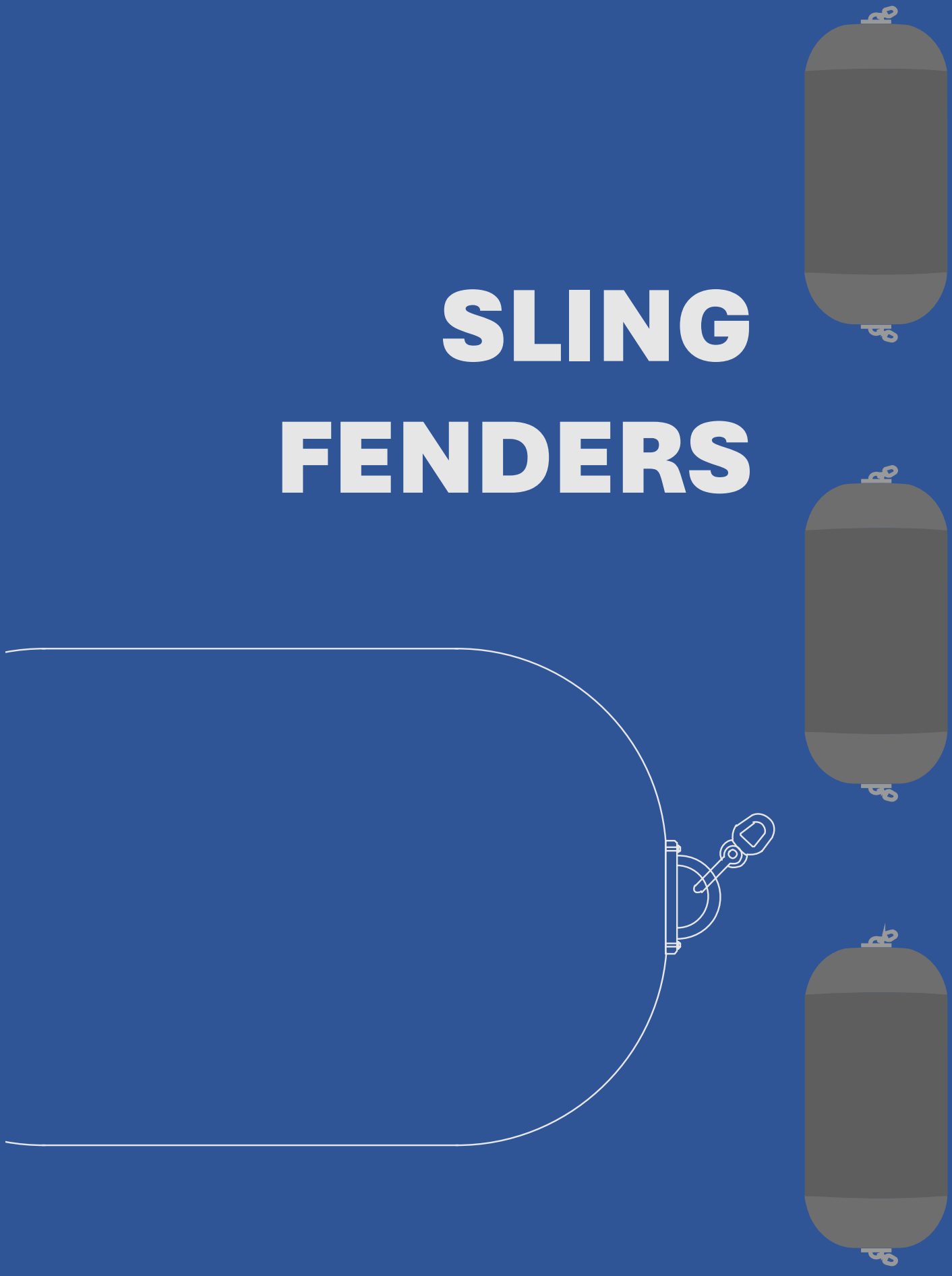
SLING FENDERS



Sling Fenders – **Chart**

50 kPa

Size	Energy Absorption	Reaction Force	Weight
Mm	kNm	kN	kg
500 x 1000	6	24	19
700 x 1500	17	137	42
800 x 1500	19	157	48
1000 x 1500	32	182	69
1000 x 2000	45	257	82
1200 x 2000	63	297	95
1500 x 3000	153	579	185
2000 x 3500	308	875	390
2500 x 4000	663	1380	580
2500 x 5500	932	2010	725
3000 x 5000	1050	2030	989
3000 x 6000	1315	2488	1149
3300 x 4500	1180	1885	1110
3300 x 6500	1814	3015	1480
4500 x 6500	3432	4150	2050
4500 x 9000	4752	5747	3490

80 kPa

Size	Energy Absorption	Reaction Force	Weight
Mm	kNm	kN	kg
500 x 1000	8	54	24
700 x 1500	21	171	45
800 x 1500	24	196	52
1000 x 1500	40	266	74
1000 x 2000	56	321	87
1200 x 2000	79	371	114
1500 x 3000	191	724	230
2000 x 3500	385	1094	410
2500 x 4000	829	1725	893
2500 x 5500	1165	2513	1135
3000 x 5000	1313	2538	1095
3000 x 6000	1644	3110	1320
3300 x 4500	1640	2647	1538
3300 x 6500	2268	3769	2640
4500 x 6500	4518	4998	3450
4500 x 9000	6633	7551	3960

Performance is calculated at 60% compression. ISO17357-1: 2014

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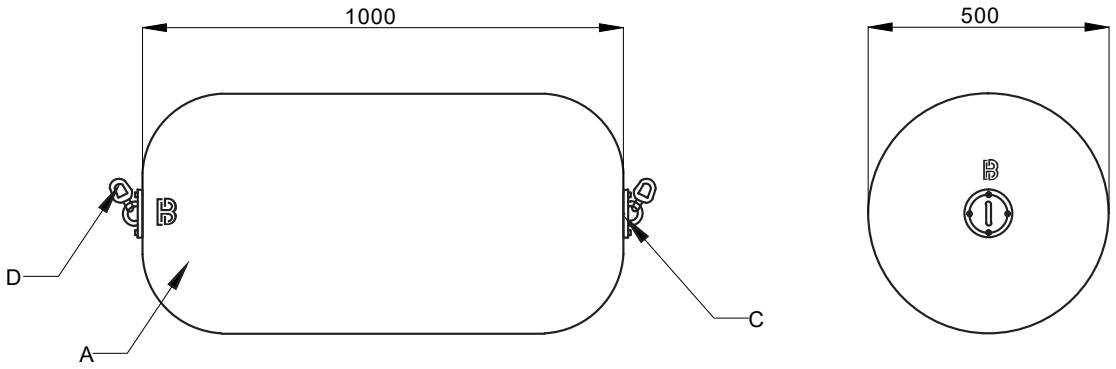
500 x 1000 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	6 kNm	Energy Absorption	8 kNm
Reaction Force	24 kN	Reaction Force	54 kN
Weight	19 kgs	Weight	24 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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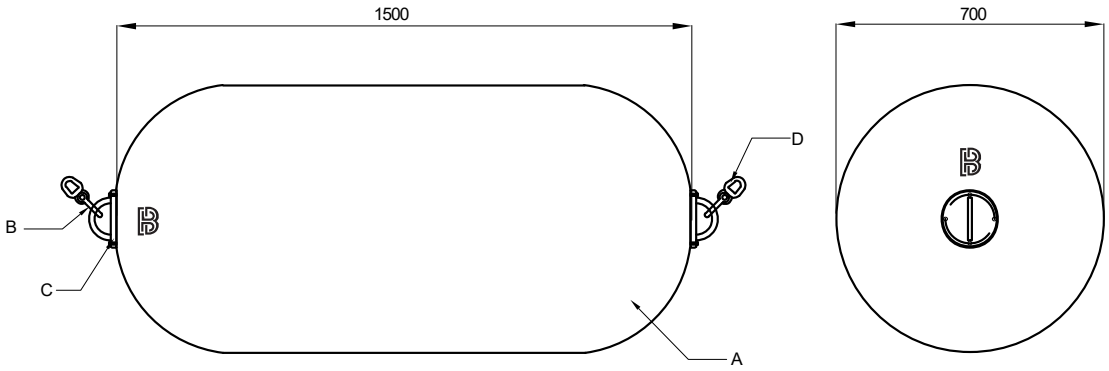
Sling Fender – **700 x 1500**



50 kPa	Value	80 kPa	Value
Energy Absorption	17 kNm	Energy Absorption	21 kNm
Reaction Force	137 kN	Reaction Force	171 kN
Weight	42 kgs	Weight	45 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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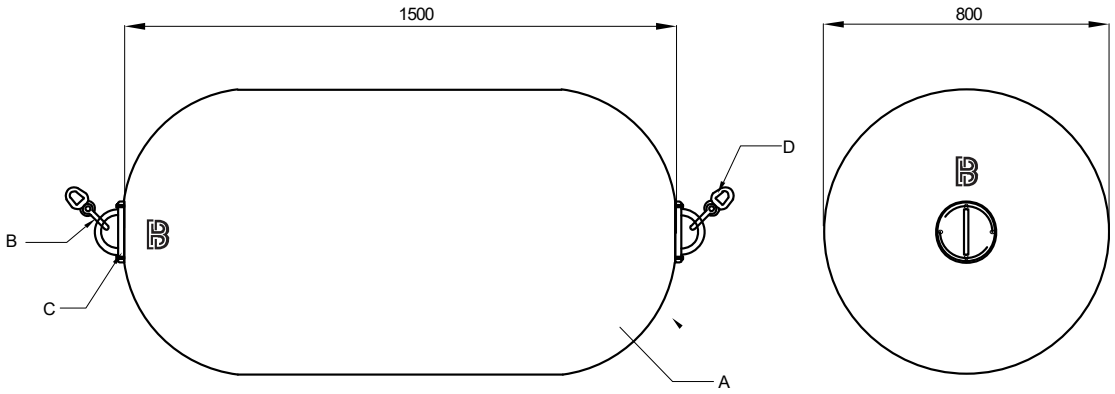
800 x 1500 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	19 kNm	Energy Absorption	24 kNm
Reaction Force	157 kN	Reaction Force	196 kN
Weight	48 kgs	Weight	52 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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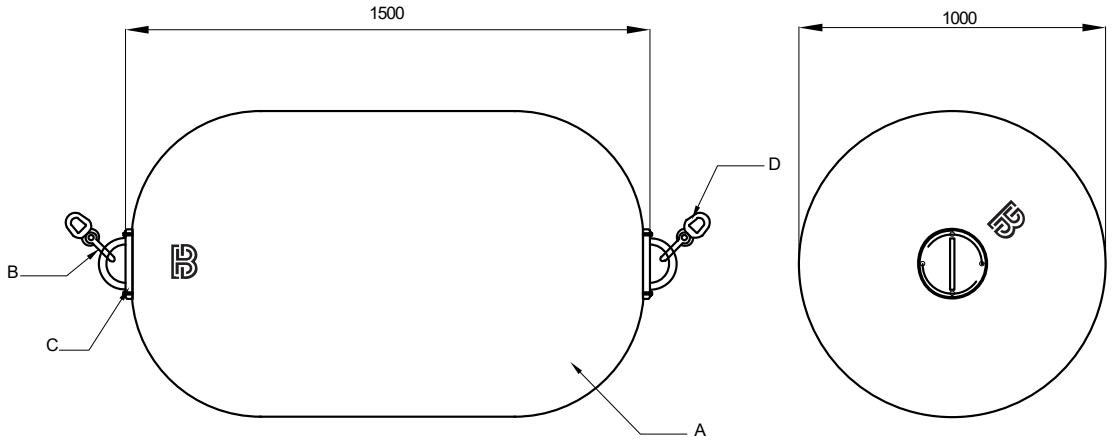
Sling Fender – **1000 x 1500**



50 kPa	Value	80 kPa	Value
Energy Absorption	32 kNm	Energy Absorption	40 kNm
Reaction Force	182 kN	Reaction Force	266 kN
Weight	69 kgs	Weight	74 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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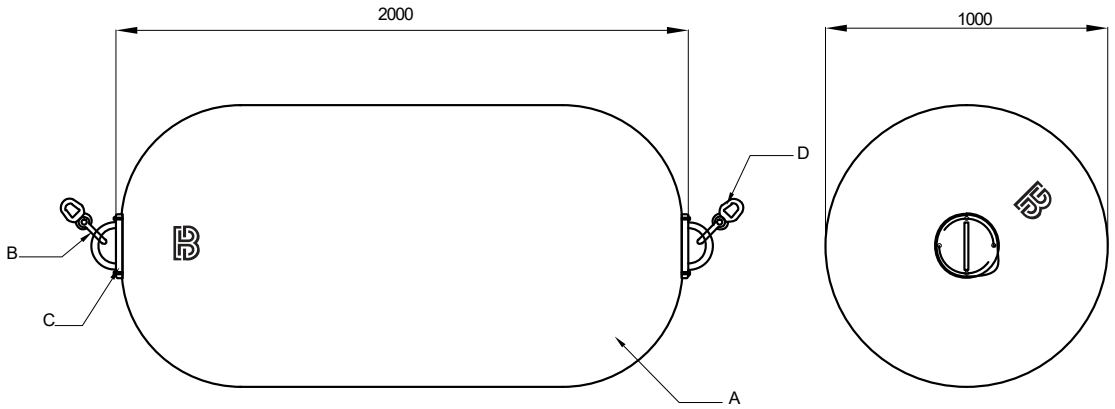
1000 x 2000 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	45 kNm	Energy Absorption	56 kNm
Reaction Force	257 kN	Reaction Force	321 kN
Weight	82 kgs	Weight	87 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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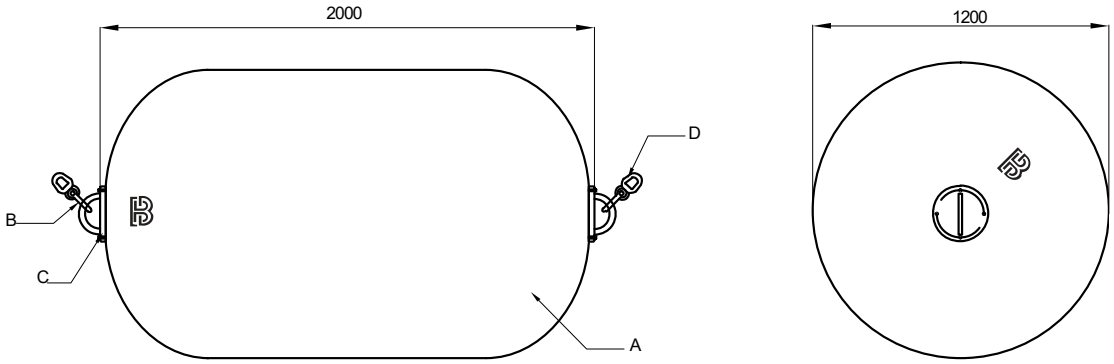
Sling Fender – **1200 x 2000**



50 kPa	Value	80 kPa	Value
Energy Absorption	63 kNm	Energy Absorption	79 kNm
Reaction Force	297 kN	Reaction Force	371 kN
Weight	95 kgs	Weight	114 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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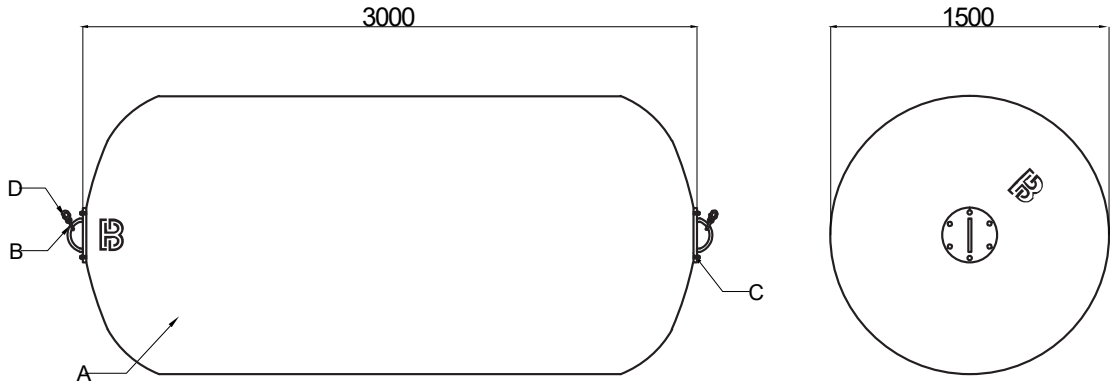
1500 x 3000 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	153 kNm	Energy Absorption	191 kNm
Reaction Force	579 kN	Reaction Force	724 kN
Weight	185 kgs	Weight	230 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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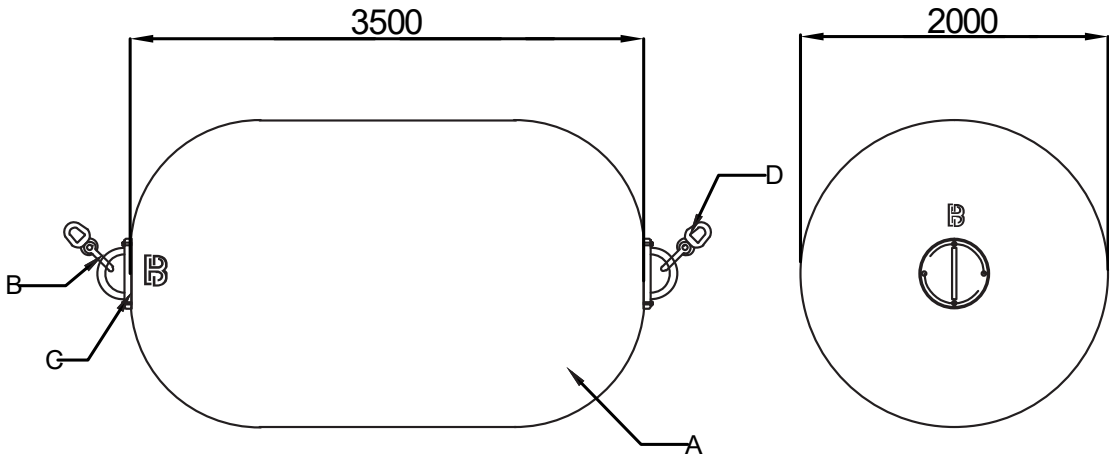
Sling Fender – **2000 x 3500**



50 kPa	Value	80 kPa	Value
Energy Absorption	308 kNm	Energy Absorption	385 kNm
Reaction Force	875 kN	Reaction Force	1094 kN
Weight	390 kgs	Weight	410 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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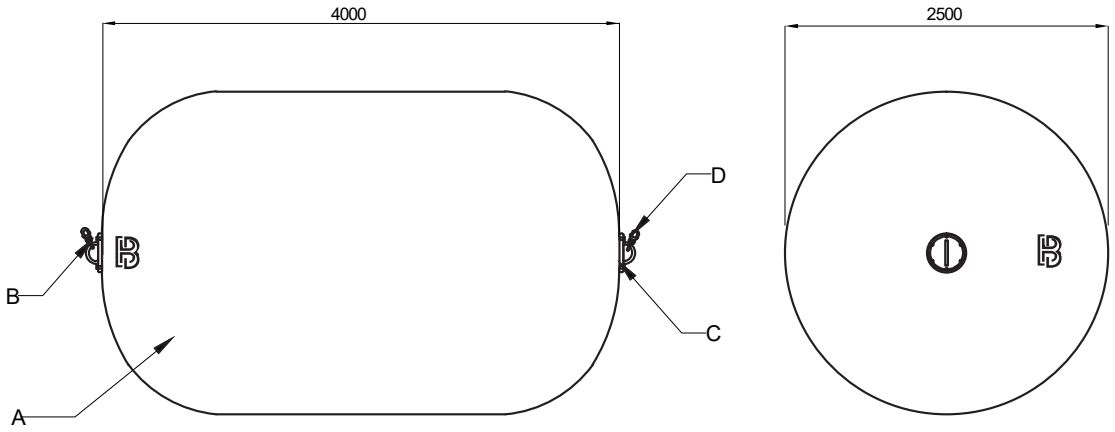
2500 x 4000 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	663 kNm	Energy Absorption	829 kNm
Reaction Force	1380 kN	Reaction Force	1725 kN
Weight	580 kgs	Weight	893 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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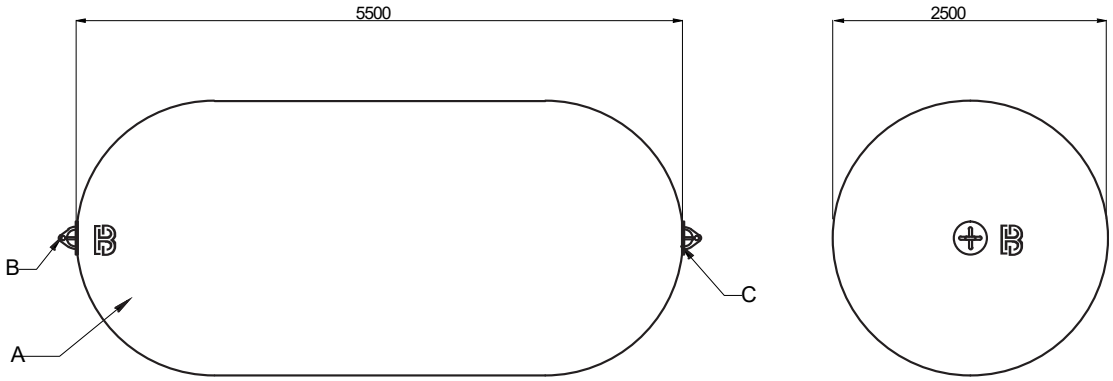
Sling Fender – **2500 x 5500**



50 kPa	Value	80 kPa	Value
Energy Absorption	932 kNm	Energy Absorption	1165 kNm
Reaction Force	2010 kN	Reaction Force	2513 kN
Weight	725 kgs	Weight	1135 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Flange	B	Flange
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

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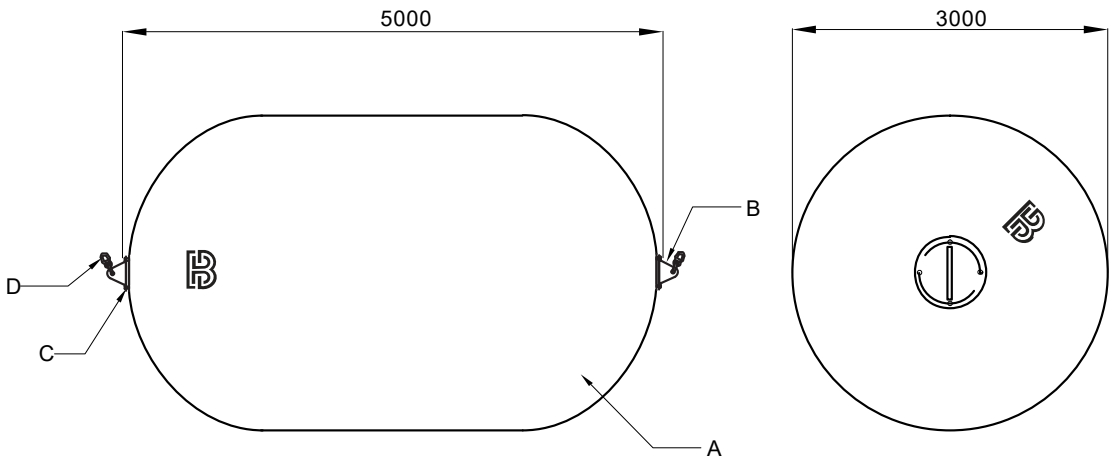
3000 x 5000 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	1050 kNm	Energy Absorption	1313 kNm
Reaction Force	2030 kN	Reaction Force	2538 kN
Weight	989 kgs	Weight	1095 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Flange	B	Flange
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

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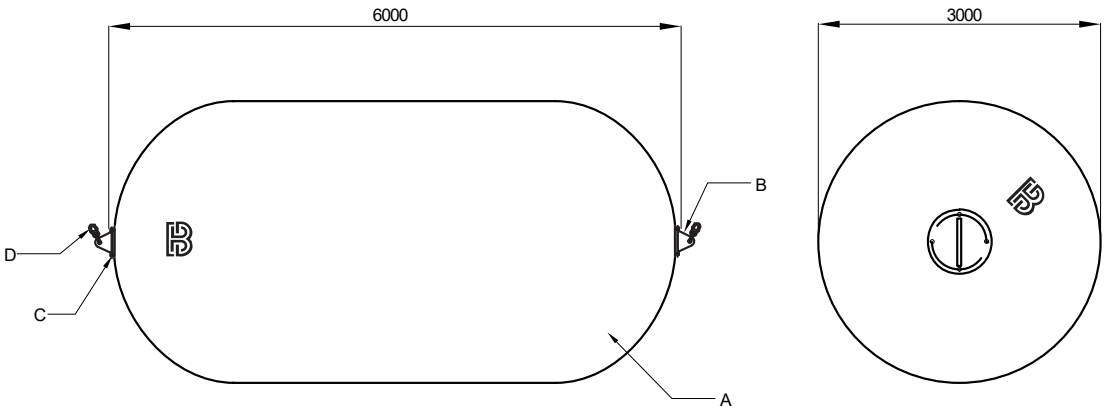
Sling Fender – **3000 x 6000**



50 kPa	Value	80 kPa	Value
Energy Absorption	1315 kNm	Energy Absorption	1644 kNm
Reaction Force	2488 kN	Reaction Force	3110 kN
Weight	1149 kgs	Weight	1320 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Flange	B	Flange
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

Performance is calculated at 60% compression. ISO17357-1: 2014

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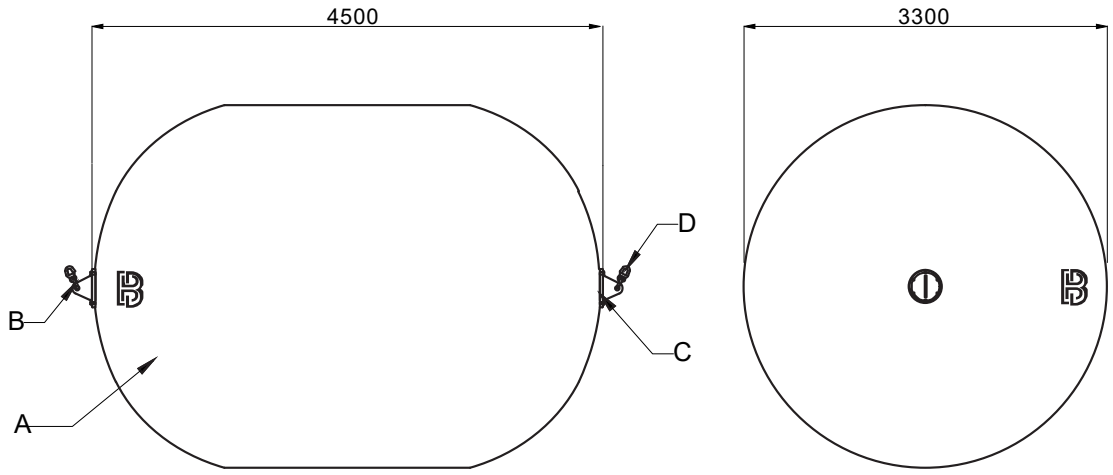
3300 x 4500 – Sling Fender



50 kPa	Value	80 kPa	Value
Energy Absorption	1180 kNm	Energy Absorption	1640 kNm
Reaction Force	1885 kN	Reaction Force	2647 kN
Weight	1110 kgs	Weight	1538 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Flange	B	Flange
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

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Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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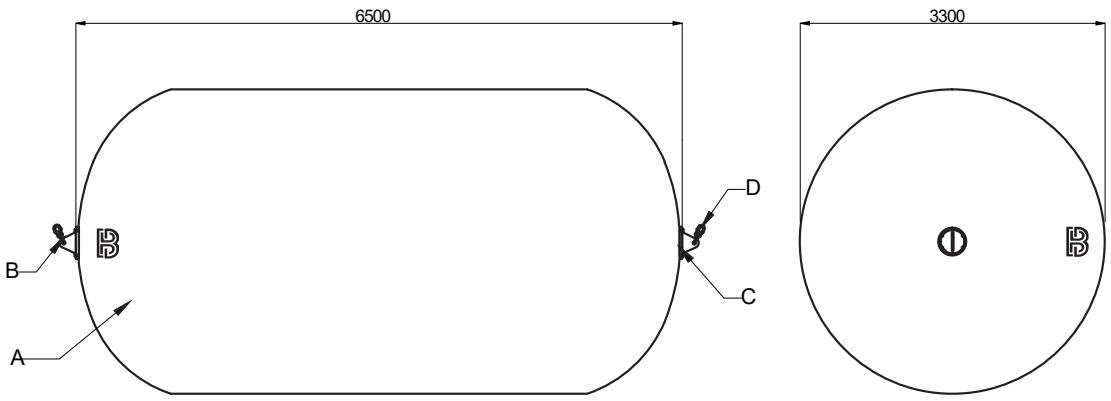
Sling Fender – **3300 x 6500**



50 kPa	Value	80 kPa	Value
Energy Absorption	1814 kNm	Energy Absorption	2268 kNm
Reaction Force	3015 kN	Reaction Force	3769 kN
Weight	1480 kgs	Weight	2640 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Flange	B	Flange
C	Pull Ring	C	Pull Ring
D	Swivel	D	Swivel

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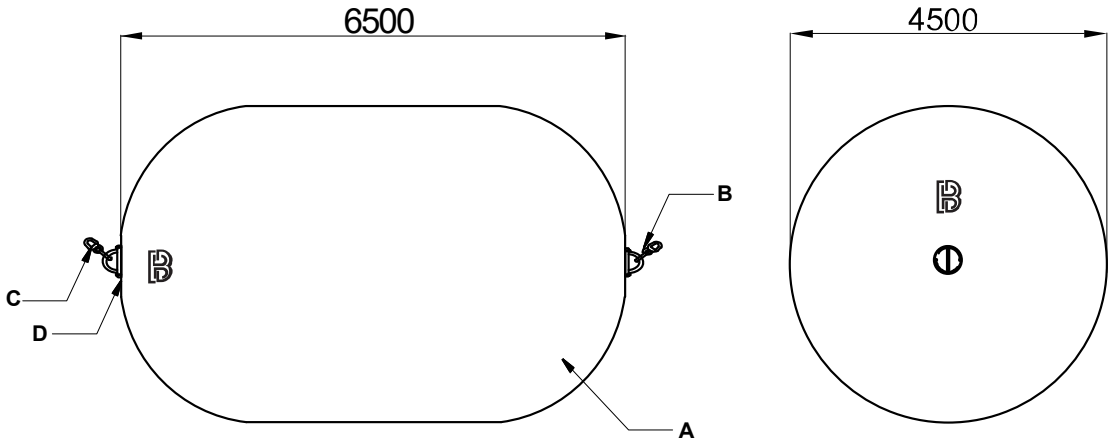

50 kPa	Value	80 kPa	Value
Energy Absorption	3432 kNm	Energy Absorption	4518 kNm
Reaction Force	4150 kN	Reaction Force	4998 kN
Weight	2050 kgs	Weight	3450 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Swivel	C	Swivel
D	Pull Ring	D	Pull Ring

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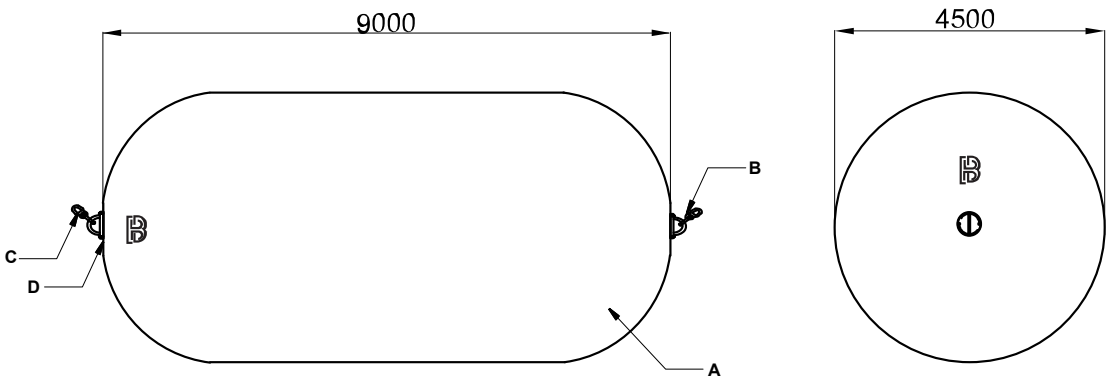
Sling Fender – **4500 x 9000**



50 kPa	Value	80 kPa	Value
Energy Absorption	4752 kNm	Energy Absorption	6633 kNm
Reaction Force	5747 kN	Reaction Force	7551 kN
Weight	3490 kgs	Weight	3960 kgs
Initial Pressure	50 kPa	Initial Pressure	80 kPa
A	Fender Body (Rubber)	A	Fender Body (Rubber)
B	Shackle	B	Shackle
C	Swivel	C	Swivel
D	Pull Ring	D	Pull Ring

Performance is calculated at 60% compression. ISO17357-1: 2014

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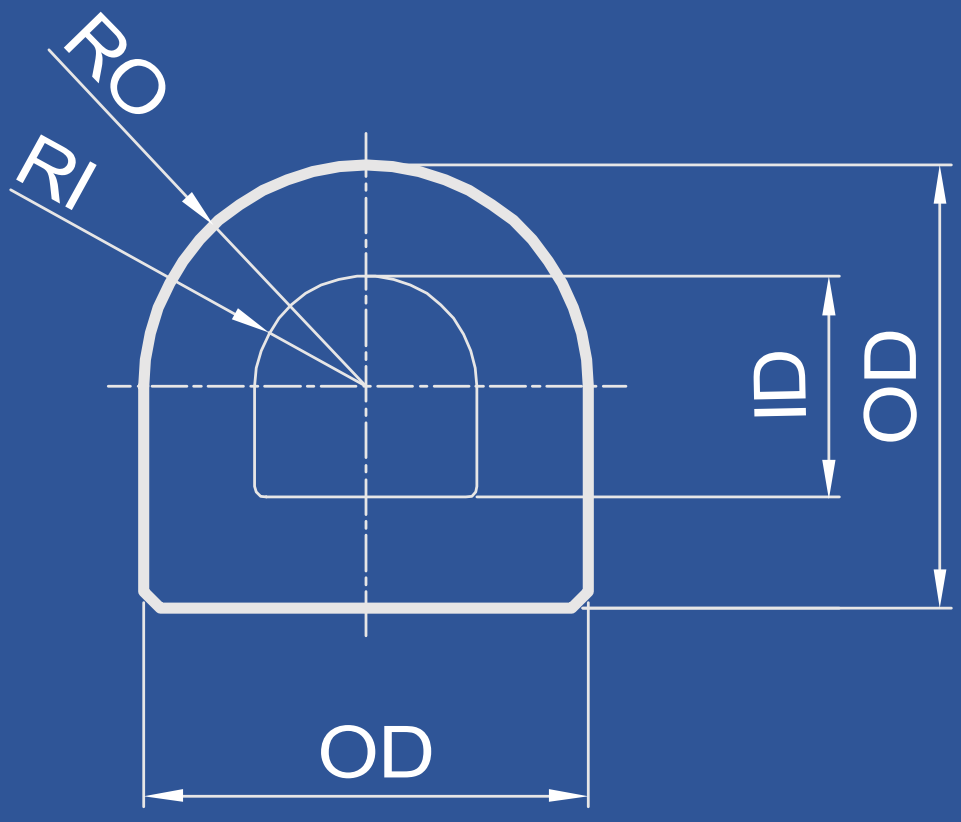
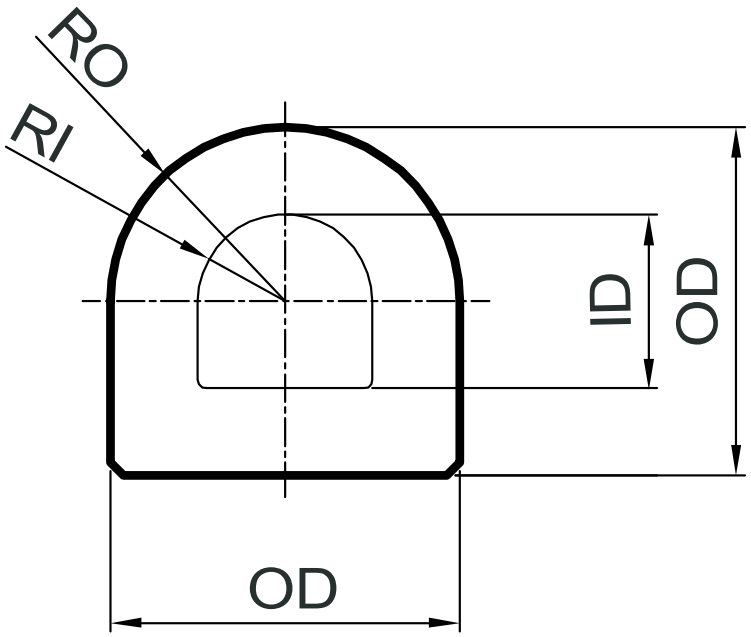
D - TYPE FENDERS



DD Fender – D Fenders



OD	ID	RO	RI	Weight	Info	Value
mm	mm	mm	mm	Kg/m	Material	Natural Rubber
100 x 100	50	50	25	8	Hardness	Max. 78 Shore A
125 x 125	62.5	62.5	31.25	13	OD Tolerance	± 5%
150 x 150	75	75	37.5	18	ID Tolerance	± 10%
200 x 200	100	100	50	32	Length Tolerance	± 30 mm
250 x 250	125	125	62.5	50	Performance Tol.	± 20%
300 x 300	150	150	75	72		
350 x 350	175	175	87.5	98		
380 x 380	190	190	95	116		
400 x 400	200	200	100	129		
500 x 500	250	250	125	201		
650 x 650	325	325	162.5	353		

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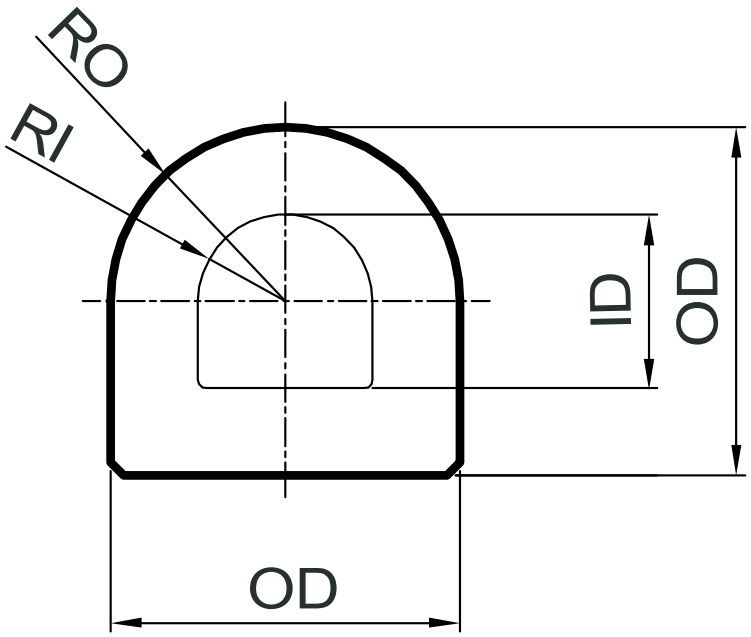
DO Fender – D Fenders



OD	ID	RO	RI	Weight	Info	Value
mm	mm	mm	mm	Kg/m	Material	Natural Rubber
100 x 100	50	50	25	8.4	Hardness	Max. 78 Shore A
125 x 125	62.5	62.5	31.25	15.8	OD Tolerance	± 5%
150 x 150	75	75	37.5	19	ID Tolerance	± 10%
200 x 200	100	100	50	33	Length Tolerance	± 30 mm
250 x 250	125	125	62.5	52	Performance Tol.	± 20%
300 x 300	150	150	75	75		
350 x 350	175	175	87.5	102		
400 x 400	200	200	100	134		
500 x 500	250	250	125	209		

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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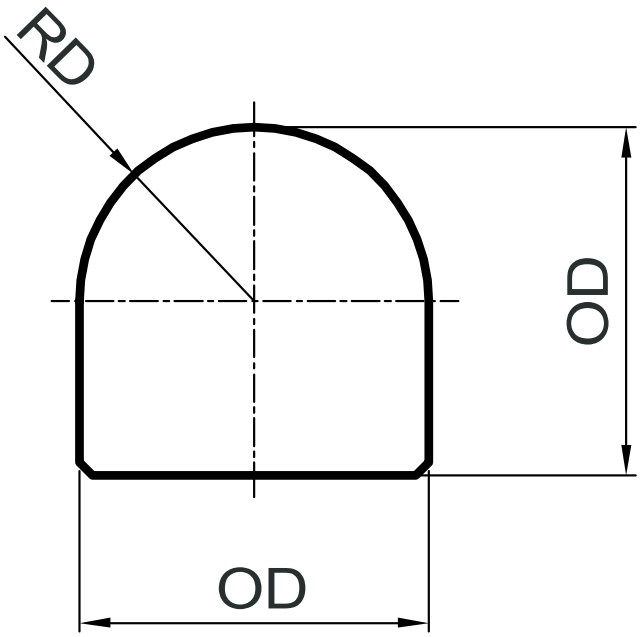
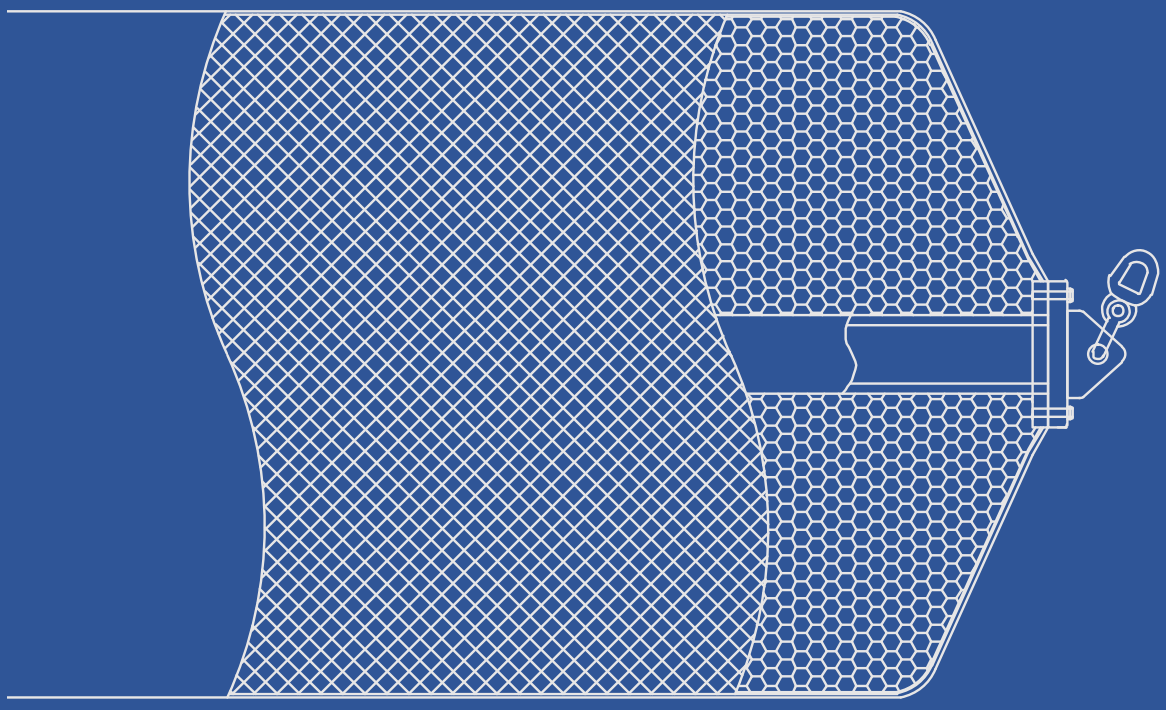
DS Fender – D Fenders



OD	RO	Weight	Info	Value
mm	mm	Kg/m	Material	Natural Rubber
100 x 100	50	11	Hardness	Max. 78 Shore A
125 x 125	62.5	19	OD Tolerance	± 5%
150 x 150	75	24.8	ID Tolerance	± 10%
200 x 200	100	44.2	Length Tolerance	± 30 mm
250 x 250	125	69	Performance Tol.	± 20%
300 x 300	150	99.4		
350 x 350	175	135.2		
400 x 400	200	176.6		
450 x 450	200	226		
500 x 500	250	280		

FOAM FILLED FENDERS



Foam Filled Fenders – **Chart**

Size	Energy Absorption	Reaction Force	Weight
Mm	kNm	kN	kg
300 x 500	2	15	6
500 x 1000	8	71	26
600 x 1200	13	92	43
700 x 1500	27	161	80
1000 x 1500	49	205	146
1000 x 1500 with Tires	49	205	243
1000 x 2000	64	274	185
1200 x 2000	93	337	305
1200 x 2000 with Tires	93	337	362
1500 x 3000	216	624	727
1700 x 3000	273	696	890
2000 x 3500	456	990	1460
2500 x 4000	781	1386	2610
2500 x 4000 with Tires	781	1386	3260
3300 x 6000	3122	4239	6130
3300 x 6000 with Tires	3122	4239	7660

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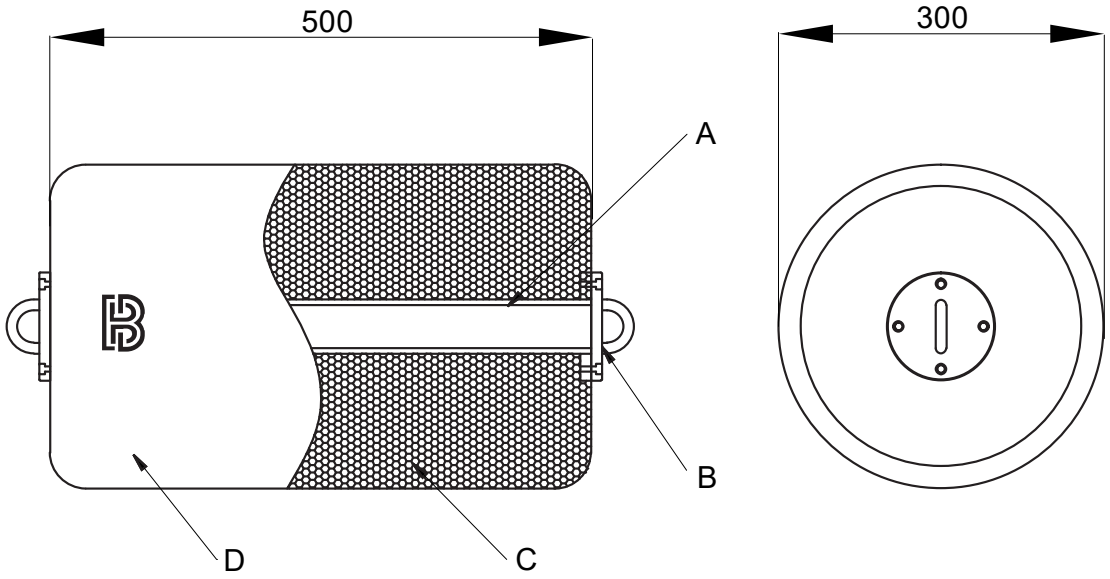
300 x 500 – Foam Filled Fender



Variable	Value
Energy Absorption	2 kNm
Reaction Force	15 kN
Weight	6 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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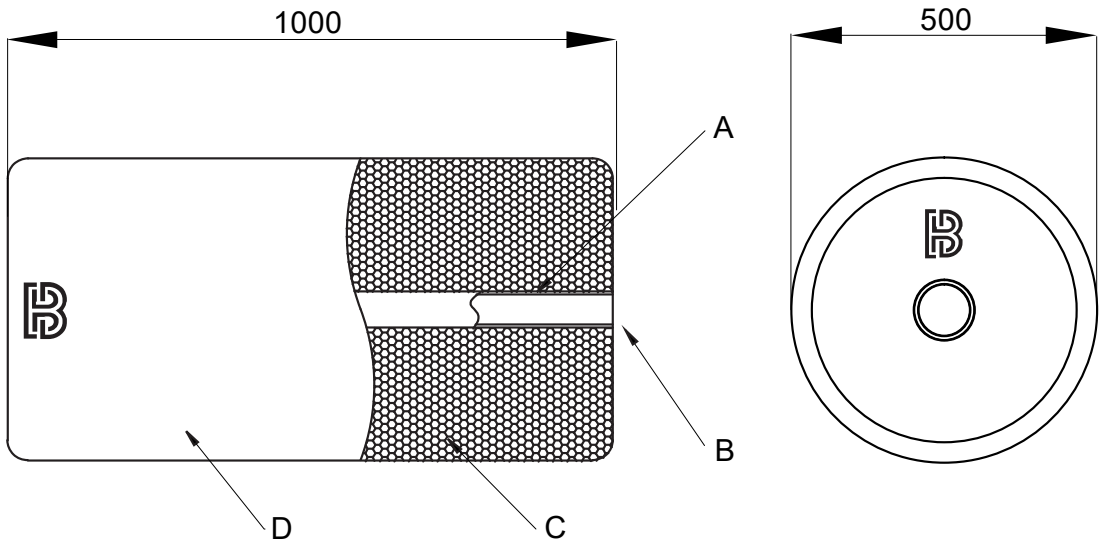
Foam Fender – **500 x 1000**



Variable	Value
Energy Absorption	8 kNm
Reaction Force	71 kN
Weight	26 kgs
A	Central Pipe
B	Hole
C	EVA Foam
D	Outer Polyurethane Layer

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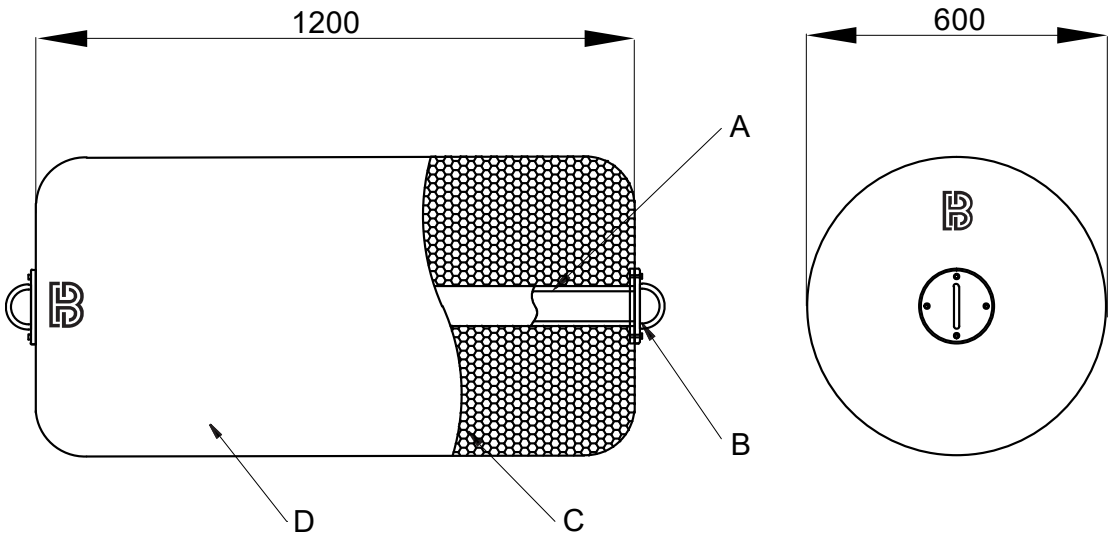
600 x 1200 – Foam Filled Fender



Variable	Value
Energy Absorption	13 kNm
Reaction Force	92 kN
Weight	43 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Outer Polyurethane Layer

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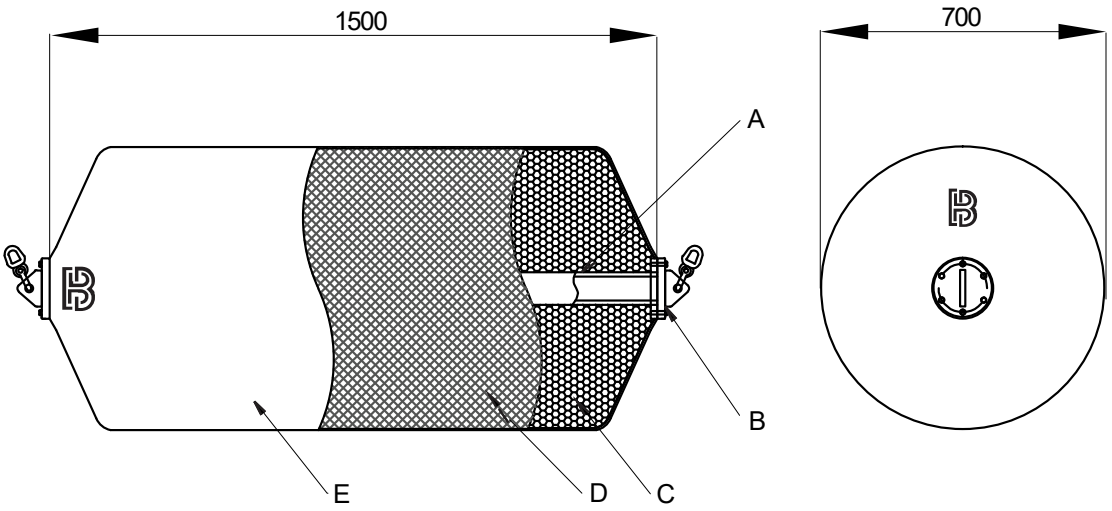
Foam Fender – **700 x 1500**



Variable	Value
Energy Absorption	27 kNm
Reaction Force	161 kN
Weight	80 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

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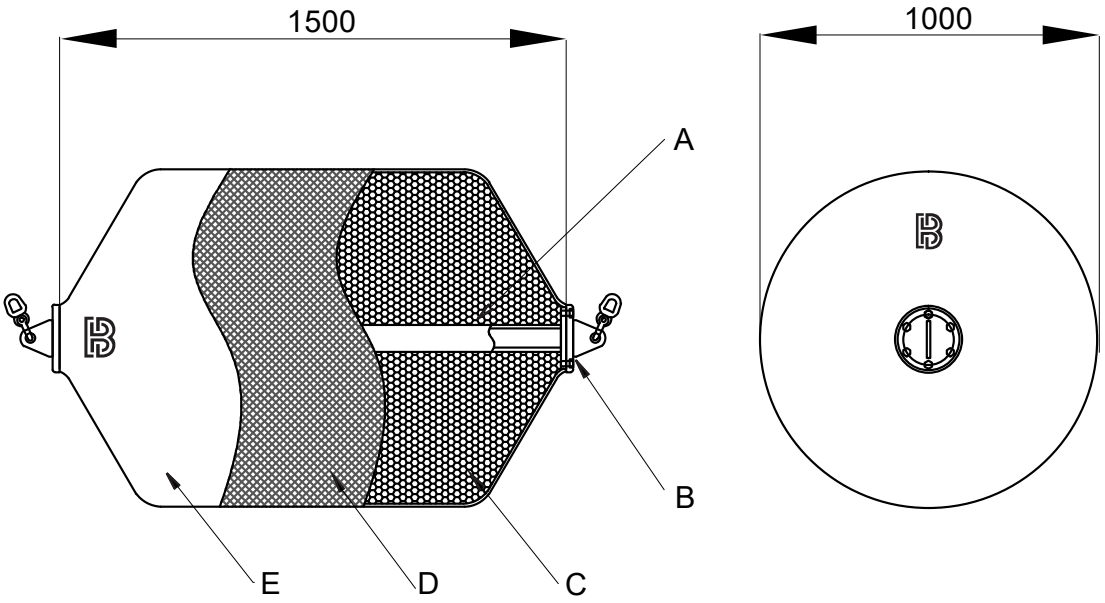
1000 x 1500 – Foam Filled Fender



Variable	Value
Energy Absorption	49 kNm
Reaction Force	205 kN
Weight	146 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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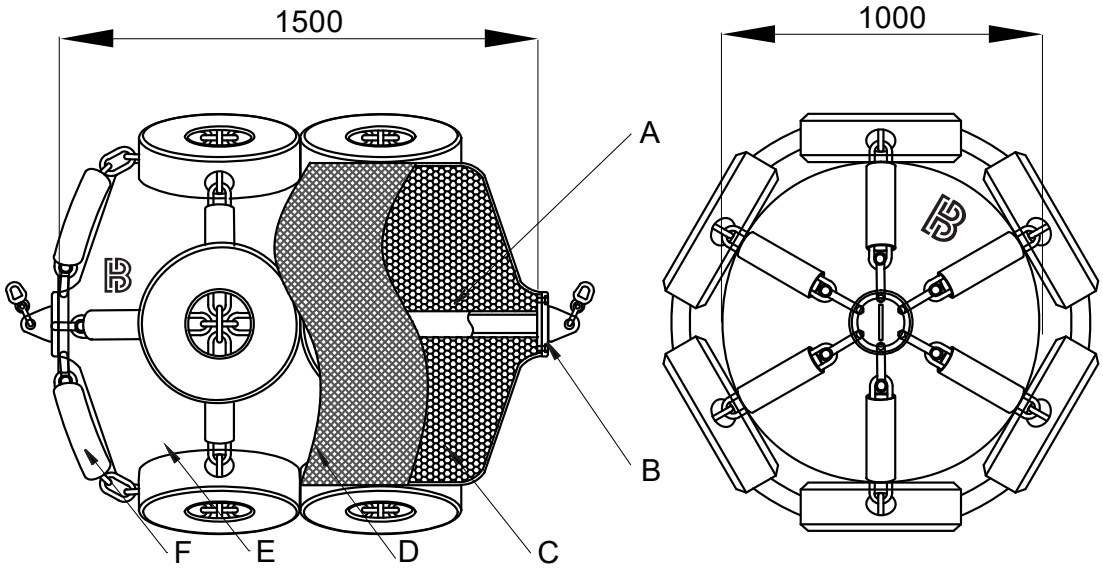
1000 x 1500 with Tires – Foam Fender



Variable	Value
Energy Absorption	49 kNm
Reaction Force	205 kN
Weight	243 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer
F	Chain & Tires Protection Layer

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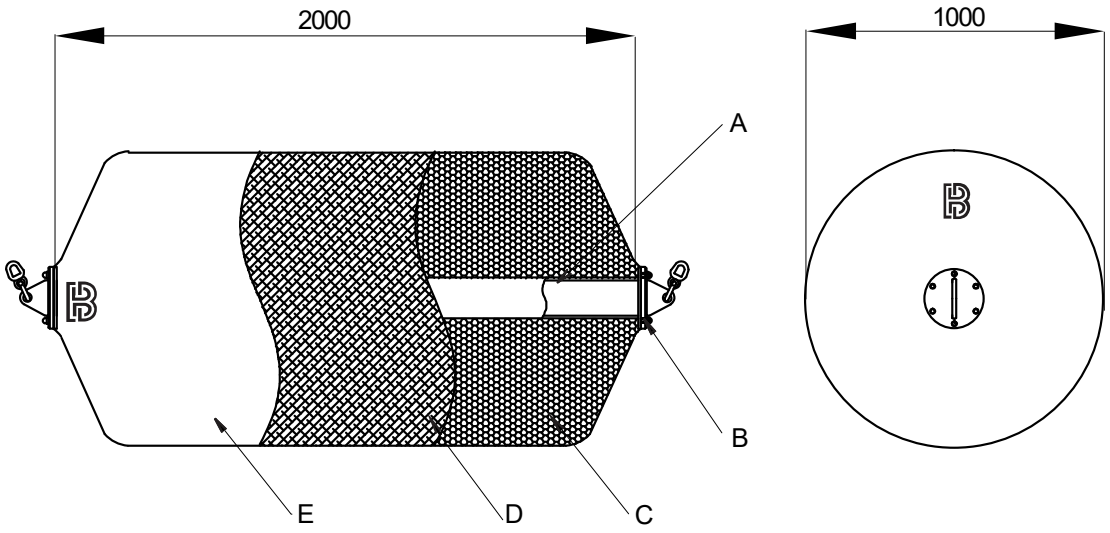
1000 x 2000 – Foam Filled Fender



Variable	Value
Energy Absorption	64 kNm
Reaction Force	274 kN
Weight	185 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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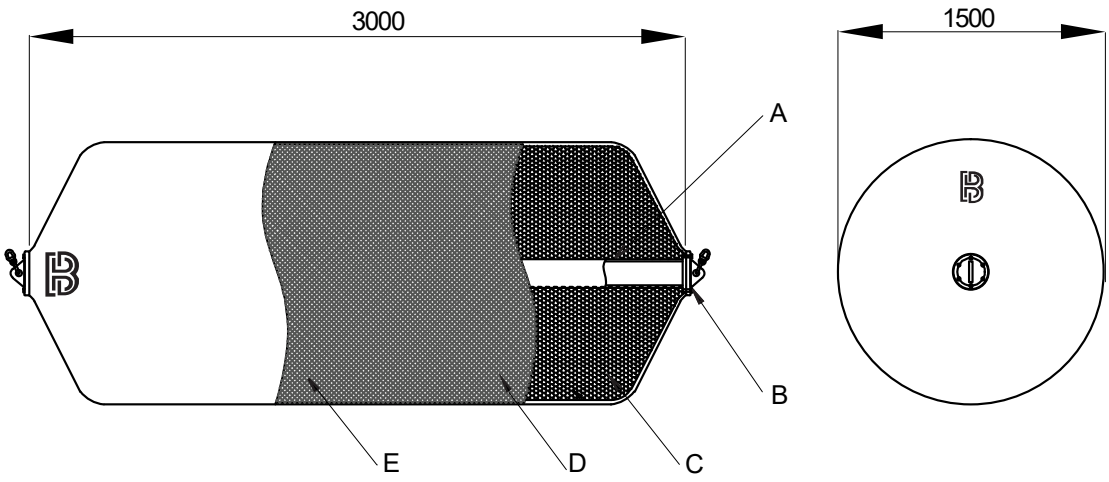
Foam Fender – **1500 x 3000**



Variable	Value
Energy Absorption	216 kNm
Reaction Force	624 kN
Weight	727 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

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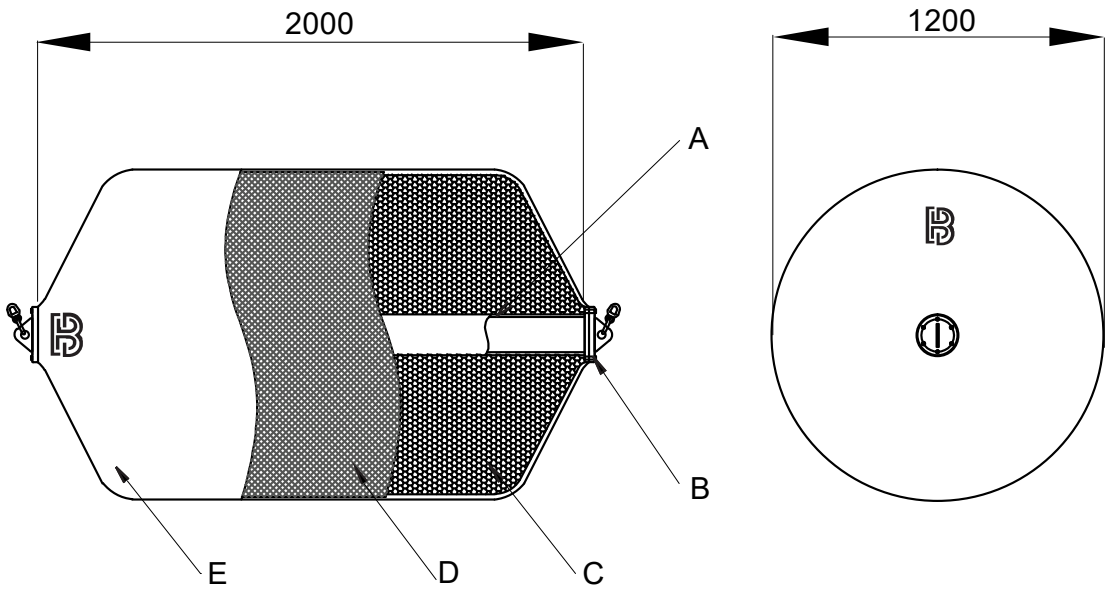
1200 x 2000 – Foam Filled Fender



Variable	Value
Energy Absorption	93 kNm
Reaction Force	337 kN
Weight	305 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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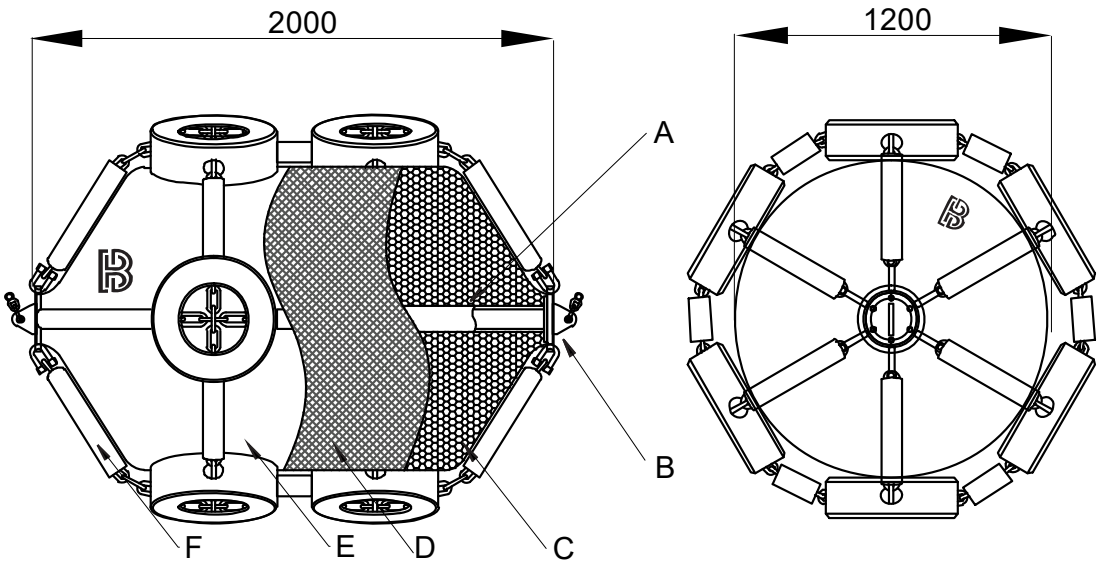
Foam Fender – **1200 x 2000 with Tires**



Variable	Value
Energy Absorption	93 kNm
Reaction Force	337 kN
Weight	362 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer
F	Chain & Tires Protection Layer

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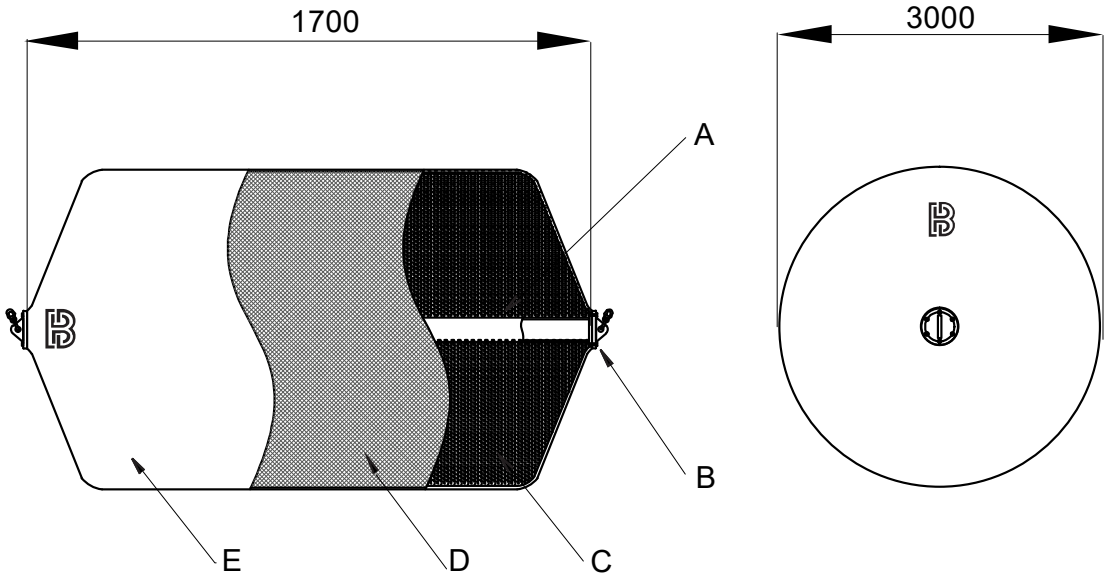
1700 x 3000 – Foam Filled Fender



Variable	Value
Energy Absorption	273 kNm
Reaction Force	696 kN
Weight	890 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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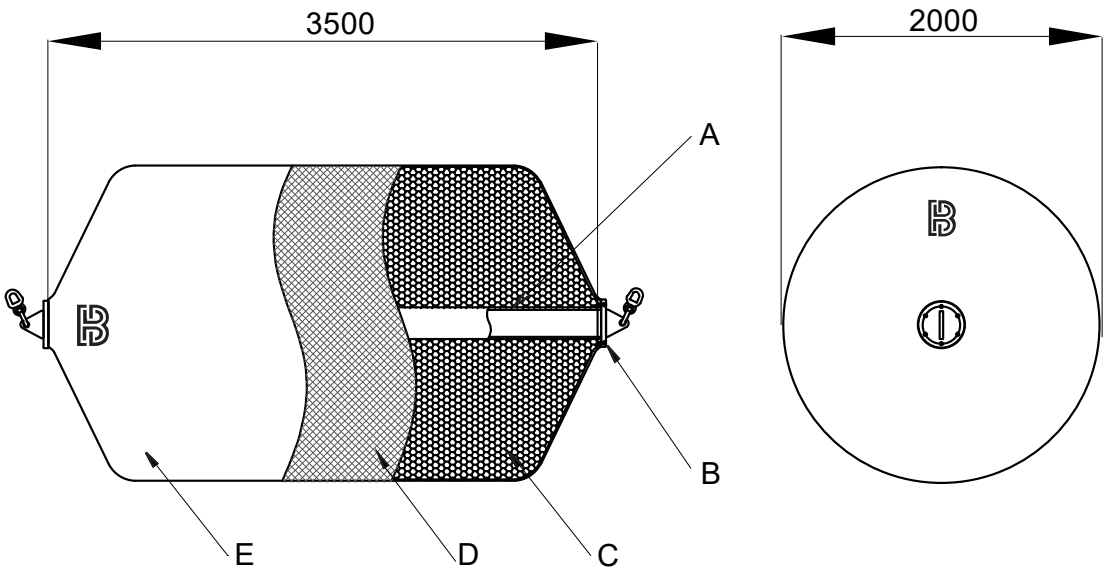
2000 x 3500 – Foam Filled Fender



Variable	Value
Energy Absorption	456 kNm
Reaction Force	990 kN
Weight	1460 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

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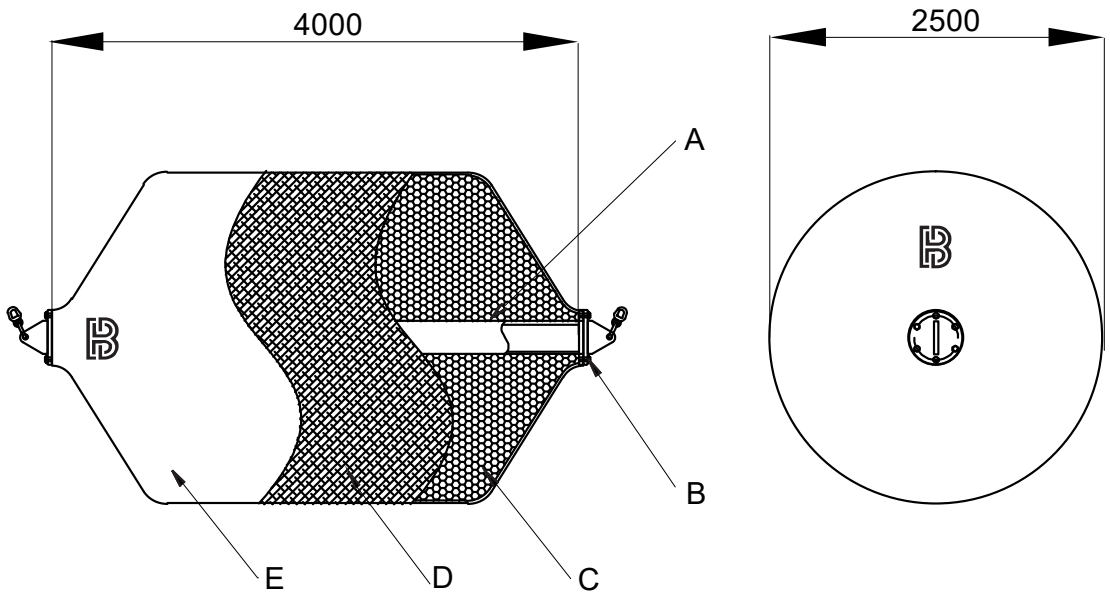
2500 x 4000 – Foam Filled Fender



Variable	Value
Energy Absorption	781 kNm
Reaction Force	1386 kN
Weight	2610 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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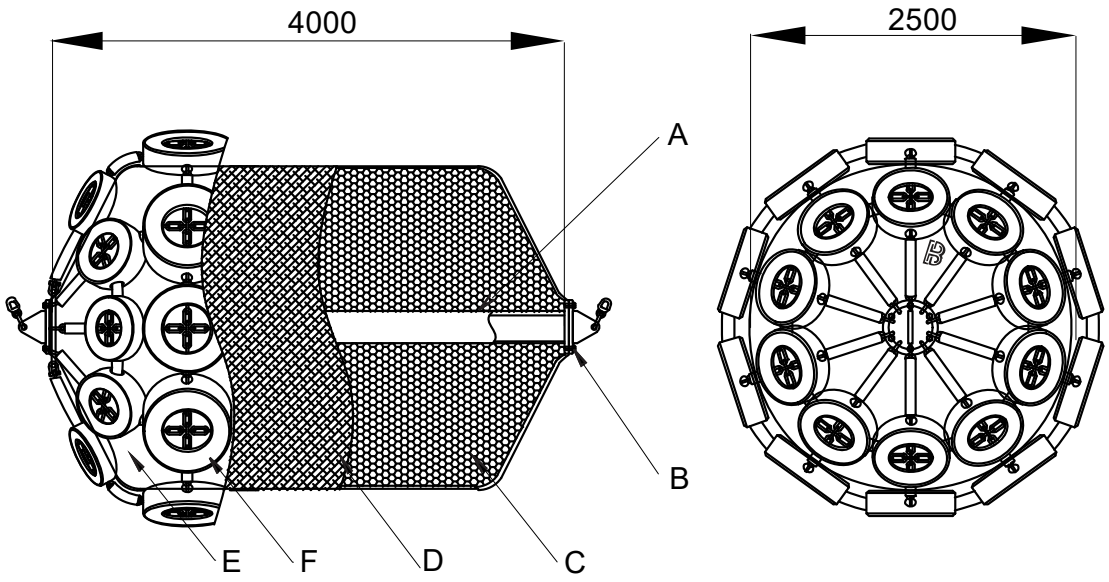
Foam Fender – **2500 x 4000 with Tires**



Variable	Value
Energy Absorption	781 kNm
Reaction Force	1386 kN
Weight	3260 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer
F	Chain & Tires Protection Layer

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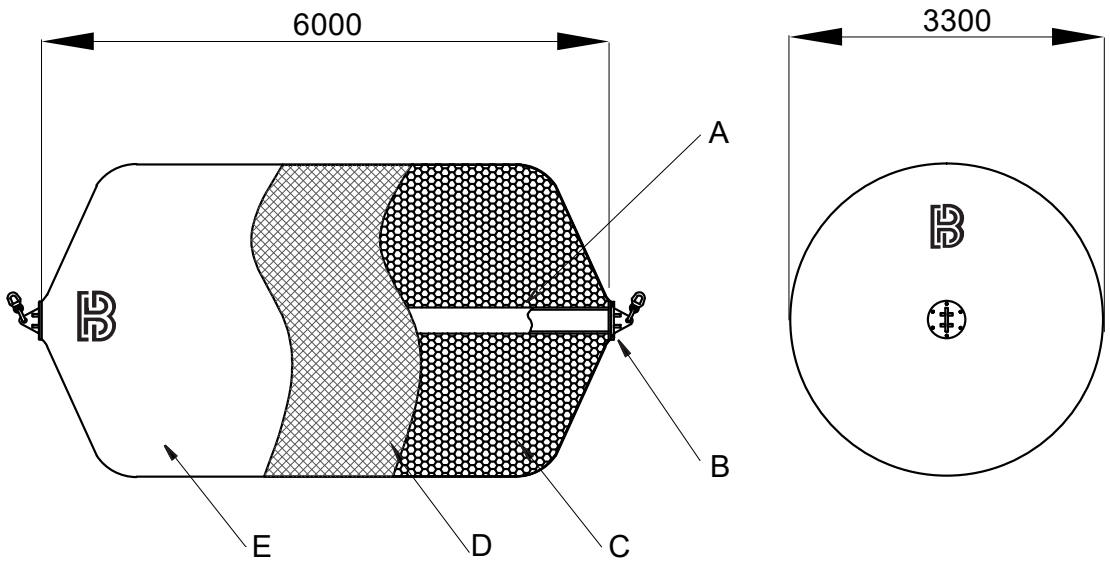
3300 x 6000 – Foam Filled Fender



Variable	Value
Energy Absorption	3122 kNm
Reaction Force	4239 kN
Weight	6130 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards, and at 60% compression. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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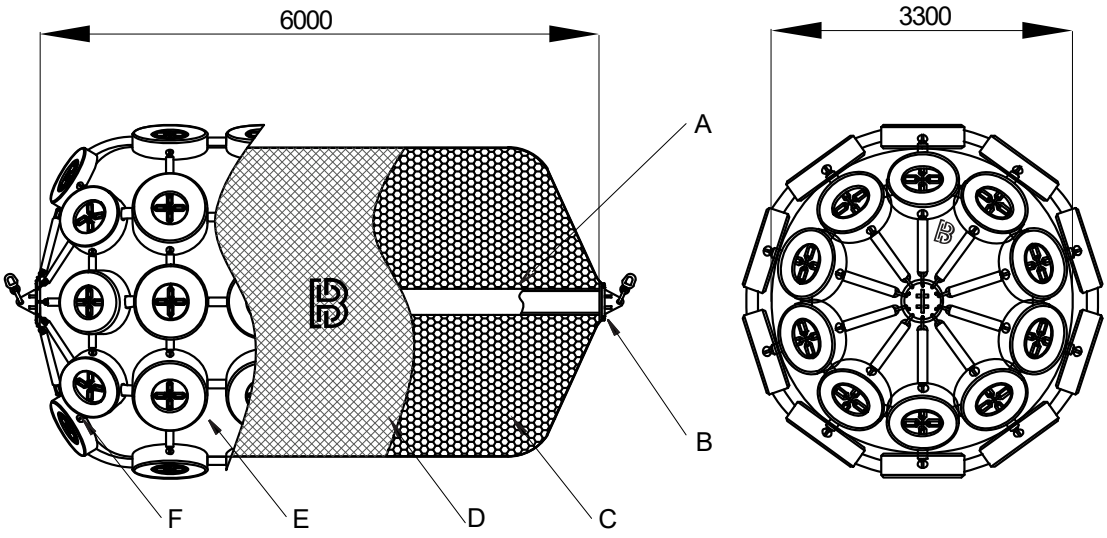
Foam Fender – **3300 x 6000 with Tires**



Variable	Value
Energy Absorption	3122 kNm
Reaction Force	4239 kN
Weight	7660 kgs
A	Central Pipe
B	Flange
C	EVA Foam
D	Cord Reinforced Layer
E	Outer Polyurethane Layer
F	Chain & Tires Protection Layer

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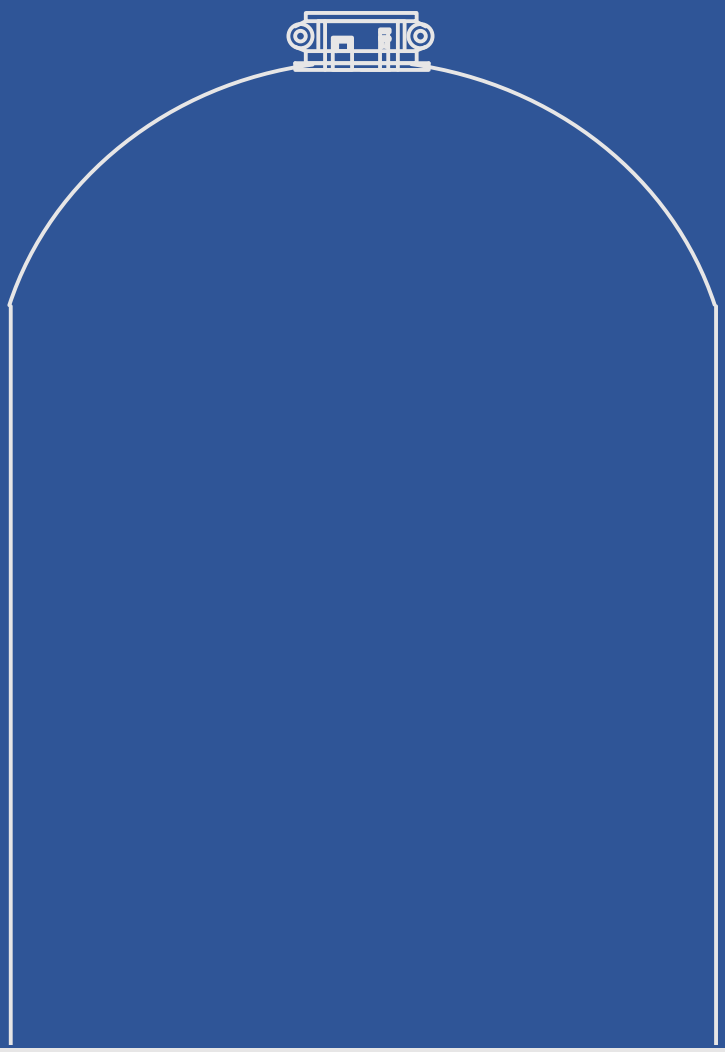
SUBMARINE FENDERS



Submarine Fenders – **Chart**

Filled **With** Water

Size	Energy Absorption	Reaction Force	Weight (Deflated)
Mm	kNm	kN	kg
2000 x 4000	103	399	420
2000 x 6000	155	599	725
2500 x 5500	223	687	590
3300 x 6500	589	1275	1480

Filled **Without** Water

Size	Energy Absorption	Reaction Force	Weight (Deflated)
Mm	kNm	kN	kg
2000 x 4000	431	1177	420
2000 x 6000	647	1766	725
2500 x 5500	928	2037	590
3300 x 6500	1913	3169	1480

ISO17357-1: 2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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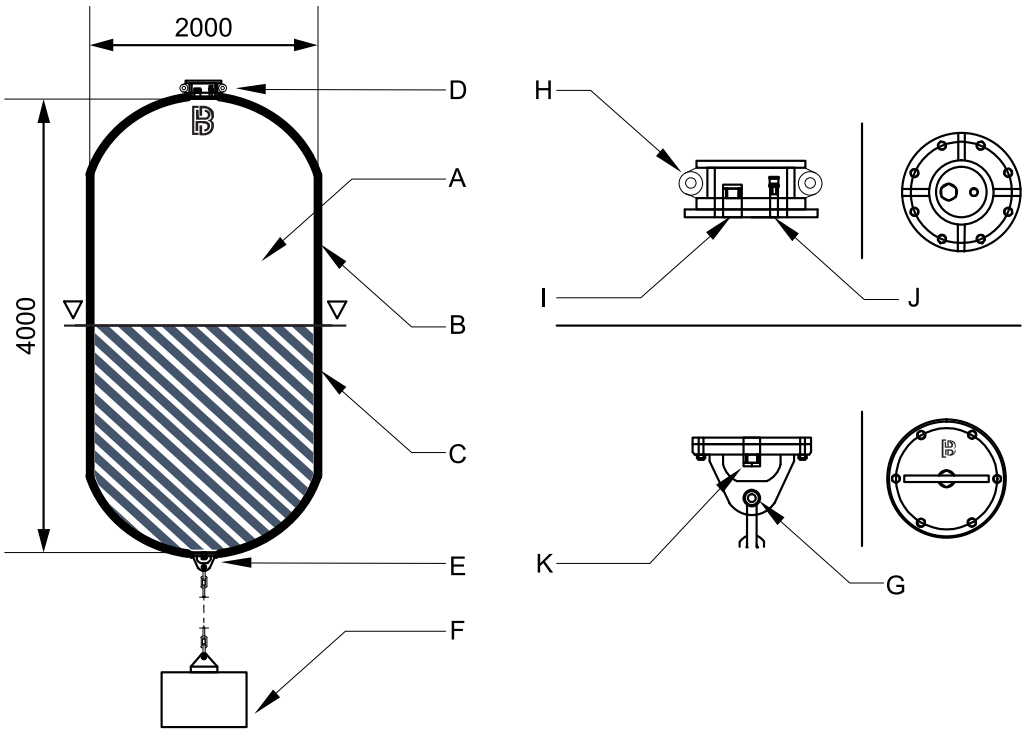
2000 x 4000 – Submarine Fenders



PROPPERTIES

Variable	Value
Weight	420
WATER FILLED	
Energy Absorption	158
Reaction Force	450
AIR FILLED	
Energy Absorption	431
Reaction Force	1177

GENERAL COMPONENTS

Variable	Value
Dimensions	2000 x 4000 mm
A	Fender Body
B	Air
C	Water
D	Top Flange
E	Bottom Flange
F	Counter Weight

FLANGES

Variable	Value
H – Top	Ear for Lifting
I – Top	Water Valve
J - Top	Air Valve
K – Bottom	Water Valve
G - Bottom	Chain Hole
Dia. Water Valves	50 mm
Dia. Air Valve	20 mm

60% - 40% RATIO WATER/AIR HYDRO-PNEUMATIC FENDERS

ISO 17357:2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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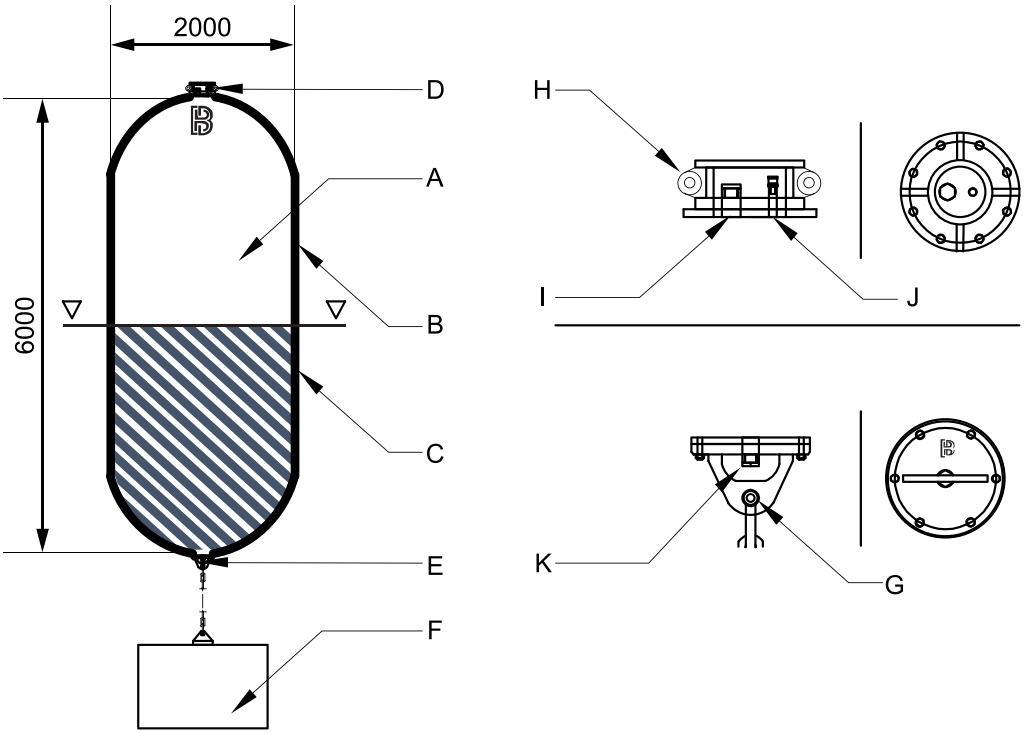
Submarine Fenders – **2000 x 6000**



PROPPERTIES

Variable	Value
Weight	725
WATER FILLED	
Energy Absorption	155
Reaction Force	599
AIR FILLED	
Energy Absorption	647
Reaction Force	1766

GENERAL COMPONENTS

Variable	Value
Dimensions	2000 x 6000 mm
A	Fender Body
B	Air
C	Water
D	Top Flange
E	Bottom Flange
F	Counter Weight

FLANGES

Variable	Value
H – Top	Ear for Lifting
I – Top	Water Valve
J - Top	Air Valve
K – Bottom	Water Valve
G - Bottom	Chain Hole
Dia. Water Valves	50 mm
Dia. Air Valve	20 mm

65% - 35% RATIO WATER/AIR HYDRO-PNEUMATIC FENDERS

ISO 17357:2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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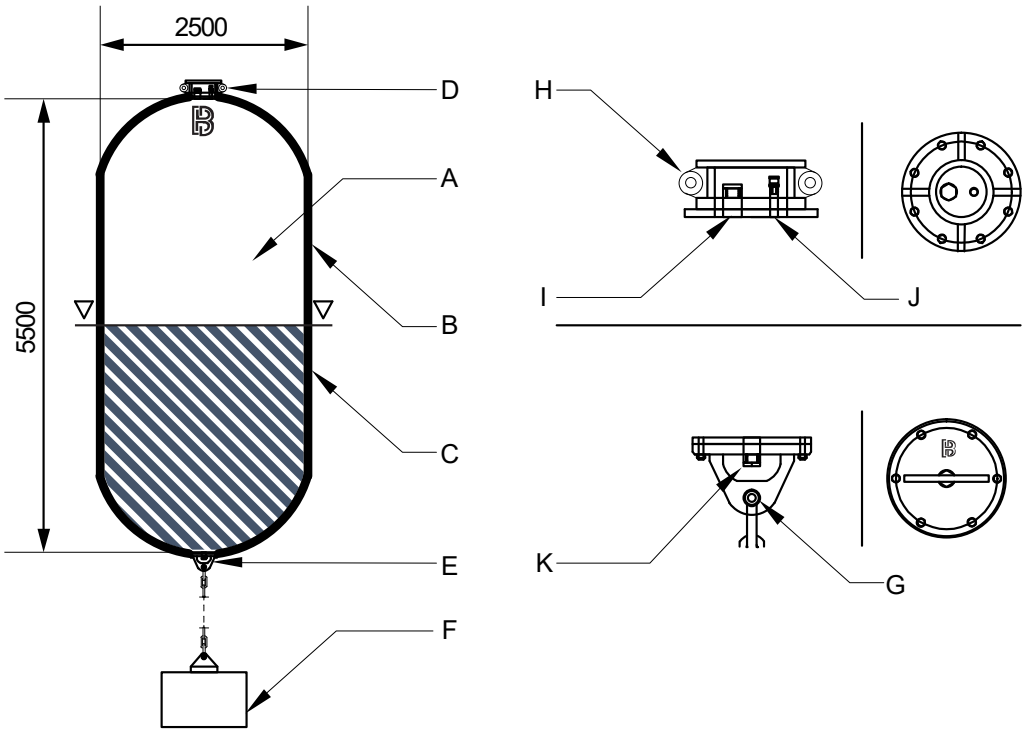
2500 x 5500 – Submarine Fenders



PROPPERTIES

Variable	Value
Weight	590 kgs
WATER FILLED	
Energy Absorption	155 kNm
Reaction Force	599 kN
AIR FILLED	
Energy Absorption	647 kNm
Reaction Force	1766 kN

GENERAL COMPONENTS

Variable	Value
Dimensions	2500 x 5500 mm
A	Fender Body
B	Air
C	Water
D	Top Flange
E	Bottom Flange
F	Counter Weight

FLANGES

Variable	Value
H – Top	Ear for Lifting
I – Top	Water Valve
J - Top	Air Valve
K – Bottom	Water Valve
G - Bottom	Chain Hole
Dia. Water Valves	50 mm
Dia. Air Valve	20 mm

65% - 35% RATIO WATER/AIR HYDRO-PNEUMATIC FENDERS

ISO 17357:2014

Weight unit is Kilograms. All measurements in mm. Measurements, weights, and drawings, are based on industry standards. A size tolerance of 5%, and other possible deviation margins need to be taken in mind.

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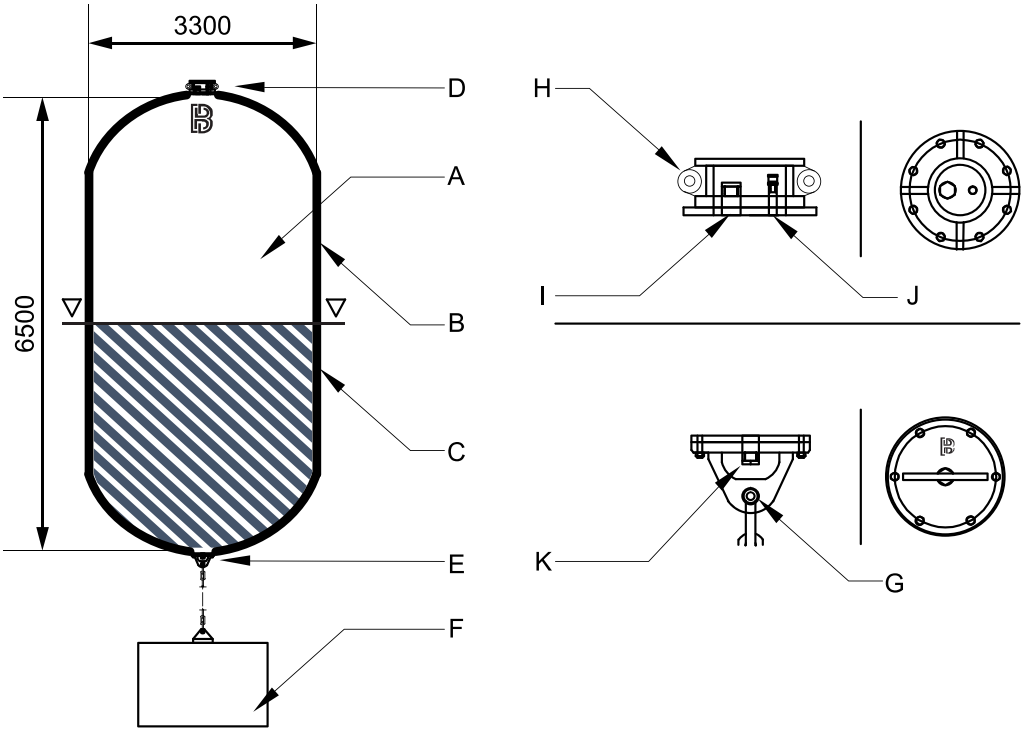
Submarine Fenders – **3300 x 6500**



PROPPERTIES

Variable	Value
Weight	1480
WATER FILLED	
Energy Absorption	589
Reaction Force	1275
AIR FILLED	
Energy Absorption	1913
Reaction Force	3169

GENERAL COMPONENTS

Variable	Value
Dimensions	3300 x 6500 mm
A	Fender Body
B	Air
C	Water
D	Top Flange
E	Bottom Flange
F	Counter Weight

FLANGES

Variable	Value
H – Top	Ear for Lifting
I – Top	Water Valve
J - Top	Air Valve
K – Bottom	Water Valve
G - Bottom	Chain Hole
Dia. Water Valves	50 mm
Dia. Air Valve	20 mm

60% - 40% RATIO WATER/AIR HYDRO-PNEUMATIC FENDERS

ISO 17357:2014

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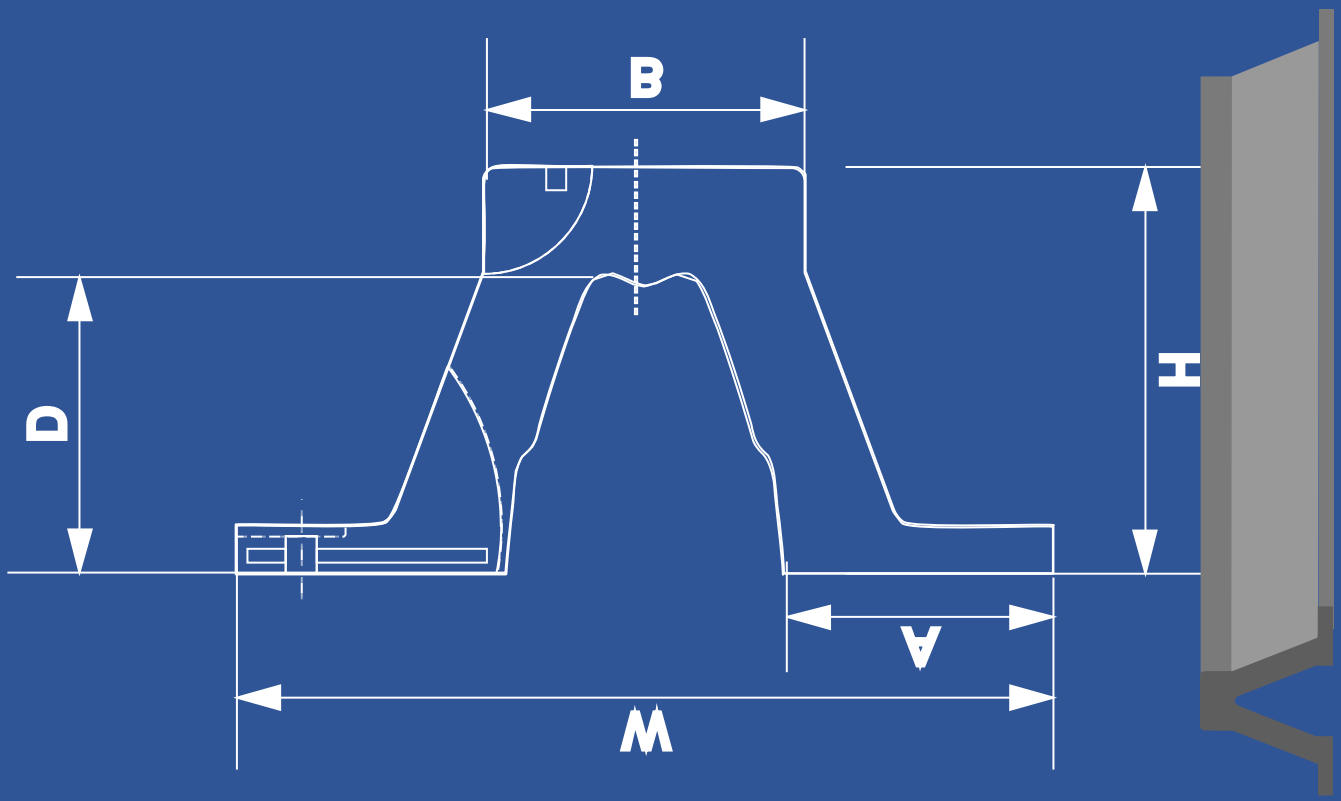
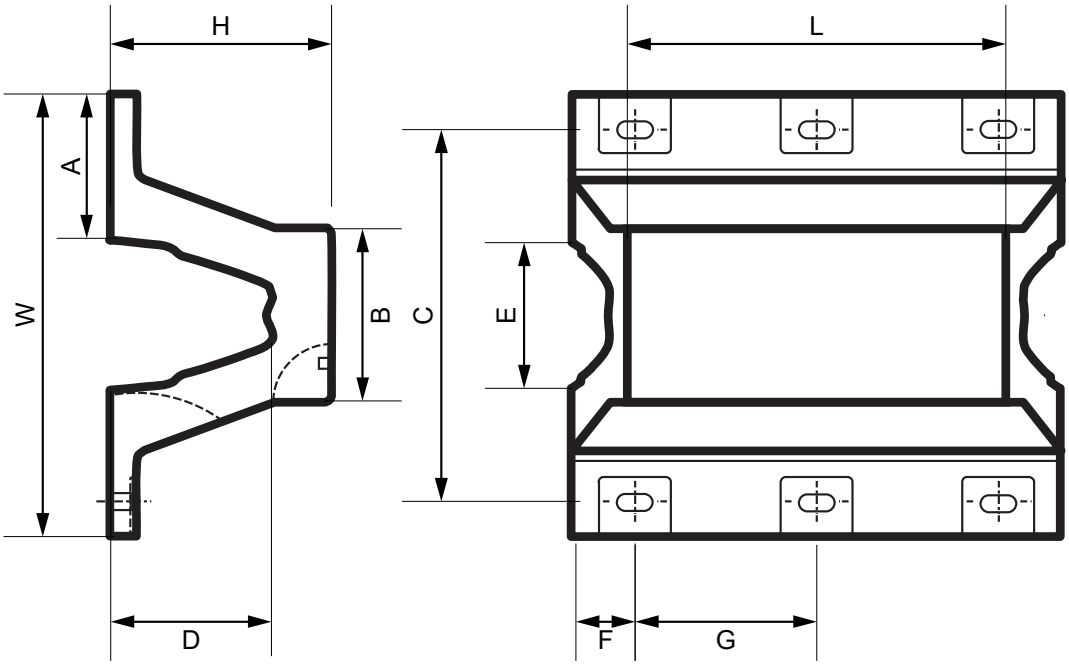
OTHER FENDERS



Arch Fender – Other Fenders



H x W	L	A	B	C	D x E	F / 1m	G / 1m	Weight / 1m
250 x 500	1000	178	200	400	58 x 29	113	900	88
300 x 600	1000	213	240	480	70 x 35	125	900	122
400 x 800	1000	285	320	640	82 x 41	150	900	206
500 x 1000	1000	358	400	800	82 x 41	175	900	332
600 x 1200	1000	425	480	960	94 x 47	200	900	476
800 x 1500	1000	520	640	1300	100 x 50	250	900	840
1000 x 1800	1000	610	800	1550	100 x 50	300	900	1363

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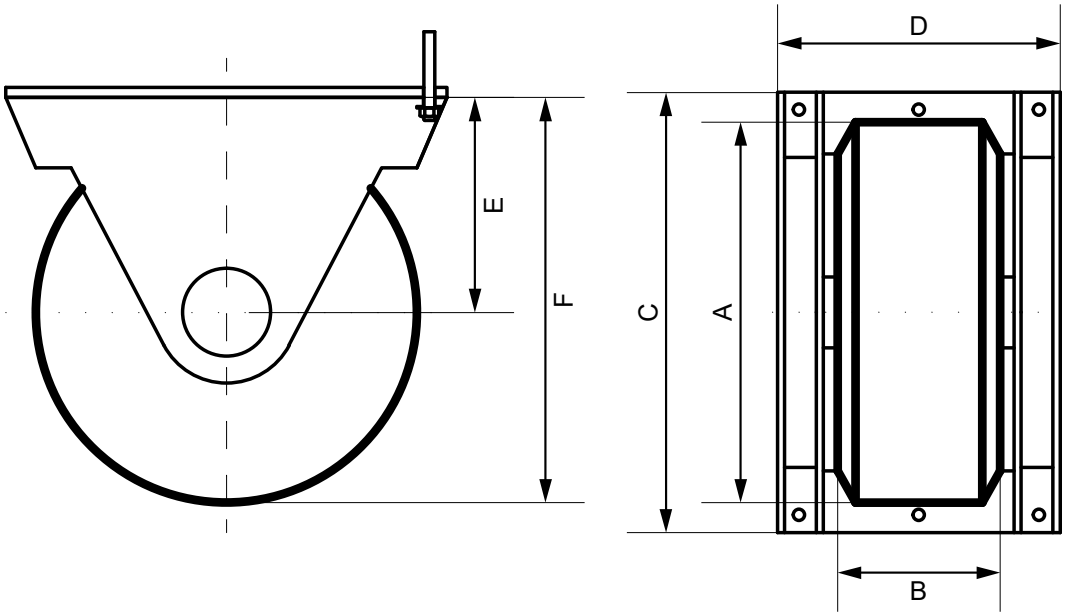
Roller Fender – Other Fenders



A	B	C	D	E	F
600	255	693	444	339	639
750	319	867	556	424	799
900	382	1040	667	508	958
1200	510	1387	889	678	1278
1500	637	1733	1111	847	1597
1800	765	2080	1333	1017	1916
2100	892	2427	1556	1186	2236
2400	1020	2774	1778	1356	2555
2700	1147	3120	2000	1525	2875
3000	1275	3467	2222	1695	3194

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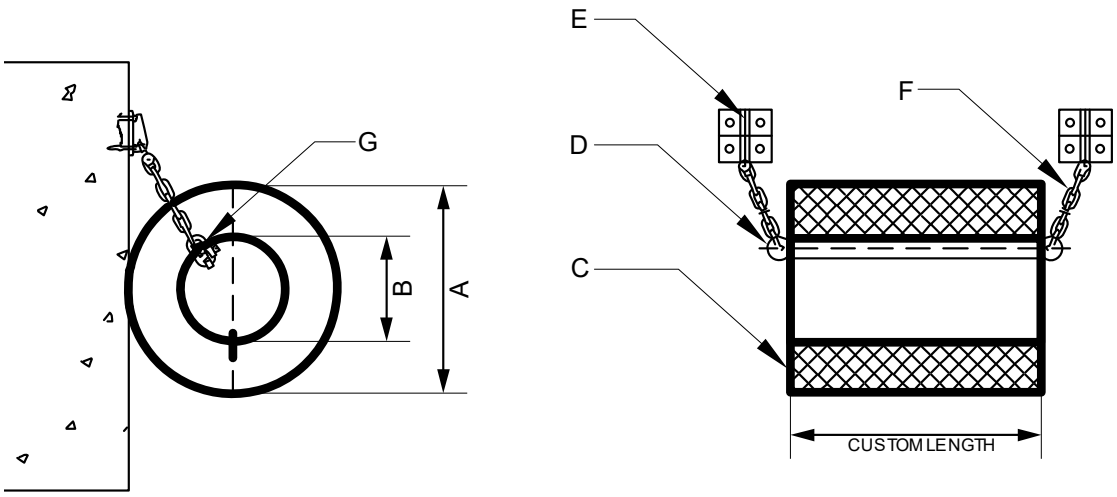
Cylindrical Fender – Other Fenders



A	B	C	D	E	F	G
Outer Dia	Inner Dia	Fender Body	Steel Bar	Brackets	Chain	Shackle
mm	mm	Rubber	Steel	Steel	Steel	Steel
590	300	1	1	2	2	4
1000	500					
1200	600					
1400	700					
1500	500					

CUSTOM SIZES AVAILABLE – This list contains the most commonly used sizes

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Rubber Fenders – Recommendations

Storage Guidelines

1. Always Store Pneumatic Fenders Inflated

Pneumatic fenders must be stored in an inflated state. Deflating these fenders for storage can lead to changes in the elastic properties of the rubber due to temperature and humidity fluctuations, potentially causing deterioration. Keeping the fenders inflated helps maintain their shape and prevents these issues.

2. Maintain a Storage Pressure of 20 kPa

When storing pneumatic fenders, ensure they are inflated to a pressure of 20 kPa. These fenders are designed for use in water, where temperature and pressure changes are less severe. On land, however, temperature variations can adversely affect the rubber. Proper inflation during storage helps preserve the fender's lifespan.

3. Store on Flat Surfaces to Prevent Deformation

When storing, installing, or using pneumatic fenders, always place them on a flat surface. Irregular surfaces, such as those with bumps or rocks, can cause permanent deformities, compromising the fender's performance. Even minor roughness can result in scratches when the fender is in motion, so a smooth, flat surface is crucial.

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Recommendations – Rubber Fenders

Usage Guidelines

4. Adjust Guide Ropes According to Seasonal Tide Changes

Seasonal changes in tide levels must be accounted for when using guide ropes (guy ropes). Inadequate rope length can place unnecessary pressure on the fender or position it at an incorrect height. Regularly adjusting the rope length to accommodate tidal variations will prevent undue stress on the fender.

5. Differentiate Between Sling Type and Yokohama Style Fenders

The Sling type fender is more delicate and lacks the protective outer net of chains and tires found in Yokohama style fenders. Due to its more sensitive construction, operations involving Sling type fenders require closer monitoring to avoid damage or deterioration.

6. Prioritize Smooth Surfaces for Sling Type Fenders

Given the lack of protective gear on Sling type fenders, the surface they come into contact with is critical. Ensure the contact surface is as smooth and flat as possible to avoid surface damage or permanent deformation. Regular inspection of the fender's condition is essential to maintain its integrity.

7. Keep Fenders Clean and Free from Marine Life

Pneumatic fenders, especially Sling types, should be kept clean and free of debris or marine life. Unlike other marine equipment, Sling type fenders are more susceptible to damage from these elements. Direct contact with debris can harm the fender’s surface, particularly when impacted by a ship.

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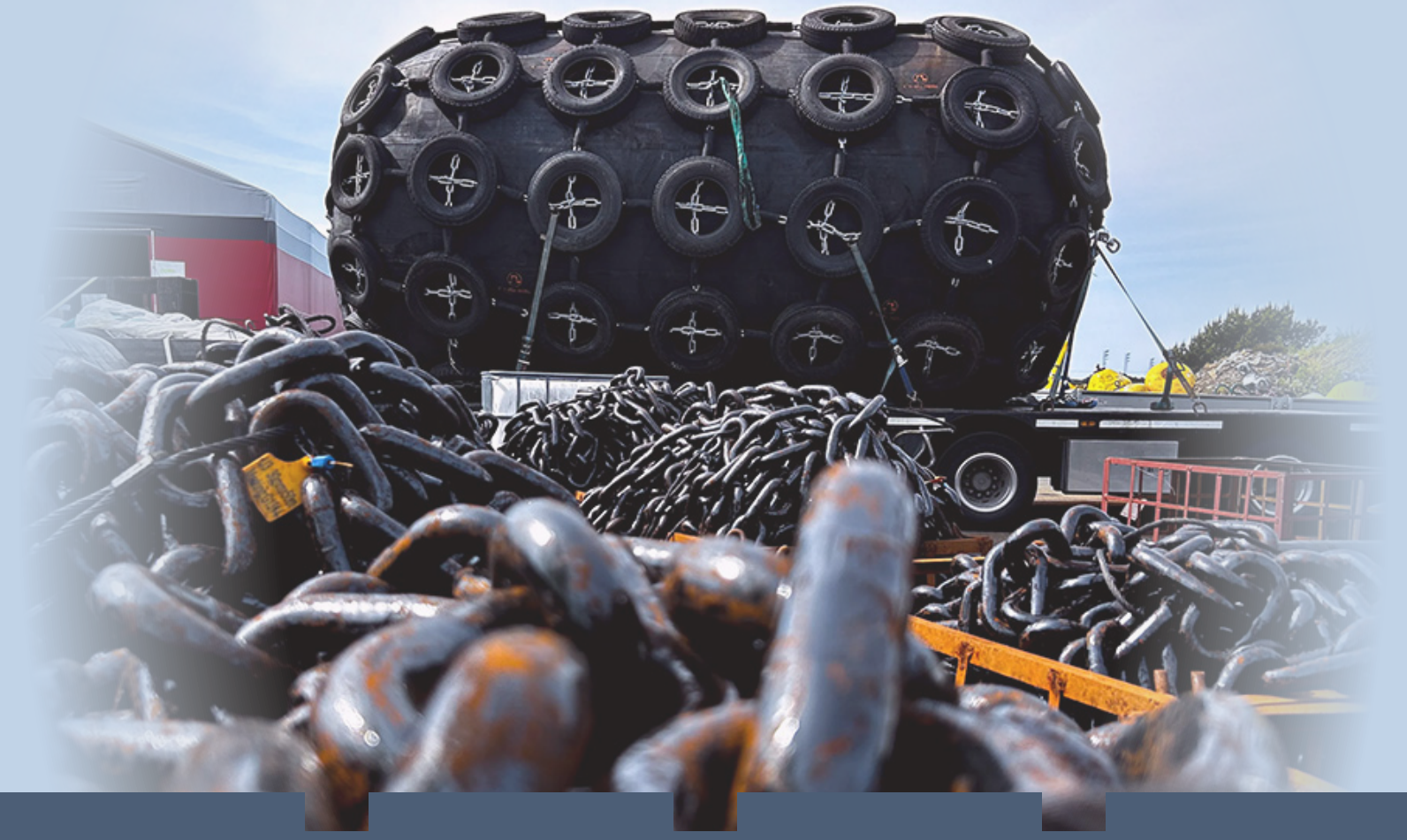

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