

Ship fenders

Trelleborg Ridderkerk BV





OUR COMPANY

For more than hundred years Trelleborg Ridderkerk has been among the leading companies in the field of technical rubber products. Trelleborg Ridderkerk has the capability to analyze specific problems and find fitting solutions. Close cooperation with our customers combined with a broad scope of engineering activities, has created a wide range of both specialized and standardized products.

The Trelleborg Ridderkerk product range consist of sealing systems, bridge bearings, vibration dampers, ship fenders, harbour fenders, expansion joints, anti-corrosion linings, riserpipe coatings, inflatable pipe plugs.

Our company is a part of the Trelleborg Group, which has 20.000 employees and representation in 40 countries all over the world. Because of this world wide coverage, Trelleborg companies and sales offices can contact their clients locally within the shortest period of time. You can get more information about the Trelleborg Group at www.trelleborg.com .

This brochure offers an overview of the main lines of the Trelleborg Ridderkerk range of *fenders*. Specific information sheets containing detailed information are available on request.

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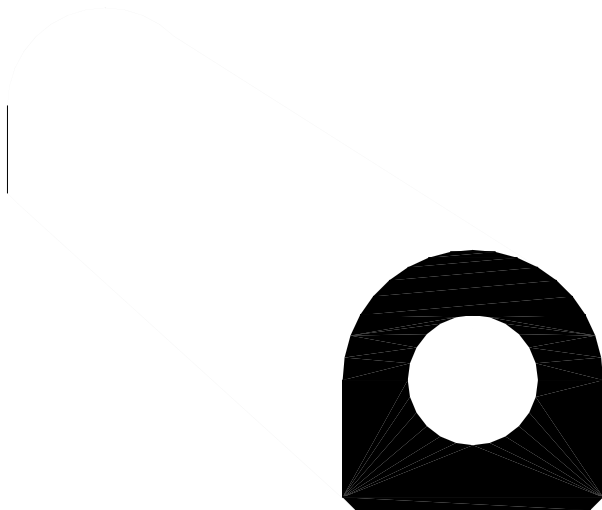
D FENDERS

D fenders are widely used as side beltings and protective fenders on many tugs, workboats and pilotboats. We can produce these fenders with d hole, circular hole or solid. On request we can pre-curve, cut and chamfer the fenders.



Type E1B		
Dimensions:	D hole:	WEIGHT
mm	mm	kg/m
100x100	45x40	9
120x120	70x45	12
150x150	80x63	19
200x200	100x80	34
250x250	100x100	56
300x300	150x150	72
400x400	200x200	127

other dimensions on request



Type E1C		
Dimensions:	O-hole	WEIGHT
mm	mm	kg/m
100x100	50	8
125x125	50	14
150x150	60	21
200x200	100	33
250x250	100	57
300x300	125	81
400x400	200	139

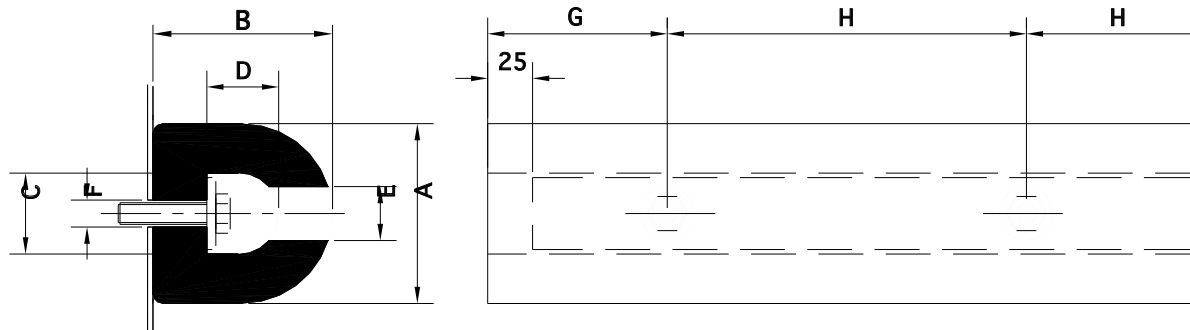
other dimensions on request

Some of the fixing/mounting methods used:

Trelleborg Ridderkerk has both the expertise and the equipment to supply customized products, which means that considerable savings can be made in terms of the total installation costs. Examples include the drilling of fixing holes, the radial prebending of fenders, the chamfering of fenders, the manufacturing of linking and connecting pieces and the delivery of connection plugs.

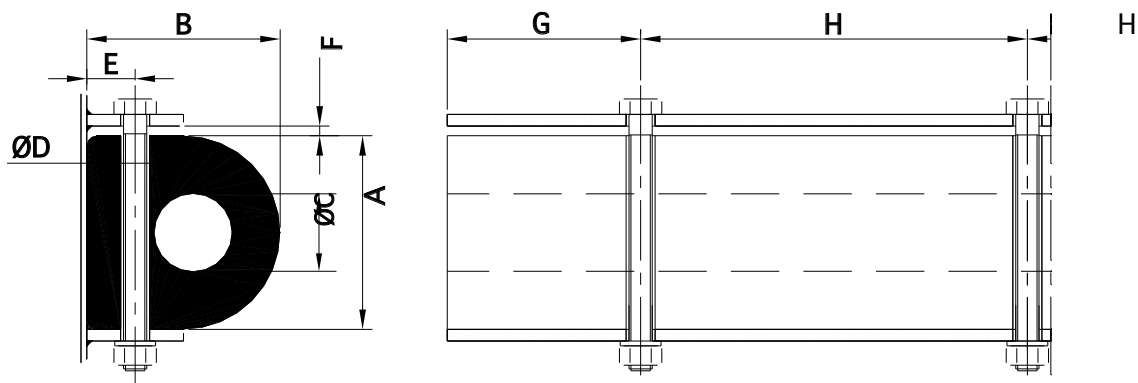
Drilling holes and attachment methods of d fenders:

Counterbore hole:



Type E1B									
A	B	C	D	E	F	G	H	Flat bar	Bolt size
100	100	45	40	30	15	90-130	200-300	40x5	M12
120	120	70	45	30	15	90-130	200-300	40x5	M12
150	150	80	63	40	20	110-150	250-350	60x8	M16
200	200	100	80	50	25	130-180	300-400	80x10	M20
250	250	100	100	60	30	140-200	350-450	90x12	M24
300	300	150	150	60	30	140-200	350-450	100x12	M24
400	400	200	200	75	35	140-200	350-450	150x15	M30

Standard hole:

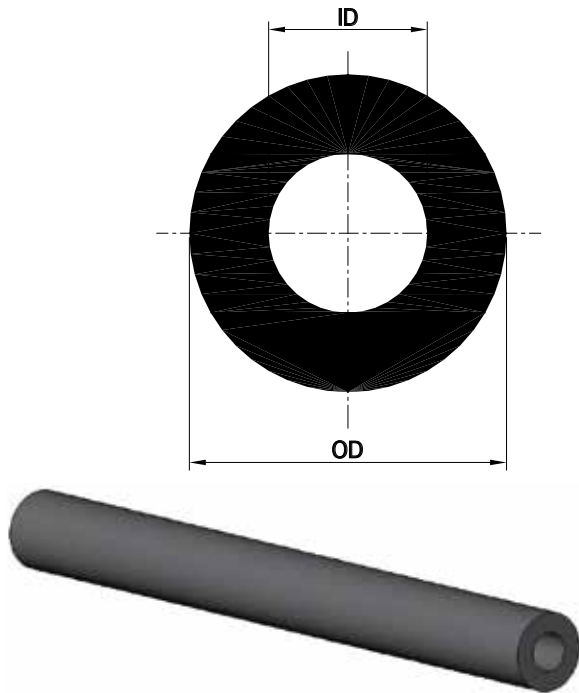


Type E1C or E1B									
A	B	C	D	E	F	G	H	Flat bar	Bolt size
100	100	50	15	25	10	90-130	200-300	50x6	M12
125	125	50	15	25	12	90-130	200-300	50x6	M12
150	150	60	20	30	12	110-150	250-350	60x8	M16
200	200	100	25	45	15	130-180	300-400	80x10	M20
250	250	100	30	50	20	140-200	350-450	100x10	M24
300	300	125	30	60	25	140-200	350-450	110x12	M24
400	400	200	35	80	30	140-200	350-450	130x15	M30

The extruded sections are available in lengths upto 12 metres max., where practical, and can be manufactured with a radius to fit round a vessel's bow or stern.

CYLINDRICAL FENDERS

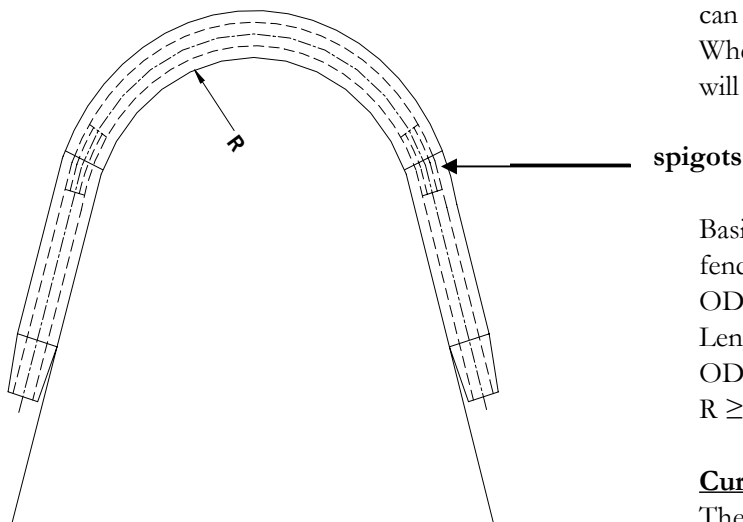
Hollow cylindrical rubber fenders are traditional pushing fenders for bow and stern.



TYPE 14		
OD:	ID:	WEIGHT:
mm	mm	kg/m.
100	50	7
150	75	17
200	100	28
250	125	44
250	150	38
300	150	64
380	190	102
400	200	113
450	225	143
500	150	225
500	250	177
600	300	252
800	400	453
1000	500	707

other dimensions on request

Depending on length of the fender it can be supplied in one or more sections. Where multiple lengths are used spigots will be supplied to facilitate installation.



Basic rules for hollow cylindrical fenders are:

OD of fender = 2x ID fender

Length of spigot = OD fender

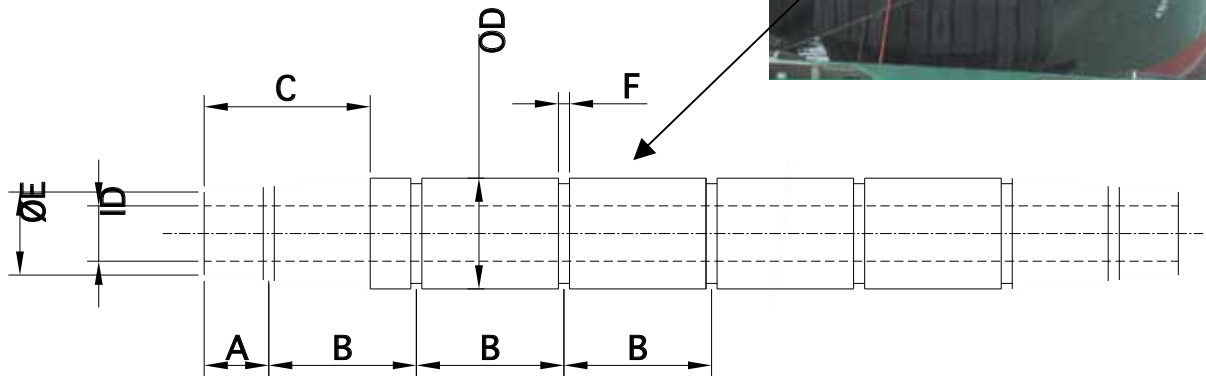
OD spigot = ID fender

$R \geq 4 \times OD$

Curve radius:

The minimum radius that can be rounded with a straight rubber fender is approx. 4-5 times the OD of the fender. When you need a smaller radius please contact Trelleborg Ridderkerk for advise.

The cylindrical fenders can be easily mounted on the hull of the ship with a longitudinal chain. The fender can be supplemented by webbing straps or sleeved chains which fit in special grooves. The ends of the fenders can be tapered to get a better connection to the hull.



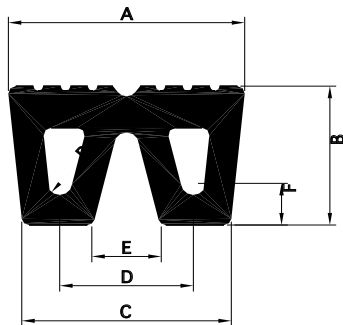
OD	ID	A	B	C	E
mm	mm	mm	mm (max)	mm	mm
200	100	150	530	500	150
250	125	200	570	500	190
300	150	225	600	700	225
380	190	250	630	800	260
400	200	300	670	800	300
500	250	300	730	900	375
600	300	350	800	900	450
700	350	350	860	1000	525
800	400	350	930	1000	600
900	450	350	1000	1100	675
1000	500	350	1060	1200	750

Dim. F depends on dimensions straps or chains.

W-FENDERS

The W fender is especially suitable for: tugs and push tugs, ice-breakers and pontoons, piles for platforms and bridges, angular constructions.

The W-Fender, the original design of Trelleborg Ridderkerk has grown to become one of the most commonly used push fender for tugs.



Type:	A (mm)	B (mm)
32x20	320	200
40x25	400	250
48x30	480	300
50x45	500	450

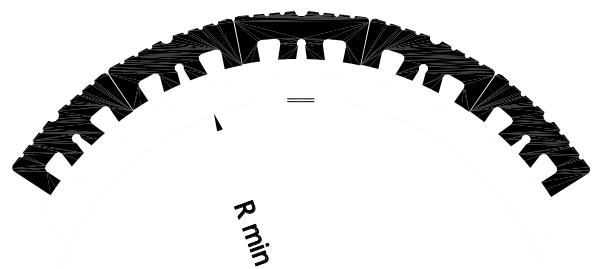
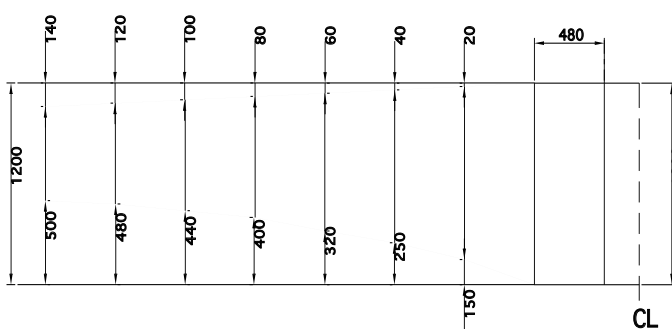


The wider face and unique developed shape of the “W” type fender allows the fender to accommodate tight radius whilst presenting continuous, unbroken external face.

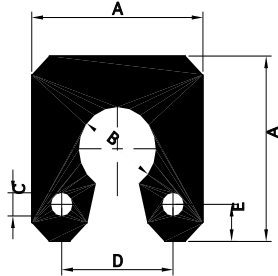
This homogeneous face contributes to operational safety by greatly reducing the risk of ropes snagging in the fendering system.

Type:	C (mm)	D (mm)	E (mm)	F (mm)	P (mm)	kg/m	flat steel	bar	R	R minus
32x20	280	180	100	67	17	51	100x20	Ø25	1750	600
40x25	350	220	110	75	20	81	120x20	Ø30	2000	800
48x30	420	265	135	90	25	116	140x20	Ø40	2500	900
50x45	420	250	90	100	25	178	150x20	Ø40	2600	1000

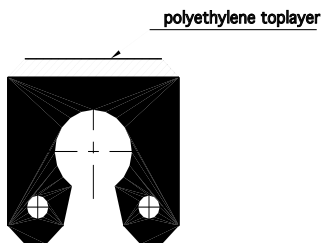
Example half development W48-30



KEYHOLE FENDERS



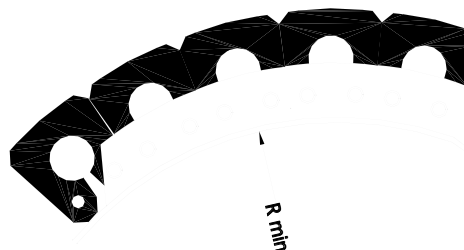
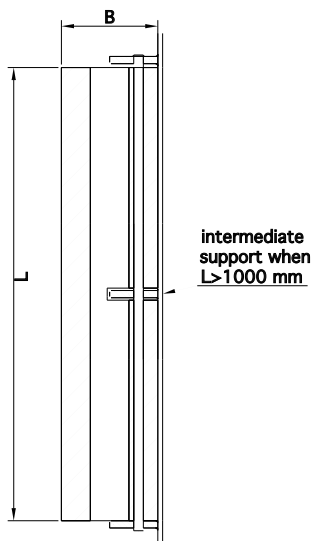
Keyhole fenders are used as an alternative to W-fenders in case of extremely heavy loads. The keyhole cross-section is very tough but can be curved around the hull. Fixing/mounting is very simple with this type of fender.



Keyhole fenders can also be supplied in rubbylene® quality. Rubbylene® is a composite material developed by Trelleborg Ridderkerk, consisting of rubber and a toplayer of UHMW Polyethylene. The combination of very high abrasion resistant UHMW-PE and rubber gives the advantage of low friction face and the energy absorption capabilities of rubber (see also next page).

We have four types in our production program:

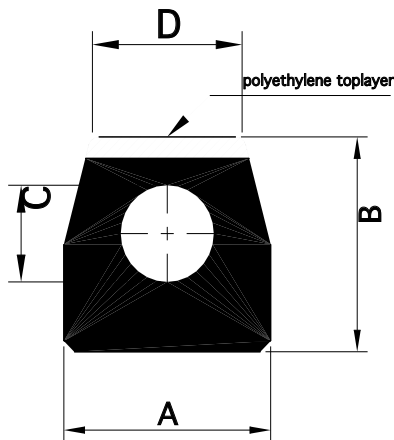
productcode	A mm	B mm	C mm	D mm	E mm	max.length mm	Weight kg/m
8-200	200	90	25	130	40	2100	35
8-250	250	100	25	150	50	2100	57
8-304	304	115	33	184	60	1900	88
8-350	350	120	33	210	70	1900	119



Productcode	min.inside radius
8-200	450
8-250	600
8-304	800
8-350	1000

TYPE 5: RUBBYLENE® FENDERS

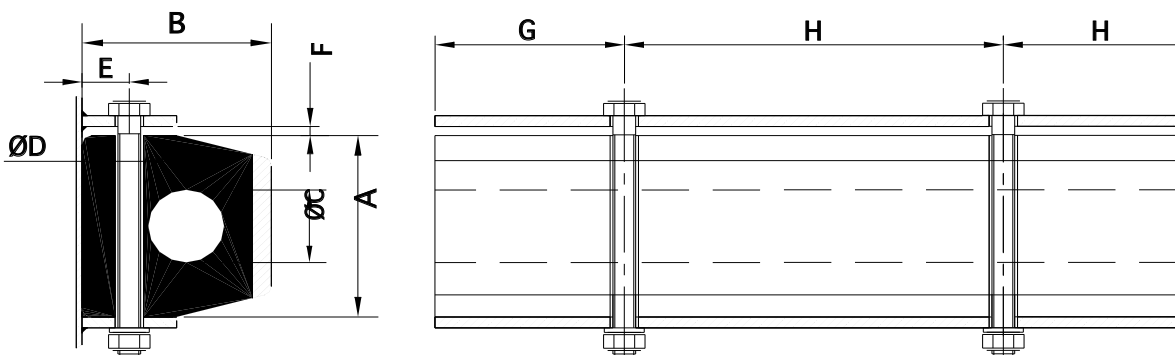
The type 5 fenders are excellent side fenders for service, work, supply boats and pilot boats



Rubbylene® is being used more and more for vessel beltings in particular on pilot boats and other such service vessels. Rubbylene® with its integrally bonded ultra high molecular weight polyethylene layer reduces the coefficient of friction of the fender by around a factor of 9. Thus reducing transmitted shear loads and protection vessel and structure alike. The production of rubbylene® in steel moulds under high pressure and temperature results in the perfect bonding of rubber to polyethylene. The cohesion values thus attained are at least equal to 10 N/mm ISO 813.

Productcode	A mm	B mm	C mm	D mm	Max.length mm
5-B 80 x 80 x 42 PE	80	80	42	60	2900
5-B 100 x 100 x 45 PE	100	100	45	74	2900
5-B 120 x 120 x 62 PE	120	120	62	88	2900
5-B 150 x 150 x 73 PE	150	150	73	110	2900

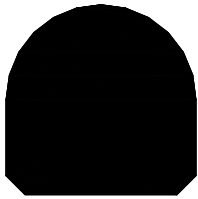
Attachment method type 5 fenders:



A	B	C	D	E	F	G	H	Flat Bar	Bolt
80	80	42	15	25	6	90-130	200-300	45 x 6	M12
100	100	45	15	25	8	90-130	200-300	45 x 6	M12
120	120	62	20	30	10	110-150	250-350	60 x 8	M16
150	150	73	20	30	12	110-150	250-350	60 x 8	M16

All dimensions are in millimetres.

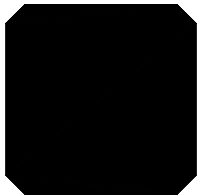
OTHER FENDER TYPES



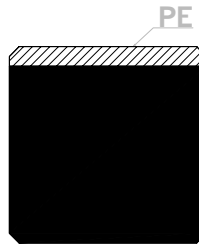
Type E1A
Closed D section



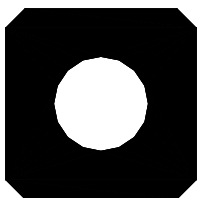
Type 2A



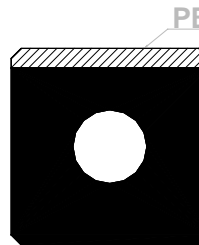
Type 15A
Solid rectangular



Type 15A
Rubbylene®
solid rectangular



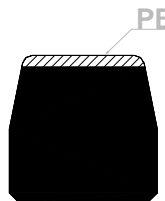
Type 15B
rectangular
hollow square



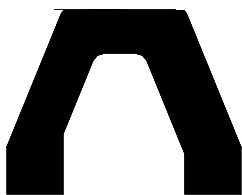
Type 15B
Rubbylene®
rectangular
hollow square



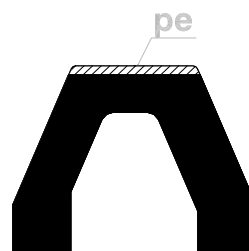
Type 4
Wingfender



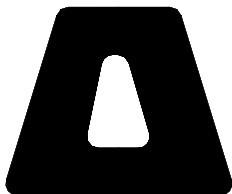
Type 5A, solid
Rubbylene®



Type 26A
open W fender



Type 26APE
Rubbylene®
open V fender



Type 26B
Delta fender



Type 16
Shear fender

On request we can inform you about properties and dimensions of these fenders.



TOLERANCES:

All Trelleborg Ridderkerk fenders are subject to standard manufacturing and performance tolerances. For specific applications, smaller tolerances may be agreed on a case by case basis.

Manufacturing tolerances:

moulded fenders in general:	+/- 2 mm or 2 %
extruded fenders in general:	3 - 5 %
wrapped fenders in general:	+/- 2 %

Contact Trelleborg Ridderkerk if you need more information about tolerances of fenders.

MATERIALS:

The materials used are high grade synthetic rubber qualities EPDM and SBR with extremely high resistance to sea water, oil and other chemical contaminants, ozone, extreme temperatures, ageing, tearing and fatigue. Hardness in general for compounds used for fenders 70 Shore A \pm 5. The weights mentioned in this brochure are calculated and depends on specific gravity of the used compound.

POLICY QUALITY, ENVIRONMENT, SAFETY AND HEALTH

The policy of Trelleborg Ridderkerk BV is to design, produce and deliver rubber products which are in accordance with the customers' requests, needs and expectations.

The starting point of our policy is the Trelleborg Group policy statement 'Code of Conduct' on our website www.trelleborg.com.

During the development of products and processes the environment, safety and health are integral to the process.

Trelleborg Ridderkerk BV is using an integrated management system which complies to international standards such as ISO 9001, ISO 14001 and SCC**.



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