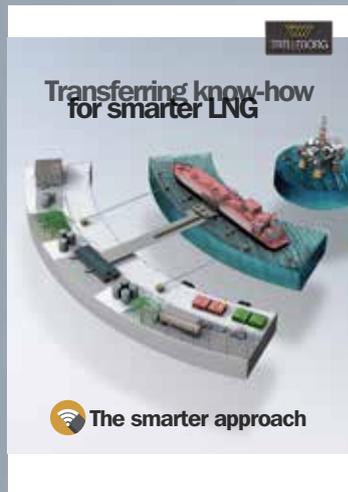




Rolling Fenders & Safety Products

PRODUCT BROCHURE

The Smarter Approach



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Better connected systems mean faster turnaround and increased throughput, improved safety and lower operating costs.

Connecting decades of experience with a new, smarter approach to port and terminal equipment optimization, Trelleborg's marine systems operation helps ports and terminals deploy smart, engineered solutions for port approach, berthing, docking and mooring. This enables better informed real-time and strategic decision making, both onshore and on board the vessel.

From port owners and operators to consulting engineers, Trelleborg works with customers to determine best fit solutions for specific applications, and supply a fully integrated solution. End-to-end service and a comprehensive product portfolio meet and exceed customer needs, enhancing safety and improving efficiency in all marine environments, from conception to completion and beyond.

Rolling Fenders & Safety Products

Trelleborg Marine Systems is a world leader in the design and manufacture of advanced marine fender systems.

We provide bespoke solutions for large and complex projects all over the world. Best practice design and quality materials ensure a long, low maintenance service life, no matter how demanding the working and environmental conditions.

All fenders are supplied fully tested and meet PIANC 2002 guidelines. Our pneumatic fenders are also completely ISO17357-1:2014 compliant. Our high performance solutions combine low reaction force and hull pressure with good angular performance and rugged construction.

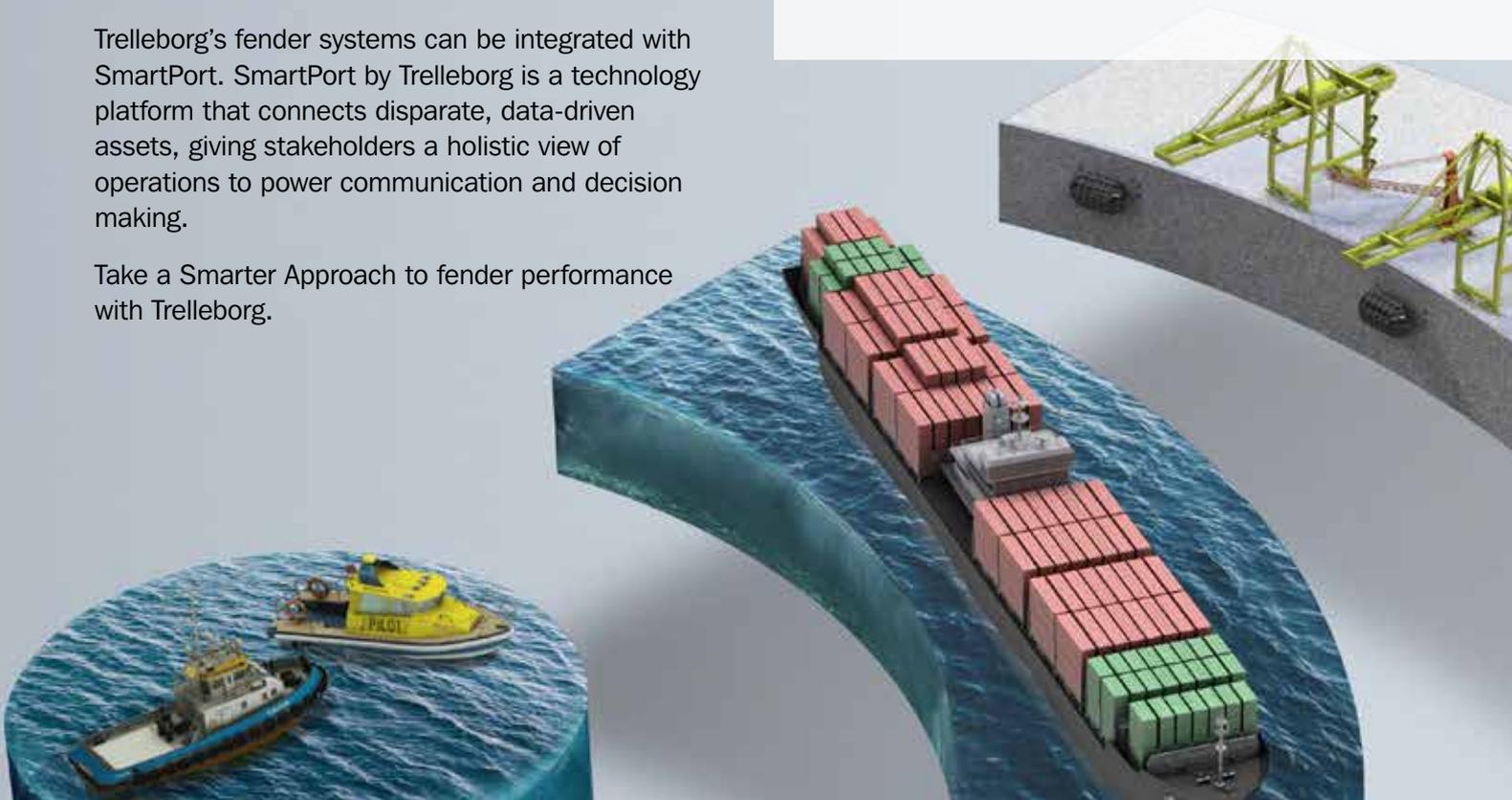
Trelleborg's fender systems can be integrated with SmartPort. SmartPort by Trelleborg is a technology platform that connects disparate, data-driven assets, giving stakeholders a holistic view of operations to power communication and decision making.

Take a Smarter Approach to fender performance with Trelleborg.

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A Smarter Approach at every stage

A smarter approach to...

CONSULTATION

Consultation from the earliest project phase to ensure the optimum fender, mooring, navigation and transfer solutions are specified, with full technical support from our global offices.



CONCEPTS

Conceptual design in your local office – with full knowledge of local standards and regulations, delivered in your language – for optimized port and vessel solutions.



DESIGN

Concepts are taken to our Engineering Centers of Excellence where our team generates 3D CAD designs, application-engineering drawings, a bill of materials, finite engineering analyses and calculations for both our fender systems and marine technology solutions.



MANUFACTURE

Our entire product range is manufactured in-house, meaning we have full control over the design and quality of everything we produce. Our strategically located, state-of-the-art facilities ensure our global, industry leading manufacturing capability.



TESTING

Across our entire product range, stringent testing comes as standard at every step in our in-house manufacturing process. We ensure that life-cycle and performance of our entire product range meets your specifications, and more.



INSTALLATION

Dedicated project management, from solution design right the way through to on-site installation support. We design products and solutions that always consider ease of installation and future maintenance requirements.



SUPPORT

Local support on a truly global scale, with customer support teams all over the world. And this service doesn't stop after a product is installed. You have our full support throughout the entire lifetime of your project, including customized training programs, maintenance and on-site service and support.



THE FUTURE

Deploying the latest in smart technologies to enable fully automated, data-driven decision making that optimizes port and terminal efficiency. At Trelleborg, we're constantly evolving to provide the digital infrastructure our industry increasingly needs.



When you choose Trelleborg you ensure your expectations will be met, because we deliver a truly end-to-end service – retaining vigilance and full control at every stage.

Wheel Fenders



Wheel fenders are widely used on exposed corners to help ships maneuver into berths and narrow channels such as locks and dry-dock entrances.

The main axle slides on bearings and the wheel reacts against back rollers to provide high energy and minimal rolling resistance, whilst the stainless steel and composite Trelleborg Orkot® bearings are almost zero maintenance.

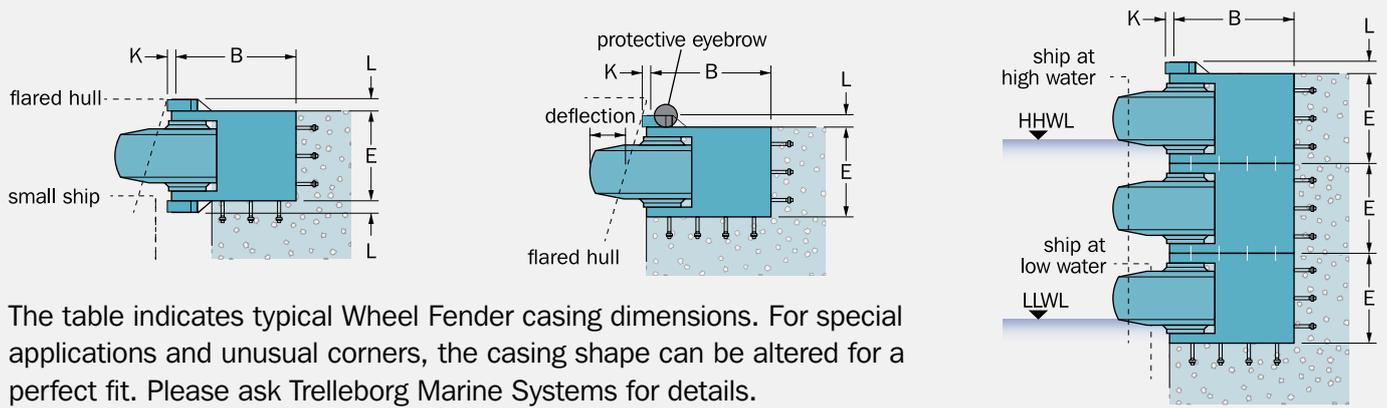
As well as our broad range of wheel fenders, we specialize in innovative turnkey solutions, designed and engineered precisely to meet the needs of individual projects.

FEATURES

- Highest energy absorption
- Very low rolling resistance
- Use singly or in multiple stacks
- Composite and stainless steel bearings
- Low maintenance casing design

APPLICATIONS

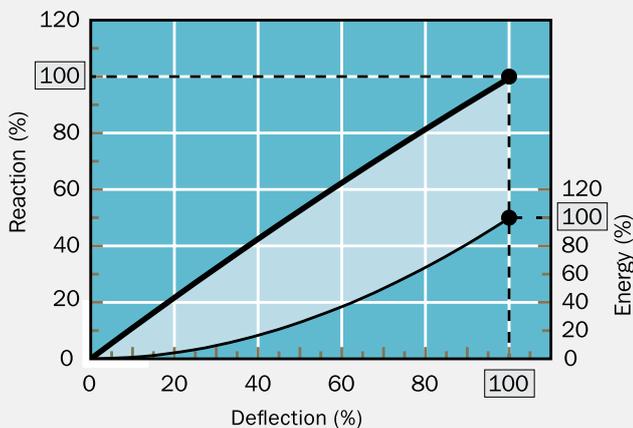
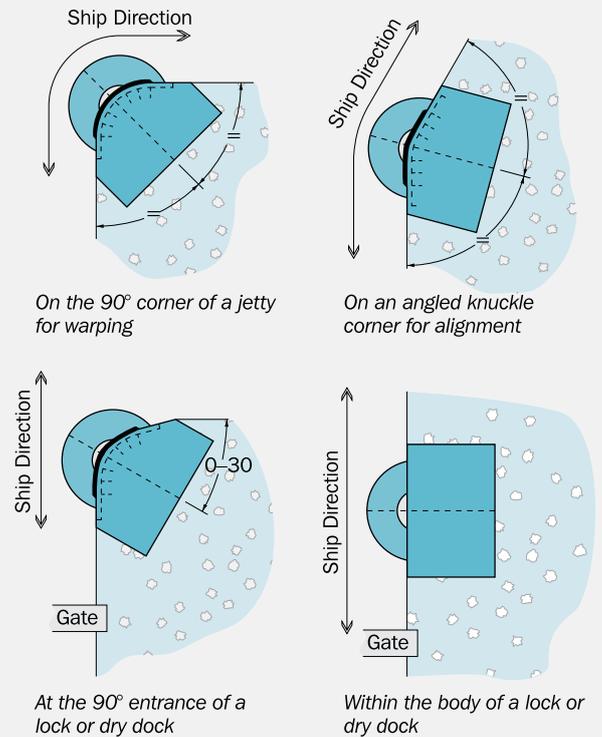
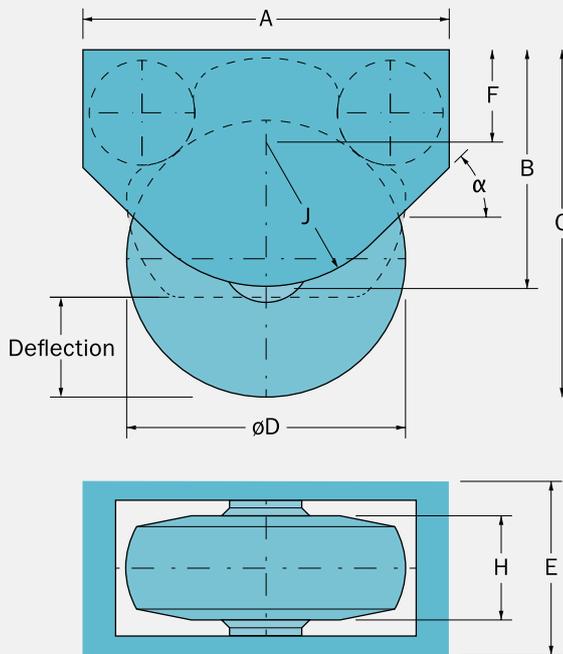
- Dry-dock entrances and walls
- Lock approaches
- Exposed corners



The table indicates typical Wheel Fender casing dimensions. For special applications and unusual corners, the casing shape can be altered for a perfect fit. Please ask Trelleborg Marine Systems for details.

FENDER	A	B	C	øD	E	F	H	J	K	L	α	ANCHOR
110-45WF	1700	1000	1450	1080	900	350	460	650	50	150	0-40°	10 X M24
130-50WF	2000	1200	1750	1300	1000	350	510	850	50	200	0-40°	10 X M24
175-70WF	2650	1500	2200	1750	1150	550	690	950	50	200	0-40°	12 X M30
200-75WF	2750	1750	2550	1980	1250	500	760	1250	50	250	0-45°	12 X M30
250-100WF	3350	2200	3200	2550	1600	850	970	1350	50	250	0-45°	14 X M36
290-110WF	4200	2500	3750	2900	1700	1000	900	1500	50	250	0-45°	14 X M36

[Units: mm]



FENDER	ENERGY (kNm)	REACTION (kN)	DEFLECTION (mm)	PRESSURE (bar)
110-45WF	33	150	400	5.5
130-50WF	61	220	500	3.5
175-70WF	100	315	600	4.8
200-75WF	220	590	700	5.5
250-100WF	440	920	925	5.5
290-110WF	880	1300	1200	5.8

Nominal rated deflection may vary at RPD.

Roller Fenders



Roller fenders are usually installed to guide ships in restricted spaces like walls of dry docks.

They can also be used on corners and lock entrances where lower energies are needed. Roller fenders use stainless steel and composite Trelleborg Orkot® bearings which give a very low rolling resistance and require virtually zero maintenance.

Along with our existing comprehensive range of roller fenders, we also engineer solutions on a project by project basis and can provide turnkey solutions to your precise requirements.

FEATURES

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

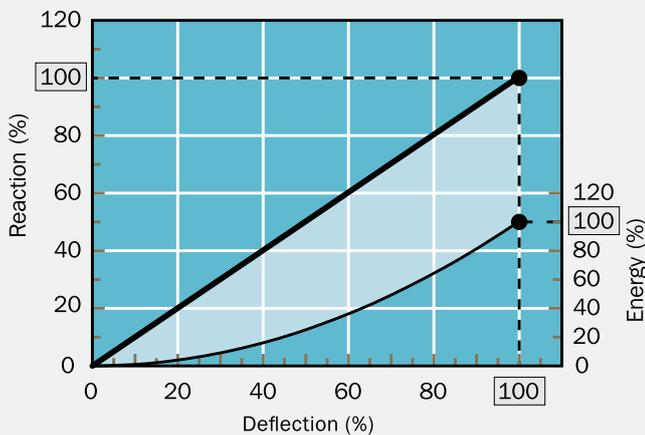
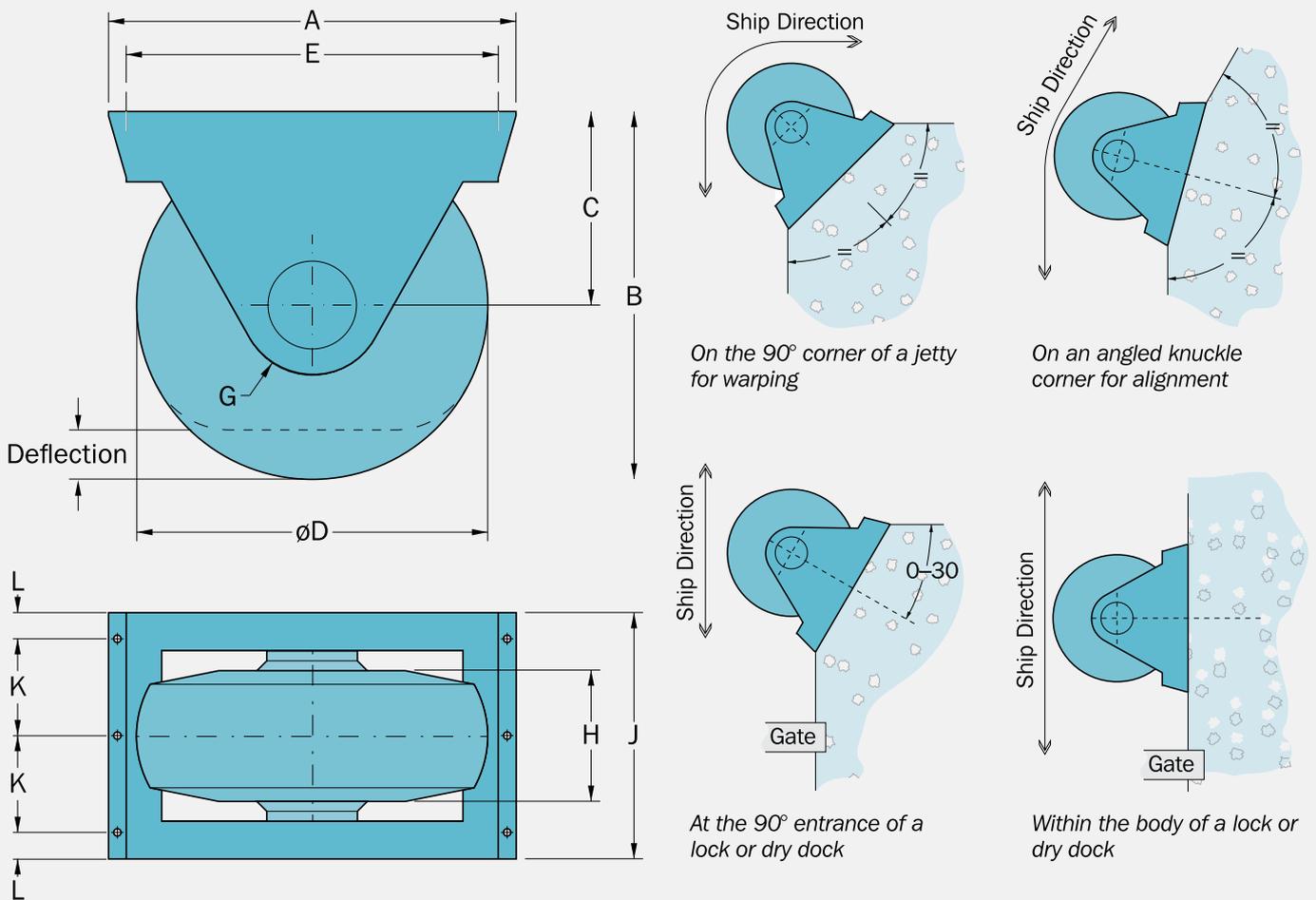
APPLICATIONS

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

The table indicates typical Roller Fender frame dimensions. For special applications and unusual corners, the frame shape can be altered for a perfect fit. Please ask Trelleborg Marine Systems for details.

FENDER	A	B	C	øD	E	G	H	J	K	L	ANCHOR
110-45RF	1250	1150	610	1080	1150	220	460	800	340	60	6 X M30
130-50RF	1530	1400	740	1320	1450	260	510	950	400	75	6 X M30
140-60RF	1600	1450	765	1370	1500	270	610	1000	425	75	6 X M30
175-70RF	2050	1850	975	1750	1900	350	690	1250	500	125	6 X M36
200-75RF	2300	2100	1110	1980	2100	400	765	1400	550	150	6 X M42
250-100RF	3000	2700	1425	2550	2700	500	895	1800	700	200	6 X M48

[Units: mm]



FENDER	ENERGY (kNm)	REACTION (kN)	DEFLECTION (mm)	PRESSURE (bar)
110-45RF	13	175	152	5.5
130-50RF	22	200	230	3.5
140-60RF	20	210	205	3.5
175-70RF	37	345	225	4.8
200-75RF	100	765	270	5.5
250-100RF	170	1000	345	5.5

Nominal rated deflection may vary at RPD.

Cushion Rollers



Cushion rollers are used to guide pontoons and floating structures quietly and gently up and down their guide piles.

The resilient wheel can be supplemented by a rubber cushion pad to withstand berthing impacts. Stainless steel and plastic bearings require minimal maintenance.

FEATURES

Extremely quiet

Resilient wheel and cushion

Withstands berthing impacts

Gentle on protective coatings

Low maintenance bearings

APPLICATIONS

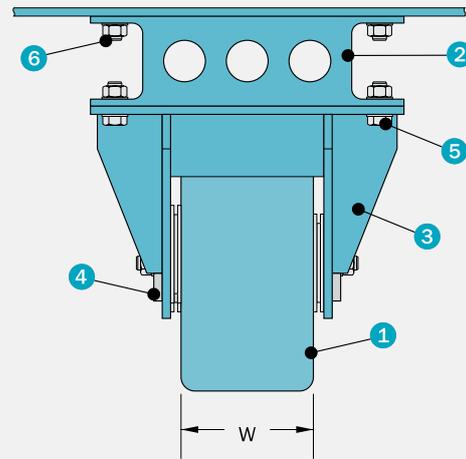
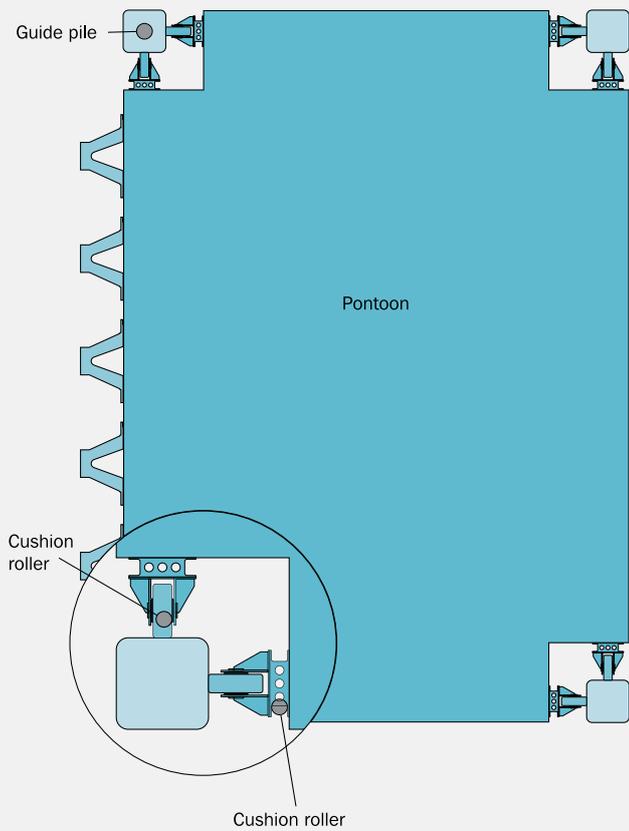
Pontoon guides

Other floating structures

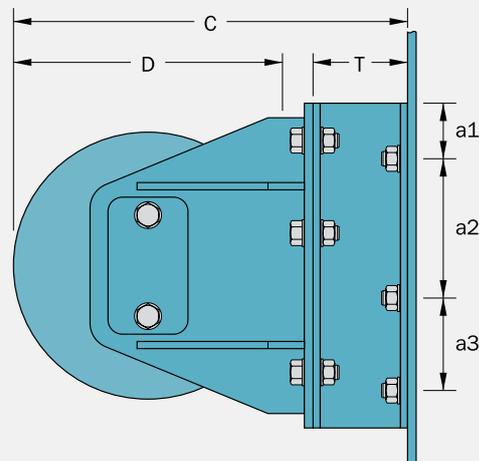
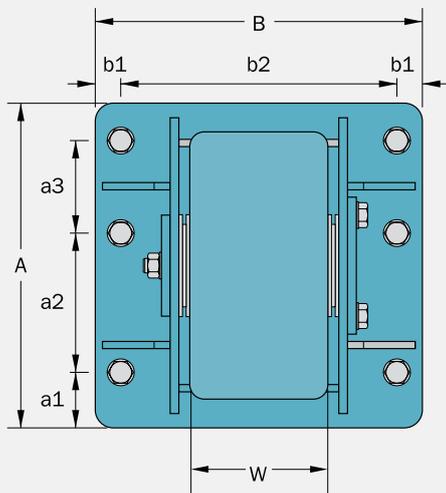
The table indicates typical Cushion Roller dimensions. For special applications, the shape can be altered for a perfect fit. Please ask Trelleborg Marine Systems for details.

FENDER	CAPACITY	A	B	C	D	T	W	a1	a2	a3	b1	b2	FIXINGS
CR10	10T	450	450	542	370	130	125	90	310	–	35	380	4 X M20
CR15	15T	450	450	542	370	130	190	90	175	135	35	380	6 X M20
CR20	20T	450	520	546	370	130	250	80	160	120	50	420	6 X M24
CR25	25T	450	550	546	370	130	315	90	175	135	35	480	6 X M24
CR30	30T	480	630	570	380	130	315	90	180	120	55	520	6 X M36
CR40	40T	770	725	690	450	200	350	120	300	300	70	585	6 X M36

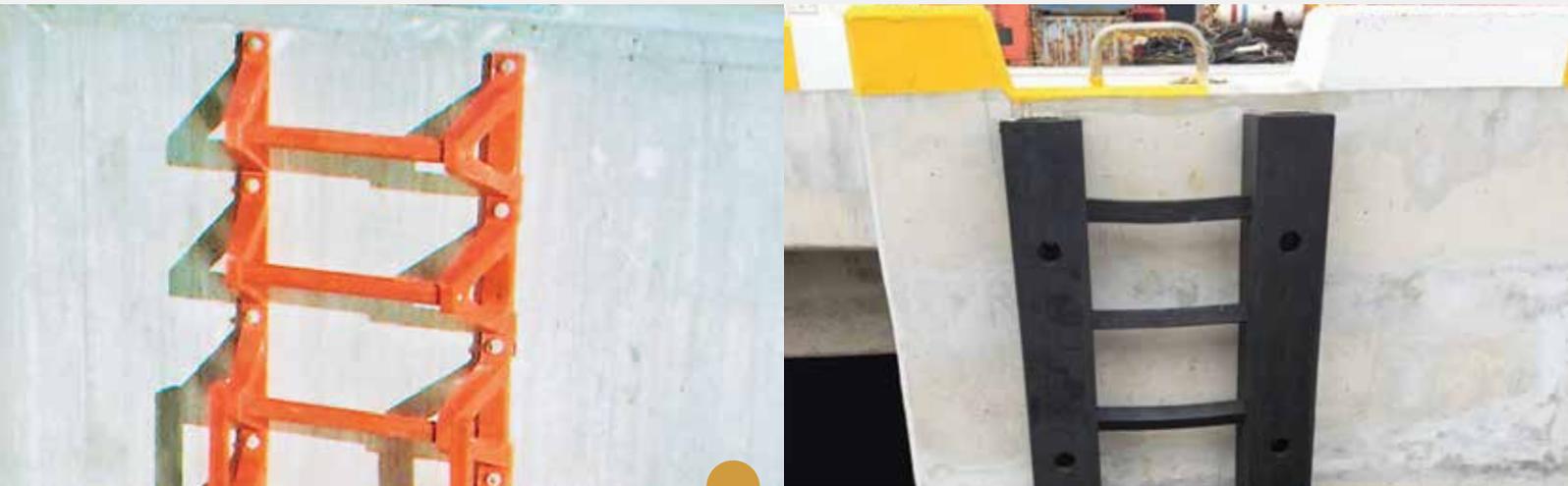
[Units: mm]



- 1 Rubber roller
- 2 Rubber cushion pad
- 3 Roller frame
- 4 Axle and bearings
- 5 Roller fixings
- 6 Cushion fixings



Ladders



Ladders are very robust but remain flexible to reduce accidental damage and help protect the wharf when small crafts berth.

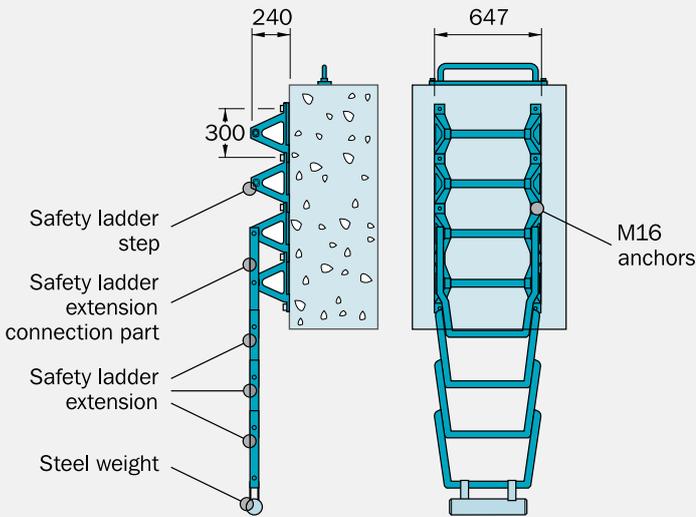
Modular ladders are flexible, corrosion resistant and can withstand most accidental impacts from smaller vessels. The step modules are made from polyurethane and can be linked together, combined with extensions and a variety of handrails to suit many applications.

The LFE / LF-250 ladders integrate the functions of a ladder and a fender into a single unit. Available in a range of lengths, the LFE / LF-250 Ladder Fender can also be fitted with a rubber encased chain extension to suit overhanging structures.

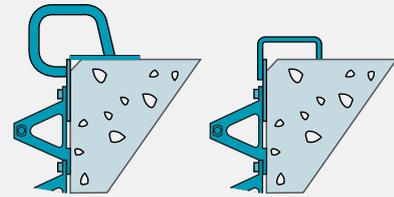
In addition to the existing range of polyurethane and rubber ladders, we can also customize steel ladder solutions according to your project requirements.

ML MODULAR LADDERS

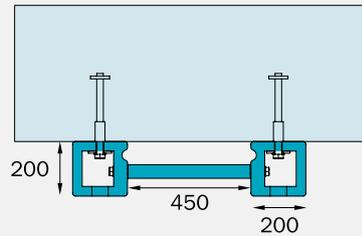
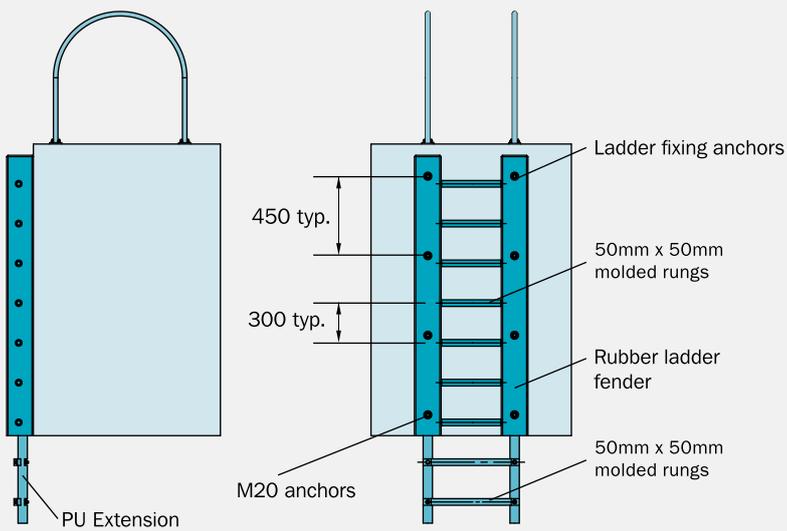
With PU ladders extensions



Examples of optional handrails



LFE LADDERS



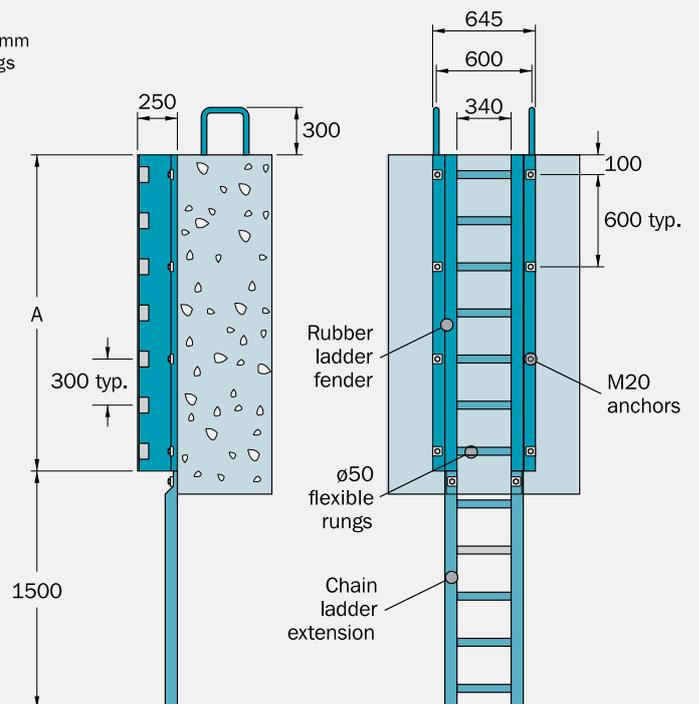
The length of both the LFE ladder and PU extension can be customized to suit your specific requirements.

LF-250 LADDERS

Dimensions

A	RUNGS	ANCHORS	WEIGHT
1100	4	2 X 3	69
1400	5	2 X 3	88
1700	6	2 X 4	107
2000	7	2 X 4	125
2300	8	2 X 5	145
2600	9	2 X 5	164
2900	10	2 X 6	183

[Units: mm, kg]



Accessories

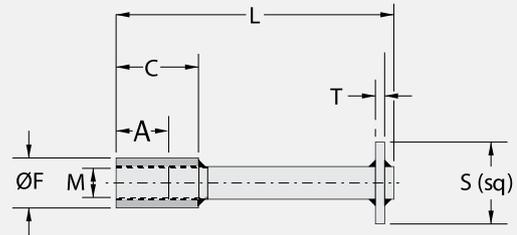
NC3 ANCHORS

THREAD	A	C	ØF	L	S (sq)	T	WEIGHT
M20	40	60	30	200	63	10	1
M22	44	66	32	225	63	10	1
M24	48	73	36	250	75	10	2
M27	54	84	40	265	75	10	2
M30	60	95	45	270	100	10	4
M36	72	112	54	320	100	12	6
M42	84	134	63	360	100	12	8
M48	96	156	72	400	100	15	12
M56	112	182	84	550	120	15	20
M64	128	208	100	600	130	20	30
M76	152	242	114	700	150	20	46

Anchors available in mid steel, HDG, SS 316 or super duplex

[Units: mm, kg]

The NC3 is a traditional cast-in anchor design used for installing fenders to new concrete. The NC3 anchor has a threaded socket, a long tail and a square anchor plate. Non-standard sizes and other cast-in anchor types are available on request.



Always check min/max clamping thickness and socket depths actual threaded length on bolts.

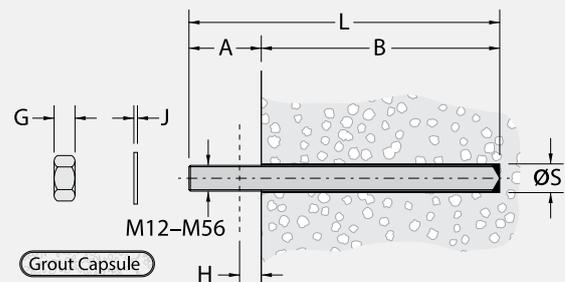
EC2 ANCHORS

THREAD	B	E	G	J	L (typ.)	ØS	CAPSULE
M12	110	5-8	10	2.5	-	15	1 × C12
M16	140	6-9	13	3	175	20	1 × C16
M20	170	6-9	16	3	240	25	1 × C20
M24	210	8-12	19	4	270	28	1 × C24
M27	240	8-12	22	4	330	30	1 × C24
M30	280	8-12	24	4	360	35	1 × C30
M36	330	10-15	29	5	420	40	1 × C30
M42	420	14-21	34	7	500	50	2 × C30
M48	480	16-24	38	8	580	54	2 × C30 + 1 × C24
M56	560	18-27	45	9	-	64	4 × C30

[Units: mm]

A = E + G + H + J, rounded up to nearest 10mm.
 E = clear threads after assembly.
 H = clamping thickness of fender.

The EC2 anchor is used for installing fenders onto existing concrete or where cast-in anchors are unsuitable. The anchor is usually secured into a drilled hole using special grout capsules. Non-standard sizes and other grout systems are available on request.



Always follow the manufacturer's instructions when installing EC2 anchors.

DISCLAIMER

Trelleborg AB has made every effort to ensure that the technical specifications and product descriptions in this brochure are correct.

The responsibility or liability for errors and omissions cannot be accepted for any reason whatsoever. Customers are advised to request a detailed specification and certified drawing prior to construction and manufacture. In the interests of improving the quality and performance of our products and systems, we reserve the right to make specification changes without prior notice. All dimensions, material properties and performance values quoted are subject to normal production and testing tolerances.

This brochure supersedes the information provided in all previous editions. If in doubt, please check with Trelleborg Marine Systems.

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Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

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