IOM MANUAL

SHIBATAFENDERTEAM

on the safe side

WELCOME TO THE SHIBATAFENDERTEAM INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Fenders are safety-critical systems which protect people, the environment, ships and structures from harm. They need to perform on demand as the designer intended for their entire service life, even in the harshest locations. To do this fenders must be installed, used and maintained correctly.

This Installation, Operation and Maintenance Manual provides guidance and tips for each stage but it cannot cover every possible scenario. This manual is intended to complement any local national or international rules and regulations, which must take precedence.

At ShibataFenderTeam we want users to benefit from the high quality systems which have been supplied. Our specialists are on hand to guide or assist with all matters – your local ShibataFenderTeam office will be pleased to help.

ShibataFenderTeam is a world-class designer and manufacturer of fenders and bollards. Our systems are used in ports, harbours and terminals around the world and trusted by the largest and most respected consultants, contractors and operators. We want every ShibataFenderTeam product to give trouble-free service and optimum performance for many years to come.

SHIBATAFENDERTEAM

ShibataFenderTeam is headquartered in Germany with regional hubs in the USA, Europe, Middle East, Asia and Australia. Our network of well-established local representatives spans all five continents.

Our Japanese mother company, Shibata Industrial Co. Ltd., has developed and manufactured a vast range of engineered rubber products since 1929, and have been pioneers in fender design and manufacture for over 50 years. ShibataFenderTeam owns and operates testing and manufacturing facilities in Japan, Malaysia and Germany where we produce:

- extruded and moulded rubber fender units up to a single unit weight of 18.5 tonne;
- pneumatic rubber fenders with diameters up to 3.3 metre and 9.0 metre long;
- foam fenders with diameters up to 4.5 metre and 10 metre long;
- HD-PE sliding fender up to 300 x 300mm cross-section and 6 metre long;
- steel constructions with a single unit weight up to 30 tonne;
- buoys for various applications up to 4.5 metre diameter;
- many special products for marine applications which exploit our knowledge of rubber, steel, polyurethane and polyethylene.

In addition to this outstanding expertise, our team of partners, employees, reputable and approved suppliers have decades of specialist knowledge in the design of safety critical fender systems, protecting people, ships and port infrastructure.

ShibataFenderTeam combines these resources and skills whenever for every state-of-the-art fender system. Our in-house manufacturing facilities and high-quality products at fair prices have earned ShibataFenderTeam a reputation as a dependable partner in the international port, harbor and waterways markets.

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SAFETY

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SAFETY

During the installation, operation and maintenance of fenders there are a number of potential hazards. A Safety Management System (SMS) provides the framework for identifying these hazards, assessing the probability they could happen and the consequences or outcome for personnel, the environment, structures and ships. An SMS may also include financial exposures.

Safety management is all about understanding risks and adopting strategies for eliminating, reducing or monitoring them. Many techniques are used to mitigate risks which might otherwise result in unexpected loss or harm. A matrix is commonly used where each hazard, either alone or in possible combinations, is then categorised according to the likelihood it might occur and the outcome or severity of an event. Each hazard is given a "risk score" with suitable measures or procedures to minimise risk and maximise safety.

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) is worn to minimise exposure to serious workplace injuries and illnesses which may result from contact with physical, mechanical, chemical, electrical or other site hazards.

Everyone entering a working area should be properly equipped. A risk assessment should always be carried out to determine the hazards and most suitable PPE.

Depending on the location and type of work additional PPE should be worn such as gloves, safety glasses and shoes, earplugs or ear defenders, hard hats, respirators, coveralls, high visibility vests, safety harnesses and personal flotation devices (PFDs).

RISK ASSESSMENT

Project Title:		Risk Assessment Ref:	ABC123
Task/Activity:		Project No:	
		Date Prepared:	

Hazards		Likelihood					Severity				Risk Score
Ref	Key hazards associated with this activity/task	Frequent	Probable	Occasional	Remote	Improbable	Catastrophic	Serious	Critical	Minor	Likelihood x Severity
	Score >	5	4	3	2	1	4	3	2	1	
1	Dropped objects			X				X			9
2	Falling from height				X		X				8
3	Falling into water			X			X				12
4	Lifting objects with a crane				X		X				8
5	Grinding and cutting steel		X							X	4
6	Fires caused by welding or burning			X						X	3
7	Collisions with plant or materials				X		X				8
8	Structural or formwork collapse					X	X				4
9	Crane collapse or toppling				X		X				8
10	Slipping or tripping	X								X	5

Very High Risk	> 10
High Risk	5–9
Low Risk	1–4

Frequent	an event likely to occur many times
Probable	event expected to happen several times
Occasional	event that might happen at least once
Remote	unlikely to happen but could at some time
Improbable	event highly unlikely to ever arise

Catastrophic	Death, system loss, or irreversible environmental damage
Serious	Severe injury, occupational illness, major system damage, or reversible severe environmental damage
Critical	Injury requiring medical attention, illness, system damage, or mitigatible environmental damage
Minor	Possible minor injury, minor system damage, or minimal environmental damage

This table is available as an Excel spreadsheet template for ShibataFenderTeam customers.

During fender installation, maintenance and operation, each activity or task should be considered and individual hazards identified. Each hazard should be ranked according to its likelihood. Events may occur in isolation or combine to create another identifiable event. The judgement of likelihood could be based on experience, similar activities or other criteria.Outcomes for people, the environment and property should be considered separately and prioritized.

RISK MATRIX

A matrix is commonly used to assess risks.

Severity						
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		Likelihood				

UNLOADING AND STORAGE

ShibataFenderTeam pack every shipment with the greatest care. Fender components are often transported in 20' and 40' containers. Open-top and flat rack containers may be used to make unloading easier. Any container parts that could obstruct the unloading of goods should be removed or rolled back.

A level, clean and dry area of ground should be prepared in readiness to store the shipment after unloading. Locate all lifting points before beginning to move items, and remove any packing straps.

Parts up to 2.1m across can be removed vertically from open-top containers. Parts between 2.1m and 2.3m in width will need to be extracted via the end opening after first removing any smaller parts in the way. Always use appropriate lifting equipment for each component, taking great care to protect any paintwork or vulnerable parts while lifting.

Smaller parts and assemblies will usually be sent in closed containers. These can be easier to unstuff at the destination port or other nearby facility, then the goods sent by van to site (optionally a flatbed or open-top trailer for better access, on request).

Very large parts, above 2.3m across, are usually shipped on open flat rack containers which simplify access for lifting.

Please inform ShibataFenderTeam immediately of any damage incurred in transit before goods are unloaded. The shipping insurer will require clear photographs and statements to determine liability and settle claims. In the rare event of serious damage to the cargo, the insurer may choose to send a surveyor to inspect and record the damage.

Minor coating damage due to transport, local handling or installation is normally the contractor's responsibility to touch up, and should be carried out after installation, unless the affected areas will be submerged or hard to access. If you are in any doubt or have further queries, please contact your ShibataFenderTeam office.

ALWAYS

Check the delivery matches the shipping documents and diagrams.	✔
Remove and recycle packing and support materials.	✔
Store goods in a safe enclosure until they are needed.	✔
Use soft slings with lifting eyes for handling rubber and painted items.	✔
Check weights and centroids before lifting.	✔
Support goods on suitable bearers on dry, level ground.	✔
Avoid damage to paintwork.	✔
Check threads and sockets are clean and free from contaminants.	✔

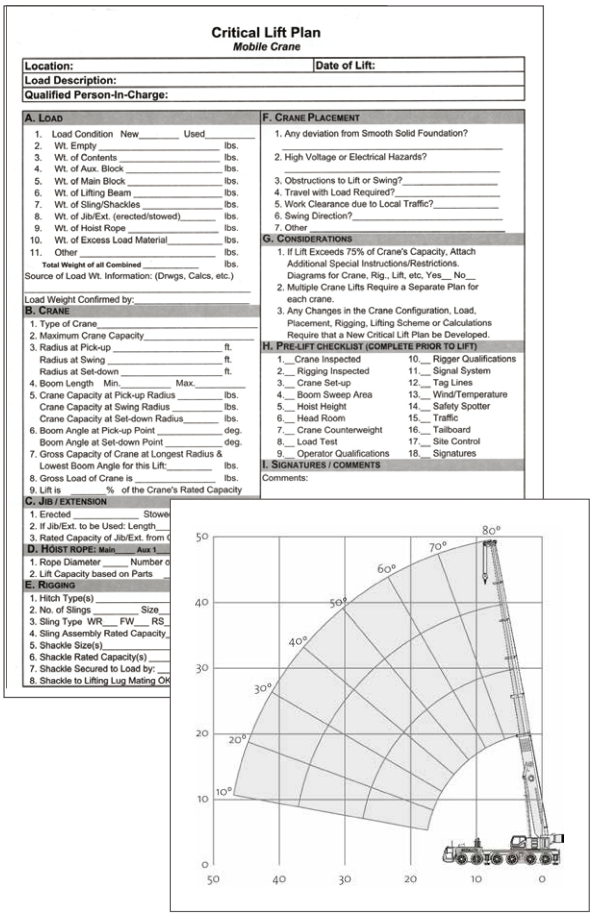
NEVER

Unpack before components are needed, except for visual check of quality and quantity on receipt.	✖
Risk damage by using unnecessary force.	✖
Move goods with unprotected lift forks or hooks.	✖
Drag components over the ground.	✖
Weld, grind, shot-blast or similar near the storage area or assembly site.	✖

SAFE LIFTING

Lifting and manoeuvring large fenders from the shore or from floating platforms is a safety critical operation. Where there are large tides or strong currents the lift must be carefully planned and executed to be completed in a short time window.

Large lifts often require multiple cranes for stable support of large loads. In marine projects where access can be limited, many lifts require a large outreach. Suitable cranes must be selected with care to consider site access and ground conditions. Lifting capacity should be considered at pick-up, swing and set-down radius.



Critical Lift Plan
Mobile Crane

Location: | **Date of Lift:**
Load Description:
Qualified Person-In-Charge:

A. LOAD
1. Load Condition New_____ Used_____
2. Wt. Empty _____ lbs.
3. Wt. of Contents _____ lbs.
4. Wt. of Aux. Block _____ lbs.
5. Wt. of Main Block _____ lbs.
6. Wt. of Lifting Beam _____ lbs.
7. Wt. of Sling/Shackles _____ lbs.
8. Wt. of Jib/Ext. (erected/stowed)_____ lbs.
9. Wt. of Hoist Rope _____ lbs.
10. Wt. of Excess Load Material_____ lbs.
11. Other _____ lbs.
Total Weight of all Combined _____ lbs.
Source of Load Wt. Information: (Drwgs, Calcs, etc.)
Load Weight Confirmed by:

B. CRANE
1. Type of Crane
2. Maximum Crane Capacity
3. Radius at Pick-up _____ ft.
Radius at Swing _____ ft.
Radius at Set-down _____ ft.
4. Boom Length Min._____ Max._____
5. Crane Capacity at Pick-up Radius _____ lbs.
Crane Capacity at Swing Radius _____ lbs.
Crane Capacity at Set-down Radius_____ lbs.
6. Boom Angle at Pick-up Point _____ deg.
Boom Angle at Set-down Point _____ deg.
7. Gross Capacity of Crane at Longest Radius & Lowest Boom Angle for this Lift:_____ lbs.
8. Gross Load of Crane is _____ lbs.
9. Lift is _____% of the Crane's Rated Capacity

C. JIB / EXTENSION
1. Erected _____ Stowe
2. If Jib/Ext. to be Used: Length_
3. Rated Capacity of Jib/Ext. from

D. HOIST ROPE: Main_____ Aux 1_____
1. Rope Diameter _____ Number
2. Lift Capacity based on Parts

E. RIGGING
1. Hitch Type(s) _____
2. No. of Slings _____ Size_
3. Sling Type WR___ FW___ RS_
4. Sling Assembly Rated Capacity_
5. Shackle Size(s)_____
6. Shackle Rated Capacity(s) ___
7. Shackle Secured to Load by: __
8. Shackle to Lifting Lug Mating OK

F. CRANE PLACEMENT
1. Any deviation from Smooth Solid Foundation?
2. High Voltage or Electrical Hazards?
3. Obstructions to Lift or Swing?_____
4. Travel with Load Required?_____
5. Work Clearance due to Local Traffic?_____
6. Swing Direction?_____
7. Other _____

G. CONSIDERATIONS
1. If Lift Exceeds 75% of Crane's Capacity, Attach Additional Special Instructions/Restrictions. Diagrams for Crane, Rig., Lift, etc, Yes__ No__
2. Multiple Crane Lifts Require a Separate Plan for each crane.
3. Any Changes in the Crane Configuration, Load, Placement, Rigging, Lifting Scheme or Calculations Require that a New Critical Lift Plan be Developed.

H. PRE-LIFT CHECKLIST (COMPLETE PRIOR TO LIFT)

1.__ Crane Inspected	10.__ Rigger Qualifications
2.__ Rigging Inspected	11.__ Signal System
3.__ Crane Set-up	12.__ Tag Lines
4.__ Boom Sweep Area	13.__ Wind/Temperature
5.__ Hoist Height	14.__ Safety Spotter
6.__ Head Room	15.__ Traffic
7.__ Crane Counterweight	16.__ Tailboard
8.__ Load Test	17.__ Site Control
9.__ Operator Qualifications	18.__ Signatures

I. SIGNATURES / COMMENTS
Comments:

CRITICAL LIFT PLAN

A lift plan should be prepared for every case, taking account of the worst combinations of lifting requirements and potential hazards. The assembled weight of the complete fender system should be checked on-site before the final lift is attempted.

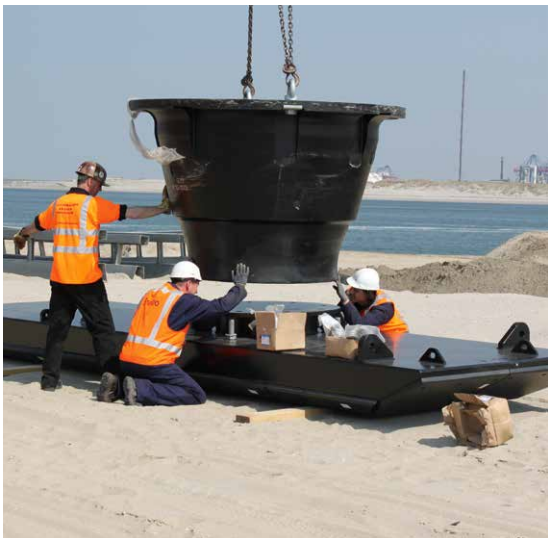
PRE-LIFT CHECKLIST*

Is the crane configured according to the lift plan?	✔
Has the crane been inspected and is its condition acceptable?	✔
Has the rigging equipment been inspected, secured, and is it in acceptable condition?	✔
Is the supporting surface stable?	✔
Are proper crane mats placed under outrigger floats and at a 90-degree angle to the outrigger cylinders? Are crawler cranes on proper crane mats?	✔
Are outriggers (if applicable) fully extended with tyres off the ground?	✔
Is the crane within 1° of level? Has the levelness of the crane been checked with a 1 metre or longer carpenter's level or other acceptable method? The 'target' level in the crane cab can be used for initial leveling but should not be considered reliable for critical lifts.	✔
Is the exact fender weight known?	✔
Is the location of the center of gravity of the load known and the crane hook positioned directly above it?	✔
Was the load radius measured exactly? For heavy lifts, has the potential increasing load radius due to deflections in the boom, tyre, and/or carrier been considered?	✔
Was the boom length determined exactly?	✔
Was the boom angle determined exactly?	✔
Are wind conditions acceptable? Typically if wind speeds exceed 40kph (25mph), the lift should not be attempted. Ideally wind speeds should not exceed 20kph (12mph).	✔
Is the rope reeving balanced to prevent boom twist?	✔
Is the rigging capacity acceptable?	✔
Is the weight of the rigging known?	✔
Has the clearance between the boom and the load been considered and is it sufficient?	✔
Has the clearance between the boom tip and block been considered and is it sufficient?	✔
Is the crane operator experienced and qualified?	✔
Has a qualified crane signal-person been assigned and a method of communication between the crane operator and signal-person established?	✔
Is someone assigned to control the load with the use of a tag line?	✔
Is the area clear of obstacles (including power lines, pipelines, and unnecessary personnel)?	✔
Has there been a pre-lift meeting between the crane operator, signal-person, supervisor, and other relevant people?	✔

* This sample checklist is provided for guidance only. A project-specific checklist should always be prepared by the contractor responsible for fitting the fenders.

INSTALLATION EQUIPMENT

Always use the correct equipment for fender preparation and installation. This is important for safe working and avoids unnecessary damage to the fender.



ALWAYS

Use undamaged and certified lifting equipment	✔
Use soft slings with lifting eyes for handling rubber and painted items.	✔
Check weights and centroids before lifting.	✔
Use suitable shackles when lifting from padeyes.	✔
Use spreader beams to avoid excessive angles on slings or chains.	✔
Ensure that components are stable and cannot fall before removing slings.	
Check that ground conditions are firm enough for crane operations.	

NEVER

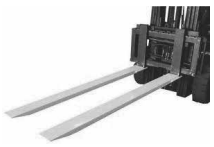
Use makeshift tools that were not designed for the job.	✖
Use unnecessary force which may cause damage.	✖
Move goods with lift forks or hooks.	✖
Drag components over the ground.	✖
Weld, grind, shot-blast or similar near the storage area or assembly site.	✖

Lifting Chains or Slings

Ensure the correct number, length and capacity of lifting chains or slings are available for each lift.

Fork Protectors

Avoid damage to rubber fenders and paintwork with fork protectors.



Sockets and spanners

Always use the correct size, purpose-made spanners and sockets. Flogging spanners can help when tightening large fixings.

Prybars

Use prybars with care to align fixing holes, or align parts using a centre-pin or dowel.

SETTING OUT

New concrete structures use cast-in anchors to securely mount the rubber fender unit, chain brackets and other assemblies. Existing structures use retrofit anchors bonded into post-drilled holes.

For all structures, it is essential to position the anchors correctly to match the hole locations on the fender assembly. It is also necessary to avoid interferences with obstacles such as reinforcement bars.

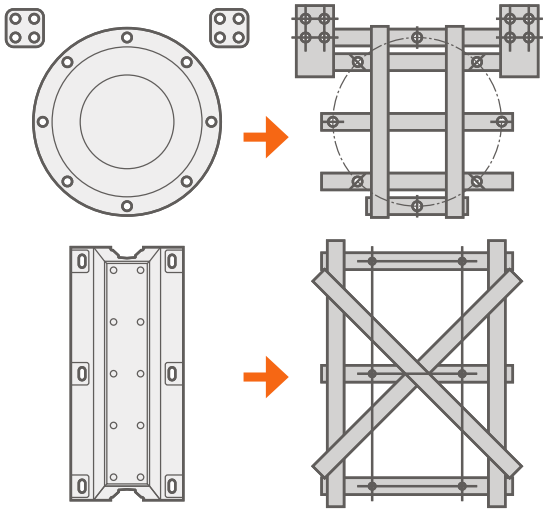
Any electrical contact between anchors and reinforcement bars will form a galvanic cell when water is present and this can promote corrosion.

Cast-in anchors should be electrically isolated from other permanently embedded steel in the structure. Retrofit anchors are usually insulated by the resin grout annulus.

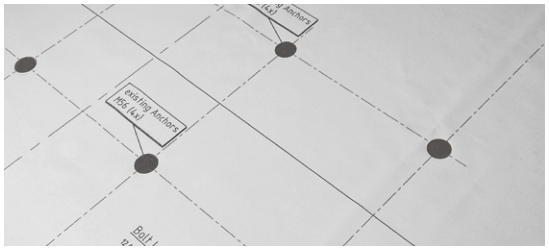
TEMPLATES

A template should be used to correctly locate anchor bolt positions in the structure. Templates are not intended to support the weight of anchors. Always refer to the general arrangement drawing when preparing a template. In the past tempaltes have been made on site from steel or plywood.

FENDER SYSTEM BOLTING TEMPLATE



ShibataFenderTeam can also provide templates printed on plastic coated fabrics. These are dimensionally stable and can also be rolled or folded. They are light enough to send by post or courier.



CHECKLIST

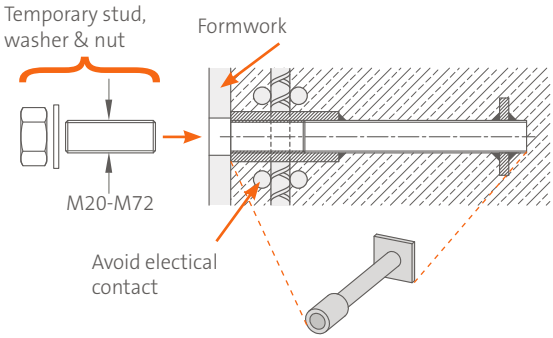
"Measure twice, drill once".	✔
Clean threads and sockets thoroughly.	✔
Avoid electrical contact between anchors and concrete reinforcements.	✔
Ensure anchors are straight and level.	✔
Check hole diameters and depths for retrofit anchors to avoid insufficient or excess grout.	✔

TEMPLATE HOLE SIZES

The correct hole size should be used in templates. It is commmon to drill a smaller hole as a 'pilot' to identify the position of the anchor and guide the drill for the full-size hole. After the template is removed, the correct diameter hole can be drilled.

CAST-IN ANCHORS

Most new concrete structures use cast-in anchors. These should be placed in the correct location and secured to prevent movement during concrete pours. A temporary bolt or stud is preferred for holding the cast-in anchor into formwork and avoids the permanent assembly bolt from being lost or damaged.



NAIL PLATES

Nail plates are a simple and effective way to support cast-in anchors. The permanent bolt may need to be longer to allow for the recess caused by the nail plate's thickness.

Avoid electrical contact between anchors and concrete reinforcements.

RETROFIT ANCHORS

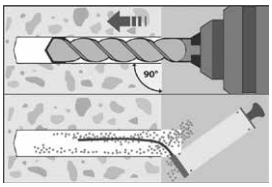
Existing structures may require retrofit anchors. These are threaded studs which are bonded into drilled holes using high-strength resin grout.

Always refer to the ShibataFenderTeam drawings to confirm details of hole depth and diameter, and for the size and quantity of grout capsules required per hole.

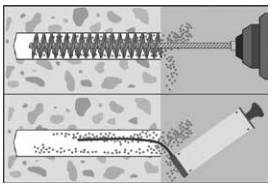
CARTRIDGE GROUT SYSTEMS

Cartridge grout systems are available in standard and express (fast cure) grades, in different cartridge sizes and in coaxial or standard tubes.

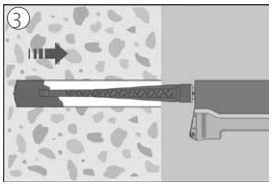
Manual, pneumatic, electric and battery-powered cartridge guns are available depending on the size of the job and grout volume per hole.



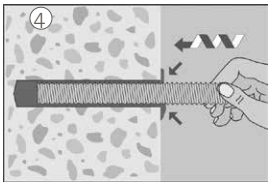
Drill a perpendicular hole of the correct diameter and depth. Blow out debris.



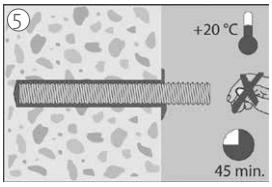
Clean the hole with a nylon brush and blow out any remaining debris.



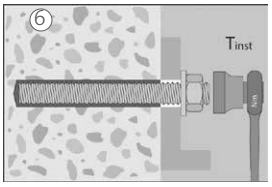
Inject the correct volume of grout. Refer to manufacturer instructions on temperatures.



Push and rotate the anchor stud into the hole. Clean any grout leakage immediately.



Allow the grout to cure. Refer to table for cure times at different temperatures.



Fenders or brackets should only be connected after the grout is properly cured.

Grouts will not cure if the temperature is too low, or they will cure too fast at high temperatures. The temperature of the concrete is also critical.

When damp conditions are expected, please inform ShibataFenderTeam so that the correct grout can be supplied. Not all grouts are suitable for installation in wet or damp locations.

TYPICAL CURING TIME (Standard Grade[1])

Temperature of base concrete	Gel time	Dry base	Wet base
-5°C (min.)	1h30	5h30	11h00[2]
-4°C to -1°C	45 mins	5h30	11h00[2]
0°C to +4°C	20 mins	3h00	6h00
+5°C to +9°C	12 mins	2h00	4h00
+10°C to +19°C	6 mins	1h20	2h40
+20°C to +29°C	4 mins	0h45	1h30
+30°C to +34°C	2 mins	0h25	0h50
+35°C to +39°C	1.4 mins	0h20	0h40
+40°C (max.)	1.4 mins	0h15	0h30

TYPICAL CURING TIME (Express Grade[1])

Temperature of base concrete	Gel time	Dry base	Wet base
-5°C (min.)	40 mins	4h00	8h00
-4°C to -1°C	20 mins	4h00	8h00
0°C to +4°C	10 mins	2h00	4h00
+5°C to +9°C	6 mins	1h20	2h00
+10°C to +19°C	3 mins	0h40	1h20
+20°C to +29°C	1 min	0h20	0h40
+30°C(max.)	1 min	0h10	0h20

[1] Cartridge tempature should be at least +5°C.
[2] Ensure icing does not occur in the hole.

CAPSULE GROUT SYSTEMS (M30 max.)

Glass grout capsules are also available. There is minimal waste but the capsules are easily broken if mishandled. They are best suited to smaller anchors, up to M30 size. Please refer to ShibataFenderTeam if glass capsules are required for larger anchor sizes.

ALWAYS

Check and confirm the required grout volume for each anchor hole.	✔
Verify that the drilled hole depth and diameter is within tolerance.	✔
Check the inside temperature of the concrete and consider cure times.	✔
Support anchors centrally in the hole and prevent grout leakage with a seal.	✔

NEVER

Use broken or damaged glass grout capsules.	✖
Use cartridges after grout has begun to cure.	✖
Install anchors when temperatures are too low for the grout to cure.	✖

BOLT TIGHTENING

The following procedure is generic for the Fender fixing bolts and anchors should be tightened correctly. Too loose and they will undo, too tight and they may fail. There is no absolute bolt torque for every case. This depends on the material, surface finish, tolerances and lubrication. Elastic connections (ie. fender flanges) must be treated differently to rigid connections (ie. fender brackets).

FENDER FLANGE & EMBEDDED CONNECTIONS

When panels are fixed to embedded sockets/ inserts in the rubber (e.g. SPC / SX-P fender head) then the connection should be tightened snug tight until the fender head and panel are flush. Then use a flogging hammer to apply 1/8 to 1/4 turn to the bolt head. Apply Loctite medium (or equiv.) When fender flanges are being fixed, there is no defined torque. A special washer is used to spread the clamping forces in the rubber. The bolt should be tightened until the washer embeds 2–3mm into the rubber. Bolts should be re tightened by a quarter to half a turn after seven days to allow for rubber relaxation.

RIGID CONNECTIONS

The table below is for guidance only and assumes the nut or female thread are stronger than the bolt. High end friction values are assumed. If the friction is lower this may result in less preload than intended. Lubrication assumes that both the male and the female threads are thoroughly coated.

Bolt class	Lubrication	Preload	Friction		Torque (Newton metres or Nm)							
			Thread	Head	M16	M20	M24	M30	M36	M42	M48	M56
Grade 4.6	Dry	$0.6\sigma_y$	0.18	0.18	84	164	283	561	979	1565	2348	3765
	Oiled		0.17	0.17	80	156	269	532	929	1484	2227	3570
	MoS_2		0.12	0.12	58	114	197	389	678	1082	1621	2595
Grade 8.8	Dry	$0.6\sigma_y$	0.18	0.18	224	437	755	1496	2610	4173	6261	10041
	Oiled		0.17	0.17	212	415	717	1420	2476	3958	5938	9521
	MoS_2		0.12	0.12	156	304	525	1037	1807	2885	4324	6921
A4-50 (SS316A)	Dry	$0.6P_{0.2}$	0.50	0.50	Not recommended – maximum preload is only $0.3\sigma_y$ – refer to ShibataFenderTeam.							
	MoS_2		0.45	0.35								
	Anti-galling		0.23	0.12	69	136	235	465	811	1297	1947	3124
A4-70 (SS316SH)	Dry	$0.6P_{0.2}$	0.50	0.50	Not recommended – maximum preload is only $0.3\sigma_y$ – refer to ShibataFenderTeam.							
	MoS_2		0.45	0.35								
	Anti-galling		0.23	0.12	149	291	503	996	1739	2780	4172	6694

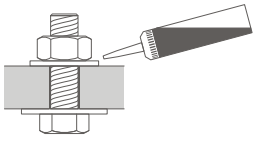
THREAD LUBRICATION (GALVANISED FIXINGS)

Galvanised bolts should be lubricated with a Molybdenum Disulphide (MoS_2) grease or paste. Oiling is possible but this degrades the marine environment and makes future dismantling difficult.

THREAD LUBRICATION (Stainless Steel Fixings)

Stainless steel can suffer galling or 'cold welding'. Bolts lock and can no longer be tightened or dismantled. The old fixing must be cut out and a new one installed. Anti-gall paste is strongly recommended for stainless steel bolts. Copper based greases and others are unsuitable.

PREVENTING LOOSENING

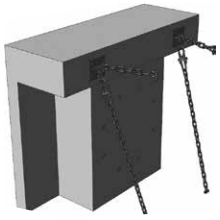


A threadlocking adhesive is the best way to stop fixings from loosening in service. It is applied to threads before assembly and only cures anaerobically. Many grades are available depending on materials and environmental conditions, but a medium viscosity type such as Weiconlock® is preferred. Other methods include tab washers, locking pins and tack-welding bolt heads to the washers. For further advice please contact ShibataFenderTeam.

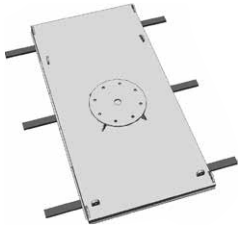
SPC CONE AND CSS CELL FENDERS

The following procedure is generic for the assembly and installation of SPC Cone and CSS Cell fender systems. The actual fender design may vary from case to case. ShibataFenderTeam are available to assist with defining the best sequence and precautions to ensure a safe and successful job.

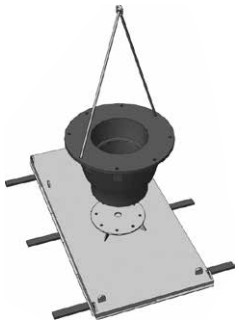
- Check the template against the fender bolt pattern, brackets and other bolted parts.
- Accurately locate the anchors on the structure according to the design.
- Template drawings or ready-to-use templates are available from ShibataFenderTeam.



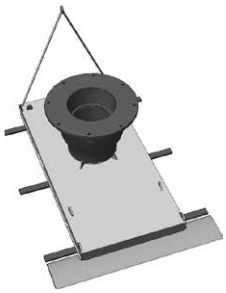
- Prior to placing the main fender system, it is suggested to install ancillary items like brackets. Chains may be connected to the panel or structure first.
- Clean out sockets and check all threads before offering up the fender system.



- Prepare a large enough working area to preassemble fenders, well away from any cutting, grinding or shot blasting.
- Place the fender panel face down, supporting it on suitable bearers to protect PE pads and paintwork.

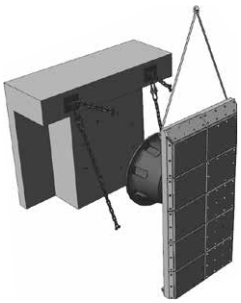


- Lift the SPC or CSS fender into position with soft slings or eyebolts and hooks.
- Take care not to damage the rubber.
- Fit all bolts through the fender flange using the special washers.

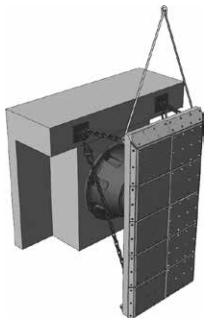


- Fit suitable shackles to the lifting points on the panel and connect a chain sling of suitable size. Component weights are indicated on the drawings or are available from ShibataFenderTeam.
- Place protective materials under the bottom of the panel where it rotates.

- Ensure the lifting area is clear and that it is safe to start lifting.
- Commence the lift and rotate the panel until it is vertical.
- Long panels may require a double lift using a second crane. Tag lines can be used to control the panel when it is near to vertical.



- Make certain that all fixing points are accessible, particularly where there are large tides.
- Use tag lines to help guide the fender into position, avoiding damage to rubber and paintwork.



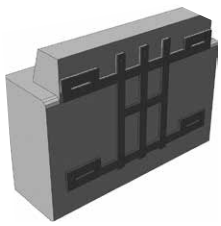
- Align the bolt holes and loosely assemble the bolts (or nuts). Tighten fixings equally, working diametrically until the washer embeds 2-3mm into the rubber.
- It is recommended that the crane should support the fender system until chains are connected and tensions are properly adjusted.

ALWAYS

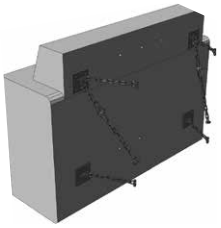
Check anchor positions before fitting fenders	✔	Use the correct fixings and washers	✔
Provide a safe working area for assembly	✔	Protect paintwork from damage during lifts	✔
Clean sockets and test fender bolts for fit	✔	Loosely assemble all bolts before tightening	✔
Use the proper lifting equipment	✔	Tighten correctly for rigid or elastic connections	✔

FE ELEMENT FENDERS

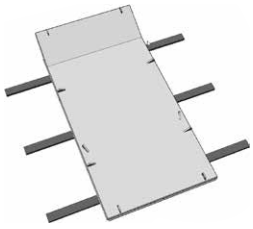
The following procedure is generic for the assembly and installation of FE element fender systems. The actual fender design may vary from case to case. ShibataFenderTeam are available to assist with defining the best sequence and precautions to ensure a safe and successful job.



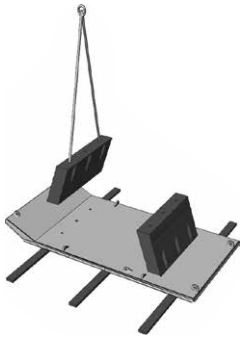
- Check the template against the fender bolt pattern, brackets and other bolted parts.
- Accurately locate the anchors on the structure according to the design.
- Template drawings or ready-to-use templates are available from ShibataFenderTeam.



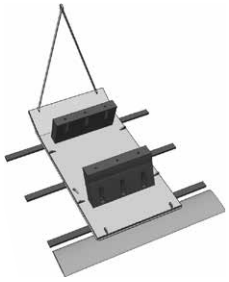
- Prior to placing the main fender system, it is suggested to install ancillary items like brackets and support chains.
- Clean out sockets and check all threads before offering up the fender system.



- Prepare a large enough working area to preassemble fenders, well away from any cutting, grinding or shot blasting.
- Place the fender panel face down, supporting it on suitable bearers to protect PE pads and paintwork.

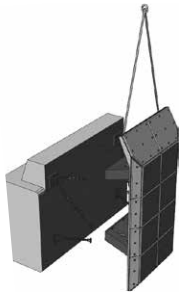


- Lift the FE elements into position with soft slings or eyebolts and hooks.
- Take care not to damage the rubber.
- Fit all bolts through the fender flange using the special washers.
- Tighten bolts until the washer embeds 2-3mm into the rubber.

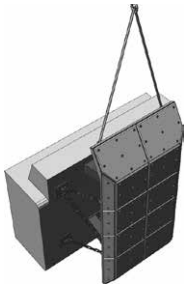


- Fit suitable shackles to the lifting points on the panel and connect a chain sling of suitable size. Component weights are indicated on the drawings or are available from ShibataFenderTeam.
- Place protective materials under the bottom of the panel where it rotates.

- Ensure the lifting area is clear and that it is safe to start lifting.
- Commence the lift and rotate the panel until it is vertical.
- Long panels may require a double lift using a second crane. Tag lines can be used to control the panel when it is near to vertical.



- Make certain that all fixing points are accessible, particularly where there are large tides.
- Use tag lines to help guide the fender into position, avoiding damage to rubber and paintwork.



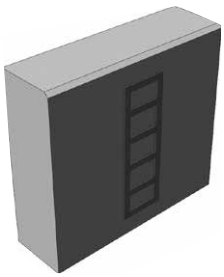
- Align the bolt holes and loosely assemble all the bolts (or nuts). Tighten fixing equally on opposite sides.
- It is mandatory that the crane should support the fender system until chains are connected and adjusted.

ALWAYS

Check anchor positions before fitting fenders	✔	Use the correct fixings and washers	✔
Provide a safe working area for assembly	✔	Protect paintwork from damage during lifts	✔
Clean sockets and test fender bolts for fit	✔	Loosely assemble all bolts before tightening	✔
Use the proper lifting equipment	✔	Tighten correctly for rigid or elastic connectionss	✔

SX, SX-P AND FE-V FENDERS

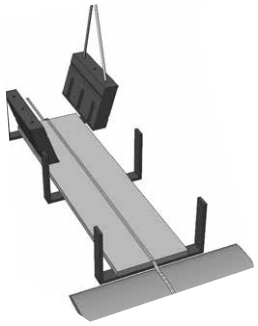
The following procedure is generic for the assembly and installation for all types of ShibataFenderTeam V and FE-V fenders. The actual fender design may vary from case to case. ShibataFenderTeam are available to assist with defining the best sequence and precautions to ensure a safe and successful job.



- Check the template against the fender bolt pattern, brackets and other bolted parts.
- Accurately locate the anchors on the structure according to the design.
- Template drawings or ready-to-use templates are available from ShibataFenderTeam.

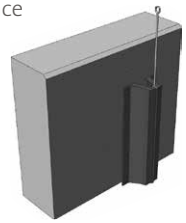
- Prepare a working area away from cutting, grinding and other possibly harmful operations. Place V-fenders on their flanges and allow them to recover from small distortions induced during shipment which will assist with anchor alignment later.
- Mount UHMW-PE or steel panel to Fender head (SX-P only) See page 11 for bolt tightenery.
- Pass a soft sling around the front and inside faces of the fender, away from the flanges.

- Component weights are indicated on the drawings or are available from ShibataFenderTeam.
- Lift the V-fender from the sling, taking care not to damage the rubber. Place protective materials under the end of the V-fender where it rotates.



- FE-V fenders are best assembled in a wooden cradle. The PE shield is placed centrally and the individual FE elements are lowered into position. Bolts should pass through the PE shield with the nut on the element side.
- Always use the correct washers to distribute loads and do not over-tighten the bolts as this could damage the PE shield.
- Pass a soft sling around the front and inside faces of the fender, away from the flanges.
- The assembly weights are indicated on the drawings or are on request from ShibataFenderTeam.

- Raise the FE-V fender carefully from the cradle using the sling, taking care not to damage the rubber or PE shield.
- Place protective materials under the end of the FE-V fender where it rotates.



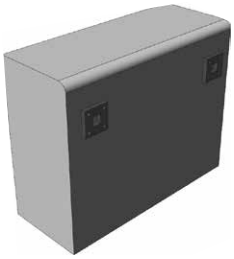
- Align the bolt holes and loosely assemble the bolts (or nuts) using the special washers provided.
- It is recommended that the crane should support the V-fender until all bolts are tightened.

ALWAYS

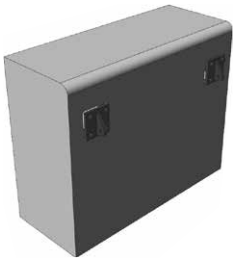
Check anchor positions before fitting fenders	✔	Use the correct fixings and washers	✔
Provide a safe working area for assembly	✔	Protect paintwork from damage during lifts	✔
Clean sockets and test fender bolts for fit	✔	Loosely assemble all bolts before tightening	✔
Use the proper lifting equipment	✔	Tighten correctly for rigid or elastic connections	✔

CYLINDRICAL FENDERS

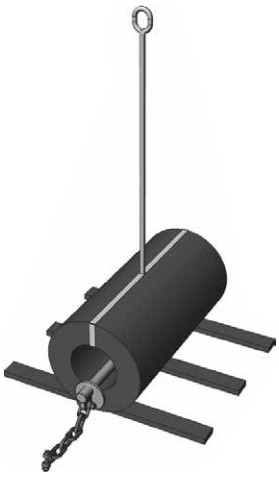
The following procedure is generic for the assembly and installation of Cylindrical Fender systems. The actual fender design may vary from case to case. ShibataFenderTeam are available to assist with defining the best sequence and precautions to ensure a safe and successful job.



- Accurately locate the anchors on the structure according to the layout on the GA drawing.
- Template drawings or ready-to-use templates are available as an option on request from ShibataFenderTeam.

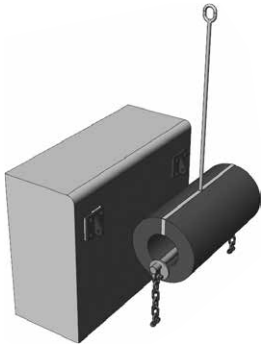


- Clean out sockets and check all threads before offering up the fender brackets.
- Install the support brackets prior to placing the cylindrical fender.

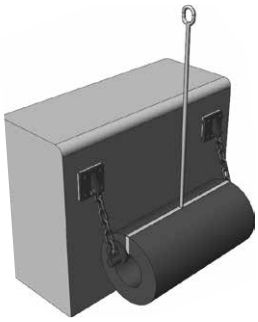


- Prepare a large enough working area to preassemble fenders, well away from any cutting, grinding or shot blasting.
- Place the fender on bearers and pass a soft sling through the bore. Very long fenders may require a spreader beam.
- Pass the support chain, bar or bracket through the fender bore.

- Component weights are indicated on the drawings or are available from ShibataFenderTeam.
- Lift the cylindrical fender assembly by the sling, taking care not to damage the rubber.



- To allow slack in the supporting chains, offer the cylindrical fender up to the berth face higher than its final mounted position.



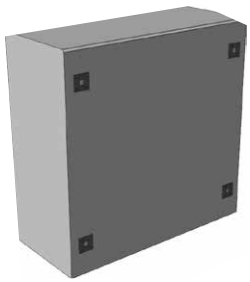
- Connect the shackle to the support brackets, not forgetting to insert the split pins.
- Slowly lower the cylindrical fender until its chains are tight. Check that the chain angle is equal on both sides of the fender.

ALWAYS

Check anchor positions before fitting fenders	✔	Use the correct fixings and washers	✔
Provide a safe working area for assembly	✔	Protect paintwork from damage during lifts	✔
Clean sockets and test fender bolts for fit	✔	Loosely assemble all bolts before tightening	✔
Use the proper lifting equipment	✔	Tighten correctly for rigid or elastic connectionss	✔

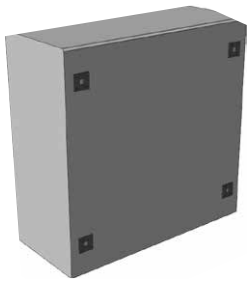
FOAM FENDERS

The following procedure is generic for the assembly and installation for OceanGuard fender systems. ShibataFenderTeam are available to assist with defining the best sequence and precautions to ensure a safe and successful job.

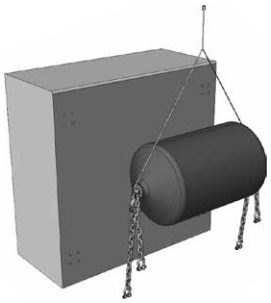


- Check the template against the fender bolt pattern, brackets and other bolted parts.
- Accurately locate the anchors on the structure according to the design.
- Template drawings or ready-to-use templates are available from ShibataFenderTeam.

- Fender weights are indicated on the drawings or are available from ShibataFenderTeam.
- Lift the OceanGuard fender assembly by the sling, taking care not to damage the skin.
- A spreader bar or beam is recommended for long fenders.

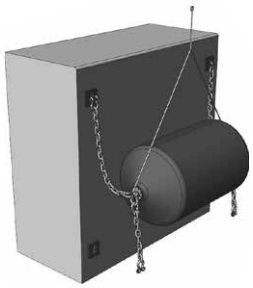


- Clean out sockets and check all threads before offering up the fender brackets.
- Install the support brackets prior to placing the fender system.



- To allow slack in the supporting chains, offer the OceanGuard fender up to the berth face higher than its final mounted position to ensure there is some slack in the primary weight support chains.

- Prepare a large enough working area to handle and prepare the fenders, well away from any cutting, grinding or shot blasting.
- Support the fender on bearers.
- Connect all support chains to the end termination shackles. It is useful to identify each chain if the system has more than one chain at each end.
- Constant motions cause vibration and shackle bolts, split pins or other parts may come loose or fail. To prevent loosening these items should be effectively secured during installation by using suitable locking nuts, tack welds or thread locking adhesive (see page 11).



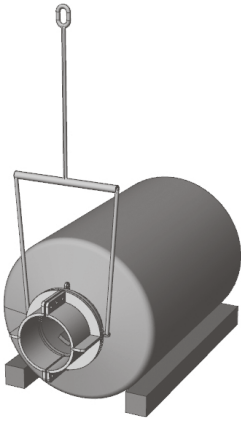
- Connect the weight support chains to the support brackets and insert the split pins into the shackles.
- Large chains are heavy and may require extra cranage to assist connection.
- Lower the OceanGuard fender and check that the chain angle is equal on both sides.
- When the fender is correctly positioned, connect any additional chains.

ALWAYS

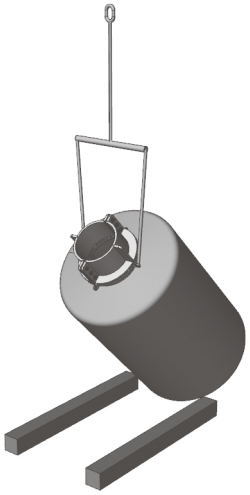
Chock OceanGuard fenders during storage to prevent rolling.	✔
Fill voids in sheet pile impans to create a flat surface.	✔
Install protective strips or facings over abrasive dock surfaces to reduce fender wear.	✔
Consider adding ballast (chains, weights, etc.) on floating installations to dampen fender motion.	✔
Consider asymmetric chain lengths to maintain fender position if long mooring chains are used.	✔

DONUT FENDERS

The following procedure is generic for the assembly and installation for all types of ShibataFenderTeam Donut fenders. The actual fender design may vary from case to case. ShibataFenderTeam are available to assist with defining the best sequence and precautions to ensure a safe and successful job.



- Prepare a large enough working area to handle and prepare the fenders, well away from cutting, grinding or shot blasting.
- Support the Donut fender on bearers and use chocks to prevent rolling.



- Use a suitable spreader bar or long leg sling to ensure chains or strops clear the pile during installation.
- Fender weights are indicated on the drawings or are available from ShibataFenderTeam.
- Lift the Donut fender using the sling, taking care not to damage paintwork or the skin.

- Ensure the Donut fender is hanging vertically before lowering onto the pile.
- Use a tag line to guide the Donut tube over the pile, checking to ensure bearings do not snag on the end of the pile.
- Continue lowering until the Donut floats and the sling can be safely removed.

SPIRALLY WELDED PILES

When spirally welded piles are used for Donut fenders, the external weld should be ground flat in the area contacted by the Donut bearings from the lowest to highest tide levels. Protruding welds may increase wear on the bearings and, in some cases, can cause the Donut to seize on the pile.

After installation, check the Donut fender is free to rotate, rise and fall with the tide.

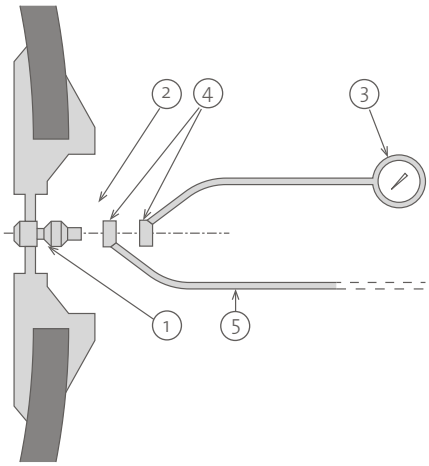
ALWAYS	
Chock the Donut fender when stored.	✔
Grind welds flush on the piling exterior.	✔
Guide the fender bearings over the piles to avoid snagging.	✔

PNEUMATIC FENDERS

Request a full instruction manual for pneumatic fenders from ShibataFenderTeam. The process is simple if these basic rules are followed:

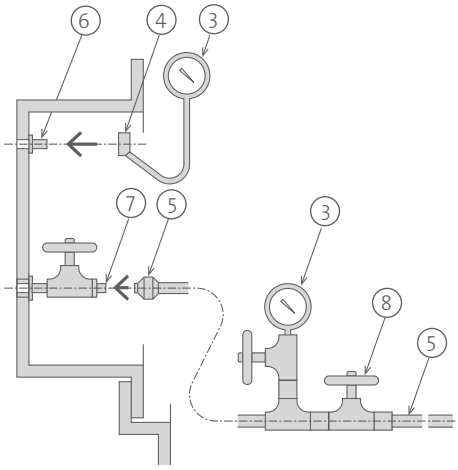
1. Release the straps which hold the fender onto the pallet or skid.
2. Unroll the fender so it is free to inflate.
3. Use fork protectors when moving the fender.
4. Keep chocks available to stop the fender rolling as it inflates.
5. Ensure the compressor has a dryer – don't fill the fender with moist air.
6. Only lift from the lifting points or from the chain and tyre net.
7. Avoid contact with sharp edges.

SMALL AND MEDIUM FENDER SIZES (≤ Ø2.5M)



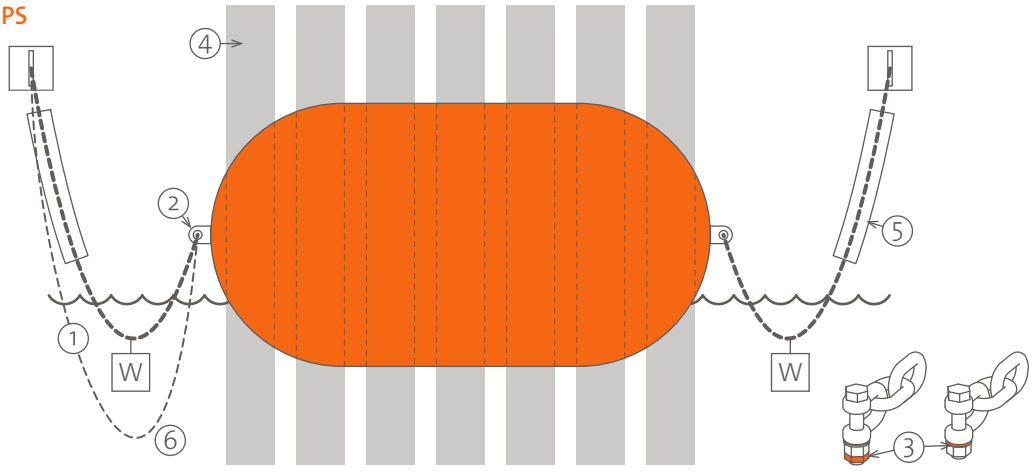
1. Small inflation valve
2. Valve cap
3. Pressure gauge
4. Small hose connector
5. Air hose to compressor
6. Pressure check valve
7. Large inflation valve
8. Air control valve

LARGE FENDER SIZES (> Ø2.5M)



Large fenders are fitted with over-pressure safety valves, which can be at either end of the fender. Over-inflation of pneumatic fenders is dangerous. Always use an accurate gauge with the correct scale, confirm the required inflation pressure and monitor continuously during inflation. Car tyre gauges are not suitable for pneumatic fenders.

FENDER MOORING TIPS



1. Sling-type pneumatics are light and can be affected by rough weather and waves. Oversize mooring chains can dampen motions. Alternatively add ballast weights to chains.
2. Only connect chains to the fender end fittings, never to the chain net or other part of the fender.
3. Constant motions cause vibration and shackle bolts, split pins or other parts may come loose or fail. To prevent loosening these items should be effectively secured during installation by using suitable locking nuts, tack welds or thread locking adhesive (see page 11).
4. Where the structure could abrade the fender body then it should be fitted with PE pads or timber rubbing strips to reduce wear and tear.
5. Where mooring chains contact the corner edge of a structure, rubber tubes should be fitted around the chains to prevent them from abrading the concrete and to help protect the galvanised finish.
6. To reduce sideways drift of fenders with long mooring chains at high tides (when the mooring chains are slack), make one chain longer or add some ballast to one side.

ALWAYS

Leave some chain slack to allow for tides	✔
Operate the fender at the correct pressure	✔
Check for sharp edges that could damage the fender body	✔
Ensure at least two fenders are in contact with the moored ship.	✔
Inflate the fender with dry air.	✔

NEVER

Allow the fender to ‘walk’ up the berth and onto the top of structure.	✖
Permit excessive fender motion, which may cause ‘snatch’ in moorings.	✖
Permit non-essential personnel near fenders during berthing	✖

HYDROPNEUMATIC FENDERS

Please ask ShibataFenderTeam for the Hydropneumatic fender instructions before inflating the fender or deployment. Hydropneumatic fenders require some special techniques to install, add the ballast weight and to trim the fender to the correct draft by water filling. The performance of Hydropneumatic fenders is affected by the air:water ratio and the initial pressure. ShibataFenderTeam can provide site training and supervision on request.

INSTALLATION ACCEPTANCE REPORT

When installation is complete, ShibataFenderTeam require an Installation Acceptance Report (IAR) to initiate the warranty period. Failure to provide an IAR may invalidate or delay warranty claims.

Project:	Ref:	Location:	
Fenders:	Number:	Type:	
Delivery Date:			
Warranty Period:	Starts:	Ends:	

INSPECTION OF	Contractor	ShibataFenderTeam
Setting out dimensions		
Fender spacing		
Fixings correctly installed, tightened and secured against loosening		
Droop and sag of fenders within limits		
Fender positions, serial numbers recorded		
Face pads and fixings undamaged		
All paint damage touched up		
Spare parts inventory checked		

SNAGGING LIST	Contractor	ShibataFenderTeam
Damage noted to:		
Rubber		
Steel fabrications		
Paintwork		
PE Pads		
Brackets		
Chains and accessories		
Anchors, bolts and other fixings		
Actions		
Responsibility		
Timeline		

SIGN-OFF			
Contractor:	Vendor:	ShibataFenderTeam	
Name	Name		Name
Signature	Signature		Signature
Date	Date		Date

Ports should have clear operating practices and procedures. This is especially important for the safety-critical berthing, mooring and departure process. It is vital that all berth users are made aware of the performance limits of fenders and operate safely within these.

Safe practices and procedures should be developed for each port and, where applicable, for each berth or terminal within the port. With respect to fenders this should include:

- Identifying hazard(s) to personnel, vessels and port structures;
- The likelihood of a hazard arising;
- Reviewing the consequences and outcome should an identified hazard occur;
- Preparing a risk analysis;
- Mitigating these risks where possible;
- Ongoing training of all personnel who are unavoidably exposed to any degree of risk;
- Regular operational reviews to identify new or changing risks.

Fenders need to perform faultlessly when called upon to protect a port structure.

ALWAYS

Make a visual check of fenders before a ship arrives at the berth	✔
Check that the arriving ship is within the design limits of the fender	✔
Ensure that the Master and pilot are aware of safe berthing speeds and angles	✔
Make provision for escalating events such as deteriorating weather	✔
Monitor fenders and moorings regularly whilst a ship is on the berth	✔

NEVER

Allow mooring lines or hull protrusions to snag on fenders	✖
Allow ships to berth on damaged or worn out fenders	✖
Permit non-essential personnel near fenders during berthing	✖

OPERATIONAL LIMITS

Fender and mooring operating parameters should be available to all berth users: pilots, linesmen, Harbour Masters, arriving vessels and others involved in the berthing and mooring process.These parameters should identify the safe limits of fenders, bollards and other dock furniture. The table below is a suggested template for summarising this information.

Port		Berth Name	
Harbour Master	Tel:	Port Operations	Tel:
Tugs	Tel:	Pilots	Tel:
VTS/VTIS	Tel:	Linesmen	Tel:

VESSELS	Min. Ship	Max. Ship	Other ship
Type/class			
Deadweight			
Displacement (tonne)			
Length overall (metres)			
Breadth (metres)			
Laden draft (metres)			
Air draft (metres)			
Bow flare (degrees)			
Beltings			
Special features			
Berthing speed (m/s)			
Berthing angle (deg.)			
Draft limited approach			

Tide (min)	m CD	Tide (max)	m CD
Deck level	m CD	Dredged depth	m CD
Berth direction	deg	Berth construction	*
Maximum current	knots	Current direction	deg
Berthing wind speed	knots	Operating wind speed	knots
Cease operation wind	knots	Depart berth	knots

* open / semi-open / closed

Fender type		Fender model	
Rubber grade		Fender spacing	metres
Fender projection	metres	Fender drawing no.	
Hull pressure	kN/m²	Reaction force	kN

Bollard type		Bollard model	
Bollard SWL	tonne	Bollard spacing	metres
Maximum line angle	deg	Bollard drawing no.	

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OPERATIONS CHECKLIST

It is advisable to carry out a berth inspection before vessel arrival and after departure. The table below is a suggested template for collecting this information. In the event that fender damage is identified, please contact ShibataFenderTeam for advice.

Port:	Berth Name:
Date:	Time:
Name:	Signature:

PRE-ARRIVAL INFORMATION			
Vessel name	m CD	Vessel IMO	
Dimensions (L × B × D)	L metres	B metres	D metres
Vessel type		Deadweight	tonne
Arrival draft	metres	Arrival air draft	metres
Pilot		Master	
Tug names	(1)	(2)	(3)
Tide on arrival	metres	Current	knots
Wind speed	knots	Wind direction	deg

PRE-ARRIVAL BERTH INSPECTION			
Damage location	(1)	(2)	(3)
Damage description			
Identified hazards			
Warnings issued	Pilot yes/no	Vessel yes/no	Linesmen yes/no
Risk mitigation measures taken			

POST-DEPARTURE BERTH INSPECTION			
Damage location	(1)	(2)	(3)
Damage description			
Cause			
Consequence			
Photos taken	yes/no	yes/no	yes/no
Vessel/agent informed	yes/no	yes/no	yes/no
ShibataFenderTeam informed	yes/no	yes/no	yes/no

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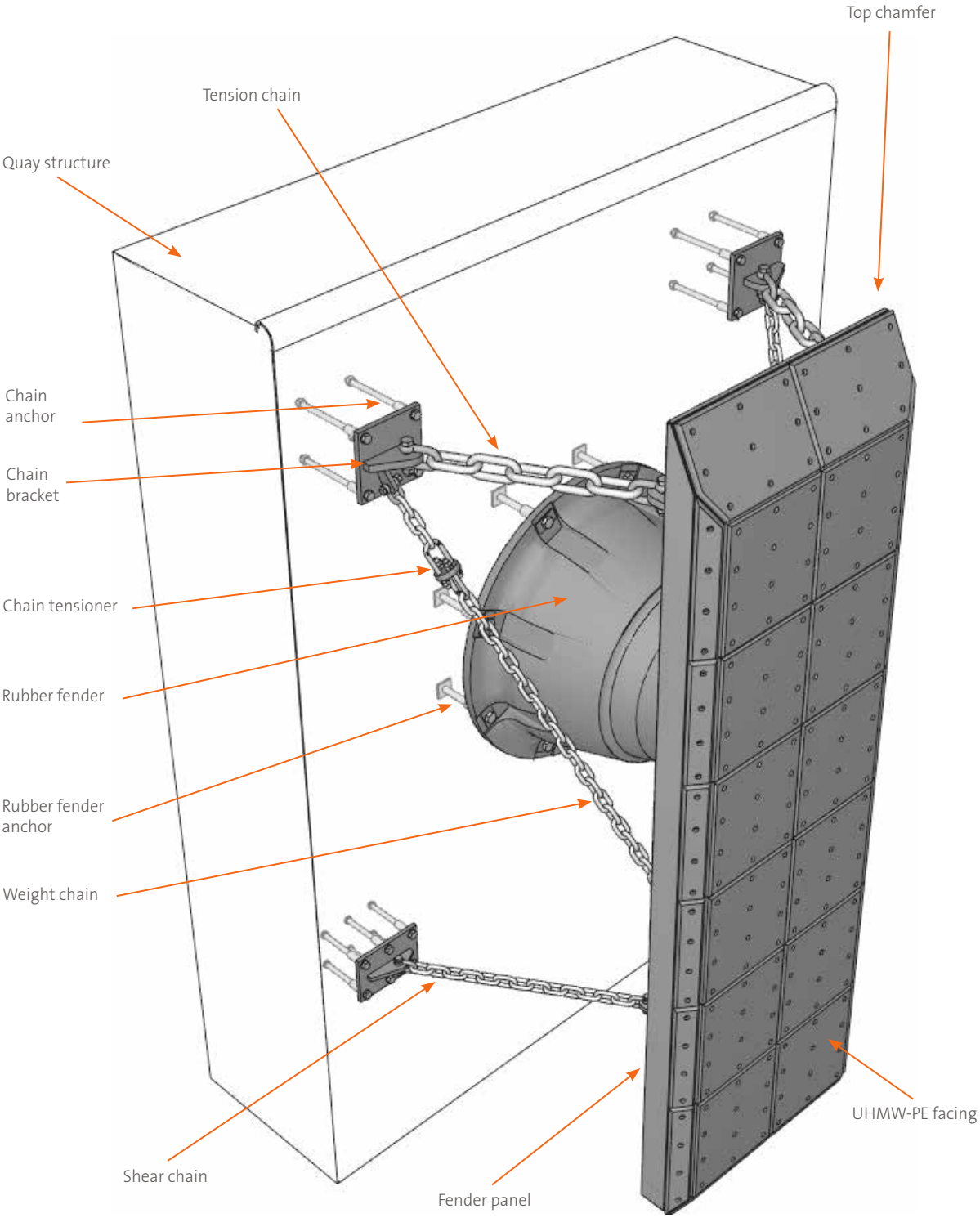
MAINTENANCE

When maintaining a fender system it is important to use the correct terminology. This avoids confusion when ordering spares. The full parts list is provided on the fender general arrangement drawing. Please refer to this if possible when discussing spare parts with ShibataFenderTeam.

All moulded rubber fender units and steel panels are identified with a job specific serial number. These should also be identified when ordering spare parts.



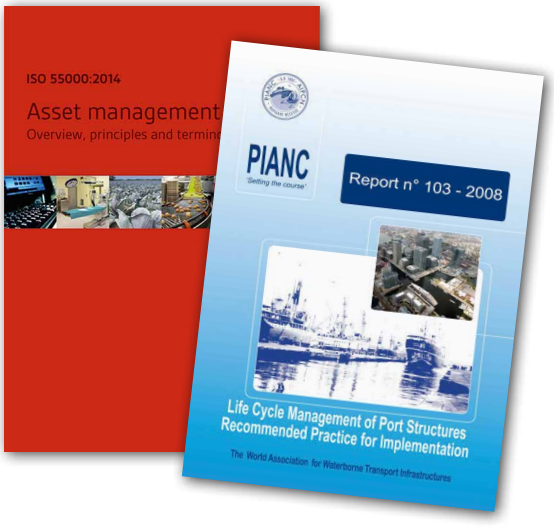
The reasons for preventative maintenance:

- Safety and reduced risks
- Early identification of damage
- Reduced operational costs
- Less berth disruption
- Warranty remains valid
- Fewer claims and less aggravation
- Extended service life

The goal of any maintenance programme is to avoid or reduce the consequences of failure of equipment whilst maintaining safety at all times and achieving this at the lowest cost. This can be achieved by preventing a failure before it occurs with planned inspections and replacements.

By routinely recording equipment wear and tear it is possible to replace or repair worn components before they cause a system failure. An ideal preventive maintenance program would ensure zero downtime.
Well maintained fenders will remain safe, last longer and cost far less than the disruption caused by loss of use or claims following a breakage.

Asset management is a systematic process of operating, maintaining, upgrading, and disposing of assets cost-effectively in a manner which benefits all users by adopting a long term philosophy. The foundations of an asset management system are defined in ISO 55000.



MAINTENANCE CHECKLIST

It is advisable to prepare a checklist for routine preventative maintenance. The table below is a suggested template for collecting this information.

In the event that fender damage is identified during a maintenance inspection, please contact ShibataFenderTeam for advice.

Port:	Berth Name:
Date:	Time:
Name:	Signature:

GENERAL			
Fender location:		Last inspection date:	
General condition:	Excellent / Good / Average / Poor / Very Poor		

RUBBER			**FENDER PANEL**		
Ozone cracks	yes/no	(photos, size)	Paint condition, damage	yes/no	(photos)
Fixings tight, secure	yes/no	(photos)	Dents, bends	yes/no	(photos)
Cuts or abrasions	yes/no	(photos, size)	Brackets		
Spillages (paint, oil)	none/minor/major		Corrosion, scratches	yes/no	(photos)
Marine growth	yes/no	(vents blocked?)	Welds, cracks	yes/no	(photos)
Tidal operations	yes/no	(hydraulic locking?)	Accident damage	yes/no	(photos)

UHMW-PE FACE PADS			**CHAINS**			
Original thickness			Weight/tension/shear	W	T	S
Current thickness			Slack	yes/no	yes/no	yes/no
Evenly worn	yes/no	(photos)	Diameter loss	yes/no	yes/no	yes/no
Cuts, gouges	yes/no	(photos)	Shackle or link wear	yes/no	yes/no	yes/no
Missing pads	yes/no	(photos)	Bracket damage	yes/no	yes/no	yes/no
Fixings loose, missing	yes/no	(photos)	Split pins fitted	yes/no	yes/no	yes/no

COMMENTS	**PHOTOS (file names)**
.....	
.....	
.....	

FOLLOW-UP			
Refer to ShibataFenderTeam	yes/no	Warranty issue	yes/no
Date referred		ShibataFenderTeam contact	

MAINTENANCE INSPECTION PERIODS

An inspection and maintenance programme is needed to identify maintenance, wear and damage as well as the likely causes at an early stage. Three levels of inspection and maintenance are recommended. The table gives average periods for temperate climates. These should be more often in harsh environments such as the tropics. If you are uncertain about any aspect of inspection or maintenance, please consult ShibataFenderTeam.

Inspection and Maintenance Programme	LEVEL 1 Close visual inspection	LEVEL 2 Interim maintenance	LEVEL 3 Major maintenance or overhaul	Notes
Rubber fenders	Every year	4–6 years	15–25 years	1, 2, 8
Steel panels (frames)	Every year	4–6 years	15–25 years	1, 3, 8, 9
Other fender steelwork	Every year	4–6 years	15–25 years	1, 3, 8, 9
Corrosion protection systems	Every year	4–6 years	10–15 years	1, 3, 8, 9
UHMW-PE face pads	Every year		15–25 years	1, 4, 8
Anchors & bolts	Every year	4–6 years	15–25 years	1, 5, 8
Chain, shackles & adjusters	Every year	2–4 years	5–10 years	1, 6, 8
Initial pressure (pneumatic fenders)	Every month	N/A	N/A	7
Valves and end fittings	Every six months	4–6 years	5–10 years	10, 11
Marine growth	Every six months	1–2 years	N/A	12

NOTES

1. A close inspection should also be made after any incident which may have damaged the fenders or supporting structure. Always record the event, cause and consequences immediately. Where there is clear damage this should be reported to ShibataFenderTeam immediately using the form on page 28.
2. Interim maintenance will include, but is not limited to, the repair of any cuts and surface damage to the rubber. Paint spills should be removed by water jetting. Accident damaged rubber units with deep cuts or clear signs of overload should be immediately replaced. Please consult ShibataFenderTeam for advice.
3. Interim maintenance will include touching up of paintwork where underlying steel or primer is exposed according to paint manufacturers' instructions. Close attention should be paid to edges where ropes may abrade, also around chain brackets. Bird droppings can aggressively attack paint and, if this is an ongoing issue, bird spikes or similar should be fitted. Repairs to dents and other minor damage should be carried out with careful attention paid to cause and possible loss of strength as a result.
4. Interim maintenance will include replacement of worn UHMW-PE pads, in particular all pads with remaining wear allowance insufficient to last until the next scheduled maintenance. Close attention should be given to cuts and heavy localised wear, often caused by inappropriate or poorly maintained ships. Pad fixings should be renewed when new pads are fitted, taking care to use the correct size and material grade of bolts, nuts and washers.
5. Interim maintenance will include retightening of loose bolts and anchors. Any missing locknuts, locking tabs or split pins should be replaced at the same time. The correct preload should be applied to fixings. The effects of surface corrosion on friction and bolt torques should be considered. If in doubt then consult ShibataFenderTeam for advice.
6. Interim maintenance will includes measurement of chain link and shackle diameter, particularly in the inter-tidal zone. Reference should be made to design corrosion allowances. Components must be changed if diameter is likely to reduce below permitted minimum before the next scheduled maintenance. Special attention should be given to "weak" links, where fitted, as these are smaller diameter and must protect other parts of the chain system from damage in the event of overloads.
7. The initial inflation pressure of pneumatics should be monitored and adjusted every month. If pressure drops gradually or unexpectedly this can indicate a leaking valve or small puncture which should be replaced or repaired immediately. Please consult ShibataFenderTeam for detailed procedures.
8. Full maintenance should be carried out when paint coatings, corrosion or damage demand removal of the fender systems for a more thorough overhaul. The opportunity should be used to dismantle the fender system, replace worn components, repair damage, and to shot blast and repaint all steelwork. Special attention should be paid to the rubber fender units, in particular any signs of ozone cracking. Overhauls also provide the opportunity to rotate fenders on the berth, moving heavily used systems to areas which are less used and vice versa. Please consult ShibataFenderTeam for advice on major maintenance and overhaul to confirm spare parts availability and the optimum scope of works. A ShibataFenderTeam engineer will visit site if required.
9. Most design specifications do not include corrosion allowances. Therefore the deterioration of pain or galvanising coatings will inevitably increase steel stresses.
10. Interim maintenance should include the replacement of the inflation valve and cap. This can usually be done in-situ with the appropriate tool and without first deflating the fender.
11. Major maintenance of pneumatic fenders includes dismantling of the end fittings, valves and replacing these components. Chain and tyre nets should also be overhauled or replaced.
12. Marine growth can hide or even cause maintenance issues. In areas prone to heavy marine growth and strong currents or tides, marine growth can increase drag forces or substantially increase the air weight of the fender system. Always remove heavy growth for inspection. Also make full allowance for increased fender weight due to marine growth when lifting out for major maintenance.

INCIDENT REPORT FORM

If any damage is caused to your ShibataFenderTeam fender system, regardless of cause, then this must be reported to ShibataFenderTeam immediately. Failure to do so may affect warranty terms. Please provide all relevant information as well as photographs and maintenance records where applicable.

Port:	Berth name:
Reported by:	Position:
Phone:	Email:

GENERAL	
Incident date:	Last inspection date:
Fender location:	Fender number:
Suspected cause:	

RUBBER DAMAGE	**FENDER PANEL DAMAGE**
FACE PAD DAMAGE	**CHAIN SYSTEM DAMAGE**
OTHER COMMENTS	**PHOTOS (file names)**
	Please take overview and close-up photos, submit in high resolution where possible. Indicate the file name(s) and respective fender position(s)
FOLLOW-UP	
Incident date:	Last inspection date:
Fender location:	Fender number:

Download this form from www.shibata-fender.team/en/downloads.html

NOTES

NOTES

AFTER SALES & WARRANTY

ShibataFenderTeam are committed to providing support and assistance during commissioning and long into the future. With our own installation and maintenance team based in Germany, we can offer assistance during the installation and/or maintenance works. We support customers with routine overhauls and upgrades, or to recover quickly in the event of accidental damages. Standard and extended warranties are available, as well as guidance on inspection and maintenance regimes to ensure our fender systems always provide the best performance and protection.

The standard warranty period is 12 months from installation or 18 months form shipping date. Longer warranties are available on request. Performance guarantees are available if optional fender performance testing is carried out. Extended paint warranties can also be provided. In all cases ShibataFenderTeam warranties are subject to berth operators conducting periodic inspections according to our recommendations, as well as timely submission of reports and photographs. This allows any issues arising to be detected early, then rectified and monitored.

Warranties do not cover accidental damage, normal wear and tear, visual appearance or the effects of environmental degradation over time. In the unlikely event of a claim for faulty materials and/or workmanship, ShibataFenderTeam will repair or replace the defective components at our discretion. Compensation values cannot exceed the cost of supplied materials, less any reduction for normal use, and in no circumstances are costs of removal or reinstallation, or any consequential costs, losses or liabilities accepted.

ShibataFenderTeam recommends that users adopt an asset management system based on ISO 55000 (or PAS-55).

DISCLAIMER

Every effort has been made to ensure that the technical specifications, product descriptions and design methods referred to in this manual are correct and represent current best practice. ShibataFenderTeam AG, its subsidiaries, agents and associates do not accept the responsibility or liability for any errors and omissions for any reason whatsoever reason. When using this technical manual to develop a design, customers are strongly recommended to request a detailed specification, calculations and certified drawings from ShibataFenderTeam specialists prior to construction and/or manufacture. ShibataFenderTeam constantly strives to improve the quality and performance of products and systems. We reserve the right to change specification without prior notice. All dimensions, material properties and performance values quoted are subject to normal production tolerances. This manual supersedes the information provided in all previous editions. It should also be used in conjunction with current ShibataFenderTeam product catalogues. If in doubt, please consult ShibataFenderTeam.

FLAG

Date: 12 / 2015

www.shibata-fender.team

Presented by: