Case Study : Thailand : damage to wharfs fender during berthing of vessel

background information

Based on records for last 3 years , we have found a number of cases where the wharf and/or it's accessories sustained the damage during berthing of the vessel , resulting in claims against ship's owner.

Causes of damage

According to records , and following investigations into causation , the incidents were attributed to ;

1) unexpected sea / wind condition

2) error in navigation under assistance of the local pilot and

3) possible latent defect in the wharf's accessories.

Claim handling

Under local regulations , the vessel is responsible for loss/damage due to contact between the vessel and the wharf / accessories. The vessel is presumed at fault unless they can prove that the damage was caused by "force majeure" or fault of the terminal. The relevant law related to this type of incident is as follows ;

"A person is responsible for injury caused by any conveyance propelled by mechanism which is in his possession or control , unless he proves that the injury results from force majeure or fault of injured person.

The same applies to the person who has in possession things dangerous by nature of destination or on account of their mechanical action."

For the damage under causes item 2) as mentioned above , it seems clear that the owner of the vessel would have difficulty avoiding liability as the master is considered to be the commander of the vessel and pilot is considered as advisor under the local law.

Anyhow , there always be a question to be considered whether the owner is able to defense the case if the damage was caused resulting from item 1) and 3)

Based on our experience , to defense the case under item 1) the owner has a burden to prove that the proper precautions have been taken to avoid the situation and even so , the incident is still occurred. If the owner could not prove otherwise , it seems likely that the owner would have difficulty to refute the claim.

The most difficulty scenario was the case under item 3) as the investigation by expert should be carried out to prove whether there is latent defect to the wharf structure and it's accessories and the associate costs would be substantial while the claim amount is normally in region of THB 350,000 – 700,000 (approx USD 11,000 – 22,000).

Based on survey report on previous cases , the local terminal operator have used the wharf fender and other accessories for approx 30 years and it would appear that maintenance and testing may not match the manufacturers recommended guideline.

According to those guideline , the physical property of rubber of "After aging" on tensile strength and elongation should not less than 80% .

Copy of table for physical property of rubber is enclosed herewith. Anyhow , we found that most of the terminal operator do not have proper maintenance or testing records.

1. FEATURES OF CELL FENDER SERIES

5. Grade of rubber

[redacted] has developed several grades of rubber for wider selection.

Grades of Rubber for the Cell Fender Series

Young's Modulus	Lower ←				→ Higher
Rubber Grade	R1	R0	RH	RS	RE
Ratio of Performance	80～85	100	130	150	169

6. Physical property of rubber:

Property		Unit	Requirement	Relavant testing standard and conditions
Before aging	Tensile strength	kg/cm²	min. 160	JIS K 6301 item 3 Dumbell No. 3 (Alt. ASTM D412 Die C/BS 903 A.Z.)
	Elongation	%	min. 350	
	Hardness	deg.	max. 77	JIS K 6301 item 5 A type tester (Alt. ASTM D2240 shore A durometer/BS 903 A.Z.)
After aging	Change in tensile strength	%	not less than 80% of original value	JIS K 6301 item 6 Dumbell No. 3 70℃×96 hrs aging through air heating (Alt. ASTM D573 Die C/BS 903 A.Z.)
	Change in elongation	%	not less than 80% of original value	
	Hardness	deg.	Original value +8° max.	JIS K 6301 item 5 A type tester (Alt. ASTM D2240 shore A durometer)
Tear resistance		kg/cm	min. 70	JIS K 6301 item 9 Test piece type A (Alt. ASTM D624 Die B/BS 903 A.3.)
Compression set		%	max. 30	JIS K 6301 item 10 70℃×22 hrs heat treatment (Alt. ASTM D395/BS 903 A.6A)
Abrasion resistance		cc	max. 1.5	British Standard BS903 A9 method-C 3000 revolutions
Ozon resistance		—	No visible cracking	JIS K 6301 Elongation 20%, 40℃×100 hours

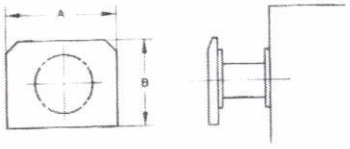
Beside the maintenance and testing factor , the angle of vessel during berthing is seems to be a factor for damage to the wharf's fender. As per fender makers guideline , the berthing angle factor will be considered in designing for a dolphin and a super structured berth for large vessel only while it was not considered for the continuous wharf where many fenders are installed. In addition , the berthing angle was estimated ideally in region of 3-6 degree. However , in the majority of previous cases , the vessel was not 100% , or close to it , parallel to the fenders causing a certain part of vessel's structure to contact only one or two of the available wharf's fender. As a result , the weight of the vessel was applied to only one or two fenders causing damage to wharf 's fender even though there was no unusual incident during berthing of the vessel .

5 TABLE OF ANGULAR PERFORMANCE

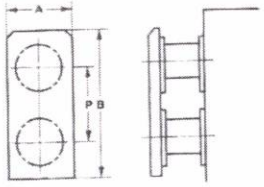
In case of a dolphin and a super-structured berth for large vessels, the effect of angular compression on the fender is generally considered in designing.
But in case of a continuous wharf where many fenders are installed with certain spacing, this effect usually is not considered.
According to the results obtained in field surveys, the berthing angle will be less than 3 degrees in most cases and 6 degrees at the maximum. We suggest that you will select the fendering system taking the correction factor for angular loading into consideration.

The following table of angular performance defines performances of Cell Fender Series under each berthing angle.
The table shows angular performance of Cell Fender Series only for 1×1 system or vertical array system such as 1×2 system.

SUC ... H×1×1

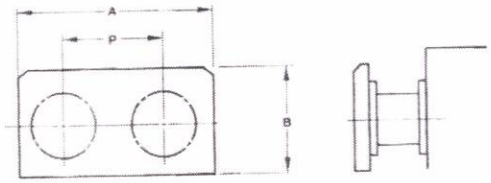


SUC ... H×1×2

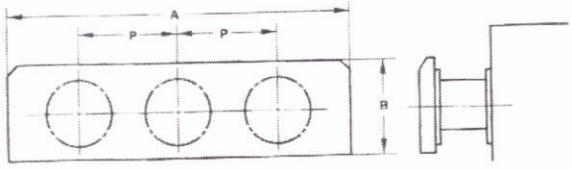


For vertical array system, multiply the performance in the following table in proportion to the quantity of fender.
For holyzontal array system such as 2×1 system or 3×1 system, angular performance of the system is depending on the distance between each fenders and frame size.

SUC ... H×2×1

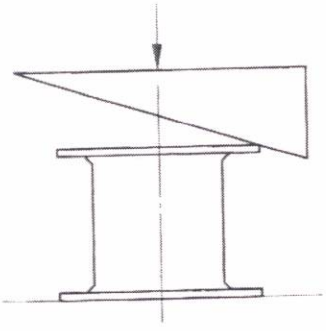


SUC ... H×3×1



If you need such a correction factor or angular performance in designing, please do not hesitate to contact Bridgestone or any of its distributors.

Remarks: Direction of compression of fenders is as follows:



It is also necessary to consider the effect of angular loading on the combined systems, two fenders or three fenders, as well as the single fender system.

Recommendation

In order to minimize the claim resulting from above scenarios , we would recommend that followings precaution measurement should be considered ;

1) Master should consult with pilot on berthing plan including usage of tug boat, in order to berth the vessel in parallel angle to the wharf and reduce the force from tug pushing during berthing as much as possible.

2) Master should also consult with pilot for precaution of unexpected sea / wind condition and also contingency arrangement in case unexpected heavy wind / sea condition is occurring during berthing of the vessel.

3) In case the damage to wharf or it's accessories is occurred , master should alert owners and / or call the club correspondent so that arrangements can be made for joint inspections.

4) If master is suspicious of fender condition prior to berthing , he should photograph same and alert the pilot.