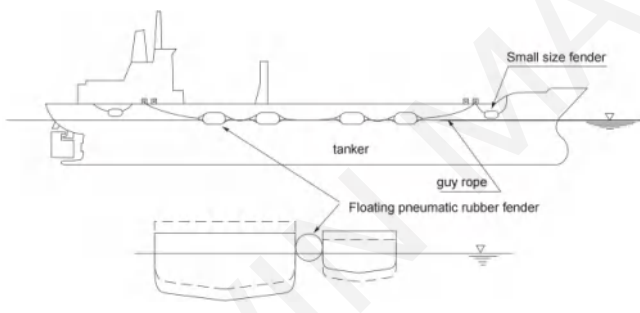


## 7. FENDER APPLICATION

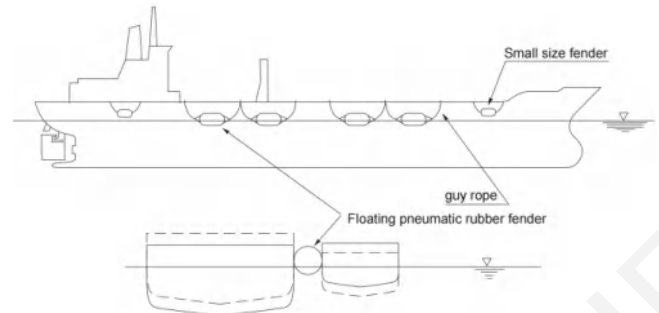
### 7.1 Ship-to-ship Application

For large tankers, normally four large-size fenders are usually floated at the water line as primary fenders to absorb impact energy at berthing and keep proper stand-off distance between two ships. At same time, two or more small-size fenders are hung high on the hull at both bow and stern of smaller ship as secondary fenders to prevent contact from rolling of ships due to swell and wind. Users can refer "STS Transfer Guide", published by the International Chamber of Shipping (OCIMF) to get more information.

Below two figures show the installation examples.



Fender Rigged in a Continuous String



Fenders Guyed Individually

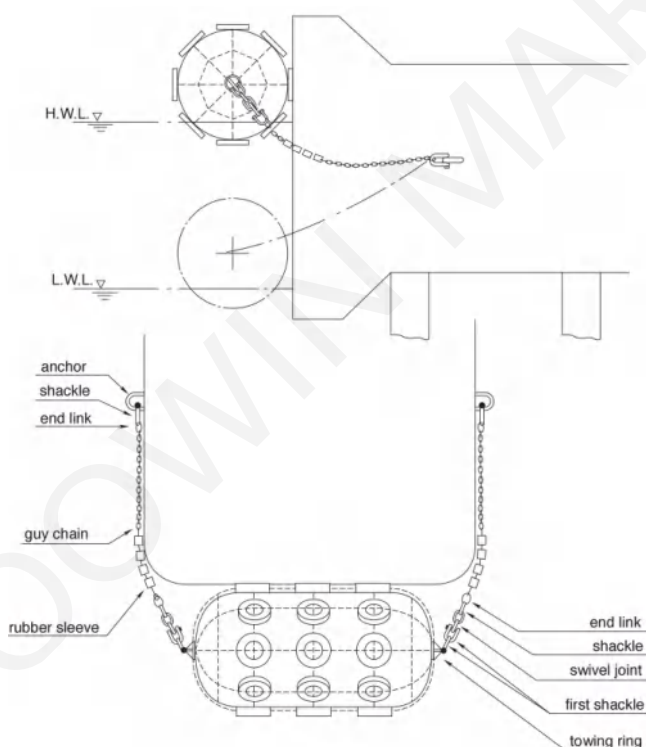
The pneumatic fenders should be hung by guy chains or guy ropes, which should be selected depending on the different size and weather condition. The fenders can be rigged in a continuous string, or guyed individually. The jaw end swivel at each end is supplied together with the fenders.



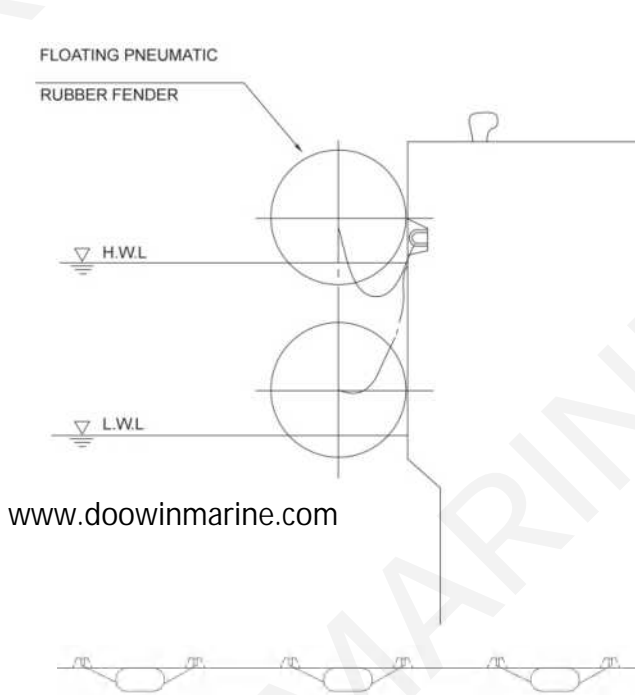
## 7.2 Ship-to-jetty Application

Pneumatic fenders are often used for the ship-to-jetty operation because of its excellent performance. At both ends of the fender, first shackles, then swivel joints, followed by a further shackle should be installed. A guy chain or guy rope is secured to the outer shackle. The swivel joint prevents twisting of the guy chain or wire.

■ Dolphin



■ Continuous Quay



The typical installation type, equipment and necessary parts for installation are show like above figures. Guy chains and guy ropes, as well as shackles, swivel, rubber sleeves and anchors are not supplied with the fenders, but they can be purchased separately upon request.

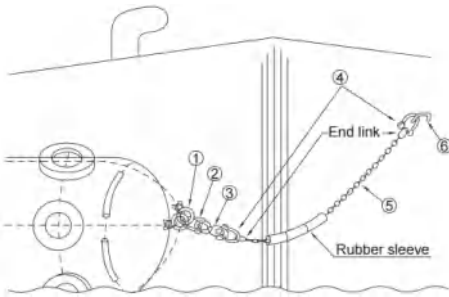
■ Fender's End Upgrade

We upgraded the design for the first shackle and swivel joint. We use one jaw end swivels to instead of the first shackle and swivel joint for easier install. The user can use one shackle to connect this swivel with the guy chain or guy rope.

Please kindly refer the right figure.

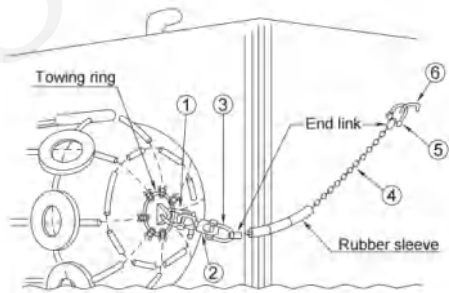


**Chain net type (Type I) Small Sizes**



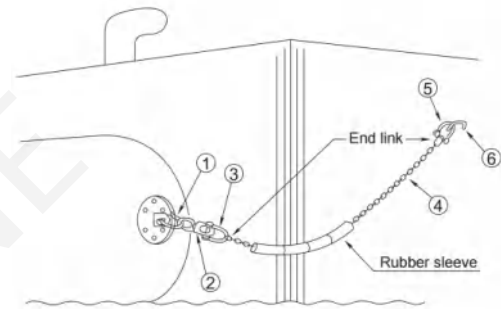
Parts		1	2	3	4	5		6
D X L	Initial Pressure	Ring Diameter	First Shack Diameter	Swivel Diameter	Shackle Diamete	Guy Rope	Guy Chain	Anchor
(m)	(kPa)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)
0.5x1.0	50	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
	80	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
0.6x1.0	50	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
	80	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
0.7x1.5	50	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
	80	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
1.0x1.5	50	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
	80	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
1.0x2.0	50	19 3/4	22 7/8	19 3/4	22 7/8	16 5/8	16 5/8	25 1
	80	19 3/4	22 7/8	19 3/4	22 7/8	18 11/16	16 5/8	25 1
1.2x2.0	50	22 7/8	25 1	22 7/8	22 7/8	16 5/8	16 5/8	25 1
	80	22 7/8	25 1	22 7/8	22 7/8	18 11/16	16 5/8	25 1
1.35x2.5	50	22 7/8	25 1	22 7/8	22 7/8	18 11/16	16 5/8	25 1
	80	22 7/8	25 1	22 7/8	22 7/8	20 13/16	16 5/8	25 1

**Chain net type (Type I) Medium and Large Sizes**



Parts		1	2	3	4	5		6
D X L	Initial Pressure	Ring Diameter	First Shack Diameter	Swivel Diameter	Shackle Diamete	Guy Rope	Guy Chain	Anchor
(m)	(kPa)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)
1.5x3.0	50	24 15/16	25 1	24 15/16	20 15/16	19 3/4	24 15/16	32 1-1/4
	80	24 15/16	25 1	24 15/16	24 15/16	20 13/16	24 15/16	32 1-1/4
1.7x3.0	50	24 15/16	25 1	24 15/16	22 7/8	19 3/4	24 15/16	32 1-1/4
	80	24 15/16	25 1	24 15/16	24 15/16	20 13/16	24 15/16	32 1-1/4
2.0x3.5	50	26 1	28 1-1/8	26 1	24 15/16	22 7/8	26 1	32 1-1/4
	80	28 1-1/8	28 1-1/8	28 1-1/8	28 1-1/8	24 15/16	28 1-1/8	36 1-7/16
2.5x4.0	50	32 1-1/4	32 1-1/4	32 1-1/4	30 1-3/16	26 1	32 1-1/4	42 1-5/8
	80	34 1-5/16	38 1-1/2	34 1-5/16	32 1-1/4	30 1-3/16	34 1-5/16	42 1-5/8
2.5x5.5	50	34 1-5/16	38 1-1/2	34 1-5/16	34 1-5/16	32 1-1/4	34 1-5/16	44 1-3/4
	80	40 1-9/16	44 1-3/4	40 1-9/16	40 1-9/16	36 1-7/16	40 1-9/16	50 2
3.3x4.5	50	36 1-7/16	38 1-1/2	36 1-7/16	34 1-5/16	30 1-3/16	36 1-7/16	44 1-3/4
	80	40 1-9/16	44 1-3/4	40 1-9/16	38 1-1/2	34 1-5/16	36 1-9/16	50 2
3.3x6.5	50	44 1-3/4	44 1-3/4	44 1-3/4	42 1-5/8	38 1-1/2	44 1-3/4	55 2-3/16
	80	48 1-7/8	50 2	48 1-7/8	46 1-13/16	42 1-5/8	48 1-7/8	60 2-3/8

■ Sling type (Type II)



Parts		1	2	3	4	5		6
D X L	Initial Pressure	Ring Dimeter	First Shack Diameter	Swivel Diamter	Shackle Diamete	Guy Rope	Guy Chain	Anchor
(m)	(kPa)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)	(mm) (inch)
0.5x1.0	50	16 5/8	16 5/8	22 7/8	16 5/8	16 5/8	22 7/8	25 1
	80	16 5/8	16 5/8	22 7/8	16 5/8	16 5/8	22 7/8	25 1
0.6x1.0	50	16 5/8	16 5/8	22 7/8	16 5/8	16 5/8	22 7/8	25 1
	80	16 5/8	16 5/8	22 7/8	16 5/8	16 5/8	22 7/8	25 1
0.7x1.5	50	16 5/8	16 5/8	22 7/8	16 5/8	16 5/8	22 7/8	25 1
	80	16 5/8	16 5/8	22 7/8	16 5/8	16 5/8	22 7/8	25 1
1.0x1.5	50	16 5/8	19 3/4	22 7/8	16 5/8	16 5/8	22 7/8	25 1
	80	16 5/8	19 3/4	22 7/8	16 5/8	16 5/8	22 7/8	25 1
1.0x2.0	50	16 5/8	19 3/4	22 7/8	16 5/8	16 5/8	22 7/8	25 1
	80	16 5/8	19 3/4	22 7/8	18 11/16	16 5/8	22 7/8	25 1
1.2x2.0	50	16 5/8	19 3/4	22 7/8	16 5/8	16 5/8	22 7/8	25 1
	80	16 5/8	19 3/4	22 7/8	18 11/16	16 5/8	22 7/8	25 1
1.35x2.5	50	18 11/16	19 3/4	22 7/8	18 11/16	16 5/8	22 7/8	25 1
	80	18 11/16	19 3/4	22 7/8	20 15/16	16 5/8	22 7/8	25 1
1.5x3.0	50	20 13/16	22 7/8	24 15/16	20 15/16	19 3/4	24 15/16	32 1-1/4
	80	20 13/16	25 1	24 15/16	24 15/16	20 13/16	24 15/16	32 1-1/4
1.7x3.0	50	20 13/16	25 1	24 15/16	22 7/8	19 3/4	24 15/16	32 1-1/4
	80	20 13/16	25 1	24 15/16	24 15/16	20 13/16	24 15/16	32 1-1/4
2.0x3.5	50	20 13/16	28 1-1/8	26 1	24 15/16	22 7/8	26 1	32 1-1/4
	80	24 15/16	28 1-1/8	28 1-1/8	28 1-1/8	24 15/16	28 1-1/8	36 1-7/16
2.5x4.0	50	28x2 1-1/8	32 1-1/4	32 1-1/4	30 1-3/16	26 1	32 1-1/4	42 1-5/8
	80	30x2 1-3/16	38 1-1/2	34 1-5/16	34 1-5/16	30 1-3/16	34 1-5/16	42 1-5/8
2.5x5.5	50	32x2 1-1/4	38 1-1/2	34 1-5/16	34 1-5/16	32 1-1/4	34 1-5/16	44 1-3/4
	80	36x2 1-7/16	44 1-3/4	40 1-9/16	40 1-9/16	36 1-7/16	40 1-9/16	50 2
3.3x4.5	50	32x2 1-1/4	38 1-1/2	36 1-7/16	34 1-5/16	30 1-3/16	36 1-7/16	44 1-3/4
	80	34x2 1-5/16	44 1-3/4	40 1-9/16	40 1-9/16	34 1-5/16	40 1-9/16	50 2
3.3x6.5	50	40x2 1-9/16	44 1-3/4	44 1-3/4	42 1-5/8	38 1-1/2	44 1-3/4	55 2-3/16
	80	44x2 1-3/4	50 2	48 1-7/8	48 1-7/8	42 1-5/8	48 1-7/8	60 2-3/8