LEAFLET

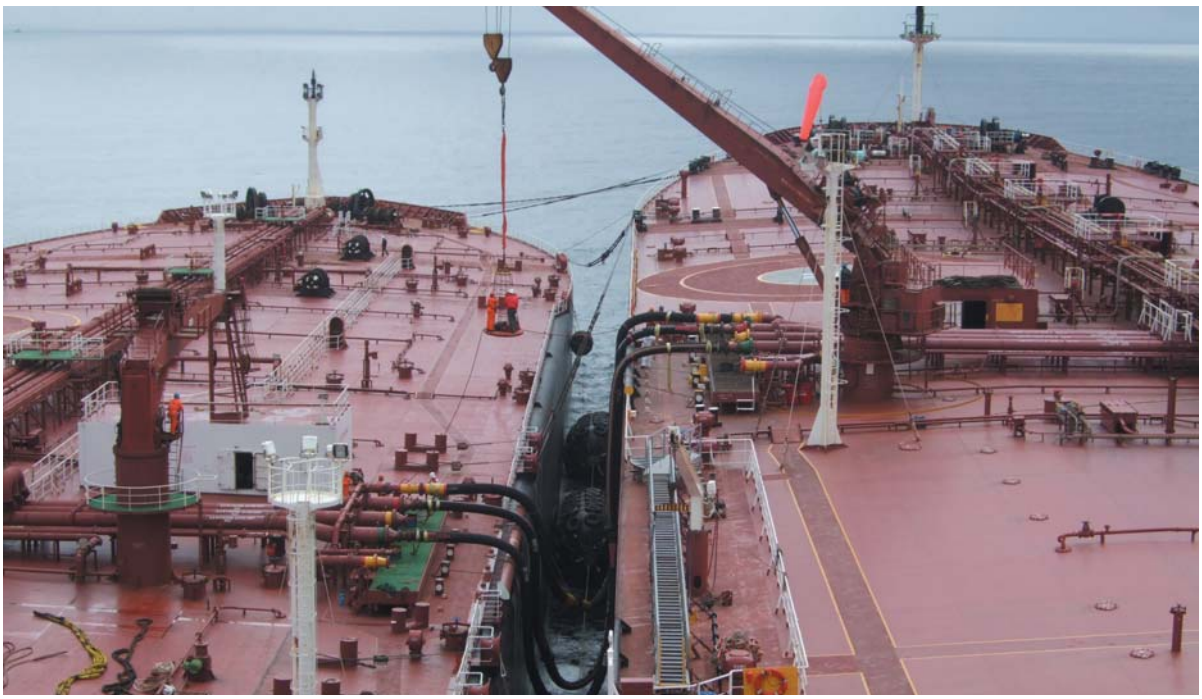
YOKOHAMA PNEUMATIC FENDER

YOKOHAMA

INTRODUCTION

The “Yokohama Pneumatic Rubber Fender” was developed in 1958 based on a rubber company’s technology for automobile tires and rubber aircraft fuel tanks. Progress in the development of such floating pneumatic rubber fenders is closely related to the progress and development of ship technology, and has to continuously cope with progressively larger oil tankers such as VLCC’s, ULCC’s, large gas carriers, bulk carriers and floating structures. Floating pneumatic fenders are used world wide for ship-to-ship (STS) transfer operations, terminals, and for all kinds of ships. Since its creation until today, more than 45,000 fenders have been supplied worldwide both for ship-to-ship and ship-to-dock operations serving our valuable customers. These fenders play a critical role in the safe operation of ship berthing and mooring.

ship-to-ship (STS) operations



ship-to-dock (STJ) operations

YOKOHAMA AIR BLOCK FENDER (ABF-P)

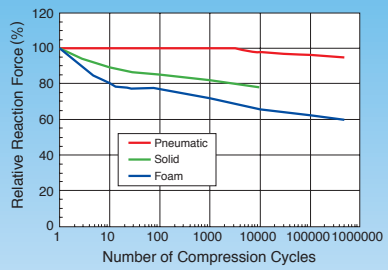
A YOKOHAMA original style fixed pneumatic fender with frontal protector panel model developed in the 1970's, which is another idea pneumatic fender system providing a "soft" and "stable" berthing/mooring condition to the ship. The ABF-P is a high performance fixed fender system with high robustness preferred in large-scale crude oil and LNG/LPG loading terminals, especially in exposed sea condition.

ADVANTAGES

The Yokohama Rubber Co., Ltd. confirms that all its Pneumatic Rubber Fenders fully comply with all requirements of ISO17357

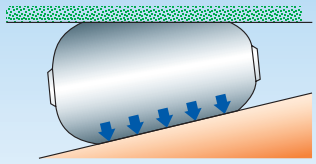
1. Safety and Reliability

Fenders are constructed of several layers of strong tire-cord, and are thus resistant to pressure and cutting.



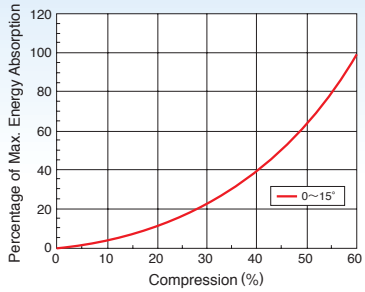
2. No Deterioration or Variation in Performance

Fenders utilize the compressive elasticity of air, therefore performance deterioration due to fatigue is absent.



3. Advantages at Inclined Berthing

Eenergy absorption does not decrease at inclined compression up to 15 degrees.

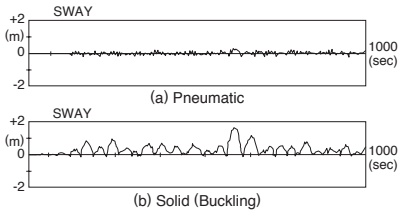


4. Soft Reaction Force

The reaction force does not increase sharply even under excess load conditions.

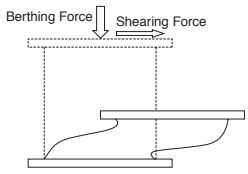
5. Lower Mooring Forces under Rough Condition

The reaction force does not increase sharply even under excess load conditions.



6. Strong against Shearing Force

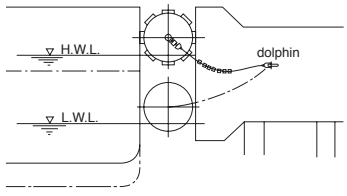
Fenders are adequately reinforced using strong tire-cord to cope against shearing and compression forces as well as internal pressure.



7. Adaptable to the Tide

8. Simple and Low Cost Installation

It can be removed easily to a suitable jetty or quay when not in use, or transferred to another mooring point whenever required.



Adaptable to Tide

9. Low Maintenance Cost

10. Shipping Cost Minimization

Fenders are usually packed and shipped in containers or on pallets in vacuumed and folded down state.

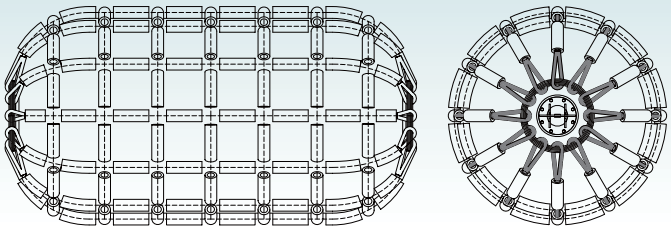
VARIATIONS

TYPE Ⅰ (Net Type)

TYPE Ⅱ (Sling Type)

1. Rubber Sleeve Net

2. Fiber Net



3. Grey Body & Chain Net

4. Flashing Light

5. Light-Weight

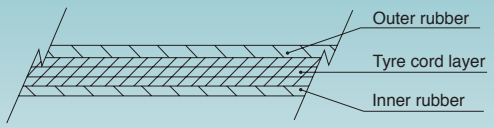
6. Rubber Jacket (Up to 2.0mDia)

7. Marking-Less

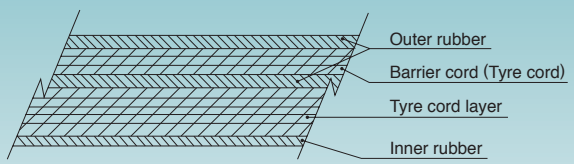
Marking-less fenders make use of a specially formulated outer rubber to avoid marking on the ship's hull.

8. Barrier Cover

Barrier cover consists of an outer rubber with an extra barrier section for better resistance to operational damage such as abrasion, cuts and gauges.



Standard Cover Construction



Barrier Cover Construction

9. Low-Pressure

The Low-pressure fender type is designed with a lighter body construction. It is popular for application requiring large clearance between the ship and jetty or between two ships but not necessarily needing the high performance of a standard high-pressure pneumatic fender.

10. Vertical

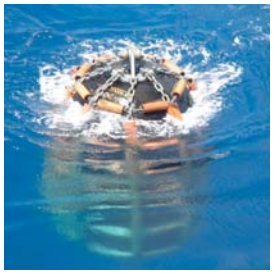
Vertical-Pneumatic fenders are specially designed to be installed vertically (Hydro-pneumatic fenders are water-ballasted). They are popular with vessels whose berthing point is below the water line such as catamaran ships, semi-submersibles platforms or other submersibles. Also, they are suitable as secondary fenders at both bow and stern of ship.

11. Fender Watch

Fender watch is convenient for checking the internal pressure of a fender by using sensors installed in the fender body and receiver. The receiver may be used for one or several fenders simultaneously.

12. Globuoy

Globuoy is a modified pneumatic fenders for use as a surface or sub-sea buoy in equipment installation, mooring, anchoring, and various offshore operations. It can be used with higher working pressure or can be filled with pressure resistant material for various under water applications. It is a non-collapsible buoy in case of over-submergence.



SIZE AND PERFORMANCE TABLE

Pneumatic 50 Standard Sizes

Nominal Size		Initial Internal Pressure	Guaranteed Energy Absorption (GEA)	Reaction Force at GEA	Hull Pressure at GEA	Safety Valve Setting pressure	Testing Pressure	Approx. Fender Body Weight	Weight of Net Type (Type Ⅰ)			Weight of Sling Type (Type Ⅱ)
Diameter × Length			E	R	p				Approx. Weight of Net			
									Chain Net	Wire Net	Synthetic Fiber Net	
(mm × mm)	(ft × ft)	(kPa)	(kNm)	(kN)	(kPa)	(kPa)	(kPa)	(kg)	(kg)	(kg)	(kg)	(kg)
500 × 1000	1.6 × 3	50	6	64	132	-	200	22	110	30	20	32
600 × 1000	2 × 3	50	8	74	126	-	200	25	120	30	22	36
700 × 1500	2.3 × 5	50	17	137	135	-	200	45	150	40	37	55
1000 × 1500	3 × 5	50	32	182	122	-	200	73	200	80	51	98
1000 × 2000	3 × 6.5	50	45	257	132	-	200	88	220	140	57	113
1200 × 2000	4 × 6.5	50	63	297	126	-	200	131	320	190	68	156
1350 × 2500	4.4 × 8	50	102	427	130	-	200	200	350	200	-	240
1500 × 3000	5 × 10	50	153	579	132	-	200	250	530	350	-	290
1700 × 3000	5.6 × 10	50	191	639	128	-	200	290	580	440	-	330
2000 × 3500	6.5 × 11.5	50	308	875	128	-	200	405	960	640	-	465
2500 × 4000	8 × 13	50	663	1381	137	175	250	902	1240	910	-	1080
2500 × 5500	8 × 18	50	943	2019	148	175	250	1090	1850	1160	-	1320
3300 × 4500	11 × 15	50	1175	1884	130	175	250	1460	1710	1270	-	1840
3300 × 6500	11 × 21	50	1814	3015	146	175	250	1870	2570	1910	-	2250
3300 × 10600	11 × 35	50	3067	5257	158	175	250	2560	4660	3300	-	3060
4500 × 9000	15 × 30	50	4752	5747	146	175	250	3940	5390	3520	-	-
4500 × 12000	15 × 40	50	6473	7984	154	175	250	4790	6990	5190	-	-

Pneumatic 50 Popular Non Standard Sizes

Nominal Size		Initial Internal Pressure	Guaranteed Energy Absorption (GEA)	Reaction Force at GEA	Hull Pressure at GEA	Safety Valve Setting pressure	Testing Pressure	Approx. Fender Body Weight	Weight of Net Type (Type Ⅰ)			Weight of Sling Type (Type Ⅱ)
Diameter × Length			E	R	p				Approx. Weight of Net			
									Chain Net	Wire Net	Synthetic Fiber Net	
(mm × mm)	(ft × ft)	(kPa)	(kNm)	(kN)	(kPa)	(kPa)	(kPa)	(kg)	(kg)	(kg)	(kg)	(kg)
400 × 1500	1.3 × 5	50	6	87	151	-	200	23	-	-	-	33
600 × 1200	2 × 4	50	10	93	132	-	200	28	-	-	-	39
800 × 1200	2.6 × 4	50	16	116	122	-	200	48	240	-	-	58
1200 × 1800	4 × 6	50	55	262	122	-	200	123	310	-	-	148
1350 × 3500	4.4 × 11.5	50	152	641	141	-	200	255	600	-	-	295
1500 × 2500	5 × 8	50	123	464	126	-	200	221	440	-	-	261
2000 × 3000	6.5 × 10	50	255	727	122	-	200	367	900	-	-	427
2000 × 4500	6.5 × 15	50	418	1188	137	-	200	480	1200	-	-	540
2500 × 7700	8 × 25	50	1350	2951	157	175	250	1370	3020	-	-	1600
3300 × 8600	11 × 28	50	2443	4138	154	175	250	2220	3710	-	-	2720
4500 × 6400	15 × 21	50	3238	3796	133	175	250	3400	3900	-	-	-

Note: 1. Figures on the table comply with requirements of ISO17357. 2. Weight of fender body and net may vary ±10%. 3. Special sizes are available upon request.

Vertical-Pneumatic

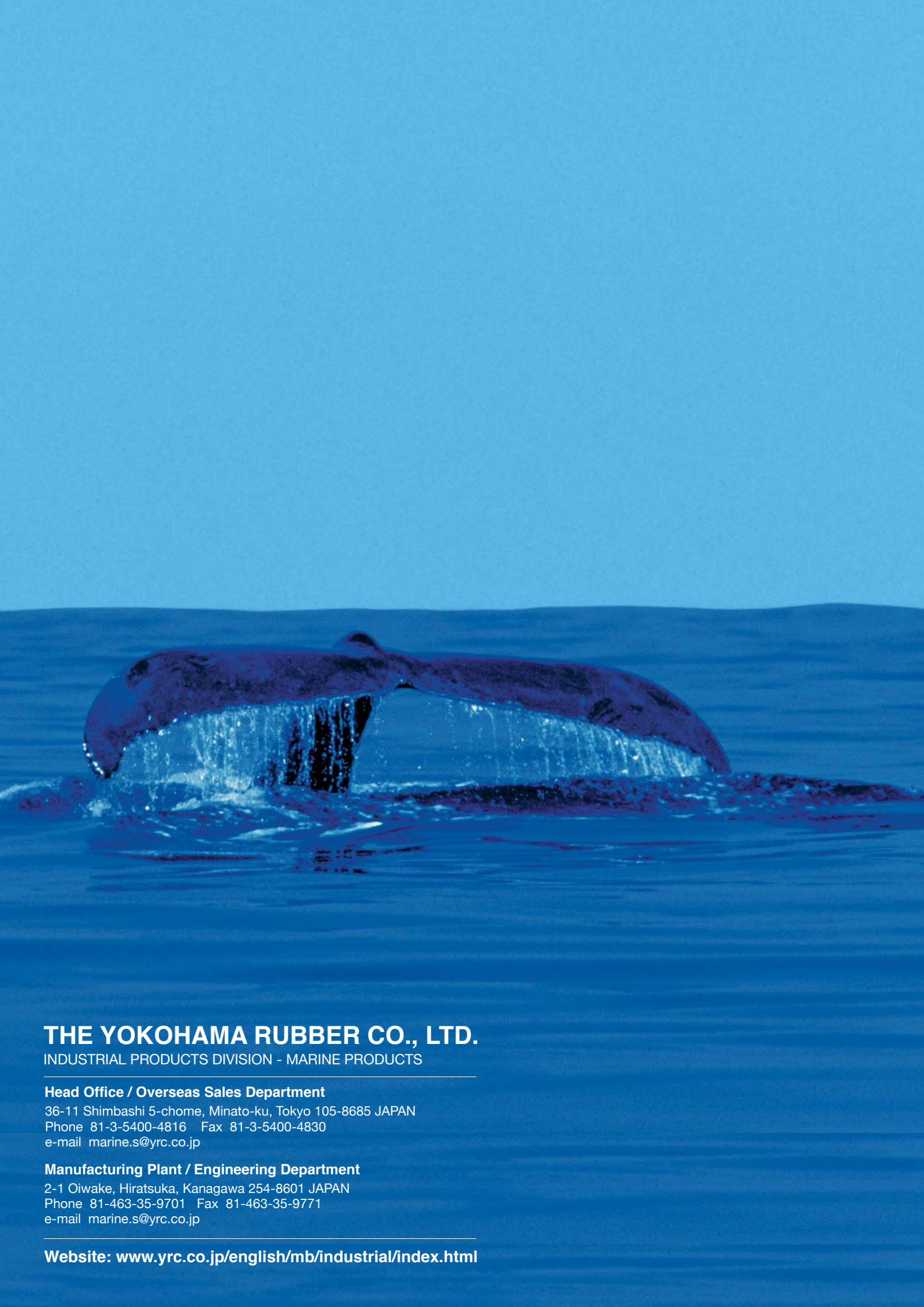
Nominal Size		Initial Internal Pressure	Weight of Body
Diameter × Length			
(mm × mm)	(ft × ft)	(kPa)	(kg)
2000 × 6000	6.5 × 20	50	1000
2500 × 9100	8 × 30	50	2200
3300 × 6500	11 × 21	50	3000
3300 × 8600	11 × 28	50	3600
3300 × 10600	11 × 35	50	4100
4500 × 9000	15 × 30	50	5810
4500 × 12000	15 × 40	50	7680

Light-Weight

Nominal Size		Initial Internal Pressure	Guaranteed Energy Absorption (GEA)	Reaction Force at GEA	Hull Pressure at GEA	Testing Pressure	Weight of Sling Type (Type Ⅱ)
Diameter × Length			E	R	p		
(mm × mm)	(ft × ft)	(kPa)	(kNm)	(kN)	(kPa)	(kPa)	(kg)
500 × 1000	1.6 × 3	80	8	85	174	250	24
1000 × 1500	3 × 5	80	45	239	160	250	65

Low-Pressure

Nominal Size		Initial Internal Pressure	Guaranteed Energy Absorption (GEA)	Reaction Force at GEA	Hull Pressure at GEA	Testing Pressure	Weight of Sling Type (Type Ⅱ)
Diameter × Length			E	R	p		
(mm × mm)	(ft × ft)	(kPa)	(kNm)	(kN)	(kPa)	(kPa)	(kg)
2500 × 9100	8 × 30	10	676	1901	88	40	1190
3300 × 12700	11 × 42	10	1565	3439	89	40	1930



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