

HEXA PLUG SERIES

Ship Bottom Plug for vessel

~ It makes offshore valve inspection possible ~



MITSUBISHI RUBBER

1. Bottom inspection

Basically , Bottom survey is carried out on Periodic and Intermediate inspection.

Rules for the Survey and Construction of Steel Ships (Part B Chapter 6) In-water Surveys stipulates It's possible to carry out In-water surveys on intermediate inspection .

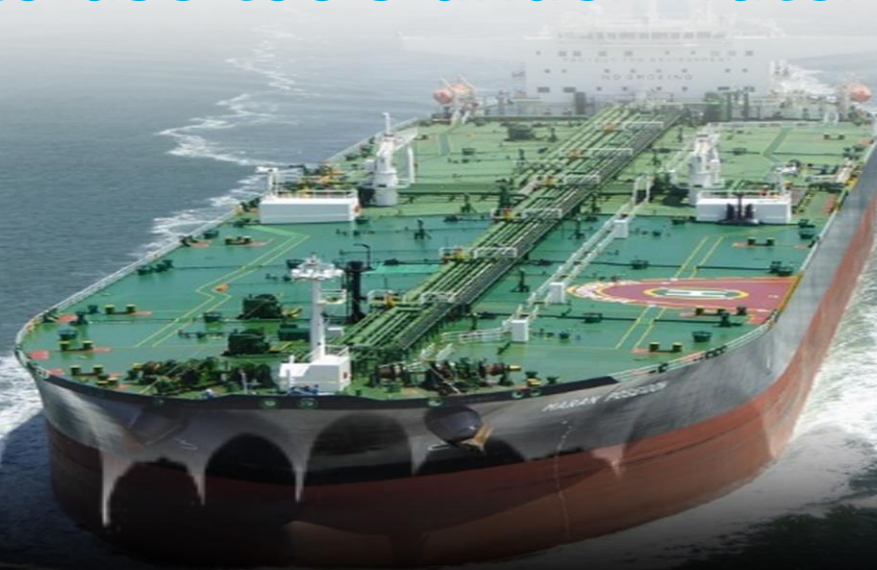
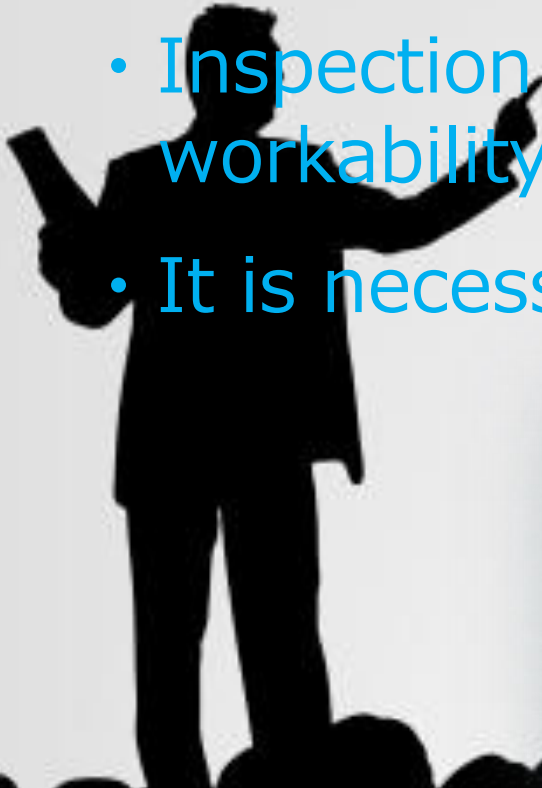
It is necessary to inspect bottom of ship twice in every 5 years.

One out of two times (Intermediate inspection) can be inspected in-water



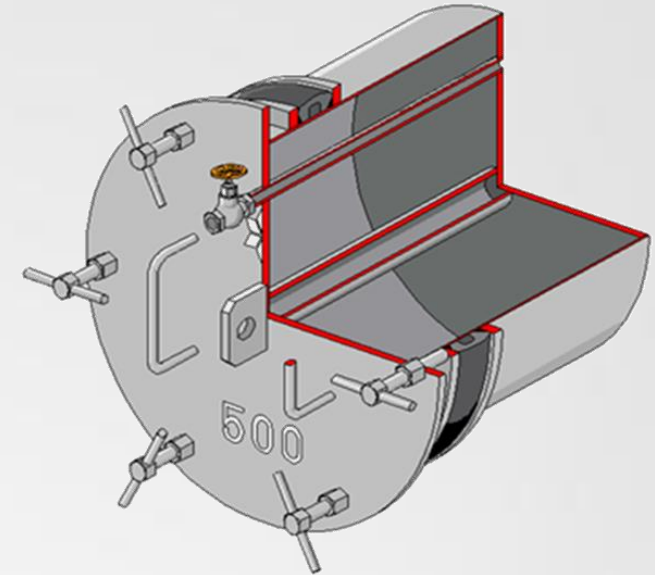
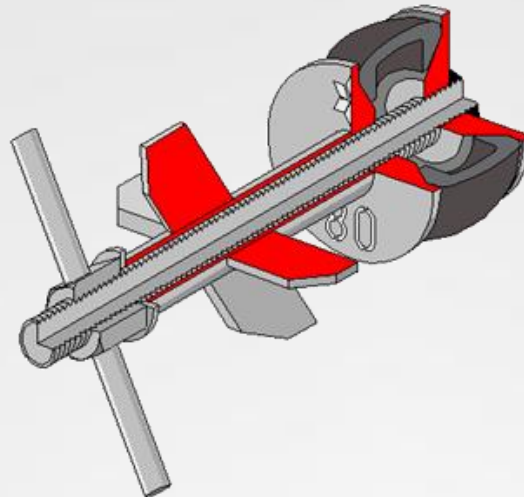
2. Current problem of ship bottom inspection

- It costs too much to enter to a dry dock
- Inspection jig is so heavy that it leads to poor workability.
- It is necessary to use tools under water.

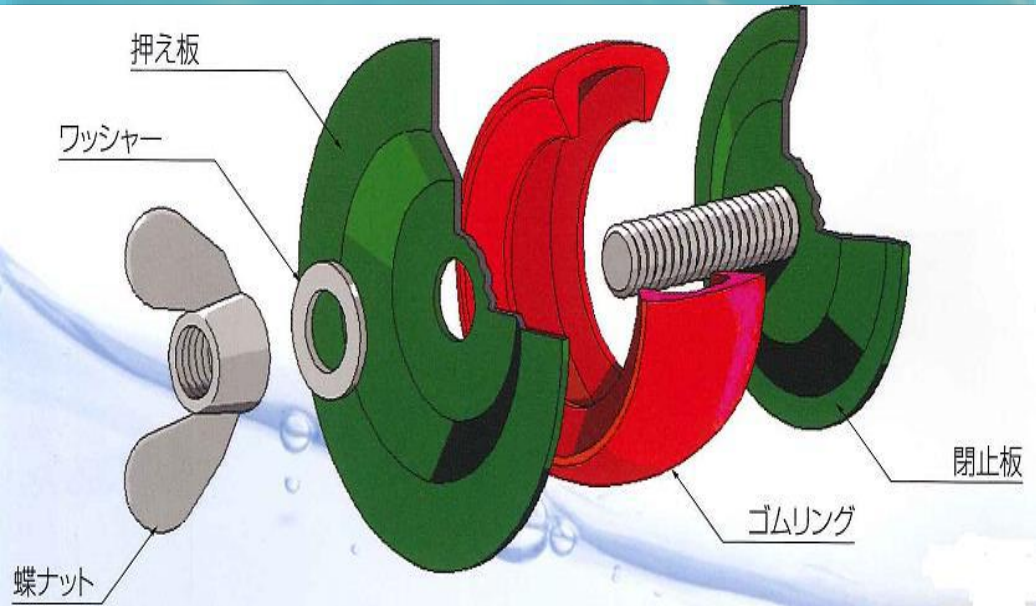


3. Ship Bottom Plug for Vessel ?

Ship Bottom Plug makes underwater inspection work safe, easy, and low cost !!



4.Characteristics of Ship Bottom Plug



- No need to use tools (Possible to install it by screwing up a handle)
- High sealing performance
- Applicable to various pipe

- For over 300A size pipe, Tank type plug is adopted.

It greatly improve workability by the reduction of its weight due to underwater buoyancy possible to reduce cost in terms of total work efficiency !

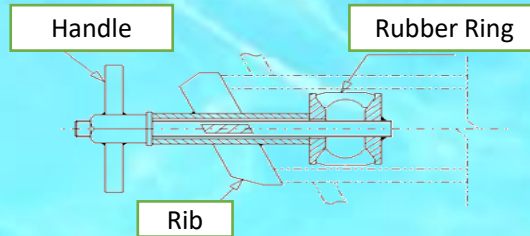
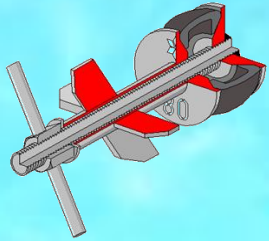
→It realizes an inspection work by only one person !



Possible to reduce cost in terms of total work efficiency !

HEXA PLUG SERIES

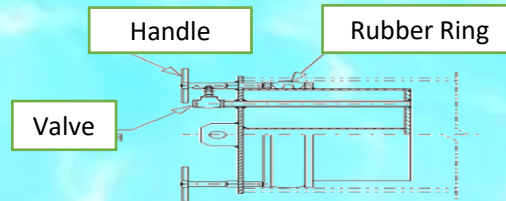
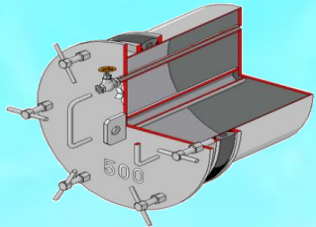
5. Ship Bottom Plug Style-MA(Existing type)


TYPE : MA-SR


For Inclined pipe

A stopper rib is designed for installation onto ship side surface.

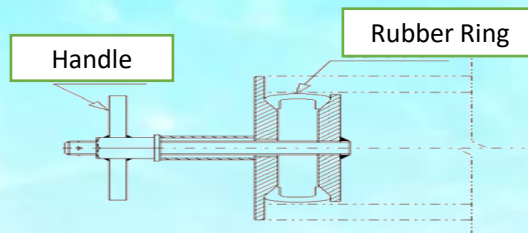
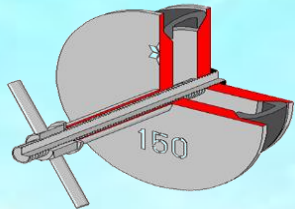
Sealing performance is secured by tightening a bolt in a state of four ribs touching the pipe end.

TYPE : MA-T(TA)


For large pipe

Buoyancy designed to reduce the underwater weight makes the driving work easier even by only one person.

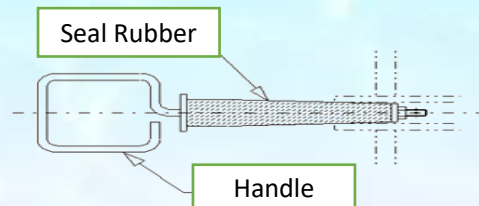
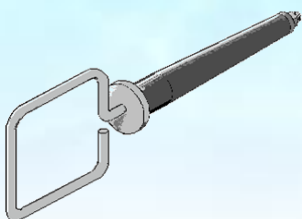
We can also design and manufacture it for inclined piping.

TYPE : MA-S


For straight pipe

Applicable to a vertical pipe end.

MA-S type plug for pipe size of over 300A is heavy, so MA-T (Tank type) is recommended in that case.

TYPE : MA-R


For Thin pipe

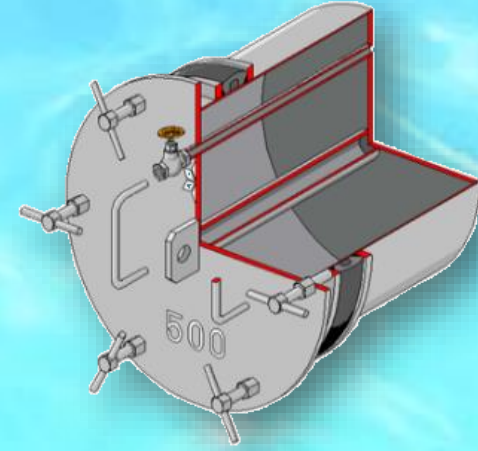
Applied to small pipe 15A~40A with vertical pipe end.

Sealing performance can be secured by inserting its tapered rubber into the pipe.

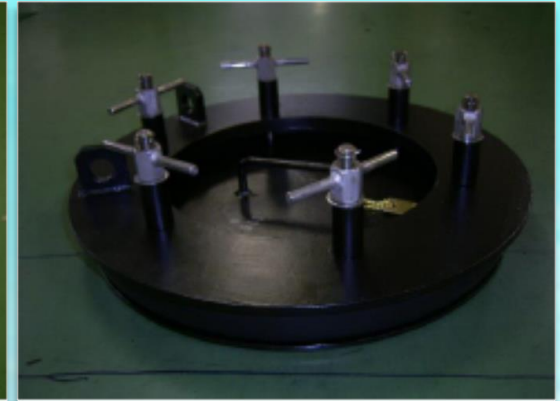
6.Style-MA Pictures



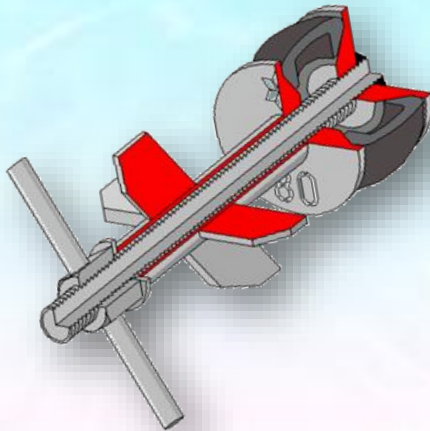
150A



150A



500A

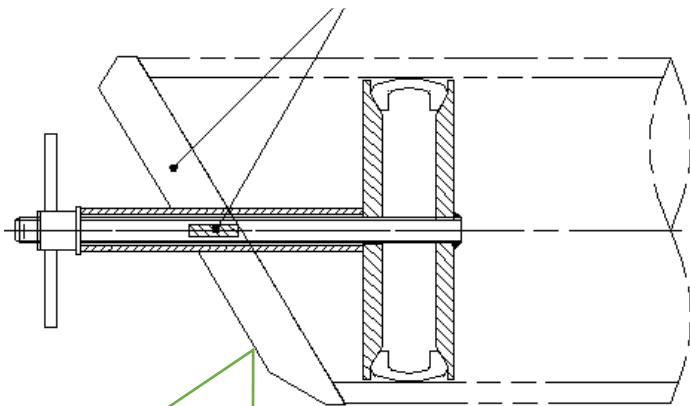


500A

7. New Ship Bottom Plug (Type-II)

Four Stopper Rib Type

Drawing data is necessary for each pipe



Fixed by welding ;
angle is set with ribs

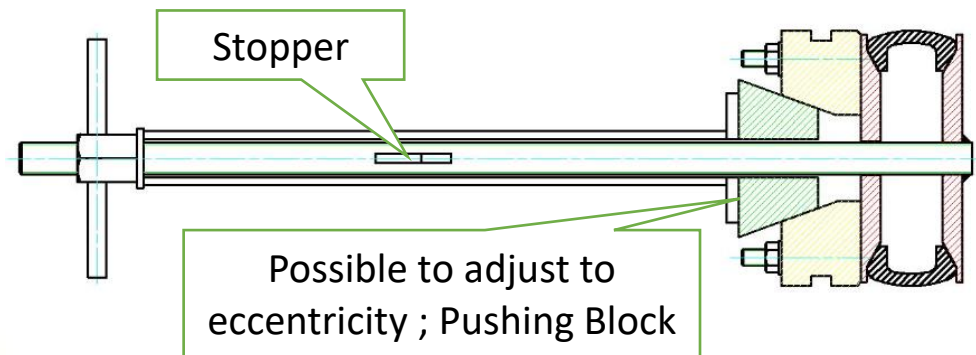
Previous Type

- Stopper ribs are needed to be designed differently depending on angle of pipe end.
- Applicable range of inner diameter for 150A pipe is 10mm
- Longer lead time due to made-to-order

NEW

Type-II

※ Less than 300A



Newly Adopted

Available for both Vertical Pipe and Ship body side

- "Pushing Block" has been newly adopted, which enables the plug to adjust to eccentricity. It becomes possible for only a single plug to be available for various angles.
- Broader range of applicable pipe inner diameter
→150A ; 15mm
- Possible to change it to stored parts.
→The plug can be used for urgent necessity of inspection work.

8. New Type Ship Bottom Plug (In house test)

Test size • Test condition

Pipe Diameter	Pipe		Rubber Ring			Test hydraulic pressure	Test time
	Inner Diameter	Angle	Outer Diameter	Extending amount of diameter	Material		
50A	51	25°	45	6	MC501	0.15MPa	10分
65A	67.6	25°	57.3	10.3			
80A	73.9	25°	63.9	10			
100A	97.1	25°	82.1	15			
125A	120.8	25°	105.8	15			
150A	143.2	25°	128.2	15			
200A	190.9	30°	175.9	15			
250A	242	35°	227	15			

Test Result	Sealing performance	Tightening Torque (N/m)		Pressure Resistance	Workability	Judgement
		Normal	Maximum			
50A	○	4.8	12.3	○	○	○
150A	○	10	11.1	○	○	○

50A test state



150A test state



9. New Type Ship Bottom Plug 50A Test Pictures

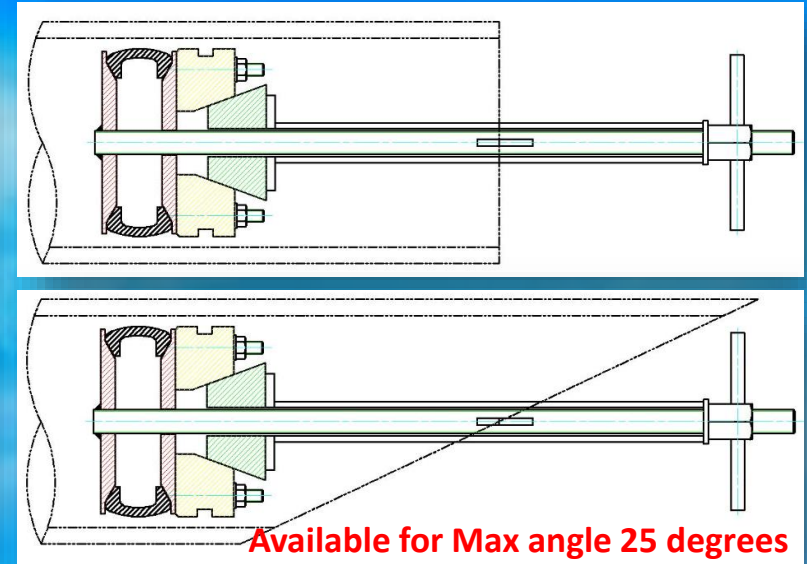
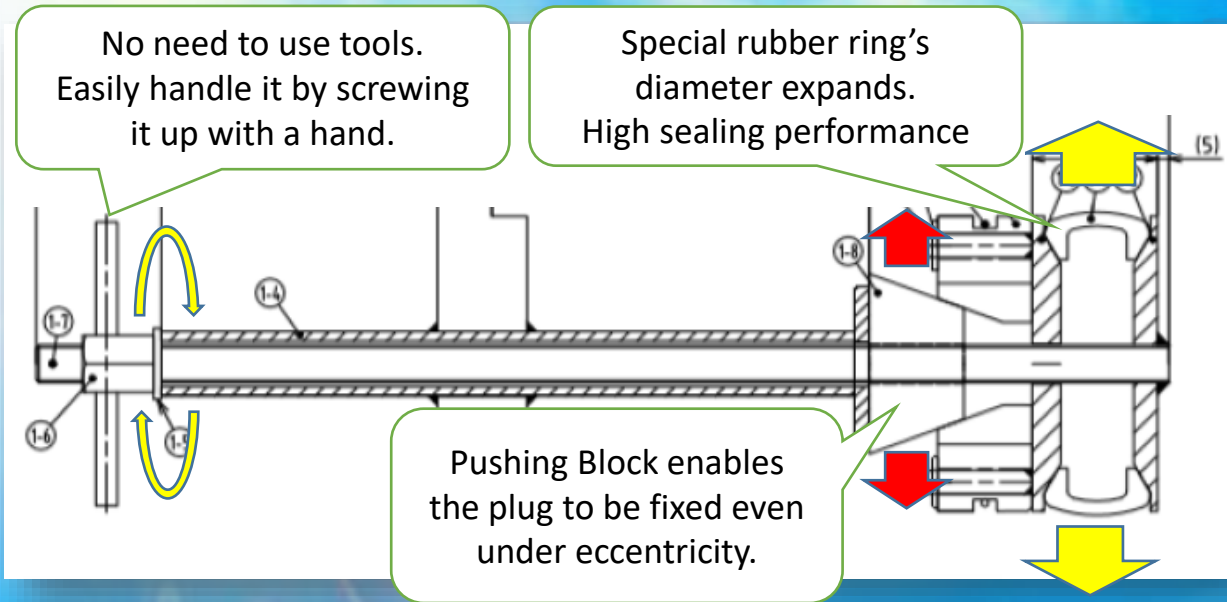


50A applicable inner diameter of pipe : 45~51mm

No water leakage • Confirmed that the plug can holds 0.15 MPa



10. New Type Ship Bottom Plug



150A Applicable inner diameter of pipe : 128.2~143.2mm

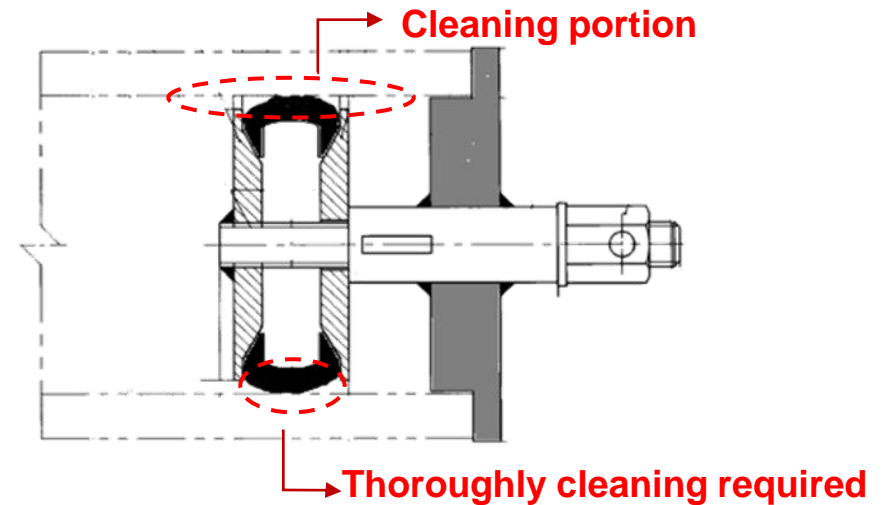
11. Inspection prior to use , Installation and Storage

Check of rubber ring prior to use

Clean the dust and oil on sealing surface with solvent.
Carefully evaluate if scratches are found on rubber surface.
It may cause low sealing performance.

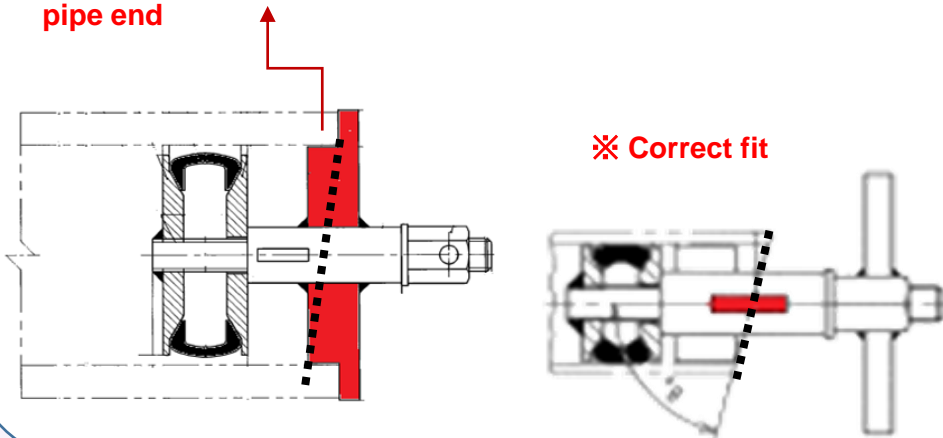


Cleaning of pipe inner surface

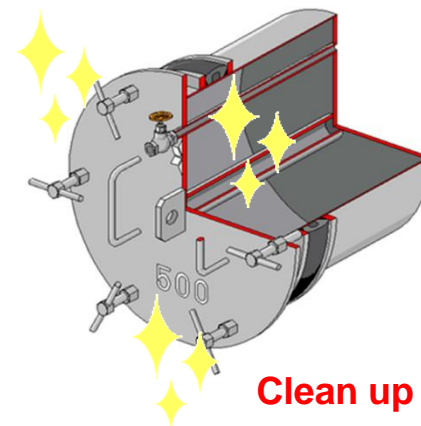


Installation Check

Don't tilt the stopper as shown below. Make sure it fits onto the pipe end



Caution on storage

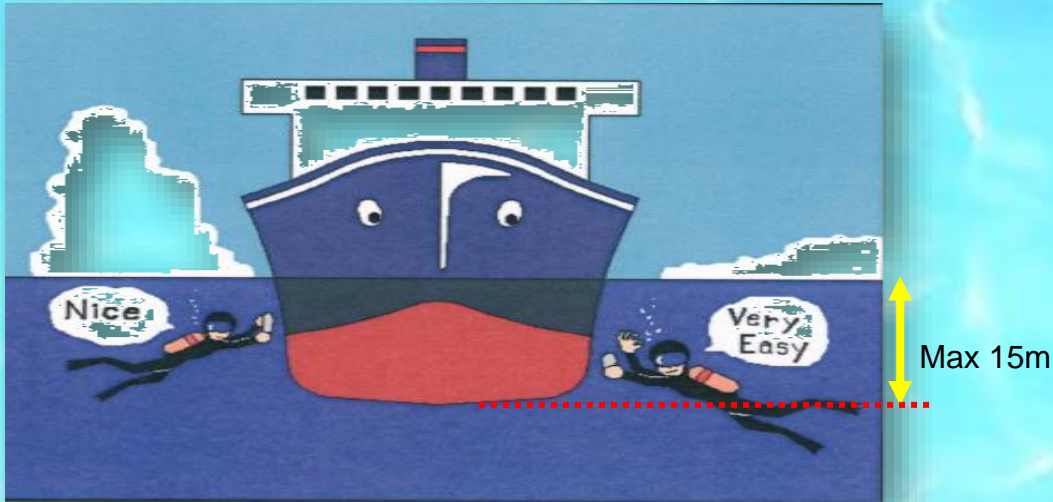


**Clean the product.
Keep it in a cool and dark
place and be careful not to
deform the rubber ring.**

12. Installation State of Ship Bottom Plug



① Diver dives in to the sea and carries out the plug to an installation place.



* Ship Bottom Plug can be installed within 15m draft.



MA-S R (Type-II)

② Open the sea chest grating



13. Delivery Results for Shipyard

Name of Shipyard
Kawasaki Heavy Industries , Ltd.
Sasebo Heavy Industries Co., Ltd.
Shin kurushima dockyard Co., Ltd.
Shin kurushima Toyohashi Shipbuilding Co., Ltd.
Shin kouchi heavy industries Co., Ltd.
Tsuneishi shipbuilding Co., Ltd.
Nacks (China)
Honda heavy industries, Ltd.
Mitsui engineering & shipbuilding Co., Ltd.
Mitsubishi heavy Industries, Ltd.
etc

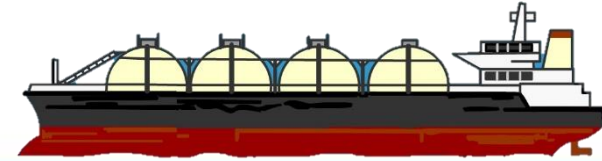
※Alphabetical order



14. Inquiry

Sales offices		Address	T E L	F A X
Headquarter and Plant	651-2228	2-3-5, Mitsugaoka, Nishi-ku, Kobe	(078)995-3331(代)	(078)995-3332
Osaka Main Office	530-0003	Keihan Dojima Bldg. 10F, 1-31, 2-Chome, Dojima, Kita-ku, Osaka	(06)6344-3555(代)	(06)6344-5660
Tokyo Branch	106-0032	MFPR Roppongi Azabudai Bldg. 7F, 8-7, Roppongi 1-Chome, Minato-ku, Tokyo	(03)5114-8551(代)	(03)5114-8552
Fukuoka Branch	804-0003	Kitakyushu Techno Center Bldg. 9F, 2-1, Nakabaru shinmachi, Tobata-Ku, Kitakyushu, Fukuoka	(093)873-5606	(093)873-5617
Nagoya Sales Office	450-0002	Nagoya-Mitsui Bldg. Higashikan 4F, 4-27-23, Meieki, Nakamura-ku, Nagoya	(052)541-1335	(052)541-1334
Oita Sales Office	870-0912	Sakura Bldg, 5F, 6-15, Harushinmachi, Oita	(097)556-5615	(097)556-5711
Kobe Liaison Office	653-0038	9-1-30, Wakamatsu-Cho, Nagata-ku, Kobe	(078)641-5681(代)	(078)641-5033
Taiwan Mutsubishi Engineering Co., Ltd.		12F No 1157, Yucheng Road, Gushan District, Kaoshiung City 804, Taiwan	010-886-7-550-2091	010-886-7-550-2093





RUBBER EVOLVE



MITSUBISHI RUBBER