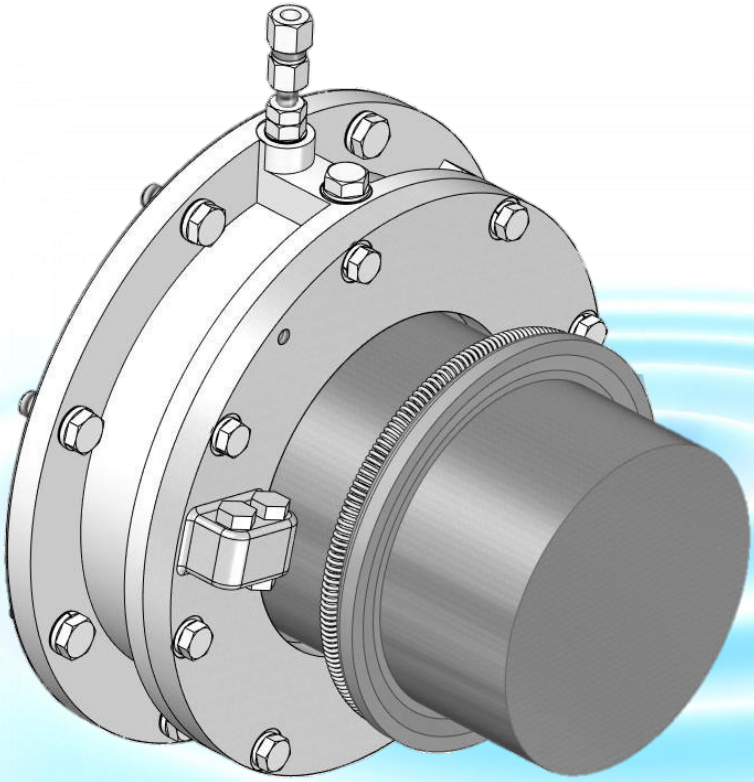
Doc. No. 15ME-014-2

Stern tube seal
INSTRUCTION MANUAL
Type EVK2RV

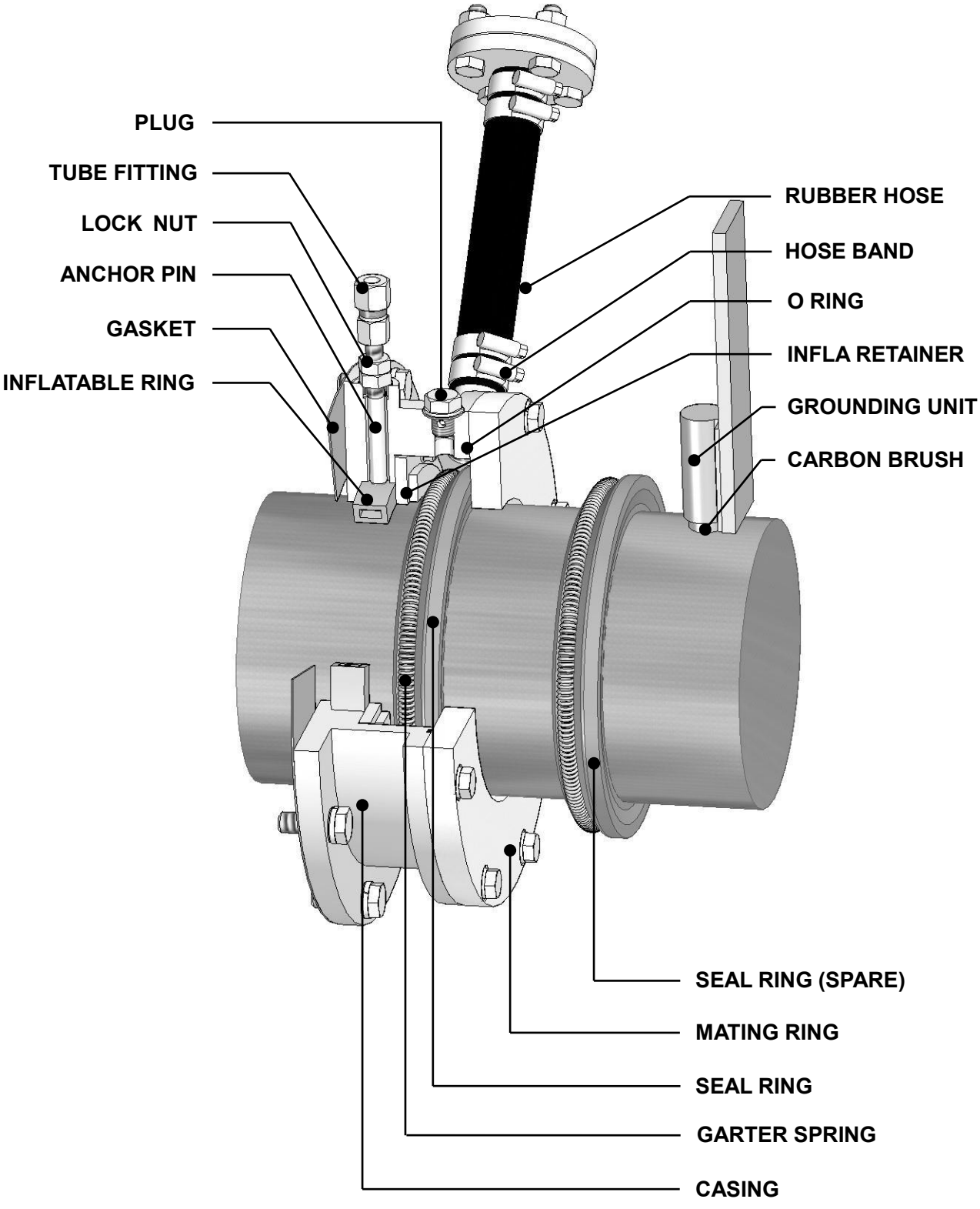


Contents

- Thank you very much for buying our EVK stern tube seal this time.
- Please read this instruction manual carefully before use, and then use it correctly.
- Please keep this instruction manual at hand so that it is always available for reference.

KEMEL EKK EAGLE INDUSTRY CO.,LTD.
URL http://www.kemel.com

Name of parts



[A] Installation

1 Inspection before seal installation

Make sure there is no serious damage on the surface of propeller shaft sleeve and bulk head in which the sealing is installed. As damage give a bad influence on the seal performance and fitting works, they should be corrected by CATALOY or equivalent. When especially corrosion is severe, repair by FRP or molybdenum coating is effective.

2 Painting on shaft sleeve

Remove grease and oil from painting area completely with solvent.

On the surface of the shaft sleeve in which the sealing is installed, EAGLE PAINT or equivalent Epoxy paint should be painted on 2 times for against corrosion (especially crevice corrosion and pitting corrosion). Part of bearing sliding area is not to be painted.

When sealing is to be disassembled, check condition of shaft sleeve surface. If paint peeled off, repainting to be done.

3 Assembling

(1) Inflatable ring

For new construction vessels, this seal is always delivered fitted in the seal casing by our factory, so install it in accordance with item (2).

When assembling on shaft sleeve, perform as follows. (See Fig.-1)

a. Insert the inflatable ring into the casing.
b. Screw the anchor pin to the inflatable ring.
c. Fix the infla retainer on the casing.
d. Tighten the lock nut in the anchor pin. At this time, be careful not to twist the anchor pin by fixing the square part of the pin with a wrench.
e. Tighten another lock nut in the anchor pin.

(2) Casing

a. Install the gasket to mounting surface of the casing. (Apply a liquid packing, if use other gasket than rubber material.)
b. Temporarily install the casing, properly aligning the "TOP" mark.
c. After adjusting the casing position to provide a uniform clearance between the infla retainer and the propeller shaft sleeve, securely install the casing. The maximum fitting error of clearance is 0.5mm. (See Fig.-1)

(3) Seal ring and Mating ring

a. After remove dirt from the casing and the shaft sleeve, apply a thin coat of grease to the surface of the shaft sleeve. Then wipe away surplus grease with your hand.
b. After apply a thin coat of grease to the pocket of the seal ring, hook a garter spring up in the pocket.
c. Place "O" ring in the groove of the casing.
d. Remove grease from the sliding surface of mating ring and seal ring COMPLETELY with solvent (methyl ethyl ketone or equivalent).
e. Push the seal ring into the casing using the mating ring and fasten the mating ring to the casing with bolts, aligning the TOP mark. At this time, fasten evenly each symmetrical pair of bolts so that the seal ring may be pushed in equally around the circumference.

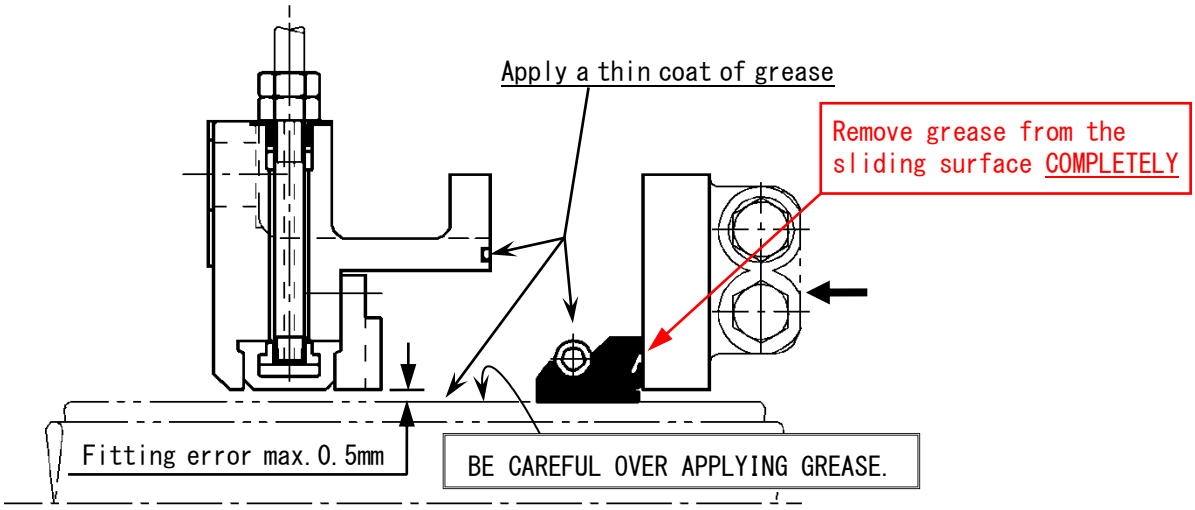


Fig.-1

[B] Piping

1 Piping for water supply

Confirm that the supply water pressure is the draft pressure plus 0.01～0.03 MPa in close vicinity to the seal.

CAUTION!	Must not too bend rubber hose. (In the case of rubber hose connection)
CAUTION!	Supply water during rigging or long time anchorage for protecting the inside of piping from marine organism growing.

2 Piping for air supply

(1) The air piping from the 0.6～1.0MPa (reduced) air source should be provided with an escape valve.

(2) Being careful not to twist the anchor pin when connecting or disconnecting tube fitting for air pipe.

CAUTION!	Disconnect the air supply line normally in order to prevent a inflatable ring from breaking.

[C] Inspection

1 Before launching

Supply an air pressure of 0.3～0.6 MPa to the inflatable ring, and apply twice as great a water pressure as the draft pressure from the water supply line to verify that water is continuously no leaking from the seal ring, and that the air pressure drop is within 10 % per hour.

2 After launching

Check to see that water is continuously no leaking from the seal ring.

Stop the propeller shaft. Close all water supply line fully. Supply an air pressure to the inflatable ring. Then open the plug ③ and check to verify that water is continuously no leaking. (See Fig.-2)

[D] Handling

1 Preparation before running

(1) Make sure to purge air in the inflatable ring on the pressure gauge (G-1) by closing valve① and opening valve②.

(2) Purge air in the casing by opening plug③. And close plug③.

(3) Open valve④.

(4) Begin running of the cooling water pump.

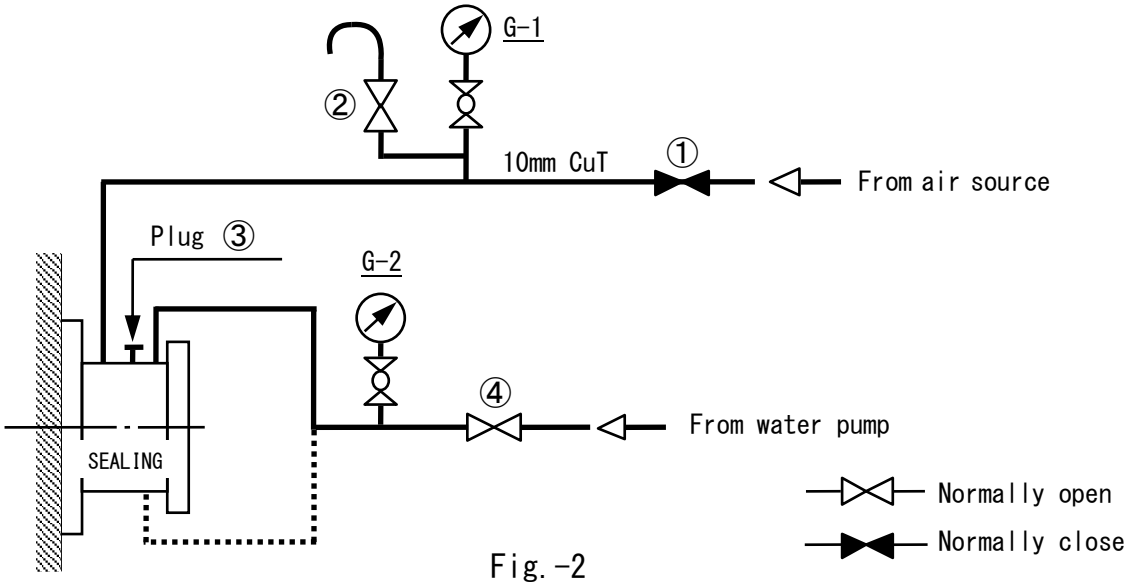


Fig.-2

2 Handling procedure of the inflatable ring

This seal is to be used in the inspection or replacement of a seal ring at sea. In working with this seal, make sure the shaft does not rotate.

Handling procedure is as follows.

(1) Stop the propeller shaft.

(2) Close valve④ and valve②.

(3) Open valve① gradually so that the air pressure becomes 0.3～0.6 MPa in Gauge (G-1).

(4) Open plug③ and make sure of no water leakage from the casing.

(5) Remove the mating ring and inspect the seal ring . If necessary, replace it.

(6) After work, the reverse procedure should be performed. At this time, reconfirm closure of valve①, and opening of valve②.

(7) Purge air in the casing by opening plug③. And close plug③.

CAUTION!	Shaft rotation must be stopped before operating the inflatable ring.

3 Maintenance

(1) During normal operation, keep all the sea water piping valves wide open, and also keep the escape valves of the air piping wide open.
Make sure of the performance of the seal ring periodically. Allowable the amount of water leakage is shown approximately dropping leakage. That leakage is good for lubrication and cooling.

(2) Make sure of the performance of the inflatable ring at no shaft rotation before dry docking.

(3) Avoid supplying over 0.8 MPa air pressure to the inflatable ring.

(4) Install a current collector near the sealing device and carry out maintenance and inspection thoroughly.

(5) Check and clean the sea water piping as occasion calls.

(6) Bind a hose band tight periodically so that the rubber hose of a sea water piping does not loosen.

(7) When using fire near the sealing device, use care not to allow fire flames and sparks to come in direct contact with the sealing device.

4 Replacing procedure of the seal rings at sea

If a large amount of water (over 100 - 200 L/day) leaks continuously, check the seal ring and replace it if necessary.

(1) Work the inflatable ring according to item 2.

(2) Remove the mating ring.

(3) Finish the sliding surface of the mating ring as flat as possible using emery paper whenever the mating ring was removed from the casing.

(4) Take the seal ring out of the casing and remove the garter spring.

(5) Cut away the seal ring.

(6) Take out the spare seal ring on the shaft sleeve and set it into the casing in accordance with item [A]-3-(3).

(7) Fix the mating ring.

(8) After work, close valve①, and open valve②. Purge air in the casing by opening plug③. And close plug③.

[E] Parts replacement intervals

1 Seal ring

The seal life might be considered approximately 2～4 years, but a little shorter in vessels with a deeper draft. In case of the replacement of a seal ring, also replace the garter spring at the same time.

2 Inflatable ring

This might be used for about 5 years, but it is recommended to replace at the shaft withdrawal. In addition, if the ring is inflated and damaged due to shaft rotation, replace the ring immediately.

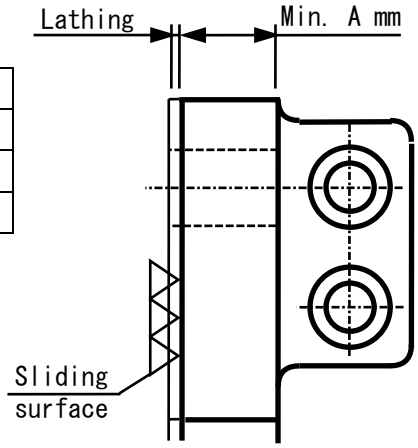
3 “O” ring

If there are no serious defects or tears in the bonding part, it can be used for about 5 years. But when disassembling the sealing, replace it, judging from its condition. It can be easily replaced using instant adhesive.

4 Mating ring

The worn mating ring can be reused after reconditioning.

Seal size	Min. A mm
110～390	10
410～590	15
610～	20



[Reconditioning of the mating ring]

If the amount of wear down on the sliding surface is over 0.5mm in depth, it should be reconditioned by lathing.

In case lathing is not necessary, finish it as flat as possible using emery paper or equivalent.

5 Rubber hose for water supply(In the case of rubber hose connection)

If there are no serious defects or cracks on the surface of a rubber hose, it can be used for about 5 years. But when dry docking, replace it with a new one.

6 Carbon brush

If carbon brush length is worn out to 17mm or less, replace it with a new one.

[F] Handling check sheet

To Be Checked At Installation.

1. No serious defects shall exist on the shaft sleeve surface and the seal mounting surface of the hull.
2. Epoxy Paint (Eagle Paint) must be applied on the surface of the shaft sleeve where the sealing is installed.
3. Liquid packing must be applied on the gaskets and the cut faces of the mating ring.
4. The casing shall be installed with its "TOP" mark at its top position.
5. The casing shall be aligned to the shaft sleeve surface within 4mm±0.5mm.
6. A thin coat of grease shall be applied to the surface of the shaft sleeve when the seal ring is installed.
7. Wipe away surplus of grease with your hand.
8. There must be no partial deformation of the seal ring. The seal ring shall be installed in correct direction.
9. Nothing clogged in the grooves of outside sliding surface of seal ring.
10. No steps,warping or damage shall be on the sliding surface of the mating ring.
11. Remove grease from the sliding surface of mating ring and seal ring completely with solvent.
12. All pipings shall be set as required.
13. The grounding device must be installed in effective position.
14. Check if a pressure-reducing valve is necessary for the air pipe line.

To Be Checked After Installation.

1. Sealing performance must be confirmed in the following manner. Pressurize the inflatable ring to 0.3～0.6 MPa and set feed water pressure at equivalent to twice draft pressure then perform air venting. There shall be no continuous leaking from the sliding surface and air pressure downfall must be 10%/Hr,or less.
2. Pressurizing air supplied to the inflatabie ring shall be eliminated after the above mentioned performance confirmation.

To Be Checked At Launching.

1. Performance of the inflatable ring shall be confirmed when the propeller shaft is stopped.
2. The inflatable ring shall not be run without fixing the propeller shaft at launching.
3. When the propeller shaft is stopped, Fully close the valves in the feed water line and pressurize the inflatable ring to 0.3～0.6 MPa Then open the plug and make sure of no water leakage from the casing.
4. After the above item 3 are confirmed, purge air in the inflatable ring shall be done.
5. No excessive leakage shall occur from the sliding surface (Max.2 L/Hr.).
6. Air venting of the sealing device shall be performed.
7. Operation control of valves shall be done without fail.

To Be Checked During Operation.

1. The supply water pressure is draft pressure +0.01～0.03 MPa in close vicinity to the seal.
2. Sealing condition shall be without problem at any time such as at stoppage, during forward and back sailing, in rough weater condition, at empty or full load condition, etc.
3. The coupling for the air pipe line shall be released.

[G] Periodical maintenance

		Frequency	Inspection / Maintenance	Note
1	Sealing Condition	1 time/day	Check visually or measure if there is any leakage, and increase or decrease in leakage rate. A little leakage of water from the seal ring is acceptable on account of lubrication and cooling.	Amount of water leakage. (L/day) Size — Less than ～ 190 — 40 210 ～ 310 — 50 330 ～ — 80
2	Supply water pressure	1 time/day	Check it is equivalent that supply water pressure is shaft center level pressure + 0.01～0.03 MPa.	Pressure gauge to be positioned in close vicinity to the seal.
3	Sea water filter	1 time/wk.	Check and prevent clog condition of element.	Adjust frequency of inspection, and sweeping clog for good condition.
4	Grounding device	1 time/wk.	Check carbon brush works well. Check and remove dust and oil on sliding surface.	
5	Inflatable ring	1 time/yr.	No leakage of water at 0.3～0.6 MPa of air pressure. Air pressure drop in piping to be within 10 %/Hr.	Inspection to be done before docking. Releasing air in the inflatable ring to be done after inspection.
6	Disassembly condition	1 time/yr.	Check seal ring works well and its installation position.	No excessive wear or deformation on seal ring.
			Confirm that something clogged in the grooves of outside sliding surface of seal ring.	Something clogged in the grooves cause the sliding surface to hot.
			Check wears down condition of mating ring.	If the amount of wear down on the sliding surface is over 0.5mm in depth, it should be reconditioned by lathing.
			Check condition of shaft sleeve surface.	If EPOXY PAINT peeled off, repainting to be done.
7	Rubber hose	1 time/yr.	Check the crack of the rubber hose.	When there is crack, exchange promptly.
			Check the slack of the hose band.	Bind the hose band tight so that there is no slack.

[H] Trouble shooting

Term	Method of inspection	Normal condition	Detected abnormality	Cause of the trouble	Course of action
1 Temp. of the mating ring	hand inspection	warm to the touch. less than 50℃ initial operating temp. for a new ring may be higher.	too hot to touch. smell of burning rubber noted.	high water pressure due to excessive water supply.	adjust water pressure. (see term 3)
				inflation of inflatable ring.	release air from the ring.
				fishing net caught on propeller.	remove fishing net.
				improperly installed seal ring.	disassmble mating ring, apply grease on the shaft sleeve and reset seal ring.
2 Amount of water leakage	visual inspection and measurement of water leakage	shaft rotating, seal size≦190 :leakage ≦40L/day 310≧seal size≧210 :leakage ≦50L/day seal size≧330 :leakage ≦80L/day shaft stationary, leakage ≦50L/day with new seal ring and reconditioned mating ring, leakage should be minimal[approx. 10cc/min].	leakage above 100～200L/day. there shoud be no leakage between seal ring and shaft sleeve.	something caught between seal ring and mating ring.	disassemble mating ring, clean mating and seal rings.
				warped seal ring.	pour hot (70～80℃) water on seal ring.
				worn seal ring.	replace seal ring with spare on shaft.
				worn mating ring. (more than 0.5mm depth)	lathe mating ring or turn to the face. temporary repair : using sandpaper or grinder, flatten as much as possible.
				seal ring hardens due to low water temperature.	pour hot (70～80℃) water on seal ring.
				something caught between seal ring and shaft sleeve.	slide seal ring out, clean shaft sleeve and inside of the seal ring.
				rubber adhesive fails	replace seal ring with spare on shaft.
3 Supply water pressure	check pressure gauge G-2 hand inspection visual inspecion	draft pressure + 0.01～0.03 MPa	mating ring too hot to touch. a large amount of water leakage.	see term 1. damaged stern tube rubber bearing	see term 1. clean inside of box.
4 Inflatable ring	with shaft stationary, inflate ring to 0.3～0.6MPa ; inspect for water leakage.	air pressure drop is within 10 %/Hr. no sea water leakage.	inflatable ring cannot be inflated and water leakage from air supply line. inflatable ring inflates but leaks sea water.	ring inflated while shaft running.	replace as soon as possible. normally this repair done in dry dock. however, in an emergency, repair may be done afloat by pluging stern boss.
				insufficient air pressure.	increase air pressure.(Max. 1.0 MPa)
				supply water line valve left open.	close the valve

Appendix
付属書

1 About the protection of the seal ring spare on the shaft. [10ME-010]
軸上予備シールリングの養生について [10ME-010]

2 Shaft grounding units. [07ME-007]
集電装置 [07ME-007]

About the protection of the seal ring spare on the shaft
軸上予備シールリングの養生について

10ME-010
2010.10.20

[The protection of spare seal ring]
[軸上予備シールリングの養生]

Please take protection of the spare seal ring on the shaft to prevent from being it will not being contaminated, deformed and deteriorated.

船尾管シール装置において、軸上予備シールリングを装着して頂いております。
本軸上予備シールリングは、汚れ、変形、劣化などを防ぐことを目的として、養生して頂くようお願いします。

[The way of protecting of spare seal ring on the shaft]
[軸上予備シールリングの養生方法]

The seal ring is made of rubber, therefore it's required to prevent from deterioration, please observe followings.

シールリングは、ゴム製であり、劣化防止のために以下を遵守してください。

a. Shout out of the air as much as possible.
出来るだけ空気に触れないこと。

b. Avoid high temperature, high humidity.
高温多湿をさけること。

c. Do not expose it to direct rays of the sun.
直射日光に晒さないこと。

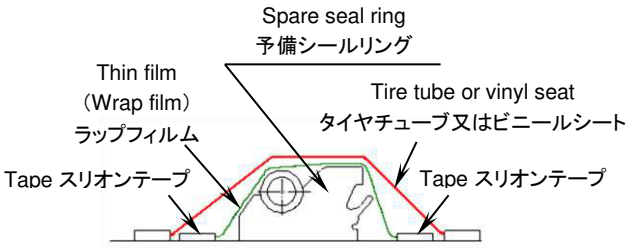


Fig.-1 An example for the way of protection
養生方法例の図

Please refer followings
以下に養生の方法例を示しますので、参考にして下さい。

1. Clean spare seal ring equipped on the shaft and the shaft surface.
軸上に装備された予備シールリングと軸を清掃する。
2. Wrap up the seal ring with garter spring onto the shaft by thin film (wrap film). It is better to use the sheet superior in interception of the air (Such as wrap film you can buy at shops)
薄手のシートなどでガータスプリングを装着したシールリングを軸と一緒に包み込む。シートは空気の遮断に優れたものがよい。(市販のラップフィルムなどを用いると良い。)
3. Seal both ends of the thin film onto the shaft by taping. Then, let air out as much as possible. In addition, do not put the tape on the seal ring directly.
薄手のシート両端をスリオンテープなどで軸に取付け隙間を塞ぐ。この時、出来るだけ空気を抜いておくこと。また、スリオンテープは直接シールリングに貼らないこと。
4. After that, cover it by tire tube or vinyl sheet to protect the thin film.
その後、薄手のシートの保護として、タイヤチューブやビニールシートなどで覆う。

[Special note]
[注意事項]

1. Please consider the spare seal ring dose not to come in contact with projection parts such as the earthing device or the flange part of the coupling.
予備シールリングは、集電装置やカップリングのフランジ部など突起部分に接触しないよう配慮願います。
2. Please do not put excessive force so that a seal ring does not transform it on the occasion of preliminary seal ring protection.
予備シールリング養生の際は、シールリングが変形しない様、過度の力を掛けないでください。
3. Please fix it well so that the protection of the seal ring doesn't come off during the shaft rotation.
軸回転中に養生が外れないようにしっかりと固定してください。
4. When removing the protection, please be careful not to damage a seal ring with knives.
養生を外す場合には、刃物などでシールリングを傷つけないように注意してください。
5. Before using the spare seal ring, please remove grease and clean sufficiently.
シールリング使用前には、十分に脱脂、清掃してください。
6. Please confirm that there is not any deformation nor damage before using a spare seal ring.
予備シールリングを使用する前に、変形、傷など無いことを確認してください。

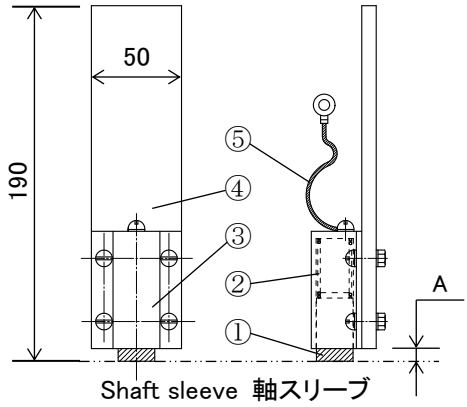
Shaft Grounding Units　集電装置

07ME-007-6
2019.01.18

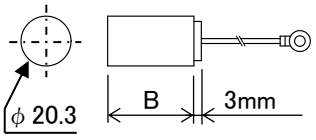
1. Notice 概要

The purpose of the shaft grounding unit pertaining to EVK protect corrosion on the shaft sleeve around the stern tube sealing. Also EAGLE PAINT or equivalent insulation paint should be painted for against corrosion.
EVK型船尾管シールに付属しております集電装置は、船尾管シール装置の軸スリーブ又は軸の電食防止を目的としております。尚、本集電装置だけでは電食を完全に防止できるとは限りませんので、必ずイーグルペイント(防食塗料)の塗布も同時にお願いいたします。

2. Structure 構造



No	Part name 部品名
①	Carbon brush カーボンブラシ
②	Coil spring スプリング
③	Case ケース
④	Plate プレート
⑤	Lead wire リード線



B:　Original length　初期値　35mm
　　Allowable length　許容値　17mm

Detail of carbon brush (Image)
カーボンブラシ（イメージ）

3. Installation 取付

A grounding unit should be installed by bolts at a place for easy maintenance after machining on an optional position of plate, and a clean place so as not to be dirty or corroded with oil and sea water etc.
集電装置はプレートの任意の位置に穴を開け、ボルト等で、できるだけシール装置直近の点検しやすい場所に設置してください。性能保持の為、海水や油分・腐食など無い様に清掃してください。
The sliding surface should be kept smooth without rough surface.
カーボンブラシがしゅう動する面は凹凸や面荒れの無い滑らかな面としてください。
The distance A is adjusted about 5～8mm.
A 部の隙間は 5～8mm を目安に取り付けてください。

4. Maintenance メンテナンス

Inspection item 点検項目	Contents 確認内容	Term 実施時期
Check a outside of carbon brush カーボンブラシの外観確認	Dirt 汚れが無いこと	1 time/day. 1 回/日
Check a shaft sleeve surface 軸スリーブの状態確認	Dirt and corrosion 汚れや腐食が無いこと	
Check a lead wire リード線の状態確認	Break of a lead wire リード線が切断されていないこと	
Check a coil spring operation スプリングの可動確認	Smooth movement of a coil spring カーボンブラシを押込み滑らかに動くこと	1 time/week. 1 回/週
Confirm a fasten 締付け確認	The screw looseness 各部のネジに緩みが無いこと	1 time/2weeks. 1 回/2 週
Cleaning 各部の清掃	Cleaning on the sliding surface sufficiently 軸スリーブとブラシしゅう動面を十分に清掃	
Check a carbon brush length カーボンブラシの残量確認	Allowable length is over 17mm カーボンブラシの長さ B が 17mm 以上のこと	1 time/month. 1 回/月

5. Replacement 交換部品

The life of a carbon brush is around 1 to 3 years, so replace it urgently when worn down to under 17mm.
Please check a coil spring operation when carbon brush is changed.
カーボンブラシが 17mm 以下に摩耗した場合、すみやかに交換してください。耐用期間は概ね 1～3 年ですが、使用状況によりますので目安としてください。
カーボンブラシ交換時、スプリングも確認の上、錆が発生したり、動きが渋い場合は合わせて交換してください。