High Expansion Foam Fire-fighting Systems



Our fire-fighting and fire prevention systems are essential for ensuring safety and protecting the life of the crew on board and property on your ships. These systems definitely require regular and proper maintenance to ensure their reliable operation in case of emergency. However, increasing troubles on the systems recently reported to us suggest that they are not always properly maintained. This document is to remind you of the typical consequences the lack of maintenance could have and of the importance of maintenance to keep the system sound and operable.

The negligence of the maintenance could lead to the failure of the system operation when needed and pose considerable risks to human life or property. Since these systems serve as the last resort for safety protection, you are kindly requested to review the maintenance arrangement to ensure their reliable operation.

Inspection/Maintenance Conducted by Uncertified Agencies

In most cases, uncertified agencies undertake inspection services of various fire-fighting systems and equipment collectively. This could mean to save the time and labor cost to you, but they do not necessarily fully understand the fundamental structure and functions of the system, and sometimes omit electrical functional tests. Due to the difficulty in allocating enough time for each item, their collective inspection is likely to be limited to visual and superficial checks without replacing consumables. Their failure to detect and identify signs and symptoms for a malfunction could lead to serious consequences, including activation failure of the system.

Troubles Brought by Poor Maintenance

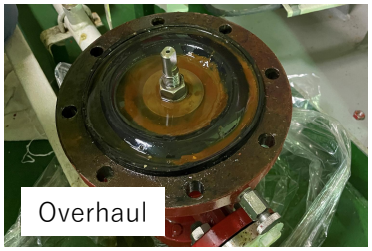
Proportioner (Diaphragm valve)

This is to balance the pressure of the foam liquid and sea water to maintain a specified mixing ratio. Some reported incidents suggest that its poor maintenance damages the inside of the valve.


This looks OK but ···


Its inside is corroded

The valve may look good in appearance, but definitely requires regular overhauls to check the inside for any damage and replacing the diaphragm every 5 years.


Overhaul


Cleaning


Replacement

NOTE: The diaphragm seat must be installed with a specific side facing up. The installation direction varies depending on the type of device, so please check the direction when opening and install it correctly. If you are unsure of the direction, please refer to the diaphragm valve outline drawing.


Used

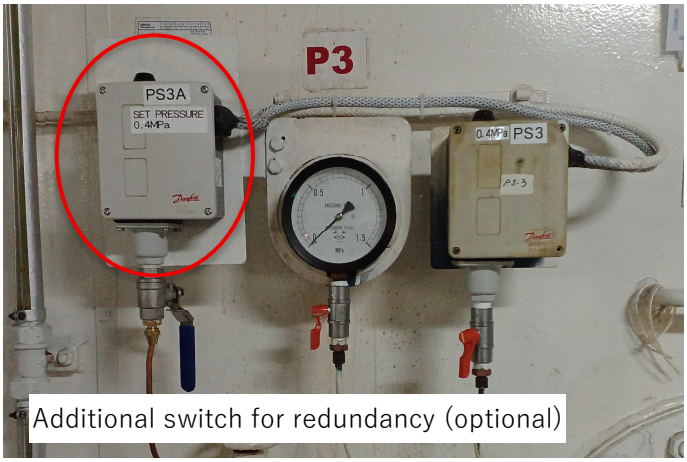

Deteriorated

NOTE: Even if the diaphragm sheet appears to be fine at first glance, a closer inspection may reveal deterioration, so we recommend that you check and replace it regularly.

Pressure switch for system activation


Intact switch


Damaged switch



Additional switch for redundancy (optional)

This is to detect the activation conditions for the system. This requires regular overhauls to ensure that the system can be activated when necessary. We can provide you with an additional pressure switch upon your request to enhance the reliability of the system. Another option as a safety precaution is to keep a spare switch on board for replacement.

Air blow test for the nozzles


Clogged

The nozzles need to be regularly air-blown to check for clogging.

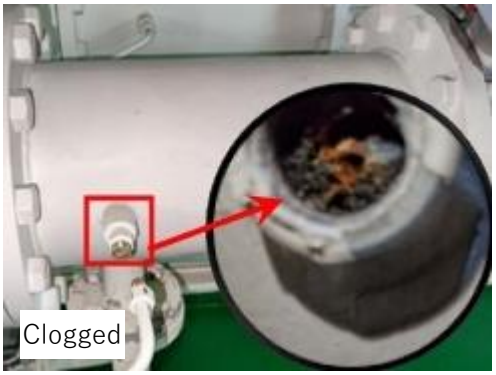
Pressure calibrator


Pressure calibrator


Calibration

Good appearance of the pressure switch and pressure gauge does not guarantee their proper operation. A pressure calibrator should be used to check their operation.

Clogged tubes/pipes


Clogged

Each tube, pipe, and copper pipe need to be regularly checked for clogging.

Simulation Test of the System

Our certified engineers can verify that system is functioning properly through various simulation tests. By implementing measures to prevent water discharge, it is possible to conduct an operational test of the equipment and confirm its electrical integrity.


Control panel

Replacement of PLC

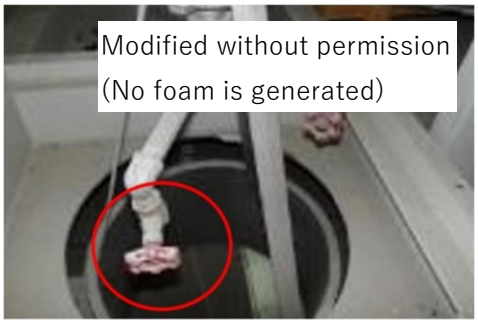
The installed PLCs (C200H series manufactured by OMRON) have 10 years of design service life and have been already discontinued with the after-sales service no longer available. It is therefore recommended to replace the existing ones with the current PLCs (e.g. CS2) to avoid unexpected troubles.

C200H series (discontinued)

CJ2 series (alternative)

Unauthorized Modification of the System


Normal foam generator


Modified without permission
(No foam is generated)

Some unauthorized modifications have been observed. Do not modify the system without our permission since it can seriously hinder the system's proper operation in case of emergency. In addition to being unable to maintain fire-extinguishing performance, it also fails to meet regulatory requirements, making it highly likely to be placed off-hire if identified during a PSC inspection.

Foam Liquid Analysis

The foam liquid is required to be regularly analyzed according to the relevant rules of the classification societies or flag state.

NOTE: Do not use any undesignated foam liquid, or mix it with the genuine one.

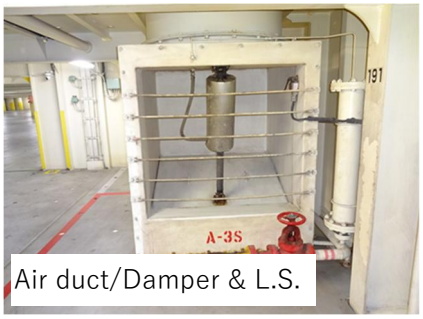
High Expansion Foam Liquid

The foam liquid used in our high expansion foam fire-fighting systems does not contain any organic fluorine compound such as PFOS, PFOA, or PFHxS. On request, we can provide you with the manufacturer's declaration statement for submission to the classification society at your own expense. If you have any questions or concerns regarding this, please feel free to contact us.

Operational Check for Dampers /Limit Switches (PCCs only)

The foam generators on car decks are equipped with the dampers for introducing the outside air which motion is detected by the limit switch. It is essential to conduct regular functional checks of the dampers and limit switches, as well as perform maintenance such as greasing the clevis. Neglecting these tasks may cause the moving parts to seize, posing a risk of malfunction during emergencies.

The limit switch originally has a short arm to activate the damper, but it may not be long enough for the deteriorated damper to activate. If that is the case, it needs to be replaced with the long one. In addition to regular inspections, measures such as checking the opening and closing of the damper by general service air, replacing the limit switch, and switching to a long arm will be necessary.

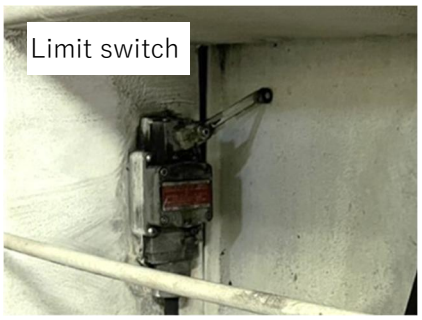


Air duct/Damper & L.S.


Air tools


Operation check

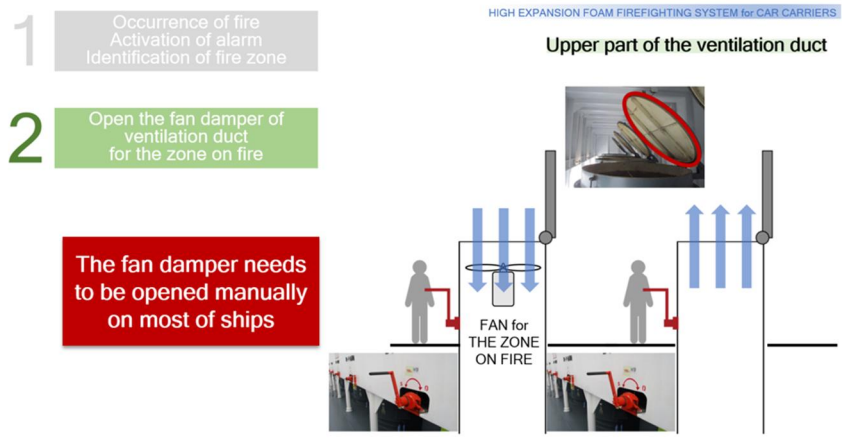

Rusty clevis


Limit switch


Long and
short arm

Opening of the fan damper (PCCs only)

When activating the high-expansion foam fire-extinguishing system in the vehicle area, it is necessary to open the fan dampers of the ventilation ducts in the protected compartment to allow for air intake and exhaust. In most cases, these dampers are operated manually, so we kindly request that regular training be conducted to ensure smooth operation in the event of an emergency.



Inspection and Maintenance

We have certified engineers who are fully qualified to inspect and service our fire-fighting systems to make sure of their reliable operation. Please feel free to contact us for the inspection and maintenance.

For request for quotation or order placement, please contact our service department at sales@kashiwa-tech.co.jp with necessary information included, such as the system name, your ship's name, and IMO No.

CHECK SHEET to consider replacing the equipment or parts

SYSTEM :
HIGH EXPANSION
FOAM SYSTEM

This is to recommend timing to consider replacing of the equipment or parts, not mandatory.
The item checked in the box is recommended to replace or keep spare, and the item shown as urgent or important is strongly recommend to replace.
If you have any clarification please feel free to contact us.

No.	Check off if "Yes"	ITEM	LOCATION	CHECK POINT	ACTION	Remarks	Urgency or importance
1		Pressure gauge	Sea water / Foam liquid line	Function and deterioration	Recommend to replace if the function (indication) is wrong or it's been deteriorated.		
2		Pressure switch	Sea water / Foam liquid line	Deterioration or salt damage	Check the function and open the cover to check no salt damage. Recommend to have a spare.	If it does not work, system does not start at fire event.	Important
3		Diaphragm sheet of diaphragm cotrol valve	Foam liquid line	Consumables	Recommend to replace it at every inspection period.	Proper foam mixing is not possible if it has damage, it affect fire fighting.	Very important
4		Breather valve	Foam liquid tank	Function (No sticking) and deterioration	Recommend to replace if the function is wrong or it's been deteriorated.	Proper foam mixing is not possible if it has damage, it affect fire fighting.	Very important
5		Automatic valves	Sea water / Foam liquid line	Function and deterioration	Recommend to replace if the function (indication) is wrong or it's been deteriorated.	If it does not work, system does not start at fire event.	Important
6		Foam liquild pump parts	Foam liquid line	Function and deterioration	Recommend to replace if leak from shaft is confirmed when test operation.		Important
7		PLC	CONTROL PANEL	MODEL : C200H (Discontinued Model)	Recommend to replace with compatible model since no support from OMRON and no new product is available.	Attachment 1	Very urgent
8		PLC	CONTROL PANEL	AGE : More than 10 years	Recommend to replace as design service life of the PLC is 10 years which is announced by OMRON.	Attachment 2	Very urgent
9		AC/DC CONVERTER (Power supply)	CONTROL PANEL	AGE : More than 7-10 years	Recommend to replace as design service life of the Power supply is 5 years which is announced by OMRON.	Attachment 3	Very urgent

●Contact information
KASHIWA TECH CO., LTD. (Tokyo Headquarters)
5-4 Takanawa, 4-Chome Minato-ku, Tokyo 108-0074, JAPAN
Sales department TEL : +81-3-5449-2431
FAX: +81-3-5449-2430
E-mail: sales@kashiwa-tech.co.jp

Diaphragm Installation Procedure

1 Check the Diaphragm Valve Internal

Remove bolt (M19x8) on top cover of the diaphragm valve. Loosen bolts evenly together. Remove top cover and check the following:

1-1 Edge of the diaphragm is correctly inserted in groove of casing

1-2 Condition of the diaphragm (are there cracks, tears, etc?)

1-3 Corrosion or cracks in the diaphragm casing

1-4 Clear any foreign matter in the diaphragm casing

1-5 Check that shaft moves up and down smoothly.

2 Replacement of Diaphragm

2-1 Open top cover (per 1 above).

2-2 Place a spanner at the top of the shaft. Loosen diaphragm fixing nut with a second spanner, while holding shaft in place.

2-3 Remove fixing nut, spring washer and fixing ring from shaft.

2-4 Remove diaphragm from shaft.

2-5 Install new diaphragm, fixing ring, spring washer and fixing nut.
Tighten fixing nut to approx 30Nm torque.
(Note: Take care while tightening, as over any tightening of the nut may damage the diaphragm.)

2-6 Lay the rim of the new diaphragm into flange groove.
Note: If rim of the diaphragm is incorrectly positioned in the groove, the diaphragm may be damaged when the top cover is re-attached. Take extra care!

2-7 Re-attach the top cover and tighten bolts evenly across the circumference of top cover.

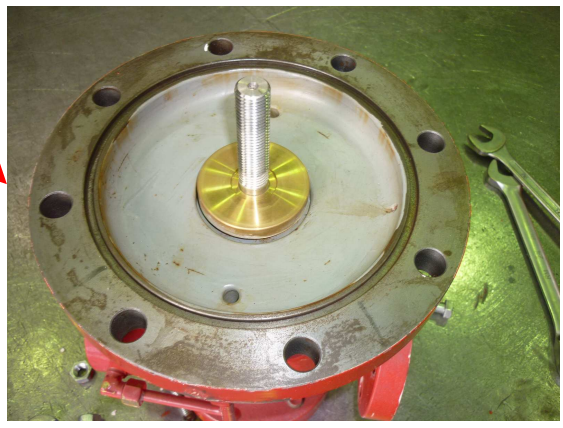
Please refer to the attached video.

How to replace the DIAPHRAGM SHEET.

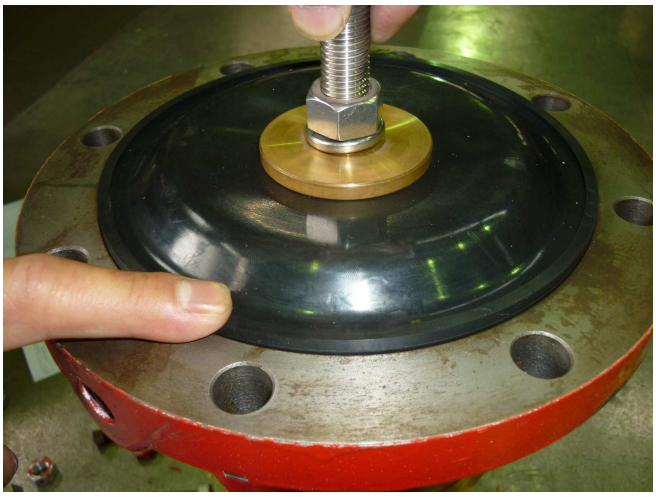
① Open a TOP COVER.

② Release a NUT.

③ Remove a DIAPHRAGM SEAT.



④ Exchange a NEW DIAPHRAGM SEAT and assemble again.



※ insert in a slot just.

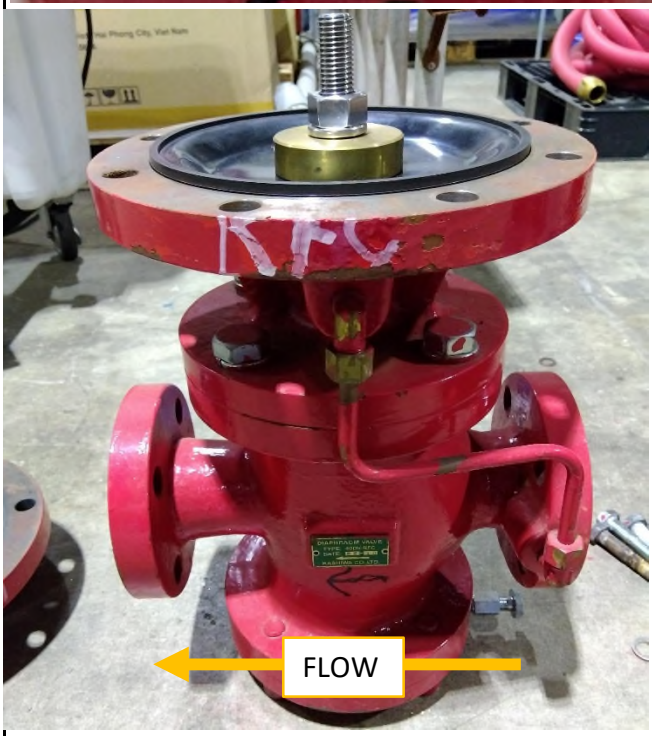
※ Fasten a NUT About 30Nm.

⑤ Put a TOP COVER.

DIAPHRAGM CONTROL VALVE

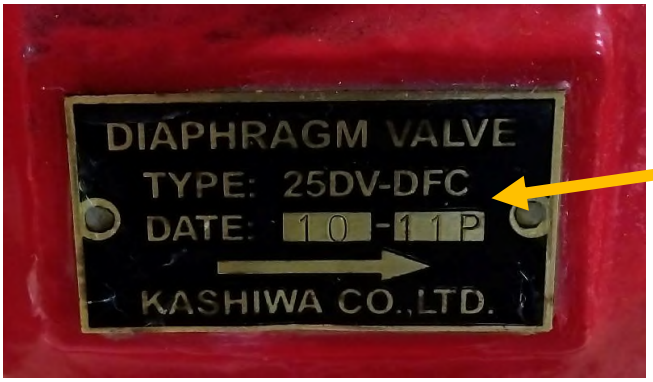
Releaf type (for Air Foam System)

The nameplate includes the below.
* TYPE: RFC
* Flow direction

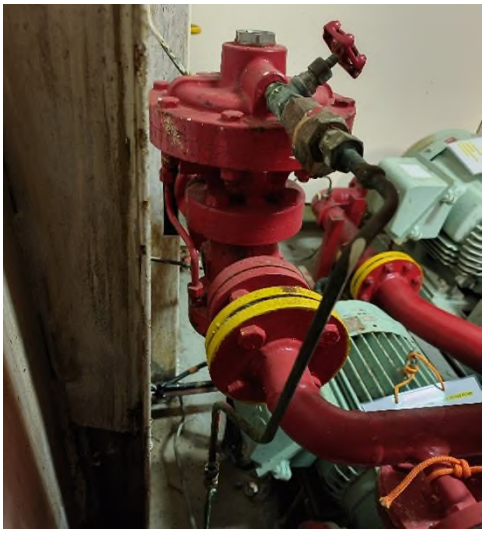


DIAPHRAGM CONTROL VALVE

Direct type (for High Expantion Foam System)



The nameplate includes the below.
* TYPE: DFC
* Flow direction

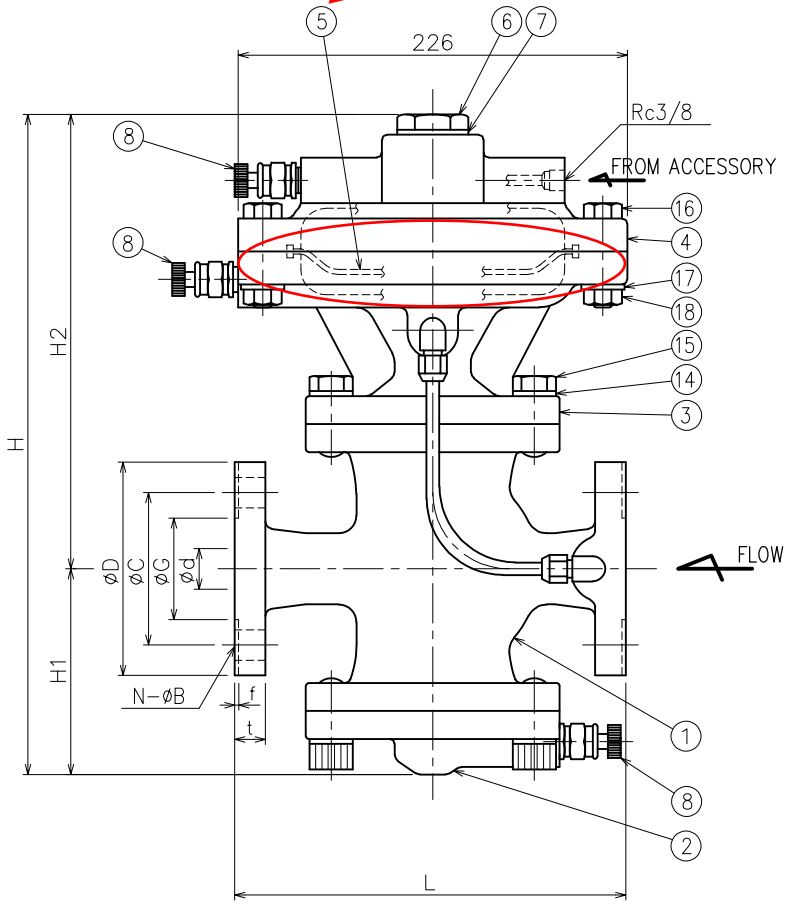


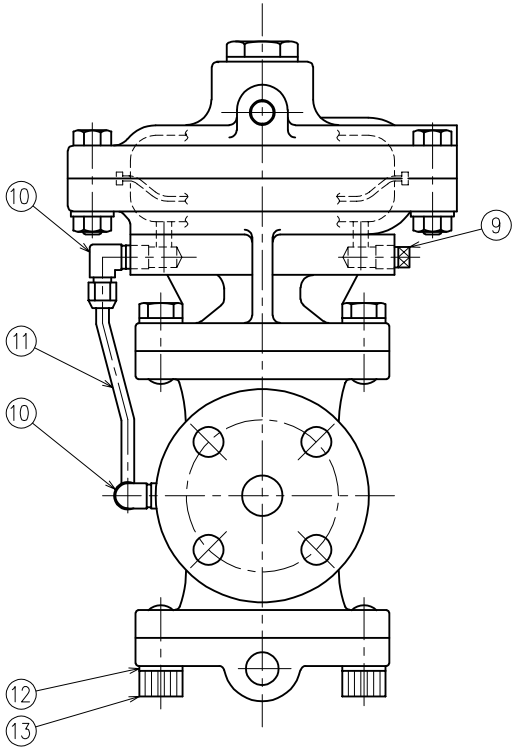
W10A–AF–DV–RFC

DIA	d	L	H1	H2	H	JIS 10K				JIS 16K				ANSI 150						WEIGHT (kg)
						D	C	N–øB	t	D	C	N–øB	t	D	C	N–øB	t	f	G	
25	25	230	122	270	392	125	90	4–19	18	125	90	4–19	18	108	79.4	4–15	18	1.6	50.8	36
40	40	260	145	290	435	140	105	4–19	20	140	105	4–19	20	127	98.4	4–15	20	1.6	73.1	41

HYDROSTATIC SHELL TEST : 1.8MPa

Check the orientation with final drawing.





DCV

SPECIFICATION OF PAINTING AND METERIAL
VALVE DISC : SUS304
SEAT RING : SUS304
BODY PAINT
INSIDE : USE EPOXY PAINT
OUTSIDE : USE OIL–PAINT
FINISH PAINT : 7.5R 4/14

NO.	PART NAME	MATERIALS	Q'TY	REMARKS
20				
19				
18	NUT	SS400	4	
17	PLAIN WASHER	SS400	4	
16	BOLT	SS400	4	
15	BOLT	SS400	4	
14	SPRING WASHER	SS400	4	
13	BOLT	SCM435	4	
12	SPRING WASHER	SS400	4	
11	CONNECTING TUBE	Cut	1	
10	RING ELBOW	C3604	2	
9	PLUG	C3604	1	
8	DRAIN VALVE	C3604	3	
7	PACKING		1	
6	SIGHT GLASS	C3604	1	
5	DIAPHRAGM	NBR	1	
4	UPPER COVER	FC 200	1	
3	DIAPHRAGM CASE	FC200	1	
2	BOTTOM COVER	FC200	1	
1	BODY	FC200	1	

Rev.	DATE	CONTENTS	DES.	CHK.	APR.
△	- -				
△2	'14–6–16	HYDROSTATIC SHELL TEST PRESS. CHANGE	R.E.	S.Z.	S.S.
△1	'03–5–15	UPPER COVER & OTHER CHANGE	A.Y.	H.O.	K.H.

CHIFE OF SECTION	K.HANYA
CHECKER	H.OHTA
DRAWER	A.YOSHIDA
DATE OF DRAWING	15–MAY–2003
WEIGHT	～

ITEM DIAPHRAGM CONTROL VALVE
TYPE : DV–RFC

DRAWING NO.
FAV – 1468

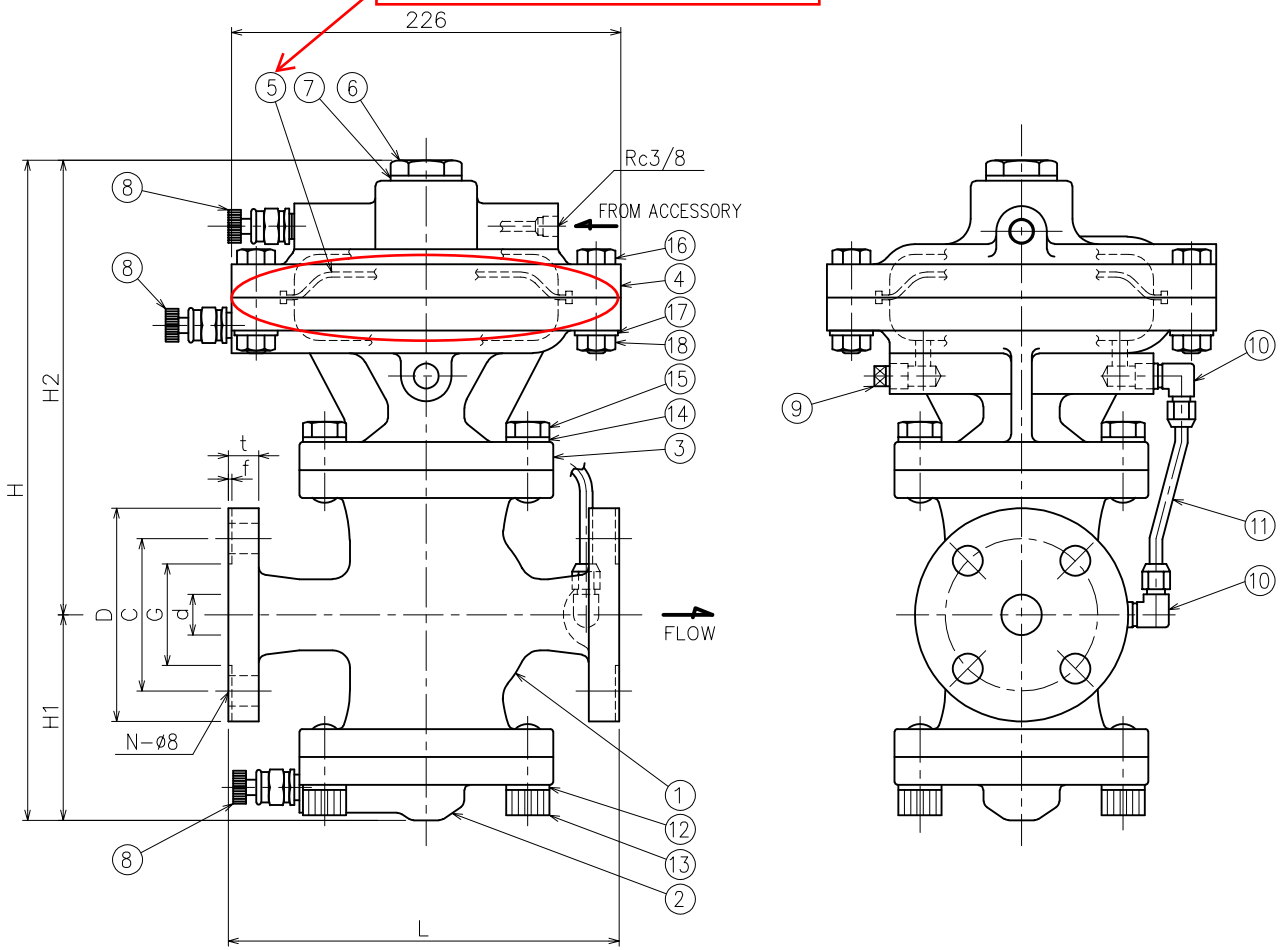
ENGINEERING DEPT.
KASHIWA TECH CO., LTD.

SIZE A3
SCALE FREE

DIA	d	L	H1	H2	H	JIS 10K				JIS 16K				ANSI 150						WEIGHT (kg)
						D	C	N−øB	t	D	C	N−øB	t	D	C	N−øB	t	f	G	
25	25	230	122	270	392	125	90	4−19	18	125	90	4−19	18	108	79.4	4−15	18	1.6	50.8	35
40	40	260	145	290	435	140	105	4−19	20	140	105	4−19	20	127	98.4	4−15	20	1.6	73.1	40

Check the orientation with final drawing.

HYDROSTATIC SHELL TEST : 1.8MPa



SPECIFICATION OF PAINTING AND MATERIAL
VALVE DISC : SUS304
SEAT RING : SUS304
BODY PAINT
INSIDE : USE EPOXY PAINT
OUTSIDE : USE OIL−PAINT
FINISH PAINT : 7.5R 4/14

NO.	PART NAME	MATERIALS	Q'TY	REMARKS
20				
19				
18	NUT	SS400	4	
17	PLAIN WASHER	SS400	4	
16	BOLT	SS400	4	
15	BOLT	SS400	4	
14	SPRING WASHER	SS400	4	
13	BOLT	SCM435	4	
12	SPRING WASHER	SS400	4	
11	CONNECTING TUBE	Cut	1	
10	RING ELBOW	C3604	2	
9	PLUG	C3604	1	
8	DRAIN VALVE	C3604	3	
7	PACKING		1	
6	SIGHT GLASS	C3604	1	
5	DIAPHRAGM	NBR	1	
4	UPPER COVER	FC 200	1	
3	DIAPHRAGM CASE	FC200	1	
2	BOTTOM COVER	FC200	1	
1	BODY	FC200	1	

Rev.	DATE	CONTENTS	DES.	CHK.	APR.
△	- -				
△6	'14−6−16	HYDROSTATIC SHELL TEST PRESS. CHANGE	R.E.	S.Z.	S.S.
△5	'03−5−15	UPPER COVER & OTHER CHANGE	A.Y.	H.O.	K.H.

DCV

CHIFE OF SECTION	K.HANYA
CHECKER	H.OHTA
DRAWER	A.YOSHIDA
DATE OF DRAWING	15−MAY−2003
WEIGHT	～

ITEM DIAPHRAGM CONTROL VALVE
TYPE : DV−DFC
DRAWING No. FAV − 1470
ENGINEERING DEPT.
KASHIWA TECH CO., LTD.
SIZE A3
SCALE FREE

Attachment 1

PRODUCT NEWS

Product Discontinuation Notices

Programmable Controllers, Networks

Issue Date
January 6 2016

No. 2016007CE

Discontinuation Notice of Programmable Controllers C200HX/HE/HE series and a part of C200H I/O and special I/O units.

Product Discontinuation	Recommended Replacement
Programmable Controllers	Programmable Controllers
Part of C200HX/C200HG/C200HE series	**Model CS1 or CJ2 series**
Model C200PC-ISA[]3(-[][][](-E))	**Model CS1 or CJ2 series**
Model C200PC-EXP01	**No recommended replacement**
Model 3G2NL-DRM21、-CPU02	**Model 3G2NJ-CPU11**
Model 3G2NL-CLK[][]	**Model 3G2NJ-CLK21**
Networks	Networks
Model C200H-B7A[][]	**Model CS1 or CJ2 series**
Model C200HW-DRT21, -DRM21-V1, -SRM21-V1, -CORT21	**Model CS1 or CJ2 series**

[Discontinuation date]

The end of March, 2017

[Caution on recommended replacement]

C200HX/HG/HE series CPU units and a part of I/O and special I/O units will be discontinued.
Replacement of PLCs will require design change works
(PLC Programming, unit setting, wiring and so on).

[Difference from discontinued product]

Recommended replacement Model	Body Color	Dimen-sions	Wire connection	Mounting Dimensions	Charac-teristics	Operation ratings	Operation methods
CS1 series	*	*	--	*	--	--	--
CJ2 series	--	--	--	--	--	--	--

** : Compatible
* : The change is a little/Almost compatible
– : Not compatible
- : No corresponding specification

Preventive Maintenance for Programmable Controllers

Date : 12 Jun. 2012

1. Introduction

The Programmable Controllers (PLC) that serve as the core of various control systems are composed of a large number of components. These components cannot be used indefinitely, and must be replaced when they have reached the end of their useful life. If a PLC should malfunction, considerable time is required to restore system operation and losses occur while the operation is stopped. To prevent PLC failures from occurring, we suggest that you consider a preventive maintenance program. Malfunctions can be prevented by replacing specific components shortly before wear-out failures (see section 2) begin to occur.

However, because there is also a possibility of early or random failures, we also recommend that you consider preparing spare parts to use as an emergency measure.

2. Useful Life (Years of Use vs. Malfunction Occurrence)

Component failures can ordinarily be classified into the three stages of early failures, random failures, and wear-out failures, as shown in the diagram below.

Early failure period:

This refers to defects, such as defective components or manufacturing problems that are discovered soon after the product is first used. We attempt to eliminate these failures by means of shipping inspections and other measures.

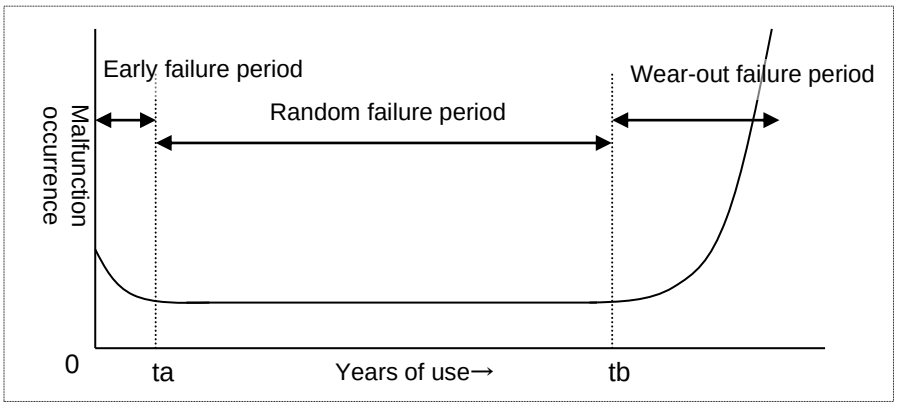
Random failure period:

This refers to failures that occur within the useful life of the equipment. They are called random failures because they occur suddenly and cannot be predicted.

Wear-out failure period:

Wear-out failures occur near the end of the useful life due to deterioration or wear. Because of this, their occurrence increases rapidly as time passes. The start of this period is indicated by ta in Fig. 1, while tb differs for each PLC and Unit. Our views on the useful life of PLC are given in section 3.

Fig. 1



3. PLC Lifetime

Some of the components used in the PLC have lifetimes of less than 10 years, depending on the environment in which the PLC is installed and the model of the PLC. These include batteries for memory back-up, output relays, fuses, photo couplers, and aluminum electrolytic capacitors. The lifetime of some Units is determined by these components. Lifetime calculations and design are employed based on the standard of a useful life of 10 years for PLC (compared with the former standard of 7 years).

4. Preventive Maintenance Time Guidelines (Recommended Replacement Times)

The following recommended replacement times (the equivalent of tb in Fig. 1) are guidelines for replacing the indicated items. For further details, please inquire and provide specific model numbers.

(Time relationship = Preventive maintenance time (recommended replacement time) < Design lifetime < Actual lifetime)

Unit Name		Recommended Replacement Time	Design Lifetime
Power Supply	C(C200H)/CV Series CS (C200Hα) (Manufactured in or before Oct. 2000)	5 years	7 years (operated at 30°C, 24 h/day) (Load rate 70%)
	CS (C200Hα), CJ Series (Manufactured in or after Nov. 2000) CP Series	8 years	10 years (operated at 40°C, 24 h/day) (Load rate 70%)
CPU	C/CV Series (See Note 1.)	7 years	7 years (operated at 30°C, 24 h/day)
	CS, CJ,CP Series	10 years	10 years (operated at 40°C, 24 h/day)
Backplane, I/O Unit (See Note 2.)		10 years	10 years (operated at 40°C, 24 h/day)
Special I/O Unit, CPU Bus Unit	C/CV Series, DRT1 Series DRT2 Series(Manufactured before Jun. 2004) SRT1, SRT2 Series	7 years	7 years (operated at 30°C, 24 h/day)
	CS, CJ,CP Series GX Series CRT1 Series DRT2 Series(Manufactured in or after Jun. 2004)	10 years	10 years (operated at 40°C, 24 h/day)

Note 1: Because the power supply is built-in to the C200H-CPU** and C200HS-CPU**, replacement/repair is recommended at 5 years.

Note 2: Except for relay contact output types. (See section 6, item 2 for information on relay contact output types.)

5. Spare Parts

1) Preparing spare parts

We recommend that you prepare spare parts in advance in order to shorten the amount of system downtime due to a PLC failure. Provide spare parts that match the PLC configuration that you are using.

2) Processing spare parts

(1) Storage conditions

The storage life of components is related to temperature and humidity (the lower these are the better). Store spare parts at a room temperature of 5 to 35°C (20 to 30°C recommended), with normal humidity of 30 to 80% (40 to 60% recommended), in a place that is not subject to direct sunlight. Do not store spare parts in places subject to the following conditions:

- Condensation
- Atmospheres with toxic gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.), so as to prevent the components from oxidizing
- Ozone, radiation, ultraviolet radiation
- Vibrations or impacts

(2) Unit storage period

When storing spare parts (units) for extended periods, it is recommended that you apply current to them for approximately 30 minutes periodically (about once every three years), to maintain the function of the aluminum electrolytic capacitors (applying current to maintain the electrolyte) and check their operation. The storage limit must be periodically checked and controlled to ensure a storage limit of about 10 years (see note 1) because these units are equipped with aluminum electrolytic capacitors.

Note 1: The 10-year limit is a guideline that was determined by considering the static lifetime of aluminum electrolytic capacitors (approx. 15 years) and their operating period as spare parts.

(See the detailed explanation in item 6.)

(3) Storage period for memory back-up batteries

Store batteries separately, not mounted in the PLC. The storage period for batteries is two years, and this storage limit must be periodically checked and controlled.

(See the detailed explanation in item 6.)

6. Detailed Explanations

1) Memory back-up batteries

Back-up batteries are used for memory (RAM) back-up mainly in CPU Units. Refer to the operating instructions for each CPU to determine the capacity lifetime of the battery (the lifetime due to capacity reduction) because it varies depending on the CPU model, operating rate (the power ON rate), and the usage conditions (temperature).

In addition to the remaining capacity of the battery, there is also a danger of electrolyte leakage caused by deteriorated seals after many years of use. For this reason, all batteries should be replaced within five years. The static design lifetime of batteries is seven years.

When batteries are used past their lifetime, the possibility of electrolyte leakage becomes extremely high. Electrolyte is highly corrosive, and it is also electrically conductive, so there is a risk that it will corrode other parts around it and also generate smoke and odors. For these reasons, careful attention must be paid to the battery lifetime.

2) Output relays

The lifetime of I/O Units that use relay contact outputs is determined by the lifetime of the outputs. The relay lifetime depends greatly on the contact current, the ambient temperature, and the nature of the load (resistance load, inductance load, etc.). Decide on the timing for preventive maintenance from the relay life-test curve and number of operations listed in the I/O Unit operation manual.

3) Photo couplers

Photo couplers are used to isolate the I/O Units, Communications Units, and other PLC Units from the other equipment in the system. The LED that is built into the photo coupler has a lifetime, and the brightness of the LED lowers with usage until, at the end of its lifetime, the signal can no longer be transmitted.

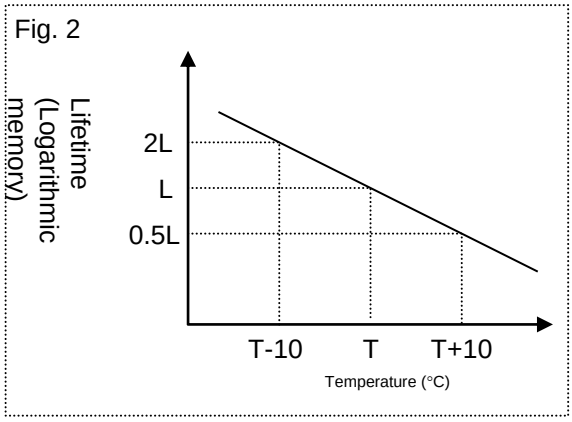
The lifetime varies depending on the ambient temperature and illumination time, but because the photo coupler lifetime is longer than that of the aluminum electrolytic capacitors, the Unit lifetime is determined by the aluminum electrolytic capacitors.

4) Aluminum electrolytic capacitors

(1) Aluminum electrolytic capacitor lifetime

Due to the component structure, the capacity reduction (performance drop) and lifetime of aluminum electrolytic capacitors is caused by its internal electrolyte gradually leaking out of the lower rubber seals. As shown in Fig. 2, the lifetime has a coefficient of correlation with the usage temperature.

Fig. 2



According to the Arrhenius equation (the doubling 10°C rule), the lifetime is reduced 1/2 with each 10°C rise in ambient temperature, and is doubled with each 10°C drop in ambient temperature.

The static lifetime of the aluminum electrolytic capacitor is about 15 years (due to deterioration of the electrolyte rubber seal). Therefore, the aluminum electrolytic capacitor lifetime is defined as the shorter of these two lifetimes, i.e., the lifetime calculated by the Arrhenius equation and the static design lifetime.

If the aluminum electrolytic capacitor is used past its lifetime, there is an extremely high possibility that electrolyte will leak out.

Electrolyte is highly corrosive, and it is also electrically conductive, so there is a risk that it will corrode other parts around it and also generate smoke and odors. For these reasons, careful attention must be paid to the lifetime of aluminum electrolytic capacitors.

(2) Power supply lifetime

1. The lifetime of the power supply is determined by calculating the lifetime of the aluminum electrolytic capacitor. Basically, the design lifetime is as follows.

   C/CV Series: 7 years (operated 24 h/day at 30°C, with a load rate of 70% (see note 1))

   CS1 Series: 10 years (operated 24 h/day at 40°C, with a load rate of 70% (see note 1))

   Note 1: Load rate = Sum of current consumed by system Units / Max. Power supply x 100

2. Relationship among ambient temperature, load rate, and lifetime

   Because a rise in the load rate also causes a rise in the heat generated by the power supply, the aluminum electrolytic capacitor temperature is affected by the sum of the ambient temperature and the heat generated by the power supply.

   Fig. 3 shows a typical sample of the change in lifetime according to changes in the ambient temperature and load rate. (Fig. 3 is a typical sample (C500-PA221) calculated from actual measurement values, and is not to be interpreted as assuring a certain lifetime.)

Fig. 3

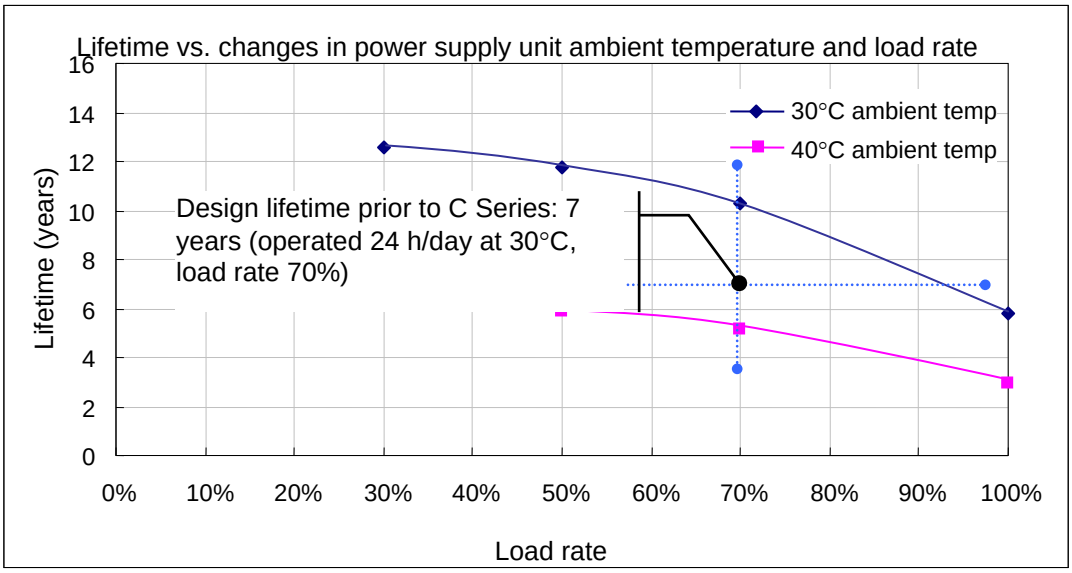
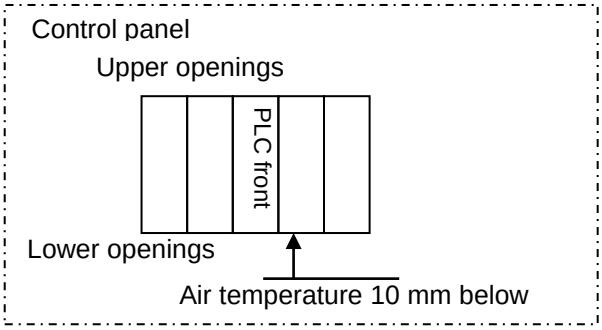


Fig. 4 Ambient temperature measurement reference point: temperature 10 mm below PLC



(3) CPU, Special I/O Unit (CPU Bus Unit)

The lifetime varies depending on the Unit.

When the Unit has an internal power supply module or uses aluminum electrolyte capacitors as an important functional component, the design lifetime is seven years for the C/CV Series (30°C), and 10 years for the CS/CJ Series or later (40°C).

When aluminum electrolyte capacitors are not used as an important functional component, the design lifetime is ten years.

(4) I/O Unit

Because aluminum electrolyte capacitors are not used as an important functional component, the design lifetime is ten years.

Period and Terms of Warranty

Warranty Period

The Power Supply warranty is valid for a period of three years from the date of shipment from the factory.

Terms of Warranty

The warranty is valid only for the following operating conditions.
1. Average ambient operating temperature of the Power Supply: 40°C max. (See note.)
2. Average load rate of 80% max. (See note.)
3. Mounting method: Standard mounting
4. Rated input voltage
Note: The maximum ratings must be within the derating curve.

If the Power Supply fails for reasons attributable to OMRON within the above warranty period, OMRON will repair or replace the faulty part of the Power Supply at the place of purchase or the place where the Power Supply delivered without charge.
This warranty does not cover the following types of failures.

(1) Failures that result from handling or operation of the Power Supply under conditions or in environments that are not given in this document and not given in any other specifications exchanged between OMRON and the customer
(2) Failures that originate in causes other than the delivered product itself
(3) Failures caused by disassembly, modification, or repair of the Power Supply by anyone other than OMRON
(4) Failures caused by applications or uses for which the Power Supply was not originally intended
(5) Failures caused by factors that could not be anticipated with the scientific or technical knowledge available when the Power Supply was shipped
(6) Failures caused by other causes for which OMRON is not responsible, such as natural disasters and other acts of God
This warranty is limited to the individual Power Supply that was delivered and does not cover any secondary, subsequent, or related damages.

Recommended Replacement Periods and Periodic Replacement for Preventive Maintenance

The recommended replacement period for preventive maintenance is greatly influenced by the application environment of the Power Supply. As a guideline, the recommended replacement period is 7 to 10 years.✻
To prevent failures or accidents that can be caused by using a Power Supply beyond its service live, we recommend that you replace the Power Supply as early as possible within the recommended replacement period.
However, bear in mind that the recommended replacement period is for reference only and does not guarantee the life of the Power Supply.

Many electronic components are used in the Power Supply and the Power Supply depends on the correct operation of these components to achieve the original Power Supply functions and performance.
However, the influence of the ambient temperature on aluminum electrolytic capacitors is large, and the service life is reduced by half for each 10°C rise in temperature (Arrhenius law).
When the capacity reduction life of the electrolytic capacitor is reached, the Power Supply failures or accidents may occur.
We therefore recommend that you replace the Power Supply periodically to minimize product failures or accidents in advance.
✻ The recommended replacement period applies under the following conditions: rated input voltage, load rate of 50% max., ambient temperature of 40°C max., and the standard mounting method.

This Power Supply model is designed with a service life of 10 years minimum under the above conditions.

INTERNATIONAL
MARITIME
ORGANIZATION

E

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1694
4 July 2025

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2, AND THE 1994 AND 2000 HSC CODES

1 The Maritime Safety Committee, at its 110th session (18 to 27 June 2025), approved the *Unified interpretations of SOLAS chapter II-2, and the 1994 and 2000 HSC Codes*, prepared by the Sub-Committee on Ship Systems and Equipment, at its eleventh session (24 to 28 February 2025), in order to provide the necessary clarity on how compliance with the requirements to prohibit PFOS will be demonstrated for both new and existing ships, as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance from 1 January 2026 when applying SOLAS regulations II-2/1.2.10 and 10.11.2.2, and regulation 7.9.4 of the 1994 and 2000 HSC Codes, respectively, and to bring them to the attention of all parties concerned.

***

ANNEX

**UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2,
AND THE 1994 AND 2000 HSC CODES**

SOLAS regulations II-2/1.2.10 and 10.11.2.2, as amended by resolution MSC.532(107), and regulation 7.9.4 of the 1994 and 2000 HSC Codes

1 The phrase "fire-extinguishing media" should include the fire-fighting foams.

2 The phrase "containing perfluorooctane sulfonic acid (PFOS)" should mean present in concentrations of PFOS above 10 mg/kg (0.001% by weight).

3 Verification that "extinguishing media containing perfluorooctane sulfonic acid (PFOS)" are not used or stored on ships should require the Administration or its recognized organization to review the maker's declaration or laboratory test reports for the extinguishing media covered by the SOLAS Convention, which should be provided to the Administration or to its recognized organization by shipyards, repair yards and equipment makers.

4 The declaration issued by the foam maker should contain information about the foam such as, but not limited to: foam type, production period, batch number, reference to type approval/Marine Equipment Directive (MED) Certificate for the foam.

5 For extinguishing media installed before 1 January 2026, where the maker's declaration or laboratory test reports are not available, sampling and testing of the extinguishing media on board should be required to be conducted in accordance with a recognized standard.

Kashiwa Tech Co., Ltd.
TECHNICAL CENTER
1165-9 Kutsukake, Bando-shi, Ibaraki, Japan 306-0515
Tel : (+81) 297-44-3781 Fax : (+81) 297-44-3788
URL : http://www.kashiwa-tech.co.jp

Date : 08 -Jul- 2025
Ref.No. : QLA – 01132 – ***

Verification Certificate

for "Vessel name" (IMO: - - - - - - -)

We hereby certify that the following product complies with the requirement specified in SOLAS regulation II-2/10.11.2.2 in RESOLUTION MSC.532(107). Please refer to the attachment.

SAMPLE

Products

・High expansion foam fire extinguishing system for Ship use.

- Vessel name :
- IMO Number : - - - - - - -
- Foam type : STHAMEX-SV
- Production period : 2012/12(800L), 2011/12(100L)
- Batch No. : 011031211(800L), 011011211(100L)
- Reference to type approval : ClassNK / N-391, MED / 201.010

Sincerely yours,

S. Sakai

S.Sakai
Managing Director
Chief Technical Officer

Declaration of Conformity

Dr. STHAMER
FOAM FIGHTS FIRE

STHAMEX®-SV 2% F-6 #9242

no PFAS added

We hereby declare that our product

STHAMEX®-SV 2% F-6 #9242

fulfills the following requirements

- no fluorine-containing raw materials are used during the production. Therefore, the limits for PFOS as well as PFHxS and its related substances (EU/2019/1021), PFOA and its respective statutory defined precursors (U/2020/784), C9-C14 perfluorocarboxylic acids and their respective statutory defined precursors (EU/2021/1279) as well as PFHxA and its statutory defined precursors (EU/2024/2462) are of course met.
- the product is manufactured without the intended addition of organofluorine compounds (PFAS) for the purpose of increasing performance and therefore does not contain any amount of organofluorine substances (PFAS) beyond the regional ubiquitous background pollution (e.g. in the drinking water used for production).
- none of the used raw materials is listed on the SVHC candidate list or is subject to any restrictions for foam concentrates as per Annex XIV and XVII of the REACH regulation (EG/1907/2006).
- none of the used raw materials shows Ozone Depleting Potential (ODP) according to the Montreal Protocol or Global Warming Potential (GWP).
- the product does not contain PCBs and PCTs (Polychlorinated Biphenyls and Terphenyls).
- the product is not a dangerous good.

All above declarations are valid at the date of issue of the document. The validity is checked on a regular base. Please contact us for an updated version.

SAMPLE

04. Feb 2025	Dr. Thomas Leonhardt	i.A.
.....	.....	.....
Date	Name	Signature/Company Stamp

Main Office Hamburg
Liebigstr. 5
22113 Hamburg
Germany
Tel.: +49 (0)40 73 61 68-0
Fax: +49 (0)40 73 61 68-60

Sales Office Hannover
Hartenbrakenstr. 54
30659 Hannover
Germany
Tel.: +49 (0)511 768 358-45
Fax: +49 (0)511 768 358-46

Sales Office Jena
Carl-Pulfrich-Str. 1
07745 Jena
Germany
Tel.: +49 (0)3641 63538-57
Fax: +49 (0)3641 63538-59

Office Frankenthal
Siemensstr. 4
67227 Frankenthal
Germany
Tel.: +49 (0)6233 3796-605
Fax: +49 (0)6233 3796-622

info@sthamer.com
www.sthamer.com

DGUV Test QM ISO 9001 zertifiziert