

# “A-LF-Sea”

## Application Manual for M&R

(Full blasting)

April 2015

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# Introduction

A-LF-Sea is a super low friction / self-polishing type antifouling paint which creates water trapped layer on the boundary surface of the coating film in the sea water, leading to reduction of frictional resistance. A-LF-Sea system can be applied without any special equipment and materials.

## 1. Standard scheme

1) Standard scheme for flat & vertical bottom

“NOA10F Rheo+ NOA A/C II Rheo + A-LF-Sea” system

Process	Product Name	DFT ( $\mu$ m)	Type of coating
A/C	NOA10F Rheo Buff	175	Epoxy A/C
	NOA A/C II Rheo Gray	75	Epoxy A/C
A-LF-Sea	A-LF-Sea	*	A-LF-Sea
	A-LF-Sea	*	A-LF-Sea

\* DFT of LF-Sea depends on operating state and service life.

\* Process depends on each shipyard’s production. Consult with us.

2) Colour scheme for A-LF-Sea system

For multiple coats, A-LF-Sea’s colour scheme is shown in following table.

A-LF-Sea’s coating times	1st	2nd	3rd	4th
A-LF-Sea 250 2 coat system	LB	B		
A-LF-Sea 250 3 coat system	B	LB	B	
A-LF-Sea 250 4 coat system	LB	B	LB	B
A-LF-Sea 150 2 coat system	LB	B		
A-LF-Sea 150 3coat system	B	LB	B	
A-LF-Sea 150 4 coat system	LB	B	LB	B

B : Brown, LB : Light brown

\* Brown colour to be top coat

## 2. High pressure fresh water washing (HPFWW)

At drydocking, salt, slime layer, marine growth and other foreign matters should be removed by the following manual for HPFWW.

1) Timing

Wash down all foreign matters before they dried up and become stiff. Prepare the facilities for HPFWW in advance to start it immediately after dry-up.

## 2) Procedures

- HPFWW should be carried out as early as possible immediately after dry-up.
- Considering falling down of salt, slime, marine growth with washing water from upper side of hull, HPFWW should be done from upper part of topsides down to boottop, vertical bottom and flat bottom/

## 3) Pressure for HPFWW

- Vertical hull (topsidess to vertical bottom) : 200kg/c m<sup>2</sup> and above
  - Flat bottom : 200kg/ c m<sup>2</sup> and above
- \* Especially, washing down with fan-jet and / or rotary-jet is recommended for flat bottom.



## 4) Degree of HPFWW

As the residues of slime layer and salt etc will badly affect the adhesion between coating layers, thorough washing down is necessary in accordance with the following procedures.

- Slime etc should be thoroughly removed by applying HPFWW to entire hull surface.
- Check the surface no slimy conditions by rubbing the wet coating surface with hand.
- Salt concentration to be less than 30mg/m<sup>2</sup>.
- Oil, grease or oil stain from scuppers should be removed with degreaser or oil detergent before HPFWW.

## **3. Surface preparation**

Before surface preparation, wooden plugs should be inserted into scuppers to avoid water flow from the scupper or upper decks to topsides. And ballast water shall be ejected.

### 1) Surface preparation

Rust scale and existing coating should be removed by blast cleaning. Blast cleaned to Sa2.0 - ISO Standard 8501-1 (2007) is recommended.

## 2) Treatment after blasting

After blast cleaning, dust or abrasives should be removed by air blowing.



Blast cleaning (vertical bottom)



Blast cleaning (flat bottom)

## 4. Cautions before painting

### 1) Relative humidity & dew points

Relative humidity to be below 85% and dew point to be at least 3 °C above steel substrate.

### 2) Substrate surface to be coated

Paint dust of A/C or finish coatings adhered to substrate surface should be removed by power tool cleaning before painting.

## 5. Cautions during painting

### 1) Overcoating intervals

In accordance with standard scheme, paint application shall be started from A/C coating with designated overcoating intervals. (Refer to column 6. Overcoating intervals.)

For corrosion protection, specified DFT of A/C should be secured.

### 2) DFT control

Especially, it is important for A-LF-Sea system to be achieved with uniform specified. Area volume control is recommended for A-LF-Sea application.

### 3) Application of holding primer (Epoxy zinc primer)

Holding primer “NIPPON CERAMO T/U” shall be recommended, when 1<sup>st</sup> A/C can not be applied by work process reasons.

① After blasting, re-rusting may occur in any ambient condition. In this case, blasting shall be stopped accordingly and NIPPON CERAMO T/U shall be applied to the blasted surface after air blowing.

② NIPPON CERAMO T/U shall be applied below 25 μm.

③ After applying NIPPON CERAMO T/U, dust or abrasives shall be removed from topsides and superstructures by fresh water hosing.

- ④ After the fresh water hosing and drying, rusted parts shall be treated with power tools such as disc sander, wire wheel etc.

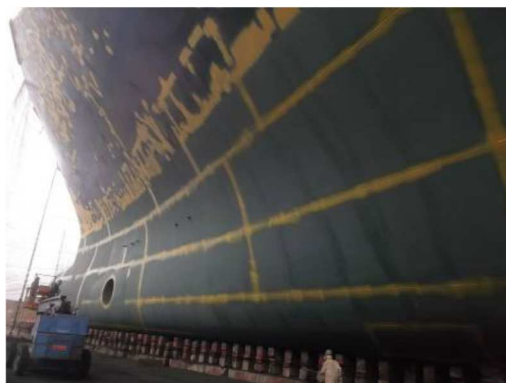


After application of N CERAMO T/U

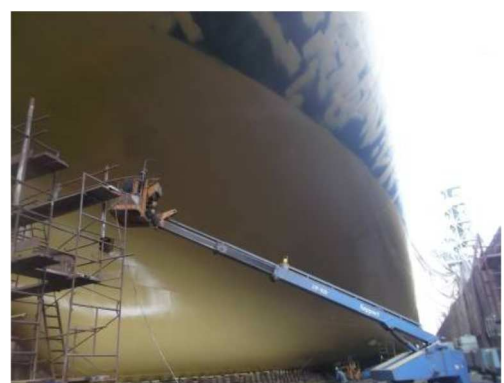
#### 4) Application of A/C & A/F

Following issues are key points for NOA10F Rheo, NOA A/C II Rheo & A-LF-Sea application to ensure smooth and uniform coating surface.

- Carefully clean the painting equipments before painting.
- Smaller tip range should be selected than general hull application. Recommendable tip range shall be shown in column 5-5) (a). Select proper tip nozzle by checking the atomization. Do not select extreme large size of spray tip nozzle which may cause dry spray or uneven paint film surface.
- Check the proper output pressure for painting and ideal spray pattern. When painting at excessive high pressure, orange peel, sagging or dry spray may occur and uniform coating cannot be ensured.
- Spray the paint by moving the gun slowly, keeping 40 ~ 50 cm distance between gun and substrate surface and about 1 meter wide spray shift at right angle.



Stripe coat of NOA10F Rheo on welds



After application of NOA10F Rheo



Application of NOA A/C II Rheo



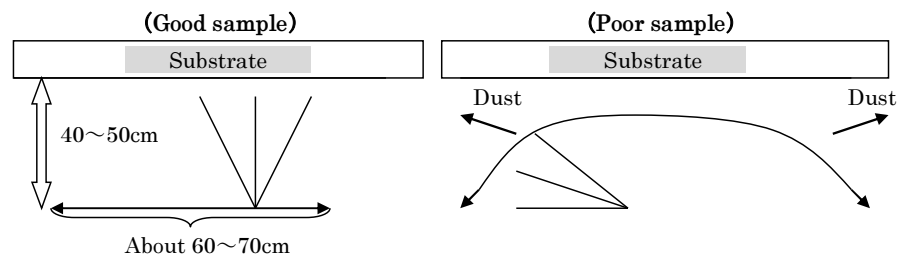
After application of NOA A/C II Rheo



1st Application of A-LF-Sea



When spraying, keep about 1 m wide spray shift at right angle



\* Excessive wide spraying or spraying where spray gun is too far from substrate may cause spray dust.

\* Do not snake-spray. Stop spraying in a stroke and start next stroke.

\* When using pole gun, its length should be 1 meter to prevent dry spray.

- Do not paint under strong wind to prevent dry spray and paint loss.
- To prevent dry spray, spray the paint from windward to leeward.
- Prepare the sufficient lighting facilities for flat bottom. When painting for flat bottom, spray the paint by moving the gun vertically to the substrate surface of flat bottom. Swinging the spray gun may cause the thin film thickness due to lack of overlapping of spray patterns. Spray where gun is too short from the surface may create uneven paint film and cause orange peeling. Therefore, spray the paint keeping 40 ~ 50 cm distance between gun and surface with proper output pressure.

5) Airless spray machine conditions

(a) Airless tip

Following table shows the standard airless tip & thinners for dilution of each product. Airless tip should be selected by checking the atomization conditions. And dedicated thinner should be used for dilution.

Items Product	Standard tip range	Thinner name
N CERAMO T/U	0.53 ~ 0.74 mm (Fan angle : 45 ° )	NIPPON MARINE THINNER 600 (*)
NOA10F Rheo	0.53 ~ 0.74 mm (Fan angle : 45 ~ 54° )	NIPPON MARINE THINNER 600 (*)
NOA10FLT Rheo	0.53 ~ 0.74 mm (Fan angle : 45 ~ 54° )	NIPPON MARINE THINNER 600
NOAA/C II Rheo	0.53 ~ 0.74 mm (Fan angle : 45 ~ 54° )	NIPPON MARINE THINNER 600 (*)
NOAA/C II LT Rheo	0.53 ~ 0.74 mm (Fan angle : 45 ~ 54° )	NIPPON MARINE THINNER 600
A-LF-Sea 250	0.64 ~ 0.74 mm (Fan angle : 45 ~ 54° )	NIPPON MARINE THINNER 300
A-LF-Sea 150	0.64 ~ 0.74 mm (Fan angle : 45 ~ 54° )	NIPPON MARINE THINNER 300

Note : NIPPON MARINE THINNER 670 is recommended at hot temperature.

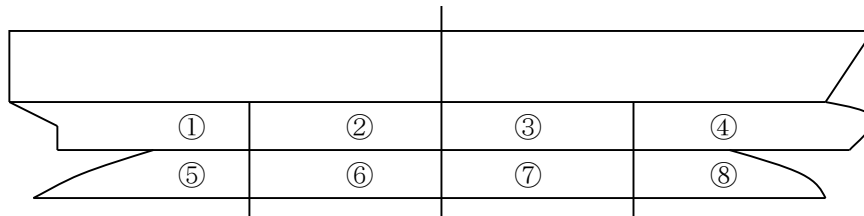
(b) Airless spray equipment : above 45 : 1

(c) Output pressure : above 5kg / c m<sup>2</sup>

(d) Refer to product datasheets for other requirements.

6) Allotment & distribution of paint

A-LF-Sea should be painted uniformly. The amount of paint volume should be allocated / distributed as illustrated below (for reference), and allocated paint volume to each area should be used up completely without leaving.





## 6. Overcoating intervals

Overcoating intervals between various coating shall be shown as follows.

Prior coat	Subsequent coat	0 °C		5 °C		10 °C		20 °C		30 °C	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
N CERAMO TU	N CERAMO TU	36H	--	24H	--	20H	--	16H	--	12H	--
N SERAMO TU	NOA10F Rheo	36H	--	24H	--	20H	--	16H	--	12H	--
NOA10F Rheo	NOA10F Rheo	NA	NA	32H	--	24H	--	16H	--	12H	--
NOA10F Rheo	NOA A/C II Rheo	NA	NA	32H	--	24H	--	16H	--	12H	--
NOA A/C II Rheo	NOA A/C II Rheo	NA	NA	32H	--	24H	--	16H	--	12H	--
NOA10F LT Rheo	NOA10F LT Rheo	32H	--	20H	--	16H	--	12H	--	NA	NA
NOA10F LT Rheo	NOA A/C II LT Rheo	32H	--	20H	--	16H	--	12H	--	NA	NA
NOA A/C II LT Rheo	NOA A/C II LT Rheo	24H	--	16H	--	12H	--	8H	--	NA	NA
NOA A/C II Rheo	A-LF-Sea	NA	NA	32H	7D	24H	6D	16H	5D	12H	3D
NOA A/C II LT Rheo	A-LF-Sea	24H	6D	16H	5D	12H	4D	8H	3D	NA	NA
A-LF-Sea	A-LF-Sea	**	--	**	--	**	--	**	--	**	--

### 【Europe version】

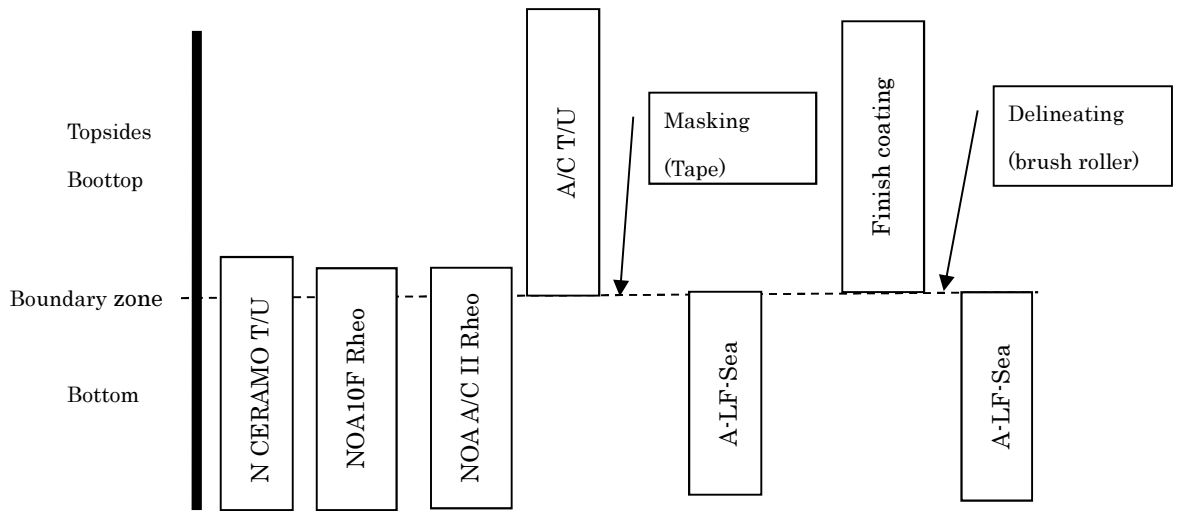
Prior coat	Subsequent coat	0 °C		5 °C		10 °C		20 °C		30 °C	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
NOA10F Rheo E	NOA10F Rheo E	32H	14D	24H	14D	16H	14D	12H	14D	10H	14D
NOA10F Rheo E	NOA A/C II Rheo E	32H	14D	24H	14D	16H	14D	12H	14D	10H	14D
NOA A/C II Rheo E	NOA A/C II Rheo E	32H	7D	20H	7D	16H	7D	12H	7D	8H	7D
NOA A/C II Rheo E	A-LF-Sea	32H	5D	20H	5D	16H	4D	12H	3D	12H	3D
A-LF-Sea	A-LF-Sea	**	--	**	--	**	--	**	--	**	--

<Note>

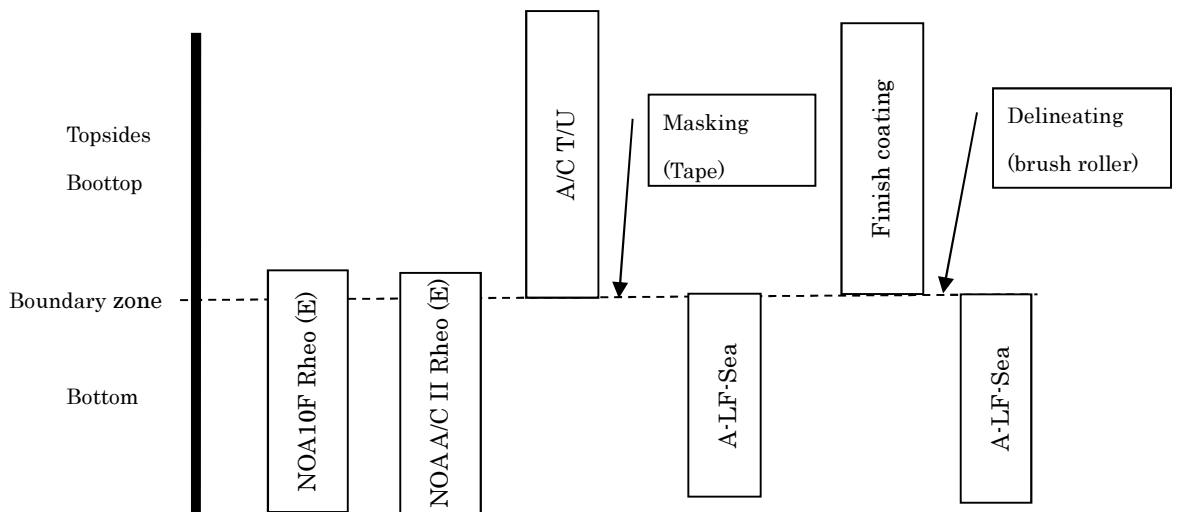
- The above overcoating intervals depends on DFT etc. For more detail, consult with us.

## 7. Application for boundary zone

(NOA10F Rheo+NOA A/C II Rheo+A-LF-Sea)



【Europe version】



## 8. Drying time before flooding & ballasting

After paint application, drying time before flooding & ballasting is to be shown in below table.

Ship's speed	Number of coat	DFT ( $\mu$ m/coat)		Drying time (H : Hour)				
				0°C	5°C	10°C	20°C	30°C
15 knots or less	2	75~100	Flooding	24H	18H	16H	12H	12H
			Ballasting	24H	6H	5H	4H	3H
		105~150	Flooding	48H	36H	36H	12H	12H
			Ballasting	24H	24H	5H	4H	3H
16~17 knots	2	75~100	Flooding	24H	18H	16H	12H	12H
			Ballasting	24H	6H	5H	4H	3H
		105~150	Flooding	60H	26H	36H	24H	12H
			Ballasting	24H	24H	5H	5H	3H
18~20 knots	2	75~100	Flooding	24H	18H	16H	12H	12H
			Ballasting	24H	6H	5H	4H	3H
		105~150	Flooding	60H	36H	24H	24H	12H
			Ballasting	24H	24H	24H	4H	3H
21 knots or more	2	75~100	Flooding	36H	24H	18H	12H	12H
			Ballasting	24H	24H	24H	4H	3H
		105~150	Flooding	72H	36H	24H	18H	12H
			Ballasting	24H	24H	24H	24H	3H
15 knots or less	3	75~100	Flooding	40H	24H	18H	12H	10H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	84H	71H	60H	36H	18H
			Ballasting	24H	24H	24H	24H	24H
16~17 knots	3	75~100	Flooding	40H	24H	18H	12H	10H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	**	84H	60H	36H	18H
			Ballasting	24H	24H	24H	24H	24H
18~20 knots	3	75~100	Flooding	48H	36H	24H	12H	10H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	**	84H	60H	48H	18H
			Ballasting	24H	24H	24H	24H	24H
21 knots or more	3	75~100	Flooding	48H	40H	30H	18H	12H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	**	**	72H	48H	24H
			Ballasting	24H	24H	24H	24H	24H

(To be continued to next page)

Ship's speed	Number of coat	DFT ( $\mu$ m/coat)		Drying time (H: Hour)				
				0°C	5°C	10°C	20°C	30°C
15 knots or less	4	75~100	Flooding	48H	24H	18H	12H	10H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	**	**	84H	60H	24H
			Ballasting	24H	24H	24H	24H	24H
16~17 knots	4	75~100	Flooding	48H	24H	18H	21H	10H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	**	**	84H	60H	24H
			Ballasting	24H	24H	24H	24H	24H
18~20 knots	4	75~100	Flooding	48H	36H	24H	12H	10H
			Ballasting	24H	24H	24H	24H	24H
		105~150	Flooding	**	**	84H	60H	24H
			Ballasting	24H	24H	24H	24H	24H
21 knots or more	4	75~100	Flooding	60H	48H	24H	18H	12H
			Ballasting	24H	24H	34H	24H	24H
		105~150	Flooding	**	**	**	60H	36H
			Ballasting	24H	24H	24H	24H	24H

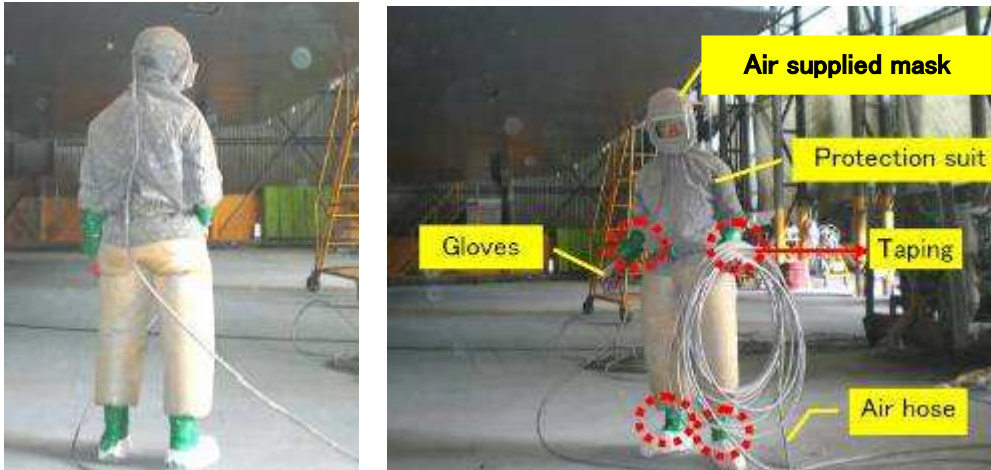
- \* Temperature indicates “average temperature in a day”.
- \* Specified overcoating intervals and drying time before flooding shall be maintained.
- \* A·LF·Sea shall be generally applied in 1 coat per 24 hours. However, 2 coat system per 24 hours is applicable in the condition of yellow-coloured part. In this case, drying time is shown as 2 coats per 24 hours.
- \* Consult with us for the drying time of \*\* marked parts.
- \* Depending on painting condition, DFT may be actually thicker than that of specification. And then longer time may be required than specified drying time.

## 9. General cautions

The paint contains organic solvents and will cause skin rash if attached to skin. For detailed information, refer to the MSDS.

As a precautionary measure during painting, use protective cream, protective gloves, goggles, organic solvent masks and / or dust proof masks.

< Example of safety clothes for painting >



End