



NIPPON PAINT MARINE



“AQUATERRAS”
Application Manual
(M&R)

August 2018

Rev. 3

Contents

1. High pressure fresh water washing (HPFWW)
 - 1) Procedures
 - 2) Pressure for HPFWW
 - 3) HPFW Washing Checkpoints
 - 4) Other requirements

2. Surface preparation

3. Painting
 - 1) Pre-caution before painting
 - 2) Application for boundary zone
 - 3) Allotment & distribution of paint
 - 4) Pre-caution during painting
 - 5) Airless spray machine set-up conditions

4. Over coating intervals

5. Over coating intervals & Drying time before flooding

6. Drying time before ballasting

7. General Precautions

An innovative biocide-free antifouling paint based on new technology. Reduction of frictional resistance and prevention ship-fouling organism from settling is realized by its hydrophilic & hydrophobic micro-domain structures and its hydrolysis reaction.

Regarding application of AQUATERRAS, AQUATERRAS system can be applied without any special equipment and materials. Paint application is necessary in accordance with the following procedures.

1. High pressure fresh water washing

Immediately after dry docking, any salt, slime layer, marine growth and other foreign matters should be removed by HPFWW.

Wash down all underwater areas before they become dried up and stiff. Any delay in this process allows foreign matters and skeleton layers dryer and therefore harder to remove. Prepare facilities for HPFWW in advance in order to start this immediately after dry-up.

1) Procedure

In principle, and to avoid contamination by used wash water carry out HPFWW from the upper part of the ship's topsides down to boot top, vertical bottom and then flat bottom..

2) Pressure of HPFWW

- Vertical hull (topsidess to vertical bottom) : 200kg/cm² and above
- Flat bottom : 200 kg/cm² and above
- Especially, washing down with fan-jet and / or rotary-jet is recommended for flat bottom.



3) Checkpoints of HPFWW

As any 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 carrying out HPFWW to the entire hull surface.
- Check that the surface exhibits no sliminess (slime residue) by rubbing the wet coating surface with your hand/fingers.
- Any remaining salt concentration is to be less than 30mg/m².
- Washing down should be carried out from both right & left sides of welds so as not to leave any slime residue on or around the welding seams.
- Salt layer and slime residues will be left in way of supporting blocks. Careful & thorough washing down should be carried out to these areas.



4) Other requirements

- Any oil and grease should be carefully removed with emulsifying detergent before HPFWW
Minor spots of oil or grease can be cleaned locally by rubbing with solvent
- Other foreign matters should be removed by proper power tools or heavy-duty scotchbrite type pads.

2. 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) Rusty and / or defective film should be removed by blast cleaning or power tool cleaning.



Spot blasting



Disc sanding

(2) Coating edges surrounding blast cleaned areas should be feathered smooth by power tool.



Removal of loose paint film

Loose paint film around T/U area shall be removed.

* Any loose or flaked coatings should be removed by blasting, power tool cleaning or scraper depending on their scope and distribution.

* For spot blasting to areas where there is heavily scattered corrosion and mechanically damage, the coating edges should be blasted off square and then feathered back to a firm edge



Examples of Removal of :

1. Loose paint film

Partial blast cleaning



2. Rust scale or blistering

Partial blast cleaning



Square blast cleaning



Square blast cleaning

(4) Water jetting shall be applicable as surface preparation. In this case, the surface should be treated to the following preparation grade and flush rust grade.

Surface preparation grade : Wa 2 1/2 (ISO 8501-4:2006)

Flash rust grade : up to FR 2 Medium flash rust (ISO8501-4:2006)

* When the flash rust exceeds FR 2, the surface should be re-treated or treated by power tool cleaning.

3. Painting

1) Precautions before painting

- Relative humidity, Dew point

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

- Substrate surface to be coated

Any paint dust or overspray from the A/C or finish coatings that have adhered to surface to be coated should be removed by power tool cleaning or other suitable method before painting AQUATERRAS.

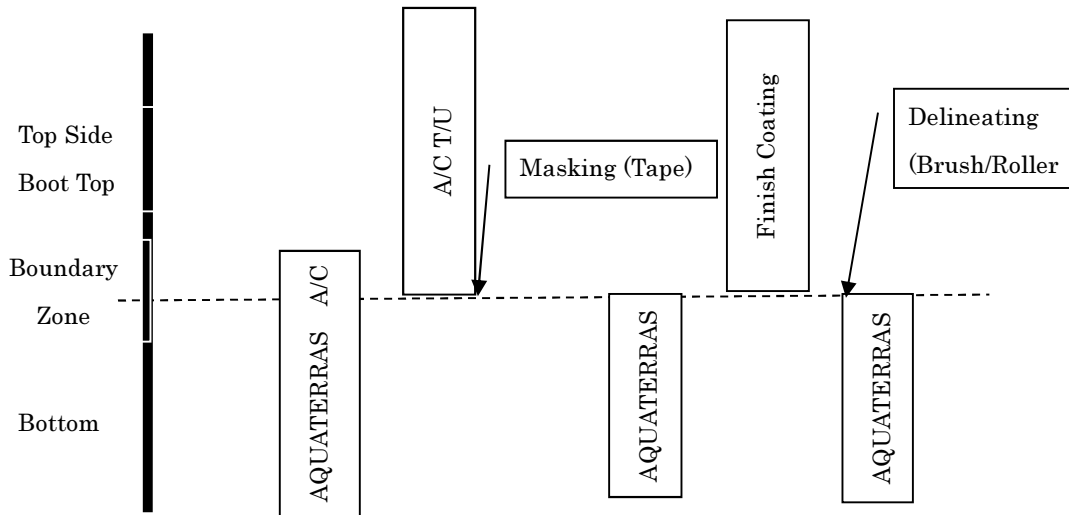


Removal of paint dust of finish coating adhered on bulbous bow



Removal of paint dust before final coating

- 2) Application for boundary zone
 AQUATERRAS A/C + AQUATERRAS system



- 3) Allotment & distribution of paint

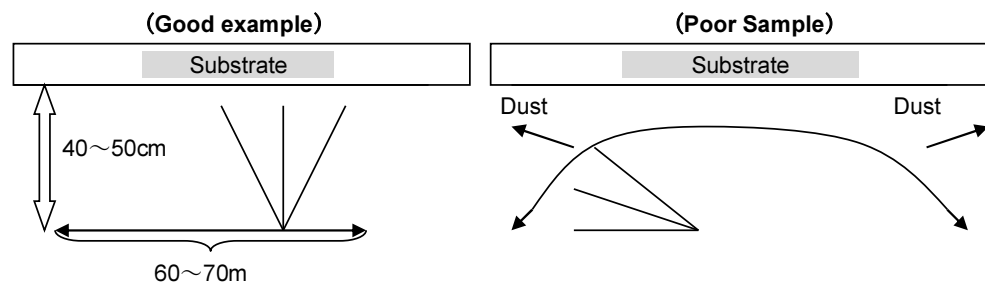
AQUATERRAS should be painted uniformly. The amount of paint volume should be allocated / distributed as illustrated below (for reference), and allocated paint volume to each area should be used up completely before moving on.



4) Cautions during painting

The following precautions are essential for AQUATERRAS application to ensure as smooth and uniform a coating surface as possible.

- Carefully clean the painting equipment / spray lines before painting.
- Tip range should be 0.64 (Graco 525) ~ 0.74 mm (Graco 529) with fan angle 45 ~ 54 °. Select proper tip nozzle by checking its atomization. Do not select an extremely large size spray tip 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 a uniform coating cannot be ensured.
- Spray the paint by moving the gun slowly, keeping a 40 ~ 50 cm distance between the gun and the substrate and keeping about a 60 ~ 70 cm wide spray pass at right angles to the hull.



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

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

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



When spraying A/F paint, keep about 1meter wide spray shift at right angle.

5) Airless spray machine conditions

① Airless tip

Following table shows the standard airless tip & thinners for distribution of each product.

Airless tip should be selected by checking the atomization conditions. And dedicated thinner should be used for dilution

Items Products	Standard tip range	Thinner
AQUATERRAS A/C	0.53~0.74mm (Fan angle : 45°~54°)	NIPPON MARINE THINNER 600 (*)
AQUATERRAS	0.64~0.74mm (Fan angle : 45°~54°)	NIPPON MARINE THINNER 350 (*)

* THINNER for exclusive use are recommended at hot temperature

- ◇ Airless spray equipment : above 45 : 1
- ◇ Output pressure : above 5kg / cm²
- ◇ Refer to product datasheets for other requirements

4. Over-coating intervals

In accordance with standard scheme, paint application shall be started from A/C coating with designated over-coating intervals. Please apply standard DFT of A/C coating for anti-corrosive property.

Undercoating	Over-coating	0°C		5°C		10°C		20°C		30°C	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
AQUATERRAS A/C	AQUATERRAS A/C	NA	NA	32H	30D	20H	30D	16H	30D	12H	14D
AQUATERRAS A/C LT	AQUATERRAS A/C LT	32H	30D	20H	30D	16H	30D	12H	30D	NA	NA
AQUATERRAS A/C	AQUATERRAS	NA	NA	32H	5D	24H	4D	16H	2D	12H	2D
AQUATERRAS A/C LT	AQUATERRAS	32H	4D	20H	3D	16H	2D	NA	NA	NA	NA

<NOTE>

Over-coating intervals depend on DFT etc. For more detail, consult with NPMC representatives

5. Over coating interval and Drying time before flooding

Ship Speed (Knots)	Number of coat	DFT ($\mu\text{m}/\text{coat}$)		Drying time (H:hour,)				
				0°C	5°C	10°C	20°C	30°C
15 or less	2	75~100	Overcoat	24H	6H	5H	4H	3H
			immersion	24H	18H	16H	12H	12H
		105~150	Overcoat	24H	24H	5H	4H	3H
			immersion	48H	36H	36H	12H	12H
16 ~17	2	75~100	Overcoat	24H	6H	5H	4H	3H
			immersion	24H	18H	16H	12H	12H
		105~150	Overcoat	24H	24H	5H	4H	3H
			immersion	48H	36H	36H	24H	12H
18~20	2	75~100	Overcoat	24H	6H	5H	4H	3H
			immersion	24H	18H	16H	12H	12H
		105~150	Overcoat	24H	24H	24H	4H	3H
			immersion	48H	36H	18H	12H	12H
21 and over	2	75~100	Overcoat	24H	24H	24H	4H	3H
			immersion	36H	24H	18H	12H	12H
		105~150	Overcoat	24H	24H	24H	24H	3H
			immersion	72H	36H	24H	18H	12H
15 or less	3	75~100	Overcoat	24H	24H	24H	24H	24H
			immersion	40H	24H	18H	12H	10H
		105~150	Overcoat	24H	24H	24H	24H	24H
			immersion	84H	72H	60H	36H	18H
16~17	3	75~100	Overcoat	24H	24H	24H	24H	24H
			immersion	40H	24H	18H	12H	10H
		105~150	Overcoat	24H	24H	24H	24H	24H
			immersion	**	84H	60H	36H	18H
18~20	3	75~100	Overcoat	24H	24H	24H	24H	24H
			immersion	48H	36H	24H	12H	10H
		105~150	Overcoat	24H	24H	24H	24H	24H
			immersion	**	84H	60H	48H	18H
21 and over	3	75~100	Overcoat	24H	24H	24H	24H	24H
			immersion	48H	40H	30H	18H	12H
		105~150	Overcoat	24H	24H	24H	24H	24H
			immersion	**	**	72H	48H	24H

<Note >

* Temperature indicates “average temperature in a day”.

* Specified over-coating intervals and drying time before flooding shall be maintained.

* 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

6. Drying time before ballasting

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

Drying time(H:hour)				
0°C	5°C	10°C	20°C	30°C
12H	6H	5H	4H	3H

7. General cautions

Antifouling paint contains organic solvents and may cause a rash if paint comes into contact with skin.

◇ For detailed information, refer to the SDS.

◇ As a precautionary measure before painting, use a protective cream, protective glove, goggles, organic solvent masks and / or dust proof masks.

◇ During application, please be off limits to painting site and do not stand

< Example of safety clothing / PPE for painting >

