



TECHNICAL DATA SHEET

PERMA FILM

09/2004

1. Description

One component surface tolerant high build protective coating for maintenance of ballast water tanks and severe corrosive environments

2. Colours

Light – green, aluminium, transparent

3. General use

Single pack multi purpose, surface tolerant coating recommended for ballast water tanks, wet voids in ships, offshore and marine structures. Can also be used for protection of machine parts, tools and equipment during sea transport and outside storage.

4. Features

- Can be applied in a thick layer of 250 µm dft in one working step
- Excellent penetration and adhesion properties
- The flat platelet structure of the film forming agents provides mechanical integrity and physical barrier to the ingress of water and oxygen into the film
- High tolerance against humidity
- Has high-volume solid, mild solvent in the formulation
- Application and curing possible at low temperatures (0 °C)

5. Approvals

Germanischer Lloyd - 2,5 years inspection interval –
Det Norske Veritas

6. Storage

Shelf life in 20 ltr. pails unlimited in original package.
In 200 ltr. drums the material should be used during 1 year

7. Package

200 ltr. drums or 20 ltr. pails – non returnable

8. Technical data for use

Applied by:	Amount of coats:	Average thickness in µm		non volatile by VOL %	Theoretical consumption/spreading rate	Nozzle / pressure	
		wet	dry			m ² /l	mm/inch
Brush	1-2	60	37,2	62	17,1	-	-
Roller	1-2	60	37,2	62	17,1	-	-
Airless	1	400	250	62	2,5	0,48-0,02	180

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9. **Recommended substrate condition**

The durability of a coating system depends among other things on the film thickness. The film thickness should be selected according to the required durability and the corrosive environment.

For ballast water tanks a dry coating thickness over 250 µm is recommended by Germanischer Lloyd.

Recommended cleaning standard is St 2/St 3 acc. ISO 8501-5 referring to hand or hand tool methods, (needle hammering, chipping, grinding) and Wa 2 acc. to ISO 9501-4 or WJ-2/WJ-3 acc. to SSPC-SP/NACE No. 5 referring to water-jetting at a water pressure of 340 – 700 bar.

If the initial conditions of the tank surfaces and other requirements i.e. technical outfit of the shipyard guarantee to achieve the required cleaning standard St 3, PERMA FILM can be applied in one coat. In case that the coating has to be done, while the vessel is in service or the surface cleaning standard in the shipyard can only reach St 2, because of insufficient equipment, Active Rust Pre-Primer has to be used as a first coat. Surfaces cleaned to St 2 and St 3 mean that a certain amount of rust can remain on the substrate after surface preparation. Rust can be different in composition, thickness, and adhesion to the substrate. Rust is also voluminous, and can accumulate numerous contaminants from the seawater (salts) and mud. Remaining rust to be overcoated has to adhere well, should not be thicker than 50 µm and be as contaminant-free as possible. Manual and power tool cleaning normally cannot remove the contaminants in the rust. Therefore, intensive pressure water washing is highly recommended as a method of desalination supporting manual cleaning or in case of using water-jetting with pressure 340 – 700 bar as a method of surface cleaning.

Just as rust must not detach from the substrate, the old coating must also adhere to the substrate, when overcoated. Old coatings to be over coated have to be evaluated on at least two points; their actual adhesion values and their characteristics (composition, unusual features, etc.).

As PERMA FILM is applied over the transition zone of rust and intact old coating, it should be determined, if the substrate is dry under the edge of the coating. An important but less known reason for serious coating failures is the film stress which arises when a coating film shrinks due to solvent evaporation and cross-linking of the binder after a surface tolerant paint is applied over remaining rust and old coating. Therefore, the remaining rust and old coating should adhere well to avoid delamination of the system. Too thick rust penetrated by PERMA FILM will be weakened and delaminate in consequence.

Use of Active Rust Pre-Primer (ARP-P) – FLUID FILM Liquid A.

As advised above when the coating has to be done, while a vessel is in service it is difficult to meet surface demands and ambient conditions required, particularly in respect to humidity. To create an effective barrier film on steel structure under difficult conditions with high humidity and/or surface rust it is recommended to apply the thinnest possible layer of FLUID FILM Liquid A as an active rust pre-primer after these surfaces have been prepared to standard St 2 or by high pressure water cleaning to Wa 2, which even in many shipyards is not yet attainable.

This Active Rust Pre-Primer - FLUID FILM Liquid A enables to work under higher humidities and tougher surface conditions. ARP-P penetrates excellently micro-porous, micro-cracked surfaces, the raised edges of old coatings and gives good adhesion, whether on remaining rust, bare steel or coatings. When the tank surface has been prepared by needle hammering, chipping and grinding for removal of thick rust scale, the cleaned tank surface should be washed thoroughly with fresh water.

10. Application details

The coating needs no field mixing and is suitable for easy application with a minimum dripping and running even when applied at very high film thickness.

PERMA FILM can be applied at low temperatures but it is not recommended to apply the coating when the substrate has a temperature below zero and white frost is forming under high humidity and also the curing time of the coating before exposure to water is very long.

When PERMA FILM is applied in a single coat without the Active Rust Pre-Primer, special care has to be taken on the backside of bars, edges, openings etc. It is recommended to use a stripe coat applied by brush on these elements. During application the wet coat thickness must be controlled to prevent under-or over coating. After curing of the coating there is often no time for control and improvements.

The applicator should be equipped with a proper respiratory mask.

When applying PERMA FILM from 200 ltr. drums it is recommended to use rampress equipment with an airless unit (above a ratio 45 : 1) fitted into the follow plate for ease of application.

Thinning with white spirit is normally not required above +15 °C, however, at lower temperature small amounts (5 % or less) should be added. To reduce the viscosity before application at low temperatures the material also can be warmed up to 20 – 25 °C (e.g. overnight storage at ambient temperatures).

PERMA FILM is easily applied by airless spray equipment in one coat or can be brushed or rolled on the surface prepared as above described. However, to achieve the recommended thickness brush applied (dft. 250 µm equal to 400 µm wet film thickness for maintenance of ballast tanks), several coats are necessary.

Application of Active Rust Pre-Primer (ARP-P) – FLUID FILM Liquid A.

To ensure the best possible spray application results, the use of airless or pneumatic spray equipment with the smallest possible nozzle is recommended to produce an oily mist layer only. A single coat, double pass spray is the preferred spraying method, which should leave a film thickness not higher than 25 – 40 µm, equal to a coverage of 25 to 40 m²/l depending on the surface roughness.

It is also recommended that the ARP-P – film be allowed to penetrate about 6 to 12 hours before the main coat of PERMA FILM is applied. An undesired surplus of ARP-P can drip to the bottom of the tank, where it should be removed with rags.

Typical Physical Properties

Appearance:	brown, opaque
Specific gravity at 25 °C:	0,915
Flash point (COC):	145 °C
Viscosity at 25 °C	700 Centistokes

While Fluid Film Liquid A is not a toxic material and does not contain solvents the spray-mist is not harmless. Dust masks should be used during spraying, ventilation should be provided in confined spaces to remove the spray-mist and vapour-proof lightning should be used during application.

11. Curing table for dft at 250 µm

Substrate temperature	Initial cure before exposure to seawater
40°C	20 hours
30 °C	24 hours
20 °C	30 hours
15 °C	40 hours
10 °C	48 hours
5 °C	96 hours

- exposure to seawater is permitted after the initial curing time;
- the mechanical strength, when cured in low temperature is low initially, but will increase after lapse of time;
- adequate ventilation is required during application and curing period.

12. Safety information

The drying process can be accelerated by applying dry and warm ventilation to increase the surface temperature. Low temperature as well as high humidity conditions will generally increase the time to cure.

Flash Point (acc. DIN 53213) > 40°C

It is very important for the safety of the applicator and the proper performance of the PERMA FILM coating that good ventilation is provided to all portions of the enclosed area. It is equally important to bring dry, fresh air into the enclosed area to remove all solvent vapours. Since all solvent vapours are heavier than air, ventilation ducts should reach to the lowest position of the enclosed areas as well as into any structural pockets. Ventilation should be provided throughout the cure period to ensure all the solvents are removed from the coating.

For welding and cutting in the coated area the tank should be “gas-free” proved by measurement.

The information and recommendations herein are believed to be accurate and reliable. However, since conditions of actual use are beyond our control, any recommendations or suggestions are made without warranty expressed or implied.

Pictorial Surface Preparation Standards for the application of PERMA FILM in ballast water tanks



Photo. 1.

Hydrojetting (over 750 bar) or sweep blasting (brush-off blasting) of all except tightly adhered residues of mill scale, rust, and coatings.

1. SSPC – SP7
2. SIS – Sa 1
3. Keren Class – 2
4. STG – Dw3



Photo. 2.

Removal of loose rust, loose paint by hydrojetting (abt. 350 bar) or power tool chipping and wire brushing.

1. SSPC – SP3
2. SIS – St 3
3. Keren Class – 3
4. STG – Dw2

Surface Preparation Standards:

1. Steel Structures Painting Council (SSPC) – Surface Preparation Specifications
2. Sveriges Standardiseringskommision (SIS 055900)
3. Japan National Standards (JNS)
4. STG Richtlinie NR. 2222 – (Surface Preparation standards for Hydrojetting Methods)