20160224TW01
24 February 2016

FISSICcoating

Resistance to water, diesel and gasoline

20160224TW01
24 February 2016

FISSICcoating

Resistance to water, diesel and gasoline

Colophon

Title	FISSICcoating, water, diesel and gasoline resistance
Project Number	14101157
Project Manager	Hans Naus
Contractor	Beele Engineering BV
Quality Assurance	Jaap Havinga
Author(s)	Tim van der Wolk

This report is not publicly available, but distributed only to the client(s) who commissioned this project. Distribution of the report outside the project team is done only by and under responsibility of the client.

Kiwa Nederland B.V.
Sir Winston Churchilllaan 273
Postbus 70
2280 AB RIJSWIJK
The Netherlands

Tel. +31 88 998 44 00
Fax +31 88 998 44 20
info@kiwa.nl
www.kiwa.nl

15/130104

Preface

FISSICcoating is developed for corrosion protection of steel parts in shipbuilding, offshore and industrial installations, especially in installations exposed to high air humidity and/or seawater conditions. The coating also offers a high degree of fire protection and can be used to thermally protect cable and pipe penetrations.

At request of Beele Engineering the resistance of FISSICcoating in contact with water, diesel and gasoline were tested. The tests were carried in the test laboratory of Beele Engineering BV in Aalten, The Netherlands, under supervision of Kiwa Nederland BV.

Contents

1 Test description and program

1.1 Test principle

Circular test pieces of FISSICcoating were prepared and the following properties were determined: weight, volume and density. These values were obtained as a starting reference point. The test pieces were submerged in water, diesel and gasoline at room temperature during one week. Thereafter the test pieces were tested again to obtain the influence of the liquids on the properties. Next the test pieces were dried in an oven at 40ºC for several days. After drying the weight, volume and density were determined again.
The swelling tests were performed according to ISO 1817. The density was determined according to ISO 2781.

1.2 Test liquids

The liquids used to submerge the pieces were:

- Demineralised water Density: 1,000 g/cm^3
- Diesel * Density: 0,831 g/cm^3
- Gasoline (95 unleaded)* Density: 0,727 g/cm^3

*The Diesel and Gasoline was purchased on 06-01-2016 at:
Esso Tank & Wascenter Dago
Varsseveldestraatweg 80
7122 NM Aalten

1.3 Test duration, swelling test

The test pieces were submerged at 7th February 2016 and removed from the liquids at the 14th of February (in total the test pieces were submerged during 7 days).

1.4 Treatment of the pieces after the swelling test

The test pieces were stored for 7 days in a dry oven at 40ºC.

1.5 Test conditions

The swelling tests were carried out at room temperature in the research laboratory of Beele Engineering BV. The laboratory has no climate control for temperature and humidity

1.6 Test specimen

The test specimen were circular of shape.
Since the test pieces were not completely circular no dimensions were determined (thickness and diameter); the thickness of each sample was less than 3 mm .

1.7 Evaluation of the test results

The influence of the liquids on the FISSICcoating was evaluated with respect to:

- Change of volume (apparatus)
- Change of mass (apparatus)
- Change of density (apparatus)
- Change of appearance (visual)
- Evidence of surface effects after exposure (visual)

2 Test results

The FISSICcoating test pieces (3 per liquid), were measured for their weight, volume and density, each sample in threefold, before submerging, after submerging and after drying (7 days at 40ºC).

Table 1 presents the results for the resistance of FISSICcoating to diesel, gasoline and water.

The results are summarised as follows.

- The surface of the FISSICcoating visually looked unchanged after the tests, see figures 1 and 2 in Annex A. There is no evidence that the coating is chemically changed.
- Diesel has a limited effect on the FISSICcoating with very low uptake of liquid and marginal change after vaporisation of the diesel.
- FISSICcoating shows a significant swelling and liquid uptake in gasoline. After vaporisation of the volatile liquid the effect almost disappears completely.
- Contact with demineralized water causes some swelling and water uptake. After drying again it results in a limited reduction of the original weight and volume of the FISSICcoating. This is probably caused by extraction of (a) water soluble substance(s). It is generally known that demineralised water is quite aggressive. It can be expected that this effect will be lower in non-demineralised water or sea water.

	change in % after submerging for 7 days			**change in % after drying for 7 days**		
Medium	**weight**	**volume**	**density**	**weight**	**volume**	**density**
Diesel	0,3	0,7	-0,3	-0,2	0,2	-0,5
Gasoline	13	32	-14	-1,3	1,1	-2,3
Demineralised water	4,1	8,3	-3,9	-4,0	-3,3	-0,7
Test method	*ISO 1817*			*ISO 1817*		

Table 1. Summary of the test results. The results are expressed as the median values of the change in % of the original properties

Rijswijk, February 2016

Kiwa Nederland B.V.

Tim van der Wolk
Certification engineer

Hans Naus
Senior Consultant Rubber

Annex A

Figure 1 Examples of FISSICcoating test specimens, before submerging.

Figure 2 FISSICcoating after submerging in the liquids, placed in the oven for drying. Visually no changes observed. From left to right: Diesel, Gasoline and water (each 3 pieces).

Figure 3 The beaker and rig system which held the systems submerged during the test.

Figure 4 FISSICcoating submerged in the liquids, used liquids from left to right are: diesel, gasoline and water

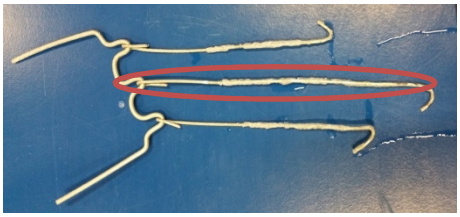

Figure 5 After removing the test pieces from the jar which contained water, a small amount of residue was observed, possibly caused by a substance migrated out of the FISSICcoating.

Figure 6 Device that measures the weight, volume and density of each FISSICcoating sample. The sample is held in place by a syringe needle.

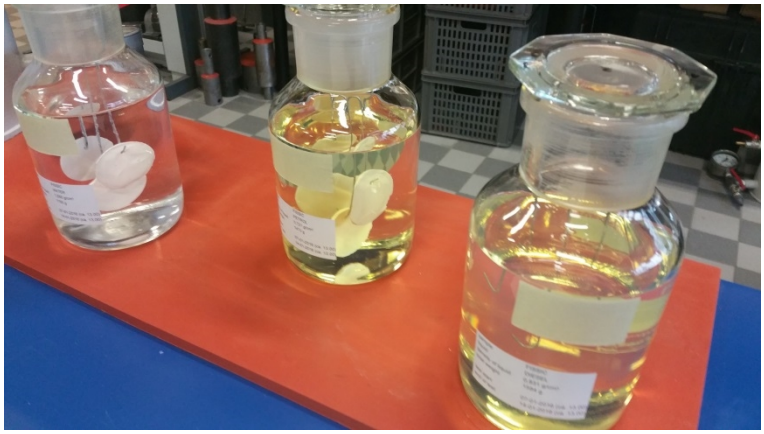

Figure 7 FISSICcoating submerged in the liquids after one week standing. No discoloration of the liquids has been observed. Used liquids from left to right are: water, gasoline and diesel