



ONAFHANKELIJK

## REPORT

Testing of Transozinc Epoxy Primer,  
Transpoxy ARC and Transurethane Shield  
according to Norsok Standard M-501, Rev. 4 system 7.

Haarlem, 25 February 2004  
RB/MH

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3071 KB ROTTERDAM  
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## 1 INTRODUCTION

By order of Transocean Coatings in Rotterdam, Holland, Centrum voor Onderzoek en Technisch advies (COT BV) has carried out a cyclic test according to Norsok Standard M-501, Rev. 4. The order has been confirmed in our fax dated 24<sup>th</sup> April 2003 with reference LB03-0315-FAX, by Mr. M. Walrave.

## 2. GENERAL DATA

Coat	Product name	Colour	Batch number	COT sample number
	Transozinc Epoxy primer	grey	--	23-04-03/516
2	Transpoxy ARC	red		23-04-03/512
3	Transurethane Shield	white		23-04-03/518

## 3. SUBSTRATE

Mild steel panels, thickness 5 mm, blast cleaned to surface preparation grade SA2½ with titanium cast-steel alloy grit, size 0.4 - 1.1 mm.

Roughness: Ra : 9 - 13 micrometres  
Rz : 55 - 65 micrometres  
Rmax : 70 - 75 micrometres

Maximum content of soluble impurities	Less than the conductivity of 20 mg/m <sup>2</sup> NaCl
Cyclic Test panels	Dimensions 75 x 150 mm
Cathodic Disbondment Test panels	Dimensions 100 x 300 mm

## 4. PAINT APPLICATION AND CURING

The coatings have been sprayed according to the recommendations of the manufacturer.

Dry film thickness: Transozinc Epoxy primer : 60 micrometres  
Transpoxy ARC : 200 micrometres  
Transurethane Shield : 75 micrometres

After 3 weeks curing at 23 ± 2°C and 50 ± 5% R.H. the dry film thickness of the paint system have been measured on each panel, after which the tests have been started.



## 5. CYCLIC EXPOSURE TEST

The fully cured coating system has been scribed horizontal down to bare metal. The scratch line is 2 mm wide and 50 mm long. The system has been exposed to the following cycle:

- 72 hours Salt Spray Test, according to ISO 7253 with synthetic seawater in accordance with ASTM D 1141
- 16 hours Drying in air
- 80 hours UV-A 340 nm weatherometer in accordance with ASTM G 53 (4 hours UV-light at 60°C / 4 hours condensation at 50°C)

The total exposure time is 4200 hours.

## 6. OVERCOATABLE WITHOUT MECHANICAL TREATMENT

After 4200 hours of cyclic testing the system has been coated with one coat Transurethane Shield without mechanical treatment.

After 7 days the adhesion has been determined according to ISO 4624.

## 7. ADHESION TEST - ISO 4624

The adhesion of the fully cured coating system has been determined by a pneumatic adhesion tester in accordance with ISO 4624. The coating surface and the dolly have been sanded lightly and the epoxy adhesive has been applied. After curing of the adhesive and prior to testing the coating and the adhesive have been scratched around the dolly down to the bare metal. Three trials have been done and the average will be reported. An average of at least 5 MPa shall be acceptable.

## 8. CATHODIC DISBONDING TEST - ASTM G8

Cathodic disbonding has been determined according to ASTM G8. After 30 days exposure time the maximum disbonding will be less than 10 mm.



## 9. REQUIREMENTS

Before and after exposure to the specified time, the test panels shall comply with the following requirements:

Method		Requirements
ISO 4628-2	Blistering	0
ISO 4628-3	Rusting	Ri 0
ISO 4628-4	Cracking	0
ISO 4628-5	Flaking	0
ISO 4624	Adhesion	Min 5.0 MPa, max 50 % reduction from original value

Corrosion of the substrate from the scratch shall not exceed 3.0 millimetres.

## 10. RESULTS

### 10.1 Adhesion without testing

The average adhesion value is  $13.1 \pm 5.0$  MPa

### 10.2 Cyclic Exposure Test

Exposure Time: 4200 hours

	Panel 1	Panel 2	Panel 3
Dry film thickness ( $\mu\text{m}$ )	$357 \pm 13$	$407 \pm 5$	$421 \pm 26$
ISO 4628-2 Blistering	0	0	0
ISO 4628-3 Rusting	0	0	0
ISO 4628-4 Cracking	0	0	0
ISO 4628-6 Chalking	0	0	0
ISO 4624 Adhesion (MPa)	$17.1 \pm 8.3$	$10.6 \pm 1.0$	$11.5 \pm 2.4$
Corrosion creep according to Rev. 4 (mm)	4.3	1.1	1.9

Adhesion according to ISO 4624 after recoating with one coat of Transurethane Shield after 4200 hours cyclic testing.

- $8.9 \pm 1.6$  MPa
- $14.5 \pm 0.8$  MPa
- $13.9 \pm 0.2$  MPa

### 10.3 Cathodic Disbonding Test

Maximum disbonding panel 1: 10 mm  
Maximum disbonding panel 2: 7 mm  
Maximum disbonding panel 3: 10 mm

## 11. SUMMARY OF TEST RESULTS

Test	Requirement	Result	Pass/Fail
Cyclic exposure test	Max. 3.0 mm creep	2x < 1.9	Pass
Cathodic disbonding	Max. 10 mm disbonding	Max.10 mm	
Adhesion	At least 5 MPa	13.1 MPa	
Adhesion after cyclic test	< 50% loss of adhesion	≥ 10.6 MPa	Pass
Overcoatability after cyclic test	< 50% loss of adhesion	≥ 8.9 MPa	Pass

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