

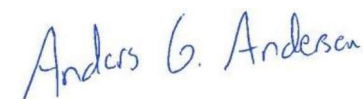
Report ID.	Norner project no	Date	Classification
NO250540	10412481	06.08.2025	Confidential
Customer / Contact / Reference			Customer Responsible
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Title

Testing of protective coatings – TEKNOZINC 90 SE / TEKNODUR COMBI 3560-09 – in accordance with ISO 12944-6:2018 – Corrosivity category C4 High.

Author(s)

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Test Responsible

Approved by

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Senior Engineer

Background

On behalf of Teknos Oy, Norner AS has performed testing of one protective coating system in accordance with ISO 12944-6:2018 – Corrosivity category C4 High.

Conclusions

Tested coating system – TEKNOZINC 90 SE / TEKNODUR COMBI 3560-09 – is in accordance with the requirements given in ISO 12944-6:2018 - Corrosivity category C4 High.

Accredited test (ISO 17025)

The test was executed under accreditation granted by Norwegian Accreditation with registration number TEST 308. The test standards included in the accreditation scope are ISO 12944-6, ISO 12944-9, ISO 9227, ISO 16474-3, ISO 4624, ISO 4628-2, -3, -4, -5, -6, ISO 9227, ISO 2812-1,-2, ISO 15711, ISO 6270-1 and ISO 2409. The sample preparation and DFT measurements are not a part of the accreditation scope. The results relate only to the items tested. The test report certificate shall not be reproduced except in full, without written approval by the laboratory.

Attachments

- Photos of exposed samples

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1. Introduction

On behalf of Teknos Oy
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HELSINKI, Finland

Norner AS has performed testing of one protective coating system according to the following test program:

ISO 12944-6:2018 – Corrosivity category C4 High.

Test regime 1:

Water Condensation ISO 6270-1 480 h.

Neutral Salt Spray ISO 9227 720 h.

The condensation testing was performed between 19.06.2025 and 09.07.2025. The NSS testing was performed between 24.06.2025 and 25.07.2025. Adhesion testing was performed on 17.07.2025 and 04.08.2025.

The application was performed by Teknos Oy.

Tested coating system:

1 st Layer	TEKNOZINC 90 SE	DFT: 60 µm
2 nd Layer	TEKNODUR COMBI 3560-09	DFT: 100 µm

Customer reference: System C4

The coating system buildup is not in accordance with ISO 12944-5 for corrosion category C4 High.

2. Application

The surface preparation, paint application and DFT measurements were performed by customer.

Table 1 DFT measurements from customer

Coating Layer	Panel ID	System Applied	Mean (µm)
1	C4.1	TEKNOZINC 90 SE	51
2		TEKNODUR COMBI 3560-09	177
1	C4.2	TEKNOZINC 90 SE	61
2		TEKNODUR COMBI 3560-09	170
1	C4.3	TEKNOZINC 90 SE	62
2		TEKNODUR COMBI 3560-09	178
1	C4.5	TEKNOZINC 90 SE	69
2		TEKNODUR COMBI 3560-09	176
1	C4.6	TEKNOZINC 90 SE	65
2		TEKNODUR COMBI 3560-09	168
1	C4.7	TEKNOZINC 90 SE	62
2		TEKNODUR COMBI 3560-09	163
1	C4.9	TEKNOZINC 90 SE	71
2		TEKNODUR COMBI 3560-09	172

Note: DFT values are adjusted with 25 µm due to compensation of blast profile.

3. Test Program

Testing was performed according to ISO 12944-6:2018 – Corrosivity category C4 High. The test standards are given below in Table 2.

Table 2 Test program

Test	Applicable Standard
Neutral Salt Spray	ISO 9227:2022
Water Condensation	ISO 6270-1:2017
Adhesion test	ISO 4624:2023 – Method B
Cross-cut	ISO 2409:2020
Blistering	ISO 4628-2:2016
Rusting	ISO 4628-3:2024 – Method 1
Cracking	ISO 4628-4:2016
Flaking	ISO 4628-5:2022

The evaluation requirements after finished testing can be found in Table 3. No visual defects shall be present, as listed in Table 4.

Table 3 Evaluation requirements

Test Regime	Corrosion from Scribe (mm)	Adhesion (MPa)	Cross-cut (Category)
Neutral Salt Spray (NSS)	≤ 1.5	≥ 2.5 and ≥ 5.0 for A/B-fractures	0 - 2
Condensation		≥ 2.5 and ≥ 5.0 for A/B-fractures	0 - 2

4. Test Results

The test results can be found in Table 4-6.

Table 4 Visual Assessments

Test	Panel ID	Blistering Density (size)		Rusting			Cracking Density (size)		Flaking Density(size)	
				(Ri)		(WRi)				
		Req.	Res.	Req.	Res.	Res.	Req.	Res.	Req.	Res.
NSS	C4.6	0(0)	0(0)	0	0	0	0(0)	0(0)	0(0)	0(0)
	C4.7	0(0)	0(0)	0	0	0	0(0)	0(0)	0(0)	0(0)
	C4.9	0(0)	0(0)	0	0	0	0(0)	0(0)	0(0)	0(0)
Condensation	C4.2	0(0)	0(0)	0	0	0	0(0)	0(0)	0(0)	0(0)
	C4.3	0(0)	0(0)	0	0	0	0(0)	0(0)	0(0)	0(0)
	C4.5	0(0)	0(0)	0	0	0	0(0)	0(0)	0(0)	0(0)

Table 5 Corrosion from scribe

Test Regime	Panel ID	Measured Corrosion including scribe (mm)										Average (mm)	Corrosion from scribe (mm)
NSS	C4.6	2.5	2.0	2.1	2.5	2.4	2.2	2.4	2.5	2.8	2.4	2.4	0.2
	C4.7	2.4	2.1	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.1	2.1	0.1
	C4.9	2.6	2.3	2.4	2.4	2.3	2.4	2.3	2.5	2.1	2.4	2.4	0.2

Test Regime	Panel ID	Pull-off			Cross-cut
		Result (MPa)	Average (MPa)	Type of fracture	Classification
NSS	C4.6	13.4	13.2	100%B	1
		13.1		100%B	1
		13.1		100%B	1
	C4.7	13.7	13.3	100%B	1
		13.8		100%B	1
		12.5		100%B	1
	C4.9	12.4	11.8	100%B	1
		10.9		100%B	1
		12.1		100%B	1
Condensation	C4.2	12.7	12.6	100%B	1
		12.6		100%B	1
		12.6		100%B	1
	C4.3	11.7	12.0	100%B	1
		11.1		100%B	1
		13.1		100%B	1
	C4.5	11.3	11.5	100%B	1
		12.0		100%B	1
		11.2		100%B	1
Adhesion Unexposed	C4.1	12.7	12.2	100%B	1
		11.3		100%B	1
		12.6		100%B	1

5. Conclusion

Tested coating system – TEKNOZINC 90 SE / TEKNODUR COMBI 3560-09 – is in accordance with the requirements given in ISO 12944-6:2018 - Corrosivity category C4 High.

NSS

Scribe line, 2 mm x 50 mm, was made mechanically on each sample.

Corrosion from scribe M has been calculated from the formula: $M=(C-W)/2$
Where C = average of nine width measurements and W is the width of applied scribe (2 mm).

Panel size: 100 mm x 150 mm x 5 mm

Adhesion test

Three test panels were used for all exposure tests. Evaluation of adhesion was done after minimum 7 days of conditioning.

Table 7 Equipment used in project

Application	Equipment	Manufacture
NSS	Salt fog chamber	Ascott and Q-Lab
Condensation	Condensation cabinet	Cromocol
Assessment	Adhesion tester PosiTest AT-A	DeFelsko
	Cross-cut multi blade	TQC
	Calipers CD-15APX	Mitutoyo
	True Color TC-60	Cromocol
Control	High surface tension Hydrometer	VWR
	FiveGo pH Meter	Mettler Toledo

All the equipment used is regularly calibrated and controlled. The pH and density of the seawater are controlled weekly.

Expanded uncertainty is estimated to be 0.35 mm for scribe measurements and 0.13 MPa for adhesion measurements. Decision rule applied in accordance with Simple Acceptance Rule ($w=0$) in accordance with ILAC G8. Uncertainty is considered as part of the conformance probability (Shared Risk / 50% PFA).



Figure 1: NSS – 720 hours

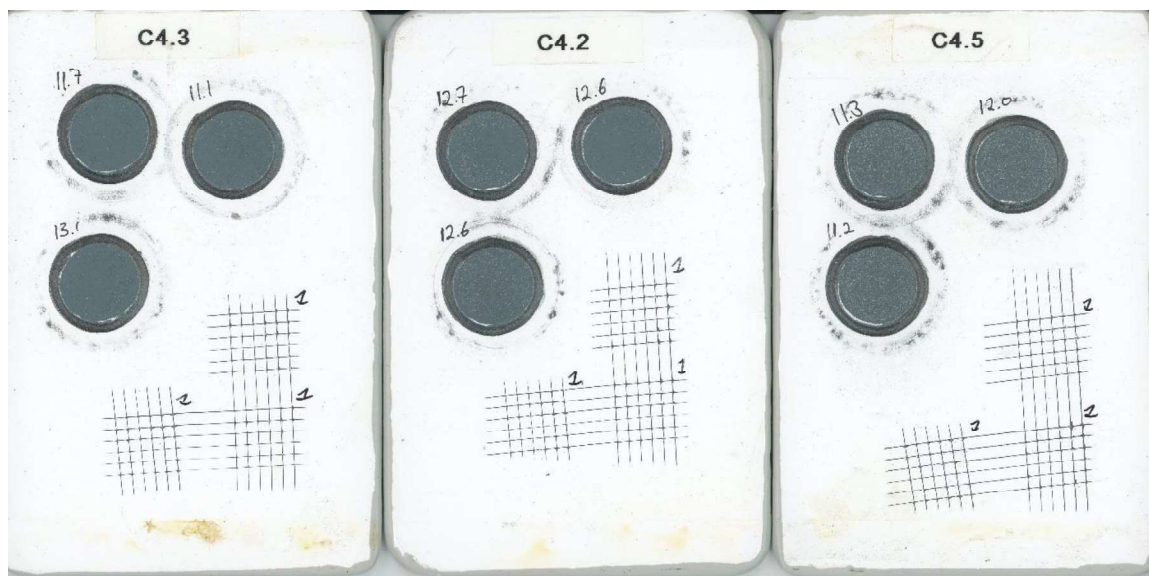


Figure 2: Condensation – 480 hours

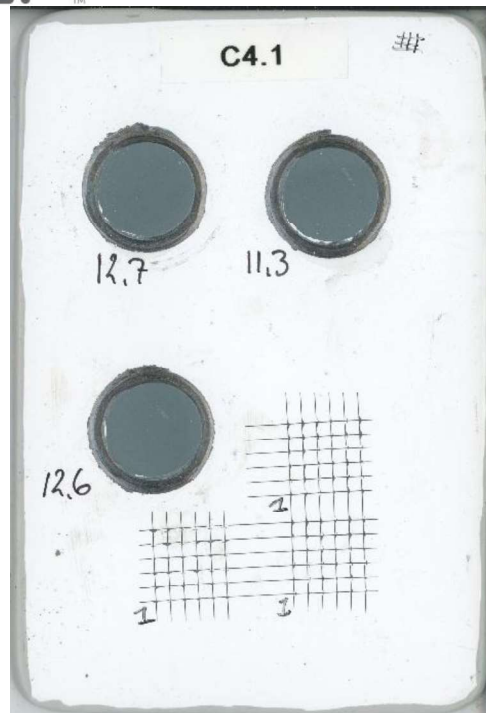


Figure 3: Adhesion Unexposed

End of report