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SWEDAC ACKREDITERING 1002 ISO/IEC 17025

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Korrosionsprovning enligt ISO 12944-6

Commission

Corrosion test of test objects according to corrosivity category C5-M medium and C5-M high as defined in ISO 12944-6. The test includes condensation test according to ISO 6270 for 720 hours, visual inspections according to ISO 4628 (ISO 4628-2, ISO 4628-3, ISO 4628-4 and ISO 4628-5) and pull-off test for adhesion test according to ISO 4624.

Test object

The test setup includes one paint system; MM ThermoCoat. The system is presented in table 1. The specifications presented in table 1 are provided by the customer.

Table 1. Test samples specifications.

System	Sample	Coating	Coating thickness	Substrate and substrate surface preparation
1	A1-A6	Thermoplastic	500 µm	Hot-dip galvanized steel plates (355) according to SS-EN ISO 1461.

All panels were marked with numbers from A1-A6. Three panels marked Ref 1- Ref 3 were used as reference panels.

The test panels were delivered at SP August 22, 2014.

Performance

Water condensation test ISO 6270

The test panels were placed in a condensation chamber and exposed for 120, 240 and 480 hours in a condensation-water test atmosphere with constant humidity, with the temperature 40 ± 3 °C and approximately 100% condensation on test specimens.

Immediately after the exposure a visual assessment was performed according to ISO 4628-2, ISO 4628-3, ISO 4628-4 and ISO 4628-5.

The exposure was carried out from August 25 to September 24, 2014.

Pull-off test for adhesion ISO 4624

Adhesion testing was performed according to ISO 4624, with two one-sided pull-off tests on each panel. The adhesion test was performed within 120 h after the panels were removed from the condensation test. Test dollies with a diameter of 20 mm were attached to the test panels using the cyanoacrylate adhesive "Loxeal 27". The adhesive was allowed to cure for 24 h before carrying out the pull-off test. The pull rate used was 1.5 mm/min. An explanation of the evaluation and type of failure/break after adhesion test according to ISO 4624 is presented below.

A = Break in base material
A/B = Adhesion break between 1:st film/base material
B = Break in 1:st film
B/C = Adhesion break between 1:st film/2:nd film
C = Break in 2:nd film
C/D = Adhesion break between 2:nd film/3:rd film
D = Break in 3:rd film
D/E = Adhesion break between 3:rd film/4:th film
-/Y = Adhesion break between film/adhesive
Y/Z = Adhesion break between adhesive/test cylinder

Results

Results from the visual assessments.
Requirements: ISO 4628-2 Blistering 0 (S0)
ISO 4628-3 Rusting Ri 0
ISO 4628-4 Cracking 0 (S0)
ISO 4628-5 Flaking 0 (S0)

Table 2. Results from the visual assessments.

	Test panel	Visual inspection according to ISO 4628			
		ISO 4628-2	ISO 4628-3	ISO 4628-4	ISO 4628-5
C5-M					
0 h	Ref 1	0 (S0)	Ri 0	0 (S0)	0 (S0)
	Ref 2	0 (S0)	Ri 0	0 (S0)	0 (S0)
	Ref 3	0 (S0)	Ri 0	0 (S0)	0 (S0)
480 h	A1	0 (S0)	Ri 0	0 (S0)	0 (S0)
	A2	0 (S0)	Ri 0	0 (S0)	0 (S0)
	A3	0 (S0)	Ri 0	0 (S0)	0 (S0)
720 h	A4	0 (S0)	Ri 0	0 (S0)	0 (S0)
	A5	0 (S0)	Ri 0	0 (S0)	0 (S0)
	A6	0 (S0)	Ri 0	0 (S0)	0 (S0)

All test panels fulfilled the requirements regarding blistering. rusting. cracking and flaking.

Requirements: ISO 4624. No adhesion break to the substrate (A/B) allowed (unless pull-off values are 5MPa or more)

Table 3. Pull-off test for adhesion test according to ISO 4624

	Test panel	Adhesion test according to ISO 4624	
C5-M		Adhesion [MPa]	Nature of fracture
0 h	Ref 1	10.89	100% A/B
		14.16	100% A/B
	Ref 2	13.49	80% A/B, 20% -/Y
		14.53	20% A/B, 80% -/Y
	Ref 3	12.89	100% A/B
		10.61	100% A/B
480 h	A1	5.71	100% A/B
		8.74	100% A/B
	A2	8.43	100% A/B
		7.57	100% A/B
	A3	6.01	100% A/B
		8.67	100% A/B
720 h	A4	7.58	100% A/B
	A5	8.14	100% A/B
		8.08	100% A/B
	A6	6.85	100% A/B
		7.44	100% A/B

All tested panels fulfilled the requirements for adhesion at brake due to that the pull-off values are 5MPa or more.

Conclusion:

The system MM ThermoCoat meet the requirements for C5-M medium and C5-M high according to ISO 12944-6.

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