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Test Report

UB200/134/12

Client:	VCI Brasil Indústria e Comércio de Embalagens Ltda. Rodovia Marechal Rondon, km 334,3 CEP 17048-690 BAURU/SP BRASIL
Date of order:	21 August 2012
Sample receipt:	August 2012, October 2012
Processing time:	21 August – 24 Dezember 2012
Task:	Tests for the VW certification of the VCI 691 film
Laboratory job number:	LA2/174/12/122122
Number of pages:	4
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Dresden, 24 Dezember 2012

1 Task

The corrosion protective effect of the corrosion protection film VCI 691 V3 100 µm on steel and iron materials has to be determined according to the guideline "Corrosion and corrosion protection for the test of VCI packings" of the Volkswagen AG Wolfsburg.

2 Supplied Packings

2.1 Corrosion protection film VCI 691 V3 100 µm, date of delivery: August 2012
2.2 VCI-free control film 100 µm, date of delivery: October 2012

3 Experimental

The following tests were performed with the corrosion protection film mentioned under 2.1:

- K-test (distance check, flask test)
- DISU-test (part of the protective effect which is solely associated with the emission of VCI components)
- KON-test (corrosion protection effect in direct contact)
- DIS-test (corrosion protection effect over distance)
- KDW-test (contact and distance check, preserving jar test)

The film mentioned under point 2.2 was used as reference material. The comparability of the reference and the VCI film was checked by measuring the ash contents and their analysis. The results are described under point 4.

The cylindrical specimen for the K-test were made of unalloyed, rimmed construction steel S235JRG2, DIN EN 10025, material number 1.0038, date of delivery: 23rd March 2004, ∅ = 16 mm, h = 10 mm. For the other tests sheets (Q-Panels of Q-Lab Deutschland GmbH) made of mild steel DC 03 material-no. 1.0347, charge no. 021310176 were used.

4 Test results

4.1 Film thickness and ash content

Film	**thickness ± standard deviation / µm**	**Ash content ± standard deviation / wt%**
VCI 691 film V3 100 µm	83.1 ± 1.6	0.327 ± 0.006
VCI-free control film 100 µm	99.9 ± 5.6	0.267 ± 0.007

The thickness values and the ash content of the reference film and the VCI film are similar. Testing with this reference film is permissible.

4.2 Corrosion protection effect VCI 691 film 100 µm

K-Test

Test duration:	29 – 30 October 2012	
Evaluation:	VCI-film grades: 3;3;3;3	Reference grades: 0;0
Rating:	**good anticorrosive effect**	

KON-Test

Test duration:	06 November – 03 December 2012	
Number of cycles until the samples fail:		
Distance:	VCI: > 25 (no failure) RG[C25]: (1;2), (0;1), (0;0)	Ref: 1 RG[C1]: (2;1)
Protection factor:	PF > 25:1	
	PF > 25	
Rating:	**good**	

DIS-Test

Test duration:	06 November – 03 December 2012	
Number of cycles until the samples fail:		
Distance:	VCI: > 25 (no failure) RG[C25]: (2;0), (0;1), (1,1)	Ref: 3 RG[C3]: (1;1)
		RG[C2]: (1;2)
Protection factor:	PF > 25:3	
	PF > 8,33	
Rating:	**good**	

DISU-Test

Test duration:	15 November – 10 December 2012		
Number of cycles until the samples fail:			
Distance:	VCI: 23	RG[C23]: (0;2), (1;1), (1;1)	Ref: 5 RG[C5]: (1;2)
		RG[C25]: (2;2), (1;1), (1;2)	
Protection factor:	PF = 23:5		
	PF = 4,6		
Rating:	**good**		

C = Cycle, RG = Rust Grade (Metal sheet front side; Metal sheet back side), PF = Protection Factor

KDW-Test

Test duration: 03 – 24 December 2012
Number of cycles until the samples fail:

Contact:	VCI: > 19 (no failure) RG[C19]: (0;1;0;0)	Ref: 4 RG[C4]: (2;2)
Protection factor:	PF > 19:4 PF > 4,75	
Rating:	**good**	
Distance:	VCI: > 14 (no failure) RG[C14]: (0;0,0;0;0;1;0;1)	Ref: 2 RG[C2]: (1;1;1;1)
Protection factor:	PF > 14:2 PF > 7	
Rating:	**good**	
Crevice:	VCI: > 15 (no failure) RG[C15]: (0;0;0;0;0;0;0;0)	Ref: 3 RG[C3]: (1;2;0;1)
Protection factor:	PF > 15:3 PF > 5	
Rating:	**good**	

4.3 Summary of the test results

Test	K-Test	KON-Test	DIS-Test	DISU-Test	KDW-Test	Overall score*
Rating	good	good	good	good	contact: good distance: good crevice: good	2.0

(* Average of all test scores, 2 = good, 3 = moderate, 4 = poor, 5 = not remarkable)

The corrosion protection effect of the corrosion protection film VCI 691 V3 100 µm (date of delivery: August 2012) on steel and iron materials is "good" according to the tests (K, DISU, KON, KDW and DIS) corresponding to the guideline "Corrosion and corrosion protection for the test of VCI packings" of the Volkswagen AG Wolfsburg. A certificate can be granted.