



Beratung - Schadensfallaufklärung - Qualitätssicherung - Forschung - Prüfung

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## Test Report PB200/015/22\_1

Client: MetPro Verpackungs-Service GmbH  
An der Linde 21  
04838 Jesewitz  
GERMANY

Day of order: 2022-03-10

Receipt of test specimens: 2022-03-09


Period of testing: 2022-03-11 to 2022-06-22

Order: Testing of "BioCor® 300 RP" 80 µm VCI film according to VW50164




Laboratory job No.: LA2/44/22/222039, LA4/100/22/222039

Number of pages: 6

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Dresden, 2022-12-22

Prepared: Dr. F. Hoffmann	Checked: Dr. S. Friedrich	Approved: Dr. S. Friedrich
Sign: 	Sign: 	Sign: 
Date: 2022-12-22	Date: 2022-12-22	Date: 2022-12-22

This test report replaces test report PB200/015/22 dated 2022-06-22, which is hereby invalidated.

The publication of test reports in extracts, the reference to the tests for the purpose of promotion and the application of the content of the test report require a written consent of the Institut für Korrosionsschutz Dresden GmbH in every single case. In the case of no other agreement we reserve to dispose of the samples three month after delivery. The statements refer to the test object exclusively.



## 1 Subject

The corrosion protective effect of the corrosion protection material "BioCor© 300 RP" 80 µm VCI film on steel and iron materials has to be determined according to the Volkswagen AG Standard VW50164, issue 2013-06, "Method for Testing and Releasing VCI Packaging Materials" for the purpose of certification.

## 2 Supplied Materials

The following materials were handed over to the IKS by the client for these investigations:

- (1) **Corrosion protection film "BioCor© 300 RP", 80 µm (sample receipt: 2022-03-09)<sup>1</sup>**
- (2) **Associated VCI-free Reference film of the same name, 80 µm (sample receipt: 2022-03-09)**

## 3 Test execution

The following tests were performed with the corrosion protection material mentioned under (1)

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

The material mentioned under (2) was used as reference. The comparability of the reference with the VCI film was checked by determining the ash content and the analysis of its elemental composition, results see IKS test report PB200/014/22.

The cylindrical specimen for the K test were made of unalloyed, rimmed construction steel S235JRN2, DIN EN 10025, material number 1.0038, date of delivery: 2003-05-30, Ø = 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. 0403193550 were used.

### Utilized accredited testing instruments (TI):

- For the determination of the refractive index of the glycerin-water-mixture during the K test the ABBE-Refractometer ABBE REF 1 (TI-card-No. PMK 200-21.1) of PCE Deutschland GmbH was used.
- K test was done in the universal oven UF110plus (TI card no. PMK 200-17) from Memmert GmbH + Co KG.
- The KDW test was carried out in the universal oven UF110plus (TI card no. PMK 200-17) from Memmert GmbH + Co KG.
- KON, DIS and DISU test were carried out in the climate chambers VC4034 (KK1, TI card no. PMK 200-3.1) and VC<sup>3</sup>7034 (KK5, TI card no. PMK 200-3.5) from Voetsch Industrietechnik GmbH.

## 4 Test results

### K test

Test duration: 2022-03-15 to 2022-03-16  
Evaluation: VCI grades: 3;2;3;3 Reference grades: 0;0  
Rating: **good corrosion protection effect (Level 3)**

<sup>1</sup> At the time of testing, the film was designated as "BIOCOR®-R". The name was later changed to "BioCor© 300 RP".

### KON test

A VCI model packaging of KON, DIS and DISU test is considered failed if

- both outer surfaces of the test sheet used exhibit corrosion and at least one surface has RN 2 or greater or
- at least one of the two test sheet surfaces has RN 3 or greater.

The particular corrosion protection level is not achieved if at least two of the three simultaneously removed units of VCI packaging failed.

Test duration: 2022-05-31 to 2022-06-22

Number of cycles until the reference samples failed:

Ref: 4 RN[Z1]: (0;0); RN[Z2]: (0;1); RN[Z3]: (1;2); RN[Z4]: (1;1)

Number of cycles without failure of VCI samples:

VCI: 20 at least RN[Z20]: (0;1), (0;0), (0;1)

Protection factor: SF ≥ 20:4  
SF ≥ 5.0

Rating: **good (Level 3)**

*Z = Cycle, RN = Rust Grade (Metal sheet front side; Metal sheet back side), SF = Protection Factor*

### DIS test

Test duration: 2022-05-04 to 2022-05-16

Number of cycles until the reference samples failed:

Ref: 2 RN[Z1]: (1;1); RN[Z2]: (1;2); RN[Z3]: (2;2)

Number of cycles without failure of VCI samples:

VCI: 8 RN[Z8]: (2;1), (0;1), (1;1)  
RN[Z10]: (1;1), (2;2), (2;2), (2;2), (2;2), (2;1)  
5 of 6 units of model packaging failed in Z10

Protection factor: SF = 8:2  
SF = 4.0

Rating: **moderate (Level 2)**

### DISU test

Test duration: 2022-05-04 to 2022-05-23

Number of cycles until the reference samples failed:

Ref: 2 RN[Z1]: (1;1); RN[Z2]: (1;2); RN[Z3]: (2;2);

Number of cycles without failure of VCI samples:

VCI: 17 at least RN[Z17]: (1;1), (1;2), (0;1)

Protection factor: SF ≥ 17:2  
SF ≥ 8.5

Rating: **good (Level 3)**

**KDW test**

The two units of VCI model packaging that were removed at the same time are considered failed if

- more than half of the surfaces to be examined (4 surfaces that were in direct contact with the packaging material or 8 surfaces for intermediate spaces and gaps) exhibit at least RN 1 or
- corrosion can be detected on half of the surfaces to be examined, and of these at least one surface has RN 2 or greater

Test duration: 2022-05-04 to 2022-06-08

KDW direct contact:

Number of cycles until the reference samples failed:

Ref: 7                      RN[Z1]: (0;0), RN[Z2]: (0;1), RN[Z3]: (0;0), RN[Z4]: (0;0), RN[Z5]: (0;0),  
                                  RN[Z6]: (0;0), RN[Z7]: (1;1)

Number of cycles without failure of VCI samples:

VCI: 33 at least        RN[Z33]: (0;1;0;1)

Protection factor:    SF ≥ 33:7

                                 SF ≥ 4.71

Rating:                    **good (Level 3)**

*Z = Cycle, RN = Rust Grade (Metal sheet surface 1; Metal sheet surface 2; ...), SF = Protection Factor*

KDW intermediate spaces:

Number of cycles until the reference samples failed:

Ref: 7                      RN[Z1]: (0;0;0;0), RN[Z2]: (2;0;0;0), RN[Z3]: (1;0;0;0), RN[Z4]: (1;0;0;1),  
                                  RN[Z5]: (0;0;0;0), RN[Z6]: (0;1;0;0), RN[Z7]: (1;1;0;1)

Number of cycles without failure of VCI samples:

VCI: 33 at least        RN[Z33]: (0;0;0;1;0;1;0;0)

Protection factor:    SF ≥ 33:7

                                 SF ≥ 4.71

Rating:                    **good (Level 3)**

KDW gaps:

Number of cycles until the reference samples failed:

Ref: 7                      RN[Z1]: (0;0;0;0), RN[Z2]: (0;0;0;1), RN[Z3]: (0;0;0;0), RN[Z4]: (0;0;0;0),  
                                  RN[Z5]: (0;0;0;0), RN[Z6]: (0;0;0;0), RN[Z7]: (2;0;0;1)

Number of cycles without failure of VCI samples:

VCI: 33 at least        RN[Z33]: (0;0;0;0;0;0;0;1)

Protection factor:    SF ≥ 33:7

                                 SF ≥ 4.71

Rating:                    **good (Level 3)**

## 5 Requirements

According to VW50164 the VCI packaging materials must pass the K, KDW, KON, DIS, and DISU tests at least with Level 2 (that means moderate or good rating), see Table 1 and Table 2.

Table 1: K test evaluation

Level	Rating
0	No corrosion protection effect
1	Slight corrosion protection effect
2	Moderate corrosion protection effect
3	Good corrosion protection effect

Table 2: Levels for evaluation the VCI corrosion protection effect (KDW, KON, DIS, DISU test)

Level	Protection factor SF for VCI film	Protection factor SF for VCI paper	Rating
0	≤3,0	≤3,0	negligible
1	≤3,5	≤4,0	weak
2	≤4,5	≤5,0	moderate
3	>4,5	>5,0	good, packaging material is suitable for overseas transport

## 6 Conformity

### Summary of test results:

Test	K test	KON test	DIS test	DISU test	KDW test	Overall score*
<b>Rating</b>	good	good	moderate	good	contact: good intermediate spaces: good gaps: good	2.1

\* Average of all test scores, 2 = good, 3 = moderate, 4 = weak, 5 = negligible

The corrosion protection effect of the VCI material

### (1) Corrosion protection film “BioCor© 300 RP”, 80 µm (sample receipt: 2022-03-09)

on steel and iron materials is “moderate” to “good” (overall score: 2.1) according to the tests K, KDW, KON, DIS and DISU in compliance with the Volkswagen AG Standard VW50164, issue 2013-06, “Method for Testing and Releasing VCI Packaging Materials”.

The VCI material (1) meets the requirements of TRGS 615 (2007), and the IKS analysis results of (1) correspond with the client’s disclosed chemical composition, see IKS test report PB200/014/22. A certificate can be issued.

### Notice:

The conformity statement refers to all specified test results.

The following decision rule(s) were applied for the conformity assessment(s):

Measurement uncertainty was not considered.

## 7 Standards and regulations

Table 3: used accredited standards and regulations

<b>Standard / regulation</b>	<b>edition</b>
VW50164	2013-06