BFSV Verpackungsinstitut Hamburg GmbH

Test Report
No. 2430/17

Testing of corrosion protection effect of one VCI-film in accordance with TL 8135-0043

Client:	Controlpack Carretera Santa Barbara km 20, 200 43560 La Senia Tarragona, Spain
Date of order:	21st March 2017
Customer reference:	Order no. 22926
Test samples:	One VCI-film, „ControlOx“
Received on:	24th March 2017
Date of testing:	27th to 28th March 2017
Test reference:	TL 8135-0043
Official in Charge:	B. Eng. S. Karg
Text pages:	2
Figures:	2
Appendices:	1
Date of issue:	31st March 017

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ista CERTIFIED LABORATORY

DAkkS Deutsche Akkreditierungsstelle D-PL-19253-01-00

1 Content of the order

The BFSV Hamburg Institute of Packaging GmbH was authorized to test a VCI film in accordance with TL 8135-0043 „ Anticorrosive film", Edition 3, September 2002, Appendix A „Testing of corrosion protection effect of VCI-packaging accessories".

Requirement: It is necessary to meet at least the corrosion protection effect of grade 2 (middle corrosion protection effect).

2 Test samples

At 24th March 2017 one VCI-film was delivered to BFSV Institute of Packaging. The product names are: „ControlOx"

3 Testing

The VCI film was tested according to TL 8135-0043, Appendix A. A description of the testing is listed on page 3.

4 Summarizing result

Table 1: Summarizing test result

VCI film	Corrosion protection effect	Grade	Requirement for TL 8135-0043
„ControlOx"	Good	3	fullfilled

The detailed results including a comparison of the corrosion symptoms with the requirements of TL 8135-0043 (Appendix A) is listed in appendix 1.

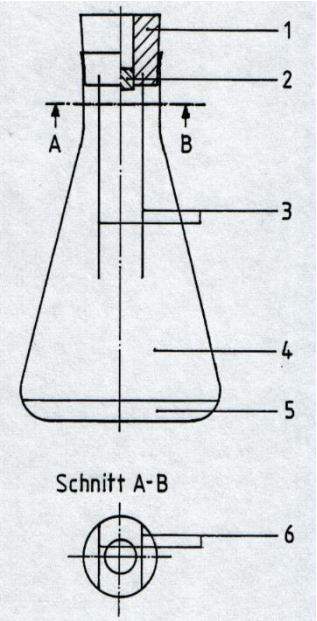
Official in Charge

Verpackungsinstitut BFSV Beratung - Forschung Systemplanung Prüfung Hamburg

B. Eng. S. Karg

Equipment and materials:

1. Rubber bung: upper diameter 53 mm, lower diameter 45 mm, hole 15 mm.
2. Test object: Unalloyed, killed structured steel according to DIN EN 10025 (Material-No. 1.0038); length12 mm, diameter 16 mm.
3. VCI-sample 25 mm x 150 mm (2 stripes).
4. Erlenmeyer flask, 1 Liter wide mouth according to DIN 12385
   - 3 glass jar with VCI-film
   - 1 glass jar without VCI-film (control)
5. Glycerine-water solution, ρ = 1,076 g/cm^3 and 23 °C
6. Two slits on the rubber bung (5 mm) for film-samples



Brief description:

- Plugs shall be abraded with water to a uniform finish surface (320 grit)
- Cleaning with destilled water and ethanol
- Fixing of two stripes of VCI-film (one on each slit on the rubber bung)
- After a period of 20 h, which serves as the build-up phase for the VCI active substances, a mixture of water and glycerine is poured in.
- After another period of 2 h the glass containers are heated from room temperature to 40 °C in a fan oven for another 2 hours
  Moisture condenses on the surface of the test objects, resulting in corrosion on the control sample without VCI.
  The test objects in the containers with VCI should display little or no corrosion.
- After finishing the test, the plugs have to be dried in the heating cabinet

Evaluation:

The corrosion symptoms are documented and the protective effect is assessed by comparison with the control sample.

Requirements of TL 8135-0043 (Appendix A) for the corrosion protection effect:

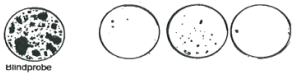
Evaluation of the test objects	Corrosion protection effect	
 Keine korrosionsschützende Wirkung	**None**	(Grade 0)
 Geringe korrosionsschützende Wirkung	**Slight**	(Grade 1)
 Mittlere korrosionsschützende Wirkung	**Middle**	(Grade 2)
 Gute korrosionsschützende Wirkung	**Good**	(Grade 3)

Table 2: Detailed test results

Controlpack VCI film „ControlOx“	**Test objects**	
	Control sample (without VCI)	Protected samples with VCI film
Evaluation		
Corrosion protection effect		3 3 3 **Grade 3** Good corrosion protection effect