

## REPORT

### Testing of a polyurethane coating

#### Product description: "Tuff-Stuff with UV coating"

#### Purpose of the test

Testing of a polyurethane coating with the product description "Tuff-Stuff with UV coating" (XRP-8249/8200) according to the German Food and Consumer Goods Act (LMBG) in consideration of the Hazard Analysis and Critical Control Point (HACCP) concept for the company Rhino Linings GmbH, Otto-Hahn-Str. 35, 63303 Dreieich Spredlingen, Germany.

#### Description of the test object

The test object with the product description "Tuff-Stuff with UV coating" (XRP-8249/8200), according to information from the client, is a polyurethane coating top-coated with a UV protectant in order to prevent discoloration of the polyurethane by sunlight. The test object is an elastomer polyurethane dual component coating system. It is comprised of the B-components XRP-8249 (polyhydroxy alcohol) and from the A-components 8200 (isocyanate). The weight ratio A/B is 61/100, the volume ratio 1/1.88. The UV coating is comprised of the following: homopolymer HDI, n-butylactetate and EEP solution.

#### Application of the test object

The surface coating, according to information from the client, is mainly used in transport vehicles, which are used for the transport of food, such as in refrigerated transport, perishable foods transport, and transport for butcher's shops and bakeries. The test object is used in accordance with DIN EN 1672 for the food industry.

### Bau und Betrieb [Construction and Business]

Business Unit  
Technical equipment  
Ridlerstr. 65  
D-80339 Munich  
Germany  
Tel.: +(0)89 51 91-31 65  
Fax: +(0)89 51 91-31 92  
[www.tuevs.de](http://www.tuevs.de)  
E-mail: [kaelte-klima@tuevs.de](mailto:kaelte-klima@tuevs.de)

Munich, 10/28/02  
BB-TAK1-MUC/hf  
G:\ATP\Berichte\020706 Rhino Linings.doc  
Job No.: 111407

This document is 4 pages.

TÜV Süddeutschland  
Bau und Betrieb GmbH

Chairman,  
Board of Directors:  
Karsten Puell  
Manager:  
Roland Ayx (Speaker)  
Dr. Kurt Vinzens  
Location: Munich

HRB 96869

DÄR  
[logo]  
DAP-PL-2886.00

Test laboratory accredited by DAP  
Deutsches Akkreditierungssystem  
Prüfwesen GmbH

The reproduction of this document in extracts and the use for advertising purposes requires the written approval of TÜV Süddeutschland Bau und Betrieb GmbH.

The test results refer exclusively to the investigated test objects.

Page 2 of 4

Bau und Betrieb  
BB-TAK1-MUC/hf. Munich, 10/28/02, Job No.: 111407  
020706 Rhino Linings**Basis of the test**

The basis of the test is the German Food and Consumer Goods Act and the regulation concerning commodities and DIN 10503 "Food Hygiene."

**Report on the testing of a polyurethane coating with the product description: "Tuff-Stuff with UV coating" from 5/15/02****Time frame of the test**

The test was performed in September 2002.

**Test**

- Definition of the global migration (distilled water, 3% acetic acid, 10% ethanol) for category 1: 10 days at 40° C [104° F] according to B II XXI

**Test Results**

The test is performed by the Umwelt Service [Environmental Service] department of the TÜV Süddeutschland Bau und Betrieb [TÜV Southern Germany Construction and Business]. The results of the test are presented in the following table.

Parameter	Method	Value	Unit
Global migration	BII XXI		
10 days/40° C [104° F]			9.2 mg/dm <sup>2</sup>
dist. Water			19.6 mg/dm <sup>2</sup>
3 % acetic acid by wt.			13.8 mg/dm <sup>2</sup>
10% ethanol by wt.			

**Summary**

The samples presented by Rhino Linings GmbH with a polyurethane coating for truck bodies were analyzed according to the German Food and Consumer Goods Act, whereby the test was limited to the materials expected from prior experience.

Page 3 of 4

Bau und Betrieb  
BB-TAK1-MUC/hf. Munich, 10/28/02, Job No.: 111407  
020706 Rhino Linings

The polyurethane coating shall be deemed a commodity, which under appropriate usage, is in contact with food longer than 24 hours (extended contact). The coating will thus be classified as category 1 according to paragraphs 2.2 of the regulation concerning commodities, Appendix XXXIX.

According to the regulation concerning commodities, the determined global migration value may not exceed 20 mg/dm<sup>2</sup> for category 1 (test conditions: 10 days at 40° C [104° F]). All of the realized values fall below 20 mg/dm<sup>2</sup>.

In commodities made of polyurethane, there must be no detectable free isocyanate and peroxide residues. There was no evidence of these materials in the tested samples. (Report from 5/15/00)

In addition, there was no evidence of aromatic amine in the samples. (Report from 5/15/00)

Phenol may not be recorded higher than 0.5 mg/dm<sup>2</sup>. All of the realized values fall below 0.5 mg/dm<sup>2</sup>. (Report from 5/15/00)

The limit for cadmium is 75 mg/kg in accordance with DIN EN 71 Part 3. The realized values are less than 0.005 mg/kg. (Report from 5/15/00)

Tests for hexamethylene diamine and diole were not performed. (Report from 5/15/00)

No objections exist against the use of polyurethane in the manufacture of commodities, as long as they are used for the intended purpose and the above mentioned preconditions are fulfilled in accordance with the German Food and Consumer Goods Act. These preconditions are demonstrated in the samples tested, so there are no objections against the approved use of the polyurethane coating.

Page 4 of 4

Bau und Betrieb

BB-TAK1-MUC/hf. Munich, 10/28/02, Job No.: 111407

020706 Rhino Linings

**Consideration of the Hazard Analysis and Critical Control Point (HACCP) Concept:**

HACCP imposes requirements that, among other things, eliminate influences in the transport and storage of food which could lead to disease among humans after the consumption of food. Food could come into contact with this coating; for that reason, Rhino Linings GmbH commissioned a test of the polyurethane coating. With this test, the basis of the analysis of danger was performed in compliance of the HACCP principle. Since the testing of samples fulfilled the requirements of the German Food and Consumer Goods Act, there exist no objections to its use. The basis of the analysis of danger for the materials (the polyurethane coating in this case) is hereby fulfilled.

Refrigeration and climate control technology ATP-Test Laboratory	Official Expert
[signature] Birgit Brunnhuber  Munich, 10/28/02	[Signature] Florian Haas