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STWC08-089 (98546/1)telephone  
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*Copy of our test report nene47-100 of October 20, 2000, because of a modified company name and product code*

### Examination of Protection lacquer PPG 2010-601/A

You asked us to examine **Protection lacquer PPG 2010-601/A** with respect to current food legislation.

According to your information the material is intended to be used as internal protection lacquer for aluminium food cans and can ends.

In order to carry out the examinations we received a wet sample of the above mentioned lacquer. We applied the lacquer onto suitable substrates by roller coating. The dry coating weight was 6,0 – 6,5 g/m<sup>2</sup>. The lacquer film was cured in a circulating air oven at 200-205 °C during 15 minutes.

The coated substrates were brought into contact with aqueous and nonaqueous solvents under test conditions which are suitable to simulate the influence of foodstuff.

The conditions for testing were applied in accordance to Council Directive of December 19, 1985 (85/572/EEC), Commission Directive of July 29, 1997 (97/48/EU) and the German adoption of the above mentioned requirements into ASU-method B 80.30 (1+2) (official collection of analytical methods according to § 35 LMBG).

According to Directive 97/48/EU the overall migration into the alternative fat simulant isooctane was determined.

### PROCEDURE OF THE EXAMINATIONS

#### 1. Migration tests

The global migration was determined as dry residue of the migrates. The organic components of the dry residue were determined as their chloroforme soluble parts according to the announcement of the BgVV Plastics Commission.

Die Prüfergebnisse beziehen sich ausschließlich auf die Prüfgegenstände. Prüfberichte und Gutachten dürfen ohne Genehmigung des Prüfinstitutes weder vollständig noch auszugsweise vervielfältigt werden.


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## 2. Analysis of the migrates

The migrates were analyzed for organic bound nitrogen, phenoles, formaldehyde and primary aromatic amines.

The migration of BADGE and BFDGE as well as their chlorohydrin and water adducts were examined in 3 % acetic acid after sterilisation at 121 °C for 0,5 h. The analysis of the migration solutions was carried out after extraction with ethanol by RP-HPLC/fluorescence detection.

## 3. Extraction test of the lacquer film

The coating film was analyzed for residual BADGE, bisphenol A, BFDGE and bisphenol F by acetonitrile extraction and gaschromatographic examination of the extract with mass specific detector.

## 4. Sensoric evaluation

The enameled substrates were brought into contact with flavour sensitive solvents. The contact was carried out at various time/temperature conditions and a surface/volume ratio of 1 cm<sup>2</sup> : 2 ml. The sensoric evaluation was carried out as triangle tests by a taste panel with particular experience. As blanks we used the solvents which had not been in contact with the coating material. The evaluation was carried out in accordance to DIN 10 955 (German Institute for Normalisation).

## RESULTS OF THE EXAMINATIONS

### 1. Global migration

Simulants	t/T conditions	Dry residue of migrates mg/dm <sup>2</sup>	chloroforme soluble parts of dry residue mg/dm <sup>2</sup>
dist. water	1 h 121 °C + 10 d 40 °C	4,6	<0,1
3 % acetic acid	1 h 121 °C + 10 d 40 °C	1,8	0,1
10 % ethanol	1 h 121 °C + 10 d 40 °C	2,1	0,9
isooctane	2 h 60 °C + 2 d 20 °C	0,5	<0,1

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2. Specific migration

t/T condition: 1 h 121 °C + 10 d 40 °C

	simulant	Results
<b>organic bound nitrogen</b>	dist. water	n.d. (< 0,07 mg/dm <sup>2</sup> )
	3 % acetic acid	n.d. (< 0,07 mg/dm <sup>2</sup> )
	10 % ethanol	n.d. (< 0,07 mg/dm <sup>2</sup> )
<b>phenoles</b>	dist. water	0,02 mg/dm <sup>2</sup>
	3 % acetic acid	0,02 mg/dm <sup>2</sup>
<b>formaldehyde</b>	dist. water	n.d. (< 0,01 mg/dm <sup>2</sup> )
	3 % acetic acid	0,02 mg/dm <sup>2</sup>
<b>prim. aromat. amines</b>	dist. water	n.d. (< 0,001 mg/dm <sup>2</sup> )
	3 % acetic acid	n.d. (< 0,001 mg/dm <sup>2</sup> )

n.d. = not detectable

Specific migration

3 % acetic acid 0,5 h 121 °C

	results
BADGE	n.d. (< 0,002 mg/dm <sup>2</sup> )
BADGE.H <sub>2</sub> O	0,006 mg/dm <sup>2</sup>
BADGE.2H <sub>2</sub> O	0,050 mg/dm <sup>2</sup>
BADGE.HCl.H <sub>2</sub> O	n.d. (< 0,002 mg/dm <sup>2</sup> )
BADGE.HCl	n.d. (< 0,002 mg/dm <sup>2</sup> )
BADGE.2HCl	n.d. (< 0,002 mg/dm <sup>2</sup> )
BFDGE	n.d. (< 0,005 mg/dm <sup>2</sup> )
BFDGE.H <sub>2</sub> O	n.d. (< 0,005 mg/dm <sup>2</sup> )
BFDGE.2H <sub>2</sub> O	n.d. (< 0,005 mg/dm <sup>2</sup> )
BFDGE.HCl.H <sub>2</sub> O	n.d. (< 0,005 mg/dm <sup>2</sup> )
BFDGE.HCl	n.d. (< 0,005 mg/dm <sup>2</sup> )
BFDGE.2HCl	n.d. (< 0,005 mg/dm <sup>2</sup> )

n.d. = not detectable

Die Prüfergebnisse beziehen sich ausschließlich auf die Prüfgegenstände. Prüfberichte und Gutachten dürfen ohne Genehmigung des Prüfinstitutes weder vollständig noch auszugsweise vervielfältigt werden.

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3. Extraction test of the lacquer film

Acetonitrile extraction 24 h 20 °C

	results
BADGE	0,006 mg/dm <sup>2</sup>
BFDGE	n.d. (< 0,002 mg/dm <sup>2</sup> )
bisphenol A	0,003 mg/dm <sup>2</sup>
bisphenol F	n.d. (< 0,002 mg/dm <sup>2</sup> )

n.d. = not detectable

4. Sensoric evaluation

Simulans t/T conditions	surface/volume ratio	appearance	odour	flavour
drinking water 1 h 121 °C + 10 d 40 °C	1 cm <sup>2</sup> : 2 ml	0	0	0,3
mineral water 10 d 40 °C	1 cm <sup>2</sup> : 2 ml	0	0	0,3

0 = no deviation detectable  
 1 = deviation slightly detectable  
 2 = slight deviation  
 3 = considerable deviation  
 4 = strong deviation

EVALUATION1. Migrations tests

The dry residues of the migrates are low and well below the limit mentioned in the Resolution AP (96) 5 of the Council of Europe. This applies to the overall migrates as well as to their chloroforme soluble parts. They are also lower than the limits mentioned in § 175.300 of the US FDA Regulations concerning resinous coatings.

2. Examination of migrates

The analysis of the migrates showed no specific migration of organic bound nitrogen, phenoles, formaldehyde and primary aromatic amines which could give reason for concerns.

There were neither BADGE and BFDGE nor their hydrolysis products and chlorohydrin adducts detectable in the acidic migration solutions in concerning concentrations.

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3. Extraction test of the lacquer film

The coating film does not contain detectable residues of BFDGE and bisphenol F. BADGE and bisphenol A were detectable in the extract at very low levels.

4. Sensoric evaluation

The sensoric evaluation showed no deviation which could give reason for doubts concerning creation of off-odours or off-flavours in food. Also there was no critical diffusion of colours and/or turbidity detectable.

According to the results of our evaluation the **Protection lacquer PPG 2010-601/A** complies with requirements of § 31 (1) of the German Food and Commodity Law and § 175.300 of the US FDA Regulations. Under conditions of appropriate application and under circumstances of destined and expected use it does not add to food any particles and/or components which are innocuous to human health, which alter odour or flavour of food.


  
 INSTITUT NEHRING GmbH

Dr. Ulrich Nehring



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