



## Translation of report from:

### IPT

Instituto de Pesquisas Tecnológicas

The client may request the return of the samples in up to 90 days. After this period, they shall be discarded.

### TECHNICAL REPORT # 48 620

CLIENT: **VCI BRASIL INDÚSTRIA E COMÉRCIO DE EMBALAGENS LTDA.**

TYPE OF WORK CONDUCTED: Tests on wrapping paper treated with VCI – Volatile Corrosion Inhibitor

REFERENCE: Letter dated 05/15/00 ACC # 689

## 1. INTRODUCTION

VCI BRASIL INDÚSTRIA E COMÉRCIO DE EMBALAGENS LTDA. requested the Surface Corrosion and Treatment Laboratory at the Technological Research Institute of the State of São Paulo S.A. – IPT, to conduct the following experiments and tests:

- vapor inhibition ability check, in the “as received” condition, with regard to materials made of carbon steel without coating, chromized carbon steel, tinned carbon steel and galvanized carbon steel;
- vapor inhibition ability check, in the “after accelerated exhaustion” condition, with regard to material made of carbon steel without coating, chromized carbon steel, tinned carbon steel and galvanized carbon steel;
- corrosion by contact check with regard to material made of carbon steel without coating, chromized carbon steel, tinned carbon steel and galvanized carbon steel;
- primary cutaneous irritation/corrosion test;
- primary ocular irritation/corrosion test;
- solid residue biodegradability test (Bartha test) in sandy soil and clay soil.

For the above, the Client sent a sample of paper treated with VCI – Volatile Corrosion Inhibitor. In this laboratory, the sample received the following identification – LCTS # 568.



## 2. METHOD USED

The test to check vapor inhibition ability, under the conditions of “as received” and “after accelerated exhaustion”, with regard to the following materials: carbon steel without coating, chromized carbon steel, tinned carbon steel, and galvanized carbon steel, was conducted as per the procedure presented in Annex I.

The test to check for corrosion by contact, with regard to the following materials: carbon steel without coating, chromized carbon steel, tinned carbon steel, and galvanized carbon steel, was conducted as per the procedure presented in Annex II.

The primary cutaneous irritation/corrosion, primary ocular irritation/corrosion and sandy soil and clay soil biodegradability tests were conducted by the Bioagri Laboratórios Ltda. company. The entire methodology adopted for conducting these tests is found in Annex III.

**TABLE 1 - The result of the vapor inhibition ability check, in the conditions of “as received” and “after accelerated exhaustion”, of the LCTS # 2 568 sample, with regard to the following materials: carbon steel without coating, chromized carbon steel, tinned carbon steel, and galvanized carbon steel.**

<b>Material</b>	<b>Vapor inhibition ability in the condition of “as received”</b>
Carbon steel without coating	<b>Approved:</b> no sign of corrosion was observed on the surface of the carbon steel without coating test material tested with the LCTS # 2 568 sample.
Chromized carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the chromized carbon steel test material tested with the LCTS # 2 568 sample.
Tinned carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the tinned carbon steel test material tested with the LCTS # 2 568 sample.
Galvanized carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the galvanized carbon steel test material tested with the LCTS # 2 568 sample.
	<b>Vapor inhibition ability in the condition of “after accelerated exhaustion”</b>
Carbon steel without coating	<b>Approved:</b> no sign of corrosion was observed on the surface of the carbon steel without coating test material tested with the LCTS # 2 568 sample.
Chromized carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the chromized carbon steel test material tested with the LCTS # 2 568 sample.
Tinned carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the tinned carbon steel test material tested with the LCTS # 2 568 sample.
Galvanized carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the galvanized carbon steel test material tested with the LCTS # 2 568



	sample.
--	---------

**TABLE 2 - The result of the corrosion by contact check, of the LCTS # 2 568 sample, with regard to the following materials: carbon steel without coating, chromized carbon steel, tinned carbon steel, and galvanized carbon steel.**

Material	Corrosion by contact
Carbon steel without coating	<b>Approved:</b> no sign of corrosion was observed on the surface of the carbon steel without coating test material that remained in direct contact with the treated wrapping paper (LCTS # 2 568 sample).
Chromized carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the chromized carbon steel test material that remained in direct contact with the treated wrapping paper (LCTS # 2 568 sample).
Tinned carbon steel	<b>Approved:</b> no sign of corrosion was observed on the surface of the tinned carbon steel test material that remained in direct contact with the treated wrapping paper (LCTS # 2 568 sample).

**TABLE 3 – Results of the primary cutaneous irritation/corrosion, primary ocular irritation/corrosion tests, conducted for the LCTS # 2 568 sample (Annex III).**

<b>Primary cutaneous irritation/corrosion test result</b>
The Cutaneous Irritation Rate for the LCTS # 2 568 product was zero (with eight being the maximum), which allows for classifying this product as non-irritant to rabbit skin. No other serious local or general alterations were observed.
<b>Primary ocular irritation/corrosion test result</b>
The Ocular Irritation Rate for the LCTS # 2 568 product was zero, which allows for classifying this product as non-irritant to rabbit eyes. No behavioral nor clinical alterations were observed in the animals.
<b>Solid Residue Biodegradation / Sandy Soil Determination Result</b>
As per the recommendations for treating residue in the soil, a product may be added to the soil when, among other parameters, biodegradation efficiency (BE) of said product is equal to or greater than 30%. Biodegradation efficiency found in the LCTS # 2 568 product was 5.2%, therefore, the residue is not open to incorporation in sandy soil.
<b>Solid Residue Biodegradation / Clay Soil Determination Result</b>
As per the recommendations for treating residue in the soil, a product may be added to the soil when, among other parameters, biodegradation efficiency (BE) of said product is equal to or greater than 30%. Biodegradation efficiency found in the LCTS # 2 568 product was 36.8%, therefore, the residue is open to incorporation in clay soil, at an application rate of 0.19 g/kg for a BE of 30%.



VCI BRASIL - INDÚSTRIA E COM. EMBALAGENS LTDA  
Rodovia Marechal Rondon, Km 334,3 Caixa Postal 494 CEP 17029-620  
Bauru - SP - Brasil

Phone: 55-14-2106-6600 - Fax: 55-14-2106-6608  
E-mail: [info@vcibrasil.com.br](mailto:info@vcibrasil.com.br) <http://www.vcibrasil.com.br>

**CONTROLLED COPY**

#### 4. TECHNICAL TEAM

The technical team that participated in the conducting of this study was:

- Anna Ramus – Chemist;
- Letícia Tagliatelli de Oliveira – Intern.

São Paulo, November 27, 2000

METALLURGICAL DIVISION  
Corrosion and Protection Group  
Surface Treatment and Corrosion Laboratory

(Signature)

\_\_\_\_\_  
Anna Ramus Moreira  
Chemist  
CRQ # 4227374 – RE 8171.1

METALLURGICAL DIVISION

(Signature)

\_\_\_\_\_  
Dr. Eduardo Albertin  
Director  
CREA # 74790 – RE # 2364.8

METALLURGICAL DIVISION  
Corrosion and Protection Group

(Signature)

\_\_\_\_\_  
Dr. Zehbour Panossian  
Group Head  
CRQ # 4426533 – RE # 2460.4