



Introduction to Fluorinated-coated Aluminum Cans for pMDI



Shanghai Jiatian Pharmaceutical Packaging Co., LTD



Personnel Introduction



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Corporation Introduction

- ***Shanghai Jiatian Pharmaceutical Packaging Co., Ltd.***, situated in *Jinshan District, Shanghai*, occupies a site spanning 50,000 square meters and employs a professional team of over 350 personnel.
- With over three decades of specialization in pharmaceutical aluminum packaging, the company has consistently delivered high-quality, high-safety packaging solutions to the pharmaceutical industry.





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齐鲁 Qilu Pharmaceutical Co., Ltd.
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云南白药 YUNNAN BAIYAO GROUP CO., LTD
NOVARTIS Novartis China
GSK GlaxoSmithKline Tianjing Company
西安杨森 xian janssen
 Xian Janssen Pharmaceutical Ltd.

Johnson & Johnson 强生 Johnson & Johnson China Ltd.
恒瑞 Jiangsu Hengrui Medicine Co., Ltd.
普华 KEEPING THE WORLD HEALTHY
扬子江 Yangtze River Pharmaceutical (Group) Co., Ltd.

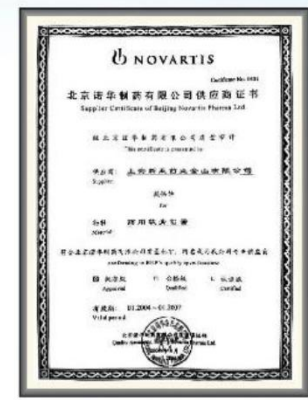
Savlon
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QUESTIONS

01 . What is FEP, is it safe? Is there any application example in pharmaceutical industry?

1 What is FEP

2 Applications of FEP

3 Safety of FEP



What's FEP ?

FEP stands for **fluorinated ethylene propylene**.

The FEP coating treatment produces a **continuous and stable FEP isolation layer** on the inner surface of the canister.

Properties of FEP

1. Excellent physical and chemical properties



2. Isolation layer with low surface energy



3. Good bonding strength to the substrate



4. High-temperature resistance (-85°C to 205°C)



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3 **Safety of FEP**



Applications of FEP

FEP-coated technology is now widely used in rubber stoppers for injectable preparations.



FEP-coated rubber stoppers are pharmaceutical bottle stoppers featuring a FEP film overlay on a butyl rubber base.

They are commonly employed in **injectable preparations** to enhance the stability and safety of pharmaceutical packaging.



Reduces the risk of drug adsorption



Suitable for sensitive pharmaceutical formulations



Excellent biocompatibility



Examples of formulations that benefit from FEP-coated cans

Preparation		Applicable pressure can		Preparation		Applicable pressure can	
		Plain cans	FEP Coated cans			Plain cans	FEP Coated cans
Single -component preparation	Salbutamol	✓	✓	Two -component formulation (Two-APIs)	Salbutamal+Ipratropium	×	✓
	Levalbuterol	×	✓		Salbutamal+Fluticasone	×	✓
	Beclometasone	✓	✓		Salbutamal+Beclomethasone	×	✓
	Cromolyn Sodium	✓	✓		Budesonide+Formoterol	×	✓
	Ciclesonide	✓	✓		Mometasone+Formoterol	×	✓
	Budesonide	×	✓		Fluticasone+Formoterol	×	✓
	Ipratropium Bromide	S.S.can	✓		Beclomethasone+Formoterol	×	✓
	Formoterol	✓	✓		Tiotropium+Formoterol	×	✓
	Fluticasone	✓	✓		Glycopyronium+Formoterol	×	✓
	Fenoterol Hydrobromid	×	✓		Fenoterol+Ipratropium	×	✓
	Tiotropium	×	✓	Tripartite formulation (Three-APIs)	Circlesonide+Tiotropium+Formoterol	×	✓
	Nitroglycerine	×	✓		Beclomethasone+Formoterol+Glycopyronium	×	✓
	Epinephrine	×	✓		Budesonide+Formoterol+Glycopyronium	×	✓
				Fluticasone+Formoterol+Glycopyronium	×	✓	

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Toxicity testing results

	Test Item	Result
1	Skin sensitization test	✓
2	Skin irritation	✓
3	Cytotoxicity	✓
4	Acute systemic toxicity	✓
5	EU RoHS Directive(EU) 2015/863 amending Annex II to Directive 2011/65/EU	✓
6	According to the specified scope and evaluation screening, the test results of 241 SVHC in the Candidate List are ≤ 0.1% (w/w) in the submitted sample.	✓
7	According to the specified scope and evaluation screening, the test results of 10 Potential SVHC are ≤ 0.1% (w/w) in the submitted sample.	✓





FDA Certificate

DMF 042506

DMF ACKNOWLEDGEMENT

SHANGHAI JIA TIAN PHARMACEUTICAL PACKAGING CO., LTD.
ATTENTION: LEON HUANG, QUALITY, DIRECTOR
NO: 3058 TINGFENG ROAD ZHUJING TOWN, JINSHAN DISTRICT
SHANGHAI, ZIP CODE: 201500, CHINA

Dear Leon Huang,

The Food and Drug Administration acknowledges receipt of the following Drug Master File (DMF) submission:

<u>DMF NUMBER ASSIGNED:</u>	042506
<u>DATE OF SUBMISSION:</u>	AUGUST 16, 2025
<u>DMF TYPE:</u>	III
<u>SUBJECT (TITLE):</u>	FLUORINE COATED ALUMINUM CANS FOR AEROSOLS
<u>HOLDER:</u>	SHANGHAI JIA TIAN PHARMACEUTICAL PACKAGING CO., LTD.
<u>SUBMITTED BY:</u>	SHANGHAI JIA TIAN PHARMACEUTICAL PACKAGING CO., LTD.
<u>AGENT:</u>	NONE

All subsequent correspondence to this DMF should be identified with the information as provided above.

Your DMF will be reviewed only in connection to a New Drug Application, Abbreviated New Drug Application, Investigational New Drug Application, Biological License Application, New Animal Drug Application, Abbreviated New Animal Drug Application, Investigational New Animal Drug Application, or DMF it is intended to support when a Letter of Authorization (LOA) is submitted to the DMF and a copy of the LOA is submitted in the application e.g., NDA, that references the DMF.

You are expected to:

- Adhere to the statement of commitment you have provided.
- Provide the following submissions to the DMF:
 - Letters of Authorization (LOAs) granting permission to a third party (authorized party) or self to reference the DMF and for FDA to review the DMF. Listing an authorized party in the Annual Report is not sufficient to authorize that party to reference the DMF. Submission of a copy of the LOA to the authorized party without submitting the original LOA to the DMF (with DMF number) is also not sufficient to authorize that party to reference the DMF.
 - Any change, addition or deletion of information
 - Annual Reports to the DMF containing:
 - Date(s) of the amendment(s) reporting changes since the last Annual Report or the original DMF filing date, whichever is most recent or a statement that no amendments have been submitted since the last Annual Report or the original DMF filing date, whichever is most recent.

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Silver Spring, MD 20993
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- A complete list of all parties currently authorized to incorporate information in the DMF by reference; identifying by name, reference number, volume, date, and page number the information that each person is authorized to incorporate and the date of the LOA or a statement that there are no Authorized Parties.
- A list of all parties whose authorization has been withdrawn, if applicable.
- Holder signed DMF Statement of Commitment stating that the DMF is current and the holder will comply with the statements made in it.

For specific information on DMF, including submission types, letter template examples, and links to other resources, please refer to the DMF webpage.¹

The holder of the DMF is responsible for compliance with 21 CFR 314.420 as interpreted on the Guideline for Drug Master Files webpage.²

Submissions in Paper (in two copies) or physical media should be sent to the following address.

Food and Drug Administration
Center for Drug Evaluation and Research
Central Document Room
Drug Master File Staff
5901-B Ammendale Road
Beltsville MD 20705-1266

For additional information on electronic submission, see the FDA eCTD webpage and the guidance for industry *Providing Regulatory Submissions in Electronic Format—Certain Human Pharmaceutical Product Applications and Related Submissions Using the eCTD Specifications*.^{3,4}

Note: If you have submitted a LOA without a DMF number, please resubmit the LOA with the DMF number.

For any questions related to DMF submissions, please contact dmfquestion@fda.hhs.gov.

Sincerely,

{See appended electronic signature page}

Don Henry
Director, Office of Program and Regulatory Operations
Office of Pharmaceutical Quality
Center for Drug Evaluation and Research

¹ <https://www.fda.gov/drugs/forms-submission-requirements/drug-master-files-dmfs>

² <https://www.fda.gov/drugs/drug-master-files-dmfs/guideline-drug-master-files-dmf>

³ <https://www.fda.gov/drugs/electronic-regulatory-submission-and-review/electronic-common-technical-document-ectd>

⁴ <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/providing-regulatory-submissions-electronic-format-certain-human-pharmaceutical-product-applications-0>

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/s/

CLAUDE THEOPHIN
09/08/2025 09:45:36 AM



FDA & CDE Registration information

Fluorine coated Aluminum Cans for Aerosols
Type III DMF Original Submission

SHANGHAI JIA TIAN PHARMACEUTICAL
PACKAGING CO., LTD.

Aluminum Cans for Aerosols
Type III DMF Original Submission

SHANGHAI JIA TIAN PHARMACEUTICAL
PACKAGING CO., LTD.

一、中国药包材 CDE 登记资料项目

COMPREHENSIVE TABLE OF CONTENTS

Part One: Administrative Parts

1. Transmittal Letter
2. Administrative Information
3. Statement of Commitment

Part Two: Technical Parts

1. Description Information
 - 1.1 General Information
 - 1.2 Manufacturer Information
2. Manufacture
 - 2.1 Raw materials
 - 2.2 Materials Test Method
 - 2.3 Process Description
 - 2.4 Equipment List
 - 2.5 Unqualified Products
 - 2.6 In-Process control
 - 2.7 In Process Control and Test Method
3. Finished products
 - 3.1 Product specification
 - 3.2 Specification justification
4. Suitability Information
 - 4.1 Protection
 - 4.2 Compatibility
 - 4.3 Safety
 - 4.4 Performance
5. Quality Control
 - 5.1 Specification
 - 5.2 Test Methods
 - 5.3 Certificate of Analysis
 - 5.4 The Conclusion and Assurance of release specification and quality control

Part III: Appendix

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1. Transmittal Letter
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 - 4.4 Performance
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 - 5.1 Specification
 - 5.2 Test Methods
 - 5.3 Certificate of Analysis
 - 5.4 The Conclusion and Assurance of release specification and quality control

Part III: Appendix

- | | |
|---------------------|------------------------|
| 1 登记人基本信息 | 4 质量控制 |
| 1.1 名称、地址、生产厂、生产地址 | 4.1 质量标准 |
| 1.2 证明性文件 | 4.2 分析方法的验证 |
| 1.3 研究资料保存地址 | 4.3 质量标准制定依据 |
| 2 药包材基本信息 | 5 批检验报告 |
| 2.1 药包材名称 | 6 自身稳定性研究 |
| 2.2 包装系统/组件 | 7 相容性和安全性研究 |
| 2.3 配方 | 7.1 相容性研究 |
| 2.4 基本特性 | 7.2 安全性研究 |
| 2.5 境内外批准上市及使用信息 | 附表 1 高风险药包材使用情况与登记资料表 |
| 2.6 国家标准以及国内外药典收载情况 | 附表 2 非高风险药包材使用情况与登记资料表 |
| 3 生产信息 | 附表 3 实行关联审评审批的药包材及风险分类 |
| 3.1 生产工艺和过程控制 | |
| 3.2 物料控制 | |
| 3.3 关键步骤和半成品/中间体的控制 | |
| 3.4 工艺验证和评价 | |

QUESTIONS

02 . Why use FEP-coated cans? What advantages do FEP-coated cans compare with others (Plain, FCP and anodized cans)

1 **Why use FEP-coated cans**

2 **What advantages do FEP-coated cans have**

3 **Comparative experiment with other types of containers**

Why can not use plain cans?

As the raw material is a magnesium-aluminium alloy, the plain can poses a risk of migration of metal ions such as Al, Mg, Fe, ect.

① The hazards of Al element

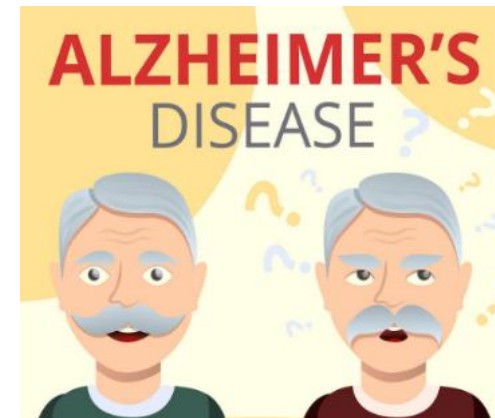
- May contribute to the development of Alzheimer's disease
- Interact with drugs, leading to drug degradation
- Risk of neurological and respiratory toxicity

② The hazards of Mg, Fe element

Catalysed **Fenton/Fenton-like** reactions generate reactive oxygen species (ROS) radicals, accelerating the oxidative degradation of pharmaceuticals.

③ High surface energy

May lead to drug adhesion or adsorption, affects the efficacy of the medication and the preparation actual dosage.



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ACADEMIC PRESS Toxicology Oxidative Stress and Dietary Antioxidants 2021, Pages 127-135

Chapter 14 - Aluminum toxicity and oxidative stress

Rafael Monteiro Fernandes, Luciana Guimarães Eiró, Victória dos Santos Chemelo, Maria Olimpia Paz Alvarenga, Rafael Rodrigues Lima

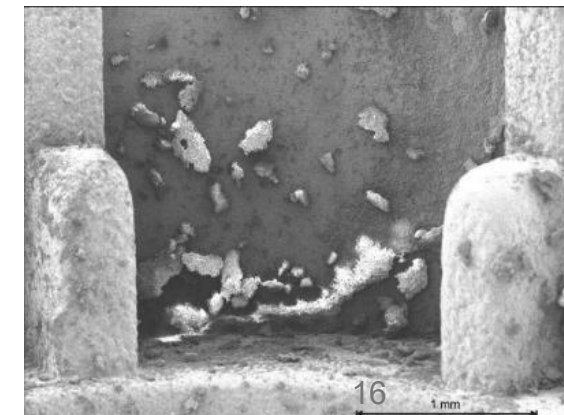
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Abstract

Aluminum is present in everyday life in several ways since it has high strength, ductility, and ability to conduct energy and heat. This metal is the third most abundant in the earth's crust, being present in large quantities in soil and water. It has been shown that aluminum accumulates in various tissues of mammals, such as the brain, bones, liver,



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3 Comparative experiment with other types of containers



FEP VS Anodized & FCP

FEP

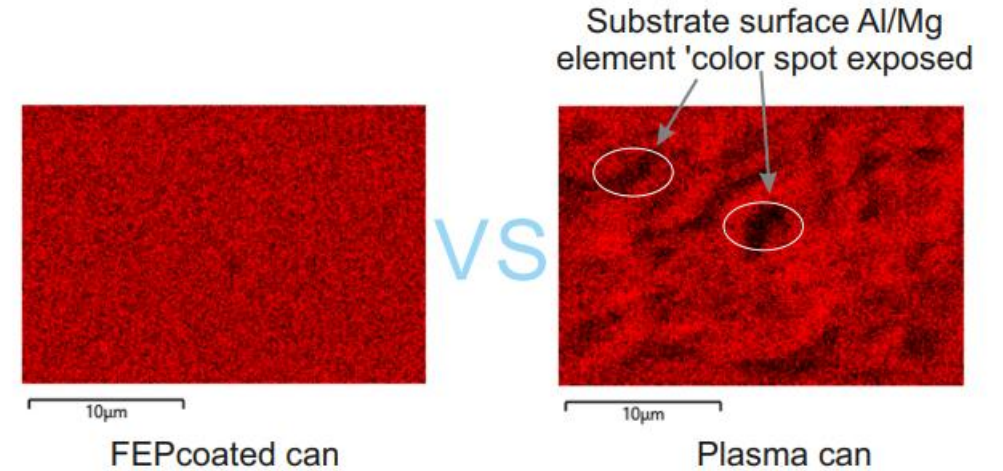
- **Mature and stable** manufacturing process
- **Excellent** bonding capability with aluminium cans
- **Superior** physical and chemical properties

FCP

- **Immature** manufacturing process
- **Poor** adhesion between coating and aluminium substrate
- Chemical **instability** of coating
- Potential migration of free fluorine and carbon monomers

Anodized

- **Poor** tolerance to acids and alkalis



Anodized: Through electrochemical surface treatment, a dense oxide film is formed on the metal surface.

FCP: Through high-temperature plasma is generated via arc discharge, melting coating particles which are then accelerated by a high-velocity gas stream (plasma jet) to adhere to the inner surface of aluminium cans.

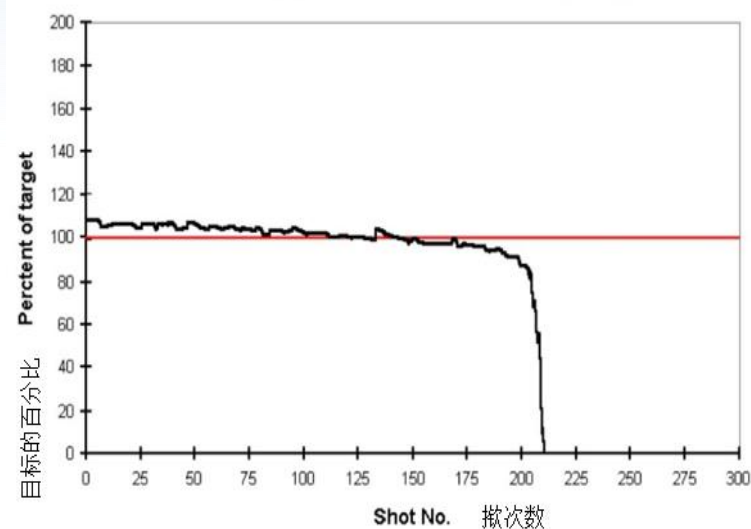
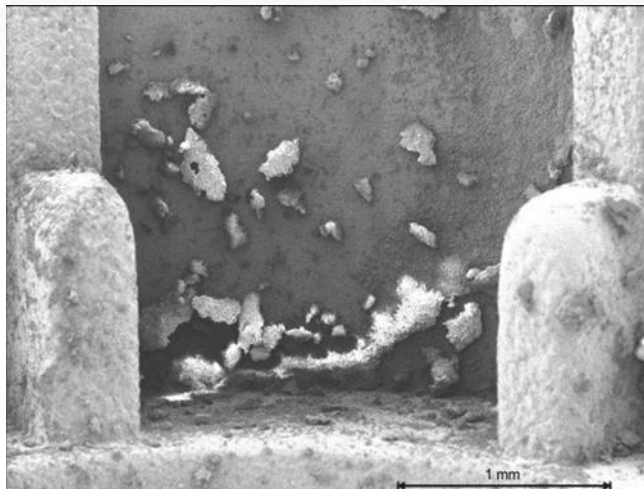


Drug Adhesion & Absorption

Drug adhesion or adsorption may result in:

- The drug undergoes degradation, resulting in a reduction in quality.
- Changes in the physical and mechanical properties of materials

(changing the softness, hardness, brittleness and so on)



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FEP-coated cans performance Quality Control Testing

1. Chemical Interaction Test

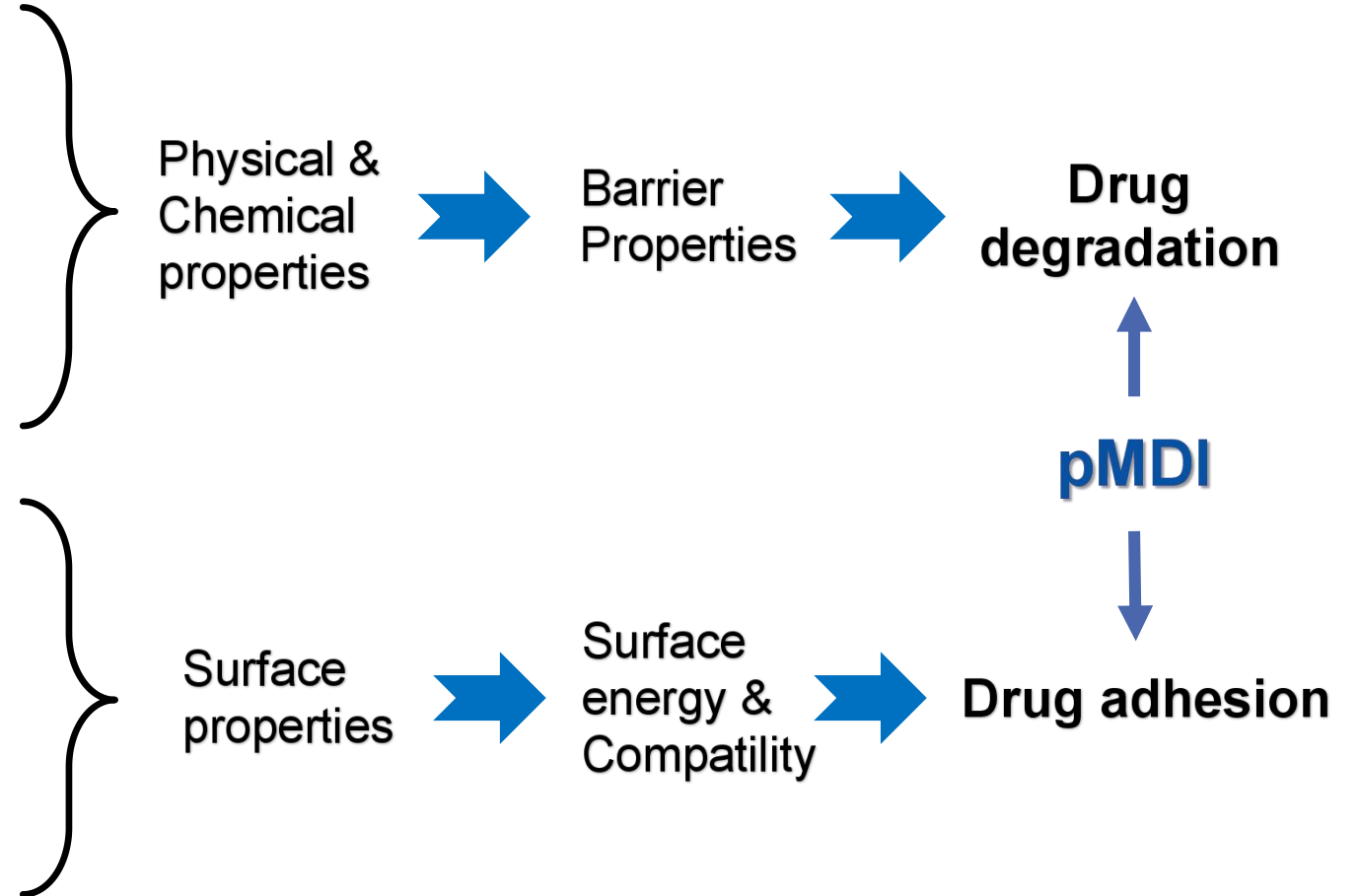
2. Electrical Conductivity Test

3. Wipe with acetone

4. Dyne Test

5. Contact Angle Test

6. Research on Aerosol Adhesion





Physical & Chemical properties

- Chemical Interaction Test
- Electrical Conductivity Test
- Wipe with acetone



Corresponding Standards
相关标准

FEA 651 F	Réceptifs aérosols métalliques revêtement intérieur
FEA 651 D	Aerosolverpackungen und Verlackbeschichtung

Introduction
简介

Coatings are used for the protection of metals from coverage of a coating applied to the internal surface chemical interaction between a reagent and any exp through the coating to protect the metal from corrosion. This test provides a method for checking the effectiveness of the coating. One of the test methods is based on the reagent and the metal surface.

Whilst these tests are suitable for checking or controlling the potential shelf life of new formulations, these tests are not intended for use on finished products or for checking or controlling the shelf life of finished products.

1. Chemical Interaction Test 化学相互作用试验

Scope 适用范围

This is a comparative test intended to indicate the applicability of the external surface of a metal aerosol can. This is a comparative test intended to indicate the applicability of the external surface of a metal aerosol can.

Apparatus 仪器

Test Solution (composition as follows):
测试溶液 (组成如下):

Copper Concentrated Demineralised	测试溶液 (组成如下):	% w/w
Distilled	Copper sulphate crystals (CuSO ₄ · 5H ₂ O) 硫酸铜晶体 (CuSO ₄ · 5H ₂ O)	
Stop clock 秒表	Concentrated hydrochloric acid (35%) 浓盐酸 (35%)	9.0
Tools to safely pierce and seal aerosol cans 用于安全地刺穿并密封气雾剂容器的工具	Demineralised/deionised water 去矿物质/去离子水	q.s.

Warning: 警告:
Test preparation involves hazardous chemicals. Precautions should be taken to safeguard operators.
测试准备涉及危险化学品。应采取预防措施保护操作人员的安全。

Procedure 程序

Safe experimental procedures should be adopted when performing the test. The test solution should be poured into the can for two minutes. At the end of this period the test solution is decanted and the can is rinsed with demineralised/deionised water. The can is then filled with the test solution and the test is performed as possible. The test solution is then decanted and the can is rinsed with demineralised/deionised water to prevent further reaction.

The aerosol containers are opened out and examined for presence of lacquer discontinuities, which show as reddish-brown stains (copper deposition) on or under the lacquer.
打开气雾剂容器，并检查是否存在供漆不连续的情况，供漆不连续的表现是漆上或漆下出现红褐色污渍（铜沉积）。

Note: Care must be taken not to confuse other (normal) lacquer discoloration or inclusions (i.e. thick flakes) from the red-brown stains created by the test solution.
注：必须注意不要混淆测试溶液产生的红褐色污渍与其他（正常）漆变色或夹杂物（即厚漆片）。

For comparative purposes and for preparation of demonstration samples it may be desirable to limit the action of the test solution to specific areas. This may be achieved by any suitable non-water-miscible liquid of specific gravity greater than 1.0 preventing attack on the base and lower wall sections of the container.
为了达到比较以及制备示范样本的目的，最好将测试溶液的作用限制在特定区域内。这可以通过比重大于1.0的任何合适的非水混溶性液体实现，从而防止对容器的底部和下壁部分的侵蚀。

Reporting 报告

A subjective assessment is made by the operative, ideally compared to a known reference sample because different materials with different coatings provide different responses.
由操作人员主观评估，同时最好与已知的参考样本进行比较，因为具有不同涂层的不同材料会产生不同的响应。

Note: The interpretation of the results rests with the experience of the operative. Containers of commercially acceptable standard will show evidence in this test of some imperfections in lacquer coverage – this is "normal" and such containers will not necessarily exhibit trouble/problems during normal storage.
注：对结果的解释取决于操作人员的经验。商业上可接受的标准容器将在该测试中显示出漆覆盖的一些缺陷——这属于“正常现象”，并且此类容器在正常储存期内不一定会出现问题。

Chemical Interaction Test

Placed for 3-5 min



Plain can FCP can Anodized can **FEP-coated can**

- Pour the copper sulfate solution into the coating can and the plain can and wait for 3-5 min.
- FEP-coated cans do not react with copper sulfate compared to other cans.



Metal aerosol containers and valves –
Assessment of internal coating coverage
金属气雾剂容器和阀门 - 内部涂层覆盖率的评估

FEA 651 E
10/2015
Page 3 /6

2. Electrical Conductivity Test 电导率测试

2. Electr

Scope
适用范围

The object of this test is to assess the continuity of the coating by using the fact that metal exposure (due to absence of coating) can be detected by measuring the magnitude of a flow of electrical current. The magnitude of the current flow is proportional to the area of metal exposed to an electrolyte thus providing a numerical assessment (see Procedure 1).
该测试的目的是通过测量电流的大小来检测金属接触情况（因为没有涂层），以此来评估涂层的连续性。电流的大小与暴露于电解质中的金属面积成比例，这可用于数值评估（参见程序1）。

Additionally it may also be possible to reveal the actual pores in the coating for steel/tinplate aerosol containers and valves (see Procedure 2).
此外，它还可以揭示钢制/马口铁气雾剂容器和阀门涂层中的实际孔隙（参见程序2）。

When using this pore location methodology on aluminium containers, it is possible, with the same enamel rater, to easily locate the pores by reversing the polarity.
当在铝制容器上使用这种方法时，使用相同的搪瓷评定器，可以轻松定位孔隙。
Example of a semi-automatic enamel rater for aerosol containers
用于气雾剂容器的半自动搪瓷评定器的示例

Apparatus
仪器

The electrical contact to the aerosol container body is created via the anodic container contacts mounted in the base of the container stand.
通过安装在容器支架底部的阳极容器触点产生与气雾剂容器主体间的电触点。

Electrolyte solution for alu
适用于铝制气雾剂容器和阀门
The electrical continuity can be automatically confirmed before test commences. The contact with the electrolyte is made via the cathode test probe.
测试开始之前，可以自动确认电气连续性。通过阴极测试探针与电解质接触。

The test will only start when the level check probe makes contact with the electrolyte.
只有水平测量仪探针与电解质接触时，才能开始测试。

Sodium Chloride
Demineralsised/d
The gauge can automatically time the 4-second elapse before recording the current flow reading in mA.
测量仪以mA为单位记录当前流量读数之前，可自动计时4秒钟。

Electrolyte solution for ste
适用于用于钢制/马口铁气雾

Potassium Ferro
Sodium Chloride
Demineralsised/d

Note: A wetting i
注：可以加入润



Figure 2: A semi-automatic enamel rater
图2：半自动搪瓷评定器

Electrical Conductivity Test

Comparison of conductivity values between
FEP-coated cans and FCP cans (mA)

Number	Jiatian FEP-coated cans (mA)			FCP cans (mA)		
	1	0.08	0.26	0.24	4.35	4.76
2	0.10	0.08	0.50	5.30	40.97	3.06
3	0.15	0.08	0.15	2.51	3.91	2.27
4	0.09	0.15	0.14	3.35	3.79	4.93
5	0.23	0.08	0.09	11.12	6.18	6.61
6	0.25	0.16	0.26	2.98	45.0	3.0
7	0.09	0.07	0.20	7.17	8.09	3.37
8	0.23	0.07	0.13	4.46	3.47	4.91
9	0.09	0.10	0.17	1.11	2.15	5.70
10	0.27	0.13	0.24	39.75	33.25	3.02
Mean	0.163			9.164		
STD, %	0.09			12.46		

- Using the conductivity meter;
- Inject the electrolyte into the can, insert the electrode, and read the current value (mA) after 4 seconds.

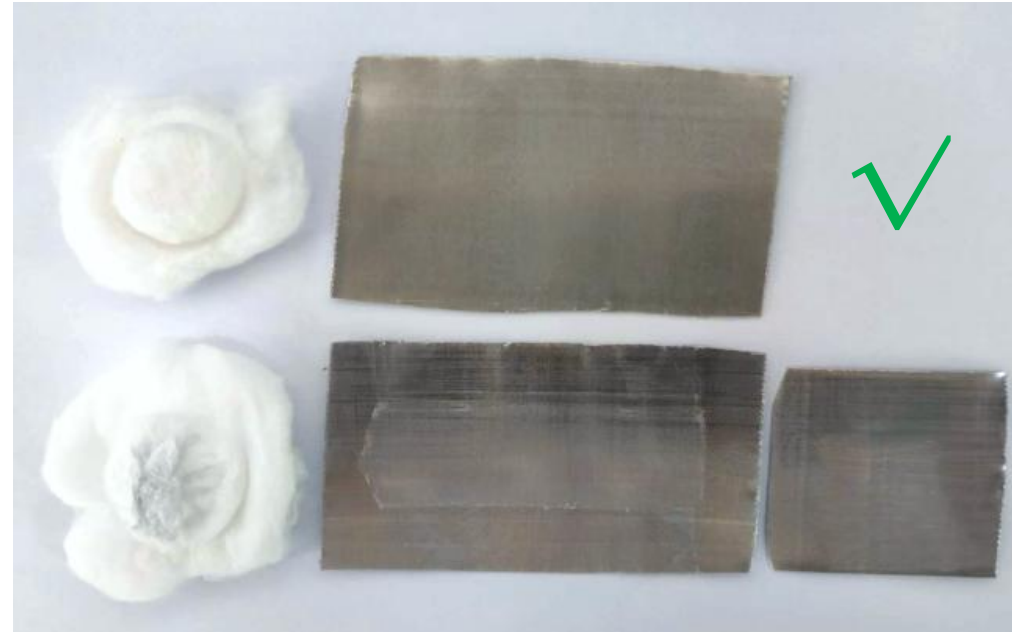


Wipe with acetone



FEP-coated can

FCP can



200 times

50 times

- Cut open the aluminum can and gently rub the inner coating back and forth with an acetone wiper for no less than 200 times;
- Observe whether there is any peeling or obvious whitening. There should be no peeling or obvious whitening.
- After 50 wipes, the FCP can exhibited whitening, indicating the detachment of free-state 'coating'; whereas the FEP-coated tank showed no significant abnormalities even after 200 wipes.



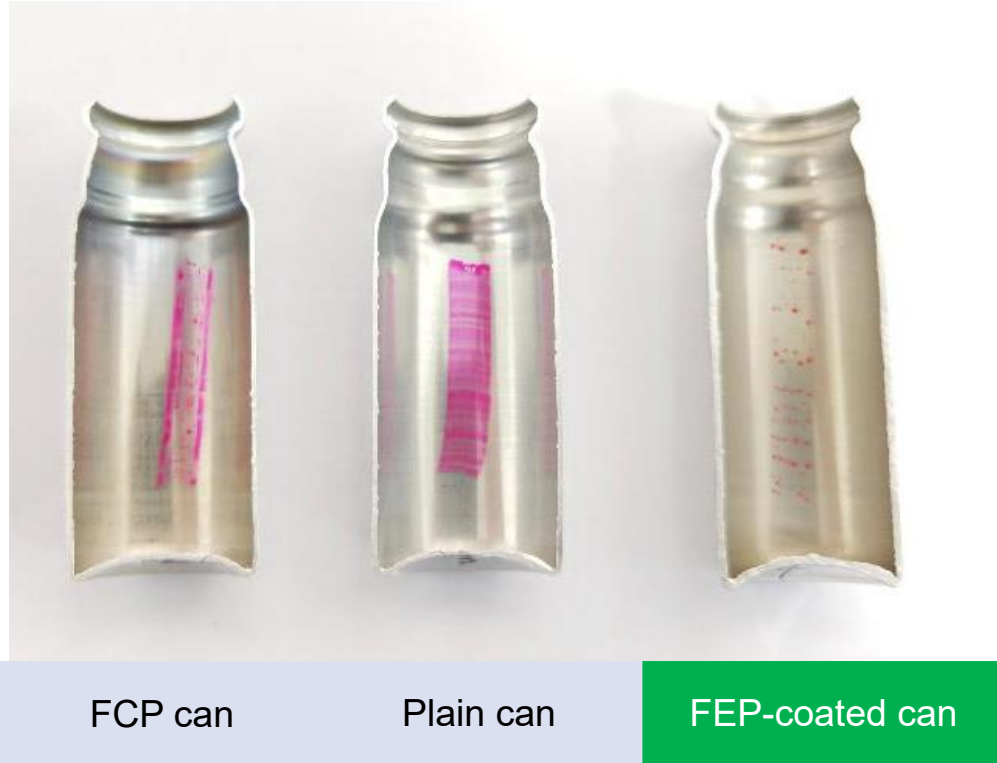
Surface properties

- Dyne Test
- Contact Angle Test
- Research on Aerosol Adhesion



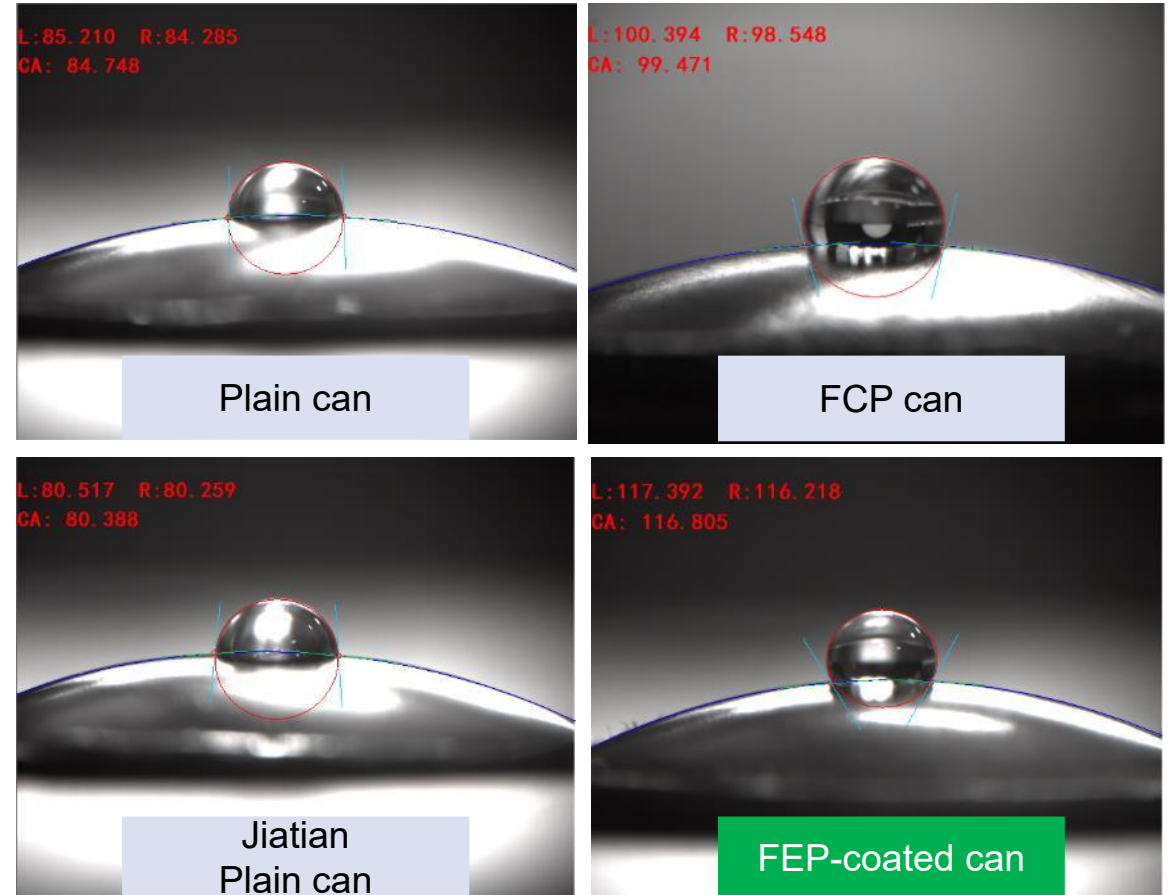


Dyne Test



- Use a Dyne pen to mark the inner surface of the container and observe the condition of the markings.
- Compared to plain can or FCP can, Coating can are not wetted and show low surface energy.

Contact Angle Test

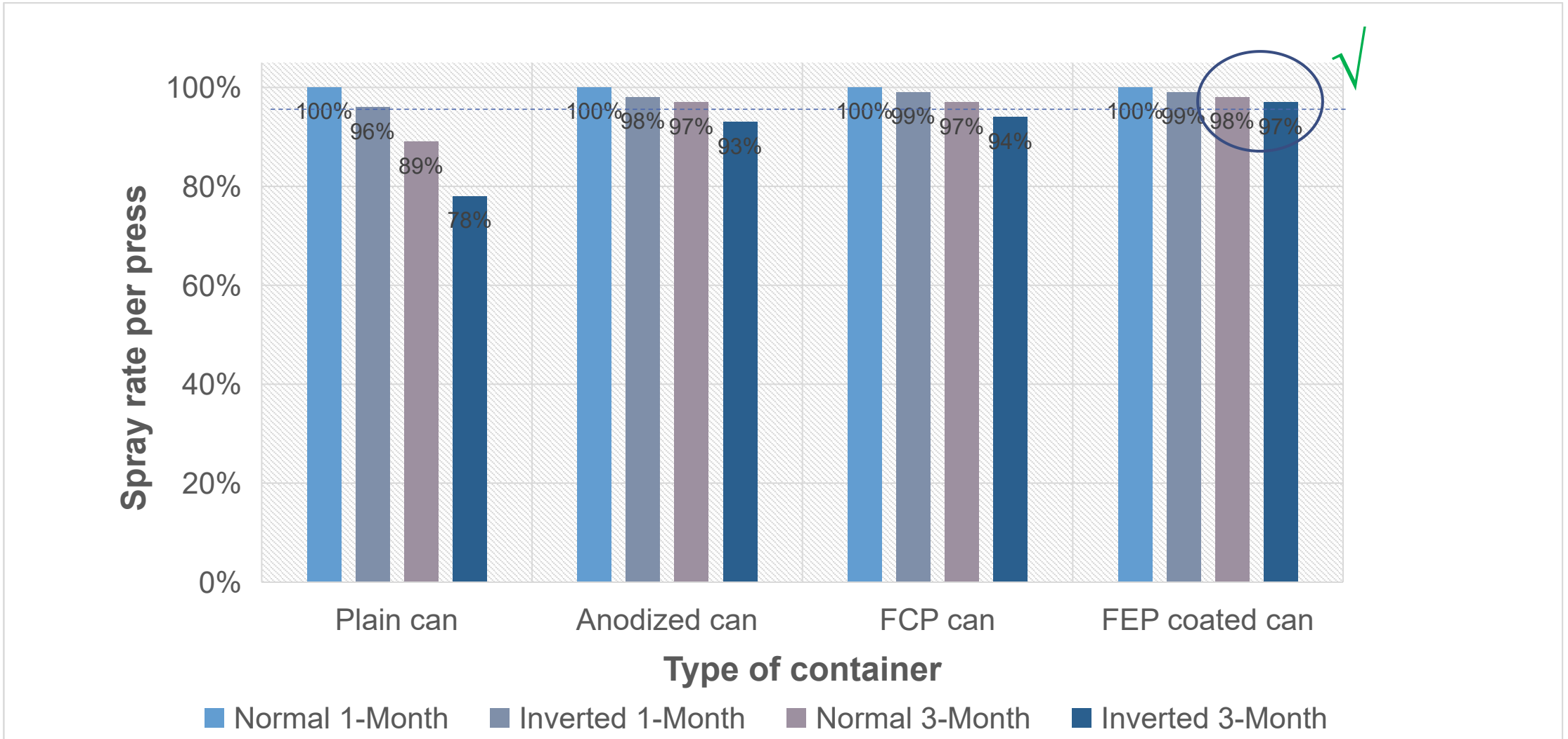


- Using a tensiometer test, drop water onto the can ;
- The water droplets on coating can are rounder and therefore have a larger. contact Angle than plain can or FCP can.



Research on Aerosol Adhesion

The stability of various drugs in X containers





Summary

	Test type	FEP coated can	FCP can	Anodised can	Plain can
Physical & Chemical properties	Chemical Interaction Test	✓	✗	✗	✗
	Electrical Conductivity Test	✓	✗	N/A	N/A
	Wipe with acetone	✓	✗	N/A	N/A
Surface properties	Dyne Test	✓	✗	N/A	✗
	Contact Angle Test	✓	✓	N/A	✓
	Research on Aerosol Adhesion	✓	✗	✗	✗

QUESTIONS

03 . How does the substitutability of Jiatian FEP-coated containers perform, including with pharmaceutical formulations and various propellants?

**1 The Substitutability of Jiatian FEP-Coated Containers
(Compared to Original Research Drug Packaging)**

2 Research into Extractables and Leachates



Examples of the FEP-coated cans used for marketed Reference Listed MDI

Company	Drug name	Brand	Specification	Formulation type	Cans
AstraZeneca	Glycopyrronium Bromide and Formoterol Fumarate Inhalation Aerosol	Bevespi®/Aerosphere®	7.2µg/5µg *120shot	Bicomponent, Suspension	14ml FEP coated can
	Budesonide, Glycopyrronium Bromide and Formoterol Fumarate Inhalation Aerosol	Breztri®/Aerosphere®	160µg/7.2µg/4.8µg *120shot	Tri-component, Suspension	14ml FEP coated can
	Salbutamol sulfate Aerosol	Ventolin®	100µg *200shot	Monocomponent, Suspension	19ml FEP coated can
GSK	Fluticasone propionate inhalation aerosol	Flixotide®	50µg *120shot	Monocomponent, Suspension	14ml FEP coated can
	Salmeterol Xinafoate and Fluticasone Propionate Powder for Inhalation	Seretide®	25µg/125µg *60shot	Bicomponent, Suspension	10ml FEP coated can
Boehringer-Ingelheim	Ipratropium bromide inhalation aerosol	Atrovent®	20µg *200shot	Monocomponent, solution	17ml stainless steel coated can
Chiesi	Beclometasone Dipropionate, Formoterol Fumarate and Glycopyrrolate Inhalation Aerosol	Trimbow®	100µg/6µg/12.5µg *120shot	Tri-component, solution	19ml FEP coated can
	Beclometasone Dipropionate and Formoterol Inhalation Aerosol	Foster®	0.1mg/6µg *120shot	Bicomponent, solution	19ml FCP can



Compatibility of Ji Tian FEP-coated containers with the original research drug (40°C, 3M)

Company	Drug name	Formulation type	Original can	Result
AstraZeneca	Glycopyrronium Bromide and Formoterol Fumarate Inhalation Aerosol	Bicomponent, Suspension	14ml FEP coated can	No abnormalities
	Budesonide, Glycopyrronium Bromide and Formoterol Fumarate Inhalation Aerosol	Tri-component, Suspension	14ml FEP coated can	No abnormalities
GSK	Salbutamol sulfate Aerosol	Monocomponent, Suspension	19ml FEP coated can	No abnormalities
	Fluticasone propionate inhalation aerosol	Monocomponent, Suspension	14ml FEP coated can	No abnormalities
	Salmeterol Xinafoate and Fluticasone Propionate Powder for Inhalation	Bicomponent, Suspension	10ml FEP coated can	No abnormalities
Boehringer-Ingelheim	Ipratropium bromide inhalation aerosol	Monocomponent, solution	17ml stainless steel coated can	No abnormalities
Chiesi	Beclometasone Dipropionate, Formoterol Fumarate and Glycopyrrolate Inhalation Aerosol	Tri-component, solution	19ml FEP coated can	No abnormalities
	Beclometasone Dipropionate and Formoterol Inhalation Aerosol	Bicomponent, solution	19ml FCP can	No abnormalities

QUESTIONS

03 . How does the substitutability of Jiatian FEP-coated containers perform, including with pharmaceutical formulations and various propellants?

1 **The Substitutability of Jiatian FEP-Coated Containers
(Compared to Original Research Drug Packaging)**

2 **Research into Extractables and Leachates**



Research into Extractables and Leachates

1. Extraction of organic residues

	Volatile Organic Compounds	Non-volatile organic compounds
Testing method	HS-GCMS (50-550m/z)	Direct Injection-GCMS (30-500m/z) or LCMS
Plain can	No Detected	No Detected
FCP can	No Detected	No Detected
FEP-coated can	No Detected	No Detected

Ethanol extraction - Data Source - Shanghai Institute for Food and Drug Packaging Materials Testing

2. Extraction and migration of metal ions

① Test result of formula element extraction (µg/mL)

Element	FEP-coated can	FCP can	Plain can
Aluminum	0.5 ✓	14.8	11
Ferrum	< 0.01 ✓	0.01	0.02
Magnesium	< 0.05 ✓	5.6	8.8
Manganese	< 0.05 ✓	< 0.05	< 0.05
Silicon	< 0.05 ✓	0.41	< 0.05
Titanium	< 0.01 ✓	< 0.01	< 0.01
Zinc	< 0.01 ✓	0.88	< 0.01

② Test results for heavy metal element extraction (µg/ml)

Element	AET	FEP-coated can	FCP can	Plain can
(Cd)	0.90	<0.005	<0.005	<0.005
(Pb)	1.50	<0.005	<0.005	<0.005
(As)	0.60	<0.005	<0.005	<0.005
(Hg)	0.30	<0.005	<0.005	<0.005
(Co)	0.90	<0.005	<0.005	<0.005
(V)	0.30	<0.005	<0.005	<0.005
(Ni)	1.80	<0.005	<0.005	<0.005
(Ti)	2.40	<0.005	<0.005	<0.005
(Au)	0.90	<0.005	<0.005	<0.005
(Pd)	0.30	<0.005	<0.005	<0.005
(Ir)	0.30	<0.005	<0.005	<0.005
(Os)	0.30	<0.005	<0.005	<0.005
(Rh)	0.30	<0.005	<0.005	<0.005
(Ru)	0.30	<0.005	<0.005	<0.005
(Se)	39.00	<0.005	<0.005	<0.005
(Ag)	2.10	<0.005	<0.005	<0.005
(Pt)	0.30	<0.005	<0.005	<0.005
(Li)	7.50	<0.005	<0.005	<0.005
(Sb)	6.00	<0.005	<0.005	<0.005
(Ba)	90.00	<0.005	<0.005	<0.005
(Mo)	3.00	<0.005	<0.005	<0.005
(Cu)	9.00	<0.005	0.009	<0.005
(Sn)	18.00	<0.005	<0.005	<0.005
(Cr)	0.90	<0.005	0.02	<0.005

pH3 acidic solution extraction - Data Source - Shanghai Institute for Food and Drug Packaging Materials Testing



THANKS

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