PET Aerosol Can

POLISH AEROSOL FEDERATION MEETING

E-proPLAST
PET-Verpackungen PET-Packaging

PZPPA
Polski Związek Pracodawców Przemysłu Aerozolowego

October 17th 2019

Introduction of E-proPLAST:

E-proPLAST GmbH
Rüdiger Löhl – Managing Director
An der Asbacher Str. 38
98574 Schmalkalden / Germany
Tel: 03683-4071-0
Fax: 03683-4071-130
www.e-proplast.com
info@e-proplast.com

Specialized in development and production of PET bottles and preforms

Founded in 1998 as a testing facility for the mould making company FORMCONSULT GmbH

E-pro ….stands for:

➔**E**ntwicklung
(Development)
+
➔**Pro**duktion
(Production)

Location
Schmalkalden/Germany

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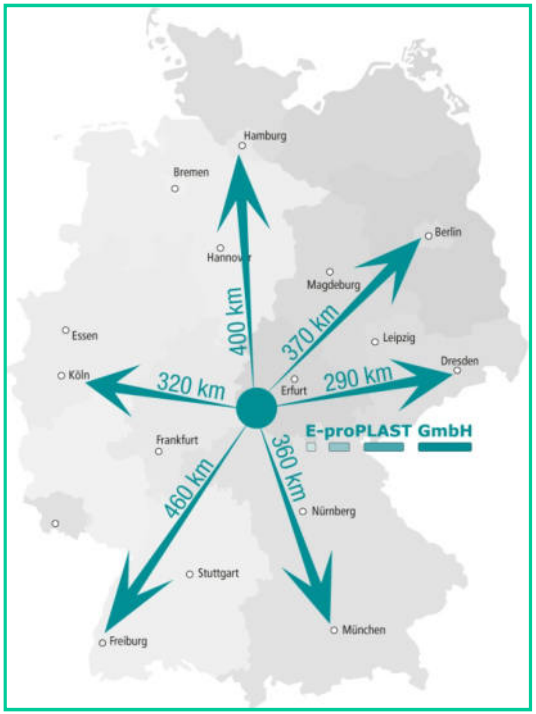
Old historical town in Thuringia with appr. 20.000 inhabitants

Technical University
3000 students

Region
Popular due to Biathlon

Central location
in Germany



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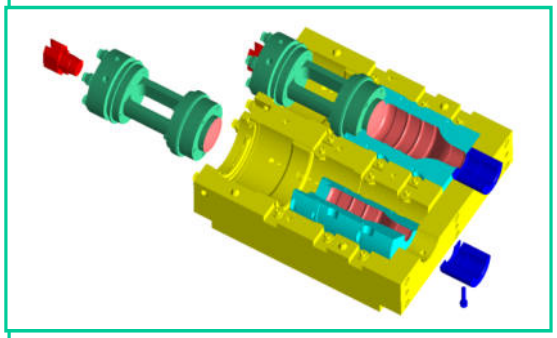
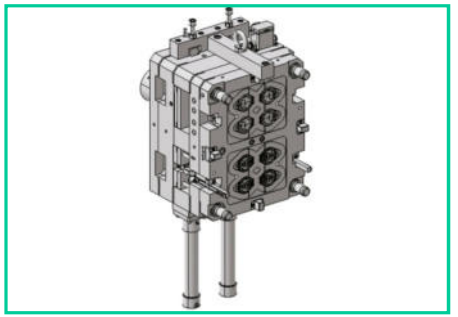
„2“BUSINESS UNIT‘S

E-proPLAST
PET-Verpackungen PET-Packaging

1) PET-packaging



2) Mould making



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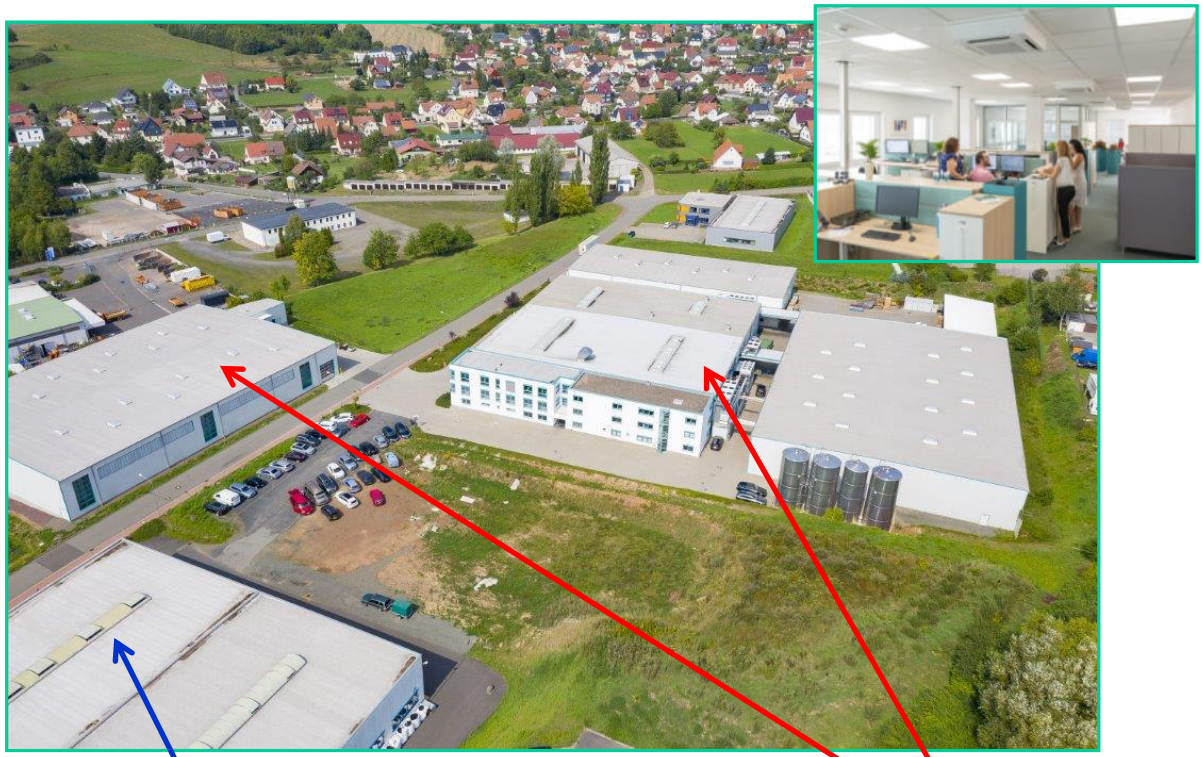
E-proPLAST at a Glance

E-proPLAST
PET-Verpackungen PET-Packaging



Sister company
FORMCONSULT GmbH
Mould making facility

E-proPLAST GmbH
More than 10.500m²
production-,
storage-, locker
room and office area

- **12x PET-Stretch blow moulding machines (2-stage)**
- **11x Injection moulding machines with 350–4500 kN clamping force for preform production**
- **Capacity of more than 200 Mio. PET-bottles per year**
- **78 employees**
- **15 Mio.€ turnover**

Quality- & Hygiene-Managment
Code of Conduct

E-proPLAST
PET-Verpackungen PET-Packaging

EN-ISO 9001-2000


ZERTIFIKAT

für das Managementsystem
nach DIN EN ISO 9001:2008

E-proPLAST GmbH
An der Asbacher Straße 38
98574 Schmalkalden

Herstellung von Kunststoffprodukten, Projektmanagement und Abmusterung von Werkzeugen für die Kunststoffindustrie

ISO 50001
Energy management

HACP-Concept
Hazard Analysis
and
Critical Control Points


Zertifikat
Nr. 02 / 2012
Hiermit wird dem Unternehmen
E-proPLAST GmbH
An der Asbacher Straße 38
98574 Schmalkalden
Bereich PET-Lebensmittelverpackungen
bescheinigt, daß es ein betriebliches
HACCP-Konzept
eingeführt hat und anwendet

Durch ein Betriebsaudit wurde der Nachweis erbracht, dass dieses HACCP-Konzept die Forderungen der VO 852/2004 über Lebensmittelhygiene in Verbindung mit der DIN EN 15593: 2008 Hygienemanagement bei der Herstellung von Lebensmittelverpackungen erfüllt

Dieses Zertifikat ist gültig bis: 06.03.2013
Zella-Mehlis, am 05.03.2012

Dr. F. Tebling
lebensmittelchemischer Sachverständiger

Code of conduct
Certified according to GKV


ZERTIFIKAT

MITGLIED
GKV
GKV-VERHALTENSKODEX

E-proPLAST GmbH

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Przemysłu Aerozolowego

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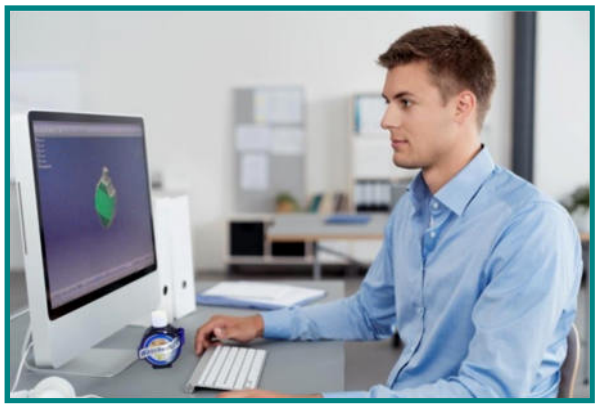
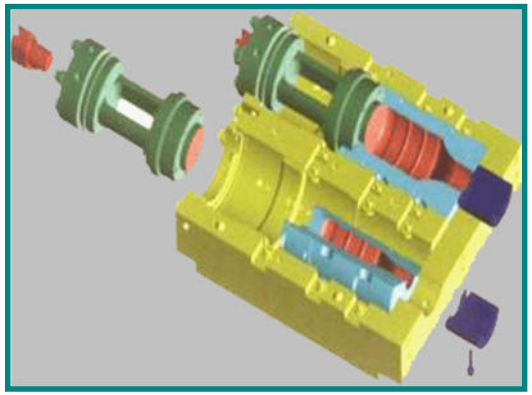
PET-Packaging
From the Design-Studies to the Final Product



Development & Design



Mould Making Facility

Production

PET-Verpackungen

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PET-Verpackungen PET-Packaging

Our PET- bottles are used in many applications:
➔ Cosmetics, detergents, honey, sauces, spirits, drinks and other kind of food stuff – between 10 and 1000 ml

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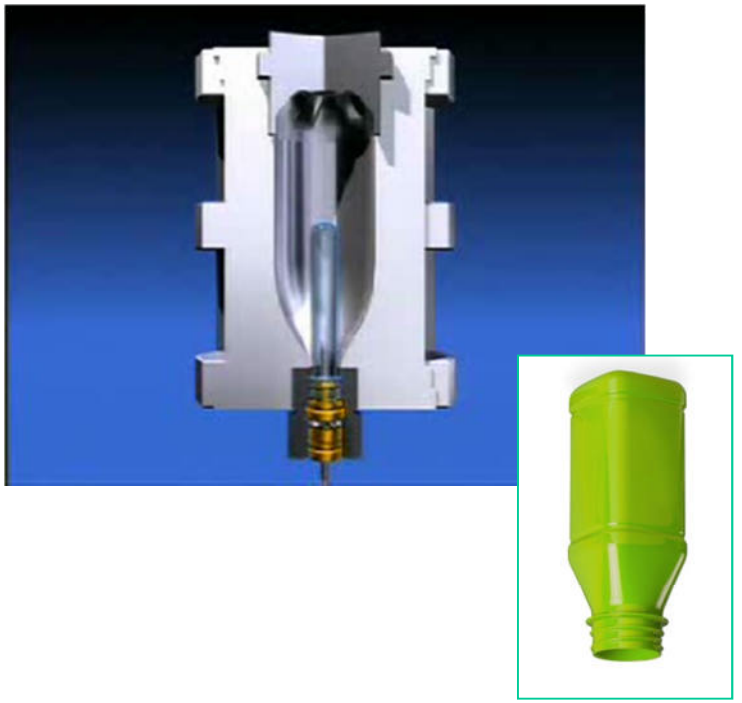
PET the process

2-stage production of preforms and bottles

Injection moulding of preforms

Stretch blow moulding of bottles



PET Hotfill stretch blow moulding process

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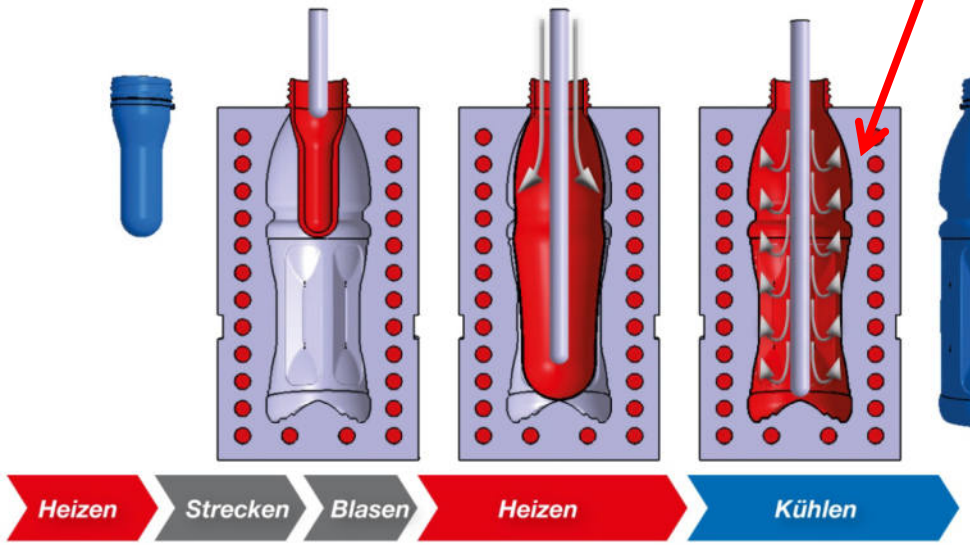
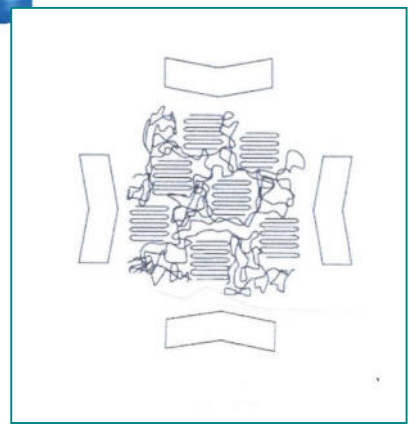
Thermical crystallisation inside blow mould

Mould temperature
120 – 150 °C





Bottles can be filled with a temperature of up to 87 °C

PET-Aerosol - markets

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Cosmetics | Pharma | Chemistry | Food

Aerosol Market 2018 (Units; %-Change to 2017)

- Germany: 1,19 Billion -8%
- Europe: 5,5 Billion –3,3%
- World: 16,0 Billion

Source: FEA Statistics

History PET Aerosoldosen

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- **2000:** Common development between SIG-PETtec/Troisdorf (machinery company) together with a leading cosmetic product supplier in Darmstadt / Germany.
- **2003-2006:** Continues development together with E-proPLAST / Schmalkalden. Due to the acquisitions of the company in Darmstadt to a large US cosmetic brand, stop of development.
- **2007-2011:** Continue of the development with comp. TUNAP / Germany. Compounding of special PET blends.
- **2011:** Because of uncertainties concerning testing and test procedures (e.g. hot-air testing) - preliminary stop.
- **2014-2017:** Supply of YOB / Regensburg and Kematen / Austria with preforms for 150ml aerosol can and development of 50- and 75-ml cans.
- **2018:**Purchase of the complete aerosol laboratory from our customer and termination of the exclusivity.
- **2019**: Marketability including necessary certification of sizes with nominal volume: 50; 75; 150ml.

BV = 45 ml
Weight: 13g

Volume 150ml;
BV 210ml
Weight: 25-26,5g

Since 09.2018 E-proPLAST has a fully equipped aerosol laboratory

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Filling

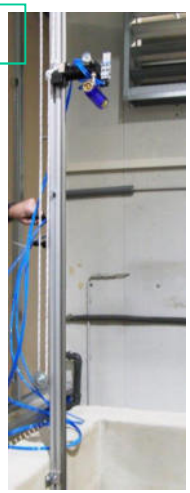
Closing / Crimping

Gas filler

Hot Air Test

Hot water bath

Drop test



Burst test

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PET – excellent barrier properties

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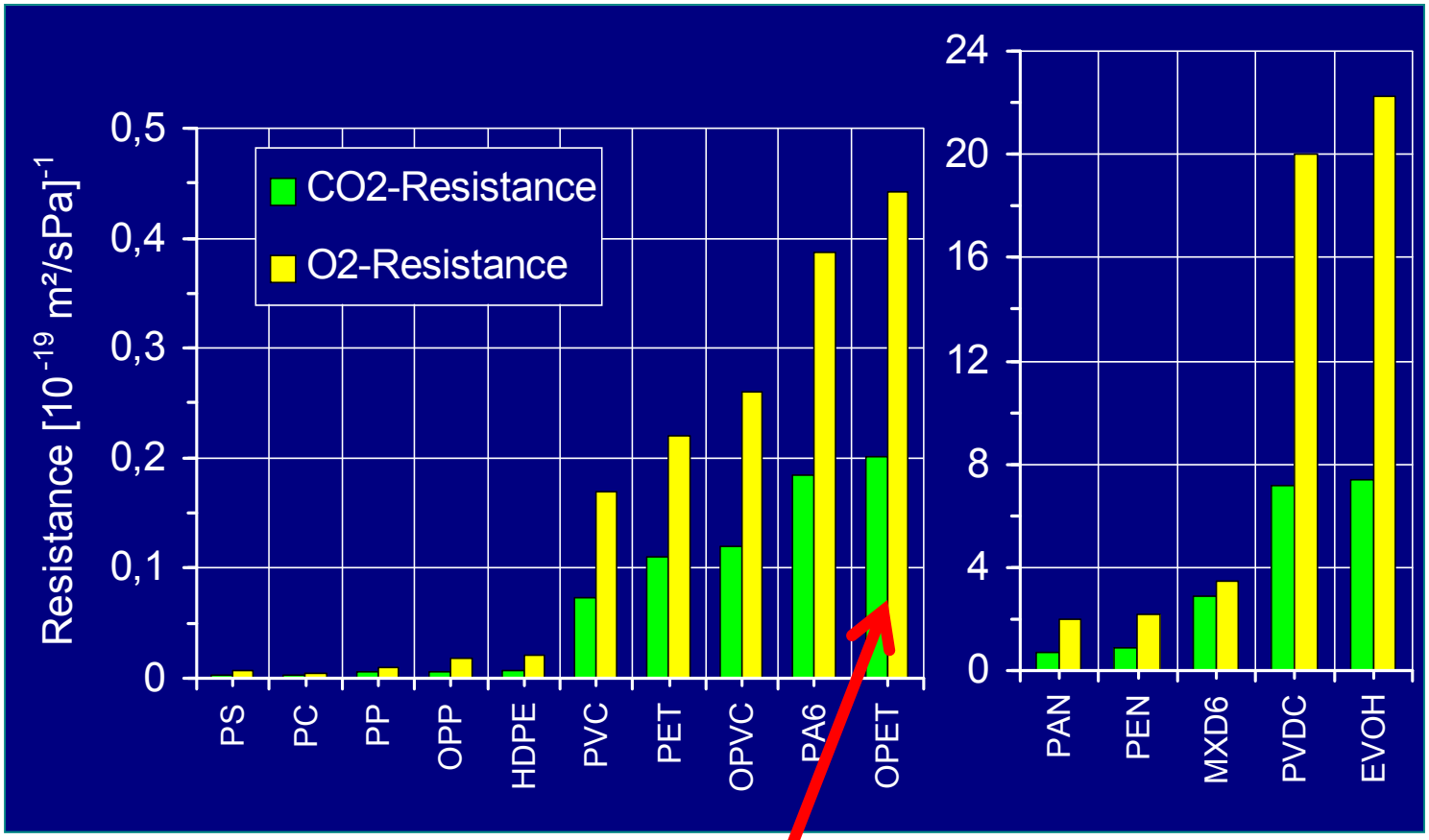

Stretch blow molded PET

Aerosol = pressure vessel

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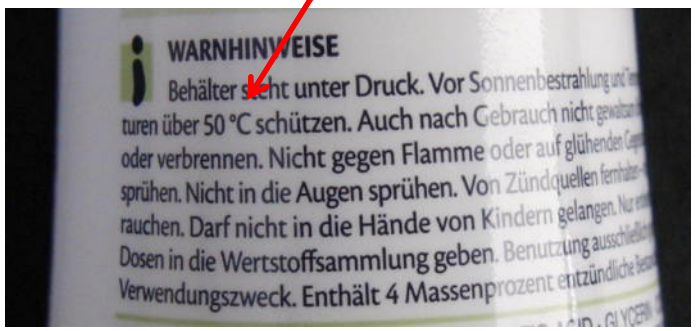
Safety!!!

An aerosol can is a pressure vessel and requires extensive safety precautions

Warning
Container is under pressure.
Protect of sun exposure and temperatures
more than 50 ° C



Today's definition of PET
Aerosol test criteria

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Aerosol plastic packaging
Comparison of test criteria EU vs. USA

test	criteria in EU (PAIR; EEC)	criteria in USA (HMR)
drop test	dropping 25 samples from a height of 1,80m onto a concrete floor, after storage at: 25pcs +40°C, 3 months 25pcs +55°C, 6 hours 25pcs -18°C, 24 hours	dropping 25 samples from a height of 1,80m onto a concrete floor, after storage at: 25pcs +38°C, 26 weeks 25pcs +50°C, 100 hours 25pcs +55C, 18 hours
burst test	240 psi (16,5bar)	16,2 bar
hot-airTest	65°C, 5 hours	65°C, 6 hours
water bath	Temperature and duration of the test shall be such that the internal pressure reaches that which would be exerted by its contents at a uniform temperature of 50 °C.	54°C, 6 minutes
maximum capacity	220ml brime full capacity	1000ml, Ø75mm

PAIR: „Pair-Project“
EEC: *75/324/ EEC*, COUNCIL DIRECTIVE (1975) on the approximation oft he laws oft he Member States relating to aerosol dispensers
HMR: Hazardous Materials Regulations (USA)

Hot Air Test - old

5 hours with 7 °C below glass transition temperature (75 °C)!!

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F E A Standard
Aerosol cans made of Plastics
No. X2-647 D 02/2009

Material resistance due to temperature

... .With the hot air test (75 ° C), interesting information about the temperature induced deformation is obtained, which may be different from hot water bath (50°C).

The aerosol container made of plastic should be designed in a way that the container is not destroyed or leaking when the filled aerosol dispenser is kept for at least 5 hours at 75 ° C in dry air conditions .....

Source: FEA standard

Result:
5 h with 75°C
Failed!!

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NEW:

Hot Air Test 65 °C - 5 hours

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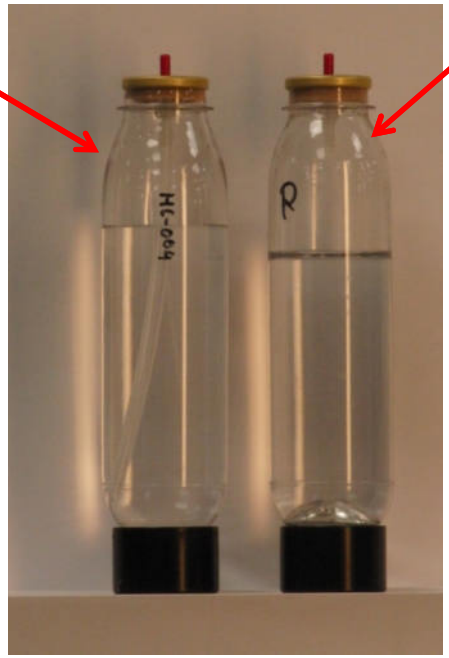
Before
hot-air test

After
Hot-air test
Deformation of base

After
Hot-air test
Deformation of shoulder

Before
hot-air test



<u>Hot-air test results E-proPLAST:</u>

- ✓ **Deformation of base and shoulder**
- ✓ **Bottles <u>do not leak</u>**
- ✓ **➔Test passed**

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Definition of test procedures
according to EU council directive 75/324 EEC

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Plastic Aerosols can be filled with compressed gas with a maximum pressure of 9 bars @ 50°C. [75-324-EWG 4.1.4.a]

Plastic Aerosols can be filled with dissolved gas with a maximum pressure of 8 bars @ 50°C. [75-324-EWG 4.1.4.b]

For plastic Aerosol containers filled with liquefied gas the maximum pressure @50°C depends on the total capacity and the percentage by weight of liquefied gas in the mixture. [75-324-EWG 4.1.4.c]

	Percentage by weight of liquefied gas in the total mixture Max. Permissible pressure at 50 °C		
Total capacity (BV)	20%	50%	80%
50 to 80ml	3,5 bars	2,8 bars	2,5 bars
>80 to 160ml	3,2 bars	2,5 bars	2,2 bars
>160-220 ml	2,8 bars	2,1 bars	1,8 bars

Pressurized with N2, or Air pressure the filling pressure at room temperature can be at max. 8 bar which will app. 9 bar at 50 °C.

The test pressure under room temperature must be at least 12 bars for containers filled with compressed or dissolved gas and at least 10 bars for containers filled with liquefied gas. Under these circumstances, no permanent and visible deformations may occur. [75-324-EWG 4.1.3.]

The bursting pressure should be at least 20% higher than the test pressure (12 bars for compressed or dissolved gas and 14,4 bars for liquefied gas). [75-324-EWG 6.1.2.]

Burst pressure

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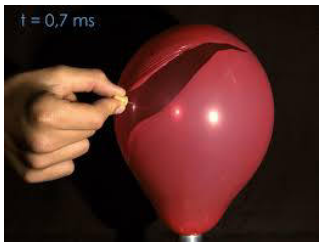
17 bar

20 bar

23 bar

24 bar

App ~ 32 bar



Bursting like a balloon!
Burst pressure under room temperature conditions will be in the range of **32 bar!!**

PET Aerosol is safe!

- ✓ A danger is visibly detected by deformations
- ✓ No splintering
- ✓ No rust
- ✓ BPA-free

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PET-Aerosol

Valve technology

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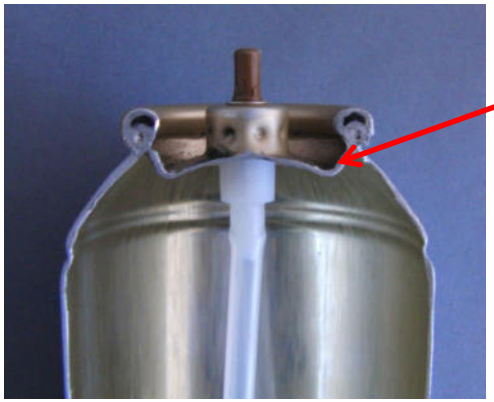
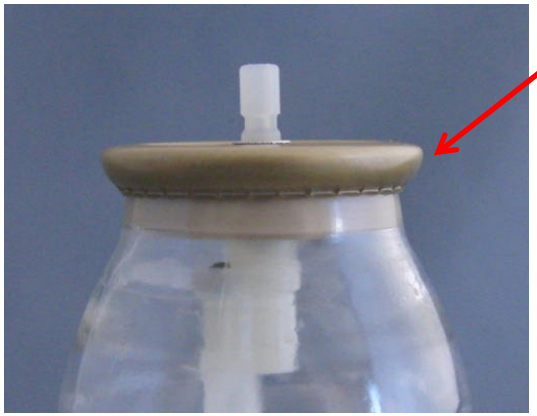
Standard:
Inside clinching



PET-Aerosol
Valve chrimped from the outside

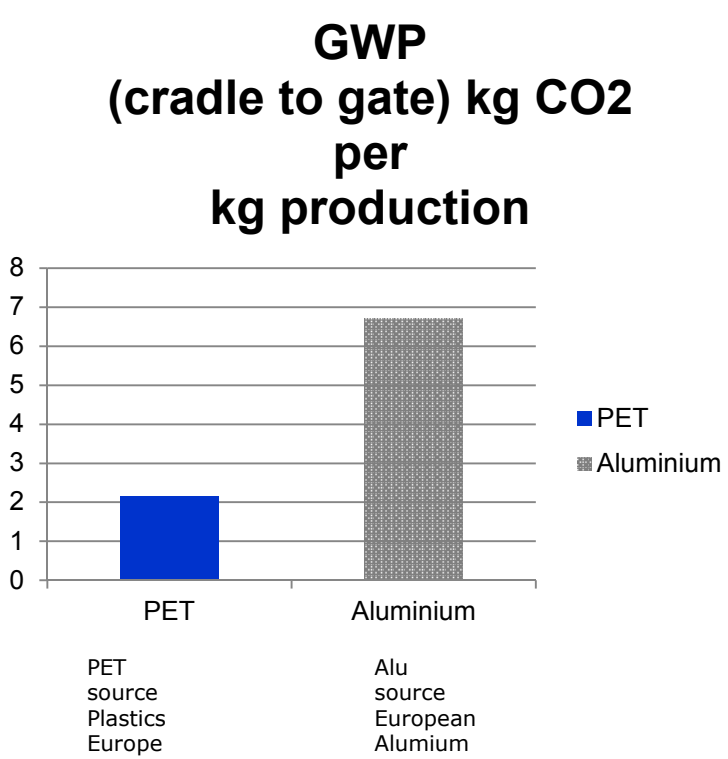


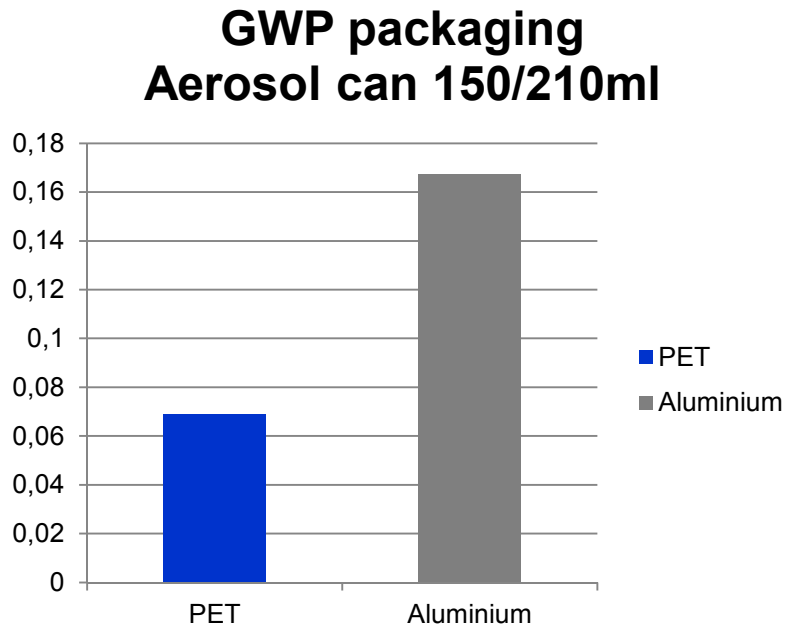
Sustainability

GWP – global warming potential

CO2-footprint PET vs. Aluminium

Aerosol can 150ml
Weight
PET: 32 g
Aluminium: 25g





PET-Aerosol bottle development & production

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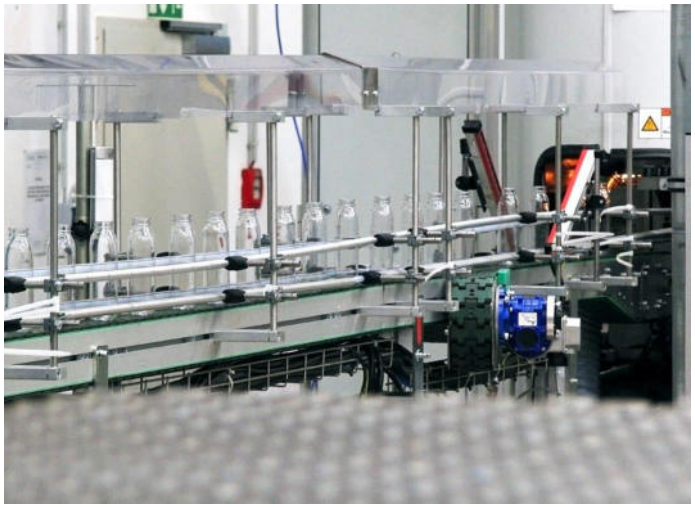
Development tools

1- Cavity Pilot preform mould
1- Cavity stretch blow mould

Large production capacity for series production available



100% Quality control by leak testing

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Current design / Coloring

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- ✓ **Nominal volume 50 – 75 – 150ml**
- ✓ **Waisted and cylindrical shapes**
- ✓ **Spray- and Foam applicator**

Individual coloring

➔first positive trials with up to 30% rPET were carried out

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Shoulder design with skirt

Base geometry

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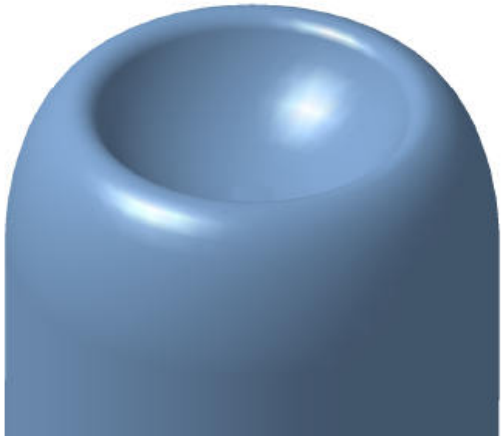

Champagne base

Petaloid base

CSD base

Future Design with PET Aerosol

Many shape possibilities

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As long as the bottles have a round shape, many more design possibilities are available

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Przemysłu Aerozolowego

Future valve & actuator technology

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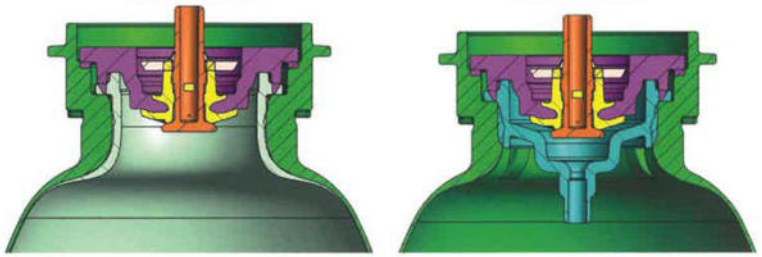
Lindal Actuator with skirt

Full plastic valves introduced by:

- LINDAL
- Clayton Corp. / USA

- Procter & Gamble
  World Aerosols July 2019



PET Aerosol cans – testing lab Lerem / France

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LEREM
LABORATOIRE D'ETUDES ET DE RECHERCHES DES EMBALLAGES METALLIQUES
Agréé par le Ministère en charge des Transports

TEST REPORT
N° 9-254/18

DATE OF APPLICATION: 15 February 2018

SUBJECT: Tests on plastic aerosol dispensers according to the FEA standard X-647 and following the study estimate N° 9-254/18.

CONCLUSIONS:

The batch of cans within which 5 aerosol containers without valves were collected is compliant to a batch of cans 10.0 bar (plastic cans).

The 25 tested plastic aerosol dispensers (material resistance) have resisted to a drop of 1.8 m after being stored 6 hours at 55°C.

The 25 tested plastic aerosol dispensers (material resistance) of have resisted to a drop of 1.8 m after being stored 24 hours at -18°C.

The 25 tested plastic aerosol dispensers (material resistance) have resisted to storage of 65°C during 5 hours.

MONTATAIRE, 24 January 2019.

The Technical Manager

J.B. MATHIEU

L.E.R.E.M.
Les Marches de l'Oise
100, rue Louis Blanc
60160 MONTATAIRE
Tél. 03.44.28.56.30 - Fax 03.44.28.25.71

The Director

F. FLECHEUX

Testing results 150ml:

- **10 bar**
- **Drop test after storing +55 ˚ C and -18 ˚ C**
- **Hot air test 65 ˚ C; 5 hours**

All relevant test's were passed

Petaloid- base

Champagne - base

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Summery why PET Aerosol?

Advantages of PET Aerosol:

- **Transparency**
- **The end-user wants to see what he is buying**
- **Variable in formats and freedom of design**
- **Simple production, low in production cost**
- **In case of high production quantities the aerosol can may be blown within the filling line**
- **High level of safety, no corrosion, no splintering, BPA-free**
- **Tactile warm touch**
- **Easy decoration with labels, sleeves or screen printing**
- **Low in weight**
- **Low carbon (CO2) footprint**
- **Easy to recycle**

Thank you very much for your attention