FEICA WEBINAR

Communicating on adhesives in plastic recycling

28 April 2021
10:00 - 11:00 Brussels CET
Proceedings

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▪ We ask participants to turn off their camera to avoid system performance issues. Note that you will be muted upon entry.

▪ During the Q&A session following the presentations, you will be able to use the chat box to ask questions.

▪ In case we don’t have sufficient time during the Q&A session to address your question, please feel free to send your question to info@feica.eu.

▪ The presentation slides will be sent to all webinar registrants.
Speakers - Moderators

Jana Cohrs
Executive Director Regulatory Affairs, FEICA

Dr. Dennis Bankmann
Senior Manager Circular Economy, Henkel and Vice Chair, FEICA Task Force on the Sustainability and Recycling of Adhesives Applications

Dr. Silvio Bassi
Regulatory Manager, COIM and Chair, FEICA Task Force on the Sustainability and Recycling of Adhesives Applications
Agenda

10:00  FEICA introduction
Ms Jana Cohrs, Executive Director Regulatory Affairs (FEICA)

10:05  Applications of adhesives in plastic packaging
Dr Dennis Bankmann, Senior Manager Circular Economy, Henkel and Vice Chair, FEICA Task Force on the Sustainability and recycling of Adhesives Applications

10:20  Types of adhesives chemistries relevant to plastic packaging
Dr Silvio Bassi, Regulatory, Regulatory Manager, COIM and Chair, FEICA Task Force on the Sustainability and recycling of Adhesives Applications

10:35  Terminology and definitions to be used when communicating on adhesives
Ms Jana Cohrs, Executive Director Regulatory Affairs (FEICA)

10:45  Q&A – by Dr Silvio Bassi and Dr Dennis Bankmann

11:00  Close of the webinar
Introduction

Jana Cohrs
Executive Director Regulatory Affairs, FEICA
FEICA facts and figures

FEICA represents 800+ adhesives and sealants producers in Europe, through its National Association Members in 16 countries, 24 Direct Company Members and 19 Affiliate Company Members.

The adhesive and sealant industry*

- represents about 2% of the total European chemical industry’s turnover
- contributes more than 17 billion euros to the EU economy
- employs more than 45,000 people
- invests about 470 million euros on Research and Development

* source: FEICA / Smithers
FEICA - Association of the European Adhesive & Sealant Industry

15 National Associations representing 16 countries +800 members

24 Direct Company Members

19 Affiliate Company Members
Markets

The European adhesive and sealant market 2020
End-use sectors

€17.1bn

- Building construction, civil engineering, craftsmen 18.2%
- Consumer/DIY 11.5%
- Transportation 9.2%
- Footwear and leather 2.2%
- Paper, board and related products 26.9%
- Assembly operations/other 22.5%
- Woodworking and joinery 9.5%

Data source: Smithers
Dr. Dennis Bankmann
Senior Manager Circular Economy, Henkel and Vice Chair, FEICA Task Force on the Sustainability and Recycling of Adhesives Applications

Applications of adhesives in plastic packaging
Today’s focus is on plastics packaging

- Adhesives are used in very many applications and on many substrates
  - Metal
  - Wood
  - Paper
  - Glass
  - **Plastics**

- Many industries use adhesives
  - Industrial manufacture
  - Craftsmen & construction
  - Home, Do It Yourself and school
  - **Packaging industry**
Why a focus on plastic packaging recycling?

- Plastic packaging is high volume
  - 40% of 50 mio tonnes / year of EU plastics demand is used for packaging
- Collection is already in place
  - Separate curbside collection schemes
- Recycling rates are still low
  - Compared to paper, metal, glass

- Impact of adhesives is more pronounced
  - Metal and glass remelting generally not affected by adhesives
  - Paper recycling has developed adhesive removal techniques
Adhesive uses in plastic packaging

- **Multilayer film production**
  - Laminating adhesives

- **Closure applications**
  - Heat seal
  - Cold seal
  - Pressure sensitive applications

- **Labeling applications**
  - Wet / water-based labeling
  - Hotmelt labeling
  - Pressure sensitive applications
Laminating adhesives

- Used to combine different films into one packaging material
- Improvement of properties such as mechanical resistance and barrier
- Food and non-food applications
  - Pouches
  - Stand up pouches
  - Certain wrappers
  - Medical/pharmaceutical packs
The laminating process

Drying stage

may be absent for solvent-free adhesives

For paper, “wet bond” lamination also possible
Heat seal

- Ensures hygienic seal and allows for easy peel (easy access)

- Main use is for lidding applications but also used for overwrap applications

- Mainly food packaging
  - Dairy lidding
  - Convenience food tray lidding
  - Hygienic seals on bottles
Cold seal

- Ensures hygienic seal and allows for easy peel (easy access)

- Ideal for temperature sensitive filling goods and high-speed lines

- Food and non-food applications
  - Cholate bar wrappers
  - Ice cream pouches
  - Medical plasters and other medical packaging
  - Collecting card packs
Pressure sensitive reclose applications

- Ensures hygienic seal and allows for easy peel (easy access)
- Can help to prevent food loss through reclosability
- Food applications
  - Cheese
  - Cold cuts
Heat seal / cold seal application process

Heat seal applied all-over
Cold seal applied in pattern

In special cases, heat seals can be applied from melt
Wet labeling

- Used to attach paper labels to containers and bottles

- Porous paper face stock allows for wash-off at relatively mild conditions

- Main applications for food
  - Reusable water bottles
  - Reusable soda bottles
  - Dairy packaging
Hotmelt labeling

- Used to attach labels on high volume food production lines

- Wash-off functions firmly established for reusable and recyclable PET bottles

- Food and non-food applications
  - Water bottles
  - Soda bottles
  - Dairy bottles and cups
  - Household products in round bottles
Pressure sensitive self-adhesive labels

- Pressure-sensitive adhesives are used to create self-adhesive labels

- Labels are supplied to the labeling machine and applied just by pressure

- Wide range of applications
  - Container labeling for food and household products
  - Logistics labels (shrink hoods, pallet wrap, secondary/tertiary packaging)
  - RFID* and other tags

* Radio frequency identification
Pressure sensitive label production

- Drying stage
- Adhesive
- Liner
- Facestock
- Coated facestock on liner
Side note: industrial and chemical packaging

- Similar principles apply as for consumer and commercial packaging

- Adhesive labeling also common
  - However, labels typically required to resist adverse environments

- Collection differs markedly
  - Some used/contaminated packaging considered as hazardous goods
  - Product residues can be problematic for recyclers
  - Often excluded from home collection
Types of adhesives chemistries relevant to plastic packaging

Dr. Silvio Bassi
Regulatory Manager, COIM and Chair, FEICA Task Force on the Sustainability and Recycling of Adhesives Applications
Adhesives – Chemical nature

- What are adhesives?
Adhesives – Chemical nature

- Adhesives are chemicals which hold together things, and enable our life as we know it, in many ways. Today we will focus on the chemistry of some of them, as they are part of the recycling process of many articles that we use in our everyday’s life...
- Their chemistry is fascinating, because they can be very different!
- But, even more important, they must be fit for the purpose.
Adhesives – Chemical nature

- But let’s speak about their chemical nature.
  
  Just for sake of making some examples, without pretending to be exhaustive I can mention to you some classes of adhesives used in different domains:
  
  • Polyurethanes (Lamination adhesives)
  
  • Hot melts (Paper and boards)
  
  • Reactive hot melts (Labels)
  
  • Etc.
Adhesives – Chemical nature

- Basically almost all of them are not soluble in water, also if warm or basic.

- As matter of fact we cannot pretend that one day they hold together, in a good and tight way, different materials and that the day after they will detach from substrate cleanly and in an easy way.

- So, we are confronted with a problem
Adhesives – Chemical nature

- But let’s begin our tour …
Adhesives – Chemical nature

- Polyurethanes

  Polyurethanes are synthesized starting from diisocyanates and hydroxylated compounds. Hereunder some examples...
Adhesives – Chemical nature

- Polyurethanes
  - Their chemical nature makes difficult an hydrolysis in mild conditions, and so very unlikely that they can be easily removed from plastic films or other substrates
  - What can be achieved is that they will stay together with the substrate at which they are bound
Adhesives – Chemical nature

- Hot melts

  - Hot melts are grouped together because they share the property to be fluid (and thus applied) at high temperature, being solid at room temperature
Adhesives – Chemical nature

- Hot melts

- Hot melts can be of different chemical nature, but all of them are polymers.
Adhesives – Chemical nature

- Hot melts 01
  - Ethylene vinyl acetates
    - Most frequently used base polymer
Adhesives – Chemical nature

- Hot melts 02
  - Polyolefins (oriented or amorphous)
    - Good, general purpose adhesives
Adhesives – Chemical nature

- Hot melts 03
  - Styrene block copolymers
    - If low temperature flexibility is required
Adhesives – Chemical nature

- Hot melts 04
  - Metallocene Polyolefins
    - Wider temperature range than EVA
Adhesives – Chemical nature

- Hot melts 05
  - Polyamides
    - Considered to be high performance hot melts
Adhesives – Chemical nature

- Hot melts 06
  - Polyurethanes
    - Reactive hot melts
Adhesives – Chemical nature

- Hot melts
  - Also for all classes of hot melts we have seen, a solubility is difficult to imagine in water at ordinary temperatures. What can be achieved, as said in the first presentation, is the fact that they stay together with their substrate.
Terminology and definitions to be used when communicating on adhesives

Jana Cohrs
Executive Director Regulatory Affairs, FEICA
Relevant characteristics of adhesives in the plastic recycling process

There are many different chemistries and application methods of adhesives in plastics packaging and each class of adhesive has its own behaviour. However, regardless of the chemistry or method of application, adhesive applications in recyclable plastic packaging (whether used in the packaging itself or on the label) must possess certain characteristics to ensure they do not interfere with the recycling process under consideration.

<table>
<thead>
<tr>
<th>Chemistry / Function</th>
<th>Labelling</th>
<th>Pressure sensitive application</th>
<th>Lamination</th>
<th>Cold seal</th>
<th>Heat seal</th>
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</thead>
<tbody>
<tr>
<td>Polyurethane</td>
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<td>Acrylic resin dispersion / emulsion</td>
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<td>Natural polymer-based adhesives</td>
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<td>Polyolefin / EVA hotmelt</td>
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<tr>
<td>Non-reactive solvent-based adhesives</td>
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</table>

Table 1: Correlation between adhesive chemistry and function.
Cooperation and communication along the supply chain

- Cooperation and communication along the supply chain is key to define what are the right characteristics that allow optimal recyclability.

- Problem: Terminology related to adhesive behavior can differ between value chain actors and create misunderstandings.

→ We all need to speak one language: harmonization of terminology and definitions.
Cooperation and communication along the supply chain

FEICA would like to contribute to establishing a common language and common understanding as regards adhesives in plastic recycling.

- FEICA Document: *Terminology and definitions to be used in the context of plastic packaging recycling*

- FEICA is actively reaching out to stakeholders to support the update of guidelines and the evaluation of recycling options

- FEICA is organizing stakeholder events – like the present webinar
Definitions related to adhesives in plastic recycling

Water-soluble / alkali-soluble adhesive application

Any applied adhesive capable of dissolving in water or alkali in the recycling process.

The dissolved adhesive is transferred into the process water and remains in solution until the washing liquid undergoes a recovery or cleaning step.
Definitions related to adhesives in plastic recycling

Releasable adhesive application
Any applied adhesive capable of releasing on at least one side of its bond under the specified conditions in the recycling process.

After releasing, the adhesive remains on one or on both substrates. The process water does not accumulate adhesives (it is not recommended to recycle the washing solution).
Definitions related to adhesives in plastic recycling

- **Water releasable**: any applied adhesive capable of releasing on at least one side of its bond in water under the specified conditions in the recycling process.

- **Alkali releasable**: any applied adhesive capable of releasing on at least one side of its bond in alkali under the specified conditions in the recycling process.
Let us work together and boost the circular economy!
Q&A

- Please use the chat box if you have a question
- Questions in the chat box will be covered as we go along

Dr. Silvio Bassi
Regulatory Manager, COIM and Chair, FEICA Task Force on the Sustainability and recycling of Adhesives Applications

Dr. Dennis Bankmann
Senior Manager Circular Economy, Henkel and Vice Chair, FEICA Task Force on the Sustainability and recycling of Adhesives Applications
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