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DELIVERABLE  
N°1.2

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## INNOVATIVE DIGITAL WATERMARKS AND GREEN SOLVENTS FOR THE RECOVERY AND RECYCLING OF MULTI-LAYER MATERIALS

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### DELIVERABLE N°1.2

#### Industry requirements for sustainable multi-layer packaging

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## 1 Introduction

This report provides an overview of industry requirements for sustainable multi-layer packaging. TWI led the identification of industry contacts and initiated dialogue with key manufacturers of multilayer packaging as well as end users of blister packs and laminate pouches, such as major pharmaceutical companies including GSK, Astra Zeneca and Novartis and fast-moving consumer goods companies (FMCG) such as Unilever and Procter & Gamble. The objective of the consultation/survey was to establish a sound understanding on individual multilayer packaging requirements and the key barriers currently restricting recycling. Discussions also acted as a platform to generate interest within these sectors for the innovative and sustainable recycling strategies being developed in the Sol-Rec2 project.

## 2 Identification of requirements

To establish the technical parameters where industry's input is required, a literature review was conducted on manufacturing processes, product design, materials incorporated and overall applications of multilayer and blister packaging.

To obtain comparable results and derive conclusion, TWI prepared a set of questions in the form of questionnaire (available in Appendix A) and shared with the identified contacts for feedback. The questions concerned functionality of packaging, composition and challenges faced by companies when considering recycling of their products. The main points of discussion with industry related to:

- Type of product contained in their packaging
- Type of multi-layer package used for their specific application
- Type of barrier that their packaging provides or their requirement for barrier properties
- Stability and sterilisation requirements for the packaging materials
- Preferred polymer or materials for packaging
- Inks and adhesives used in packaging
- Challenges and restrictions faced when considering recycling of their products
- End-of-life strategy

The questionnaire was also shared with the consortium to review and comment, a final version incorporating recommendations and suggested revisions, was issued and eventually shared with the contacted industries.

## 3 Industry contacts and consultations

As part of task 1.2, TWI reached out to over 30 companies which included both packaging material suppliers and packaging consumers in the pharmaceutical and food industry. Existing associations and contacts were first approached. New industries and key players were also approached, initially through the company websites and available contact channels, including TWI's membership portfolio. However, after a series of non-responses, a more direct approach was taken by identifying relevant employees of selected industries and reaching out through social media platforms, primarily through LinkedIn and available communication links found herein. Through this approach the consortium was able to obtain more responses and to raise awareness and communicate the objectives of SolRec2. Reaching the appropriate contact was time consuming and demanding process, especially for larger/ global cooperation's such as *Unilever* and *Procter & Gamble*. Discovering the right contact required reaching out to many employees



in a number of different corporate locations around the globe. Once the right contact was reached the survey was forwarded along with a request for a virtual meeting. In virtual meetings organised, the objectives and efforts of the consortium in developing a sustainable lifecycle design for multilayer and blister packaging were communicated. The possibilities of key industries members assuming a position in the project's advisory board was also discussed. Contacts agreeing to assume a position in the project's advisory board were listed and a final selection from the consortium is planned in May (M12). The second most significant barrier, besides identifying the right contact, was confidentiality restrictions associated with the product, including details of their composition, the sequence of the materials, the materials involved and applied bonding techniques. Often contacts inquired on access rights and visibility of the report and the information provided and potential conflicts of interest from other competing organisations involved. The variety of subjects and technical topics listed in the questionnaire posed an additional challenge the consortium faced, and contacts often reported inability to answer the questionnaire and useful information could only be derived through virtual meetings. The consortium observed that very often contacts were unable to assist with information on packaging requirements as well as end-of-life strategy. This was attributed to the fact that these two topics lay within the responsibilities of different groups within the company.

Table 1 below gives the list/register of companies and attempts of communication, as well as outcomes of contacts made. Despite many difficulties and non-responsiveness of companies during the task, several successful discussions took place and gave valuable insights into the industry barriers, current requirements and future strategies/trends. Completed questionnaire forms are available in Appendix B. There was difficulty in filling in the questionnaire in detail as contacted companies supply/use a variety of different packaging materials for various applications and so it was not possible to list the requirements or information for each individual packaging type. To establish a broad understanding of packaging requirements in industry, TWI held consultations with companies and obtained general trends and strategies. This report gives the overview of these obtained insights.



Table 1 register of contacts attempted

Company name	Number of people contacted	Communication Method			Surveys completed	Outcome
		Personal message/call	e-mail	Meeting		
Multivac	2	1	1			Discussion
Unilever	2	1	1	1	1	Survey and discussion
Procter & Gamble	3	3				None
Novartis	3	3				None
Astra Zeneca	4	5				None
Mondi	2	2	1	1		Discussion
Amcors Flexibles Europe & Americas	2		1			None
Constantia Flexibles International GmbH	3	5	3			None
SIG Combibloc	1		1	1	1	Survey and discussion
Tetra Pak	3	3	1			None
Goglio S.p.A.	2	3	1			None
CEFLEX - A Circular Economy for Flexible Packaging	1	3	1			None
BASF	4	3	1	1	1	Survey and discussion
Eurofilm Mantzaris SA	3	3	1			None
BEWI	1	3	1			None
Holland Colours Europe	1	2	1			Rigid packaging producer – did not wish to take part
Friesland- Campina	2	5	1			None
Hordijk Verpakkingen	1	1	1			Mono thermoform material producer
CEDO	2	3	2			None
Lamb Weston	1	3	1			None
Oerlemans packaging	1	3	3			None



<i>Avery Denisson</i>	1	2	1			Did not take part as they supply materials
<i>Exxon Mobile</i>	3	3	3			None
<i>Compass group</i>	2	2	2	1	1	Survey and discussion
<i>Celab Consortium</i>	3	3	5	3		Discussion, technical details and insights shared
<i>Hollister</i>	5	2	1	2	1	Discussion, technical insights shared
<i>Nutra-med company</i>	2	1	1	1	1	Survey
<i>GSK</i>	2	4	3	1		Under review not yet received
<i>Johnson &amp; Johnson</i>	2	5	2	1	1	Survey under preparation (circulated within the industry). Technical information provided.



#### 4 Industry Insights and trends

From the consultations with the industry players, a common trend was identified; industry is moving towards the adaptation of a mono-material approach and the use of paper as a main component in packaging bodies. They claim that this will allow for increased recyclability and a reduction of environmental impact due to waste mismanagement. Currently, it is a wide belief of industry and end users that separation of multi-layer packaging is not feasible. Usual multi-layer and blisters packs are designed to serve a specific function. This explains the significant number of different packaging configurations and different material grades used with the individual layers. In order to satisfy the functionality of the package, a variety of different materials is combined. A normal configuration includes different laminates and/or coatings, inks, barrier layers, etc. Each layer employed in the multi-layer packaging has a specific purpose. Normally, the outer layer serves as a suitable substrate for printing or label adhesion, intermediate layer(s) provide stiffness, sealing layers provide sealing properties, barrier layer(s) provide protection (location is not standard) and isolation from, or to, a specific environment normally preventing ingress of oxygen, solvents (including humidity), or the leaching of aromatic, therapeutic or nutritious compounds. A large number of layers and a high variety of materials create difficulties for the recycling industry and it is a challenge to separate individual polymeric layers. SolRec2, aiming to increase the recyclability of multilayer and blister packaging by providing the necessary toolbox and process system that will allow for the separation of the combined layers and the recovery of the polymers used within, can help eliminate this technical barrier; preventing the recycling of the mentioned packaging system. However, the existing technical gap for the recycling (separation and recovery) of multilayer systems created an ambition for industry to move towards the adaptation of “*mono materials*” for packaging. According to members of industry (provided through interviews and communication) “*mono materials*” provide the advantage of easier recyclability. It was, however, highlighted during discussions that mono-materials are bulkier (using more raw material) and have inferior mechanical and barrier properties as there is no single material that can satisfy all the desired packaging properties/requirements. To satisfy these properties, coatings, adhesives or “atom-thick” layers are incorporated in “*mono material*” systems to achieve desired product properties. This trend aims to simplify the current multi-layer packaging. In reality though “*mono material*” systems remain a multilayer system with the exception that the overall concentration of different layers is within the accepted contamination levels for reuse in the same or similar applications following recycling. It is, however, the belief of the consortium that this will unavoidably lead to material downcycling and, after a certain number of trials, either to feedstock/energy recovery or even landfilling (since the aforementioned options may not be possible).

The polymer types highlighted as being considered for “*mono material*” applications are PE, PET, PP and paper.

Another trend that was highlighted, was the adaptation towards paper-based packaging. Specifically, packaging that will consist of 95% fibres and 5% plastic. Currently, the beverage cartons used for packaging dairy products (55%), juices and other liquids (45%) consist of 75% paperboard (structural layer to give stiffness), 21% polymers (mostly PE) and 4% aluminium (barrier for oxygen and light). These types of packaging are claimed to consist of recyclable long fibres, plastic film (LDPE with or without aluminium coating), caps and closures (HDPE/PP) and remaining residues (called PolyAl) as recycled material. Produced PolyAl can also be recycled further.

The removal of the aluminium layer with the adaptation of EVOH (polyethylvinyl alcohol layer), or yet the reduction of the aluminium layer to an “atom-thick coating” or metallised layer was also mentioned.

Endorsing industry’s position, the Circular Economy for Flexible Packaging (CEFLEX) initiative which is a collaboration of 180 European organisations representing the entire value chain of flexible packaging



aims to make all flexible packaging in Europe circular by 2025. CEFLEX has published a 5-step roadmap for the transition of this market towards a circular economy. In the 5-step roadmap the 3<sup>rd</sup> step is to reduce multi-material flexible packaging to “*mono material*” with existing recycling streams where possible. CEFLEX encourages design for recyclability but also highlights that compromising protective properties of packaging will result in higher costs and associated environmental impacts compared with producing flexible packaging which is not recycled but delivers the required level of product protection. In terms of “*mono materials*”, polyolefin-based packaging is currently preferred as these are easier to recycle. The CEFLEX guidelines also recommend the use of mono-PE and mono-PP structures where possible, followed by flexible mixed PO and use of mixed plastics including flexibles as the last choice (Designing for a Circular Economy for Flexible Packaging | CEFLEX D4ACE, 2022).





## 5 Industry's move towards recycled and recyclable plastic

Some of the biggest industry players have published their plastic packaging strategies. In particular, Unilever has committed by 2025 to,

- Achieve a reduction of more than 100,000 tonnes of virgin plastic used in packaging and
- Collect and process more plastic packaging than they sell
- Ensure that 100% of Unilever's plastic packaging is designed to be fully reusable, recyclable or compostable
- Use 25% recycled plastic in their packaging

So far, Unilever has reduced its virgin plastic packaging footprint from 711,000 tonnes to 599,000 tonnes in 2021 and has advertised on their corporate website their long-term transition from multi-layered sachets to mono-material sachets to improve their collection and recyclability (Rethinking plastic packaging - Unilever, 2022).

The alliance for beverage cartons and the environment aims, by 2030, to produce beverage cartons from recycled content, use more fibres and less plastic and achieve at least a 70% recycling rate for beverage cartons (Beverage Carton Recycling Facts & Figures).

Mondi, a leading global packaging and paper group also targets to make 100% of its products reusable, recyclable or compostable by 2025. It will also, eliminate waste to landfill from its manufacturing processes (MAP2030, 2022).

Constantia flexibles group similarly committed to make 100% of its packaging recyclable by 2025 (Constantia Flexibles - One pager factsheet, 2022).

In a report issued by the Ellen MacArthur Foundation's named "The Global Commitment 2021 Progress Report", it was stated that there is a focus on the reduction or elimination of multilayer materials as well as metallised films among packaging companies (Global Commitment 2021 Progress Report, 2021).

The same trend observations were made during the industrial consultations conducted under Task 1.2.



## 6 Conclusions

Key manufacturers, as well as end users, were contacted to establish individual requirements for their product needs (as a manufacturer and end user). Although a considerable number of companies and people were contacted, a low response rate was observed. Direct communication to relevant employees or members appeared to be more successful, however, communication was restricted in many cases due to claimed conflicts of interests or confidentiality.

With the exception of one manufacturer (BASF), a common approach was observed among packaging industry companies, to transition towards the adaptation of a “*mono-material*” system. The only exception shared the opinion that product quality and durability are at risk and material content is bound to increase.

Interviews with industries, highlighted common goals and objectives to,

- Manufacture and design recyclable packaging
- Increase recycled content in packaging
- Simplify packaging designs to aid recycling, primarily through minimising the number of materials utilised
- Elimination of aluminium layers in packaging (with the exception on pharmaceutical applications)
- Transition towards paper - based packaging

It is the belief of the consortium that the transition towards paper-based packaging will lead to a significant increase in product carbon footprint and material integrity and fitness for service will be affected after short periods or cycles and will limit product specifications and application environments.

All manufacturers agreed that for certain applications multilayer packaging will not be able to be replaced with “*mono-material*” alternatives.

Existing multilayer packaging comprises a series of different layers, the combination of which provides the desired product properties. Based on manufacturer, the individual layers can be welded or bonded normally using the same or similar types of adhesive.

Industries also highlighted the product structures and materials of choice for their next generation packaging, whilst at the same time showing interest in the technology developed within Sol-Rec2. The mono-material approach is associated with higher risks and will lead to downcycling, in addition, for certain applications, multilayer systems will continue to be used (pharmaceuticals and labelling). In this respect, the technology developed within the project can provide an alternative approach towards achieving circularity and homogeneous of high value and purity.



## 7 References

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Global Commitment 2021 Progress Report. [online] Available at: <<https://ellenmacarthurfoundation.org/global-commitment/overview>> [Accessed 21 March 2022].



## Appendix A – questionnaire

### Can you describe the product type contained in the package?

- Pharmaceutical
- Food
- Cosmetic
- Chemicals
- Other

(Other) Please specify:

### Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?

- Blister packaging
- Pouch
- Other

(Other) Please specify:

### What are the primary functions of the package (containment, protection or both)?

- Containment
- Protection
- Both

### What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?

- Moisture
- UV
- Oxygen
- Temperature (hot or cold)
- Physical damage
- Biological contamination
- Other

(Other) Please specify:

### Are there any specific stability requirements for the packaging material?

### Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)

### Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)



**Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?**

**Are there any standard or preferred material combinations for blister packs/pouches?**

**Are there any standard company or industry product information labels or codes applied to the packages?**

Yes

No

(Yes) Please specify:

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

**Are any inks, adhesives and/or coatings applied the packages? If so, can you supply further information including the composition?**

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

**Can you please provide a typical cost of a multi-layer package?**

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**



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**What restrictions and challenges do you face when considering recycling?**



## Appendix B – completed questionnaires

### Completed questionnaire no. 1

Company name: Unilever

#### Can you describe the product type contained in the package?

Pharmaceutical

Food

Cosmetic

Chemicals

Other

(Other) Please specify:

#### Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?

Blister packaging

Pouch

Other

(Other) Please specify: 4 side seal sachets, wrappers, etc

#### What are the primary functions of the package (containment, protection or both)?

Containment

Protection

Both

#### What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?

Moisture

UV

Oxygen

Temperature (hot or cold)

Physical damage

Biological contamination

Other

(Other) Please specify:

#### Are there any specific stability requirements for the packaging material?

#### Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)

no

#### Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)

Yes, for example FDA/EFSA



**Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?**

For some of the pouches filled with liquid (mayo or soups) yes, but dry powders or ice-cream not

**Are there any standard or preferred material combinations for blister packs/pouches?**

Preferred are mono-materials

**Are there any standard company or industry product information labels or codes applied to the packages?**

Yes

No

(Yes) Please specify:

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

For example: PET9/Paper40/PE12/Alu6/OPP20

**Are any inks, adhesives and/or coatings applied to the packages? If so, can you supply further information including the composition?**

Fully printed

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

Stiffness and stretch of the material, sealing, perforation

**Can you please provide a typical cost of a multi-layer package?**

Wide range

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**

Yes, needs to be fully recyclable, minimum headspace, minimum thickness and reduced virgin plastic usage

**What restrictions and challenges do you face when considering recycling?**

Many, but starting with lack of infrastructure. Costs, barrier properties and therefore potential (food) waste increase. Sealing properties on a monomaterial structure are challenging. How to tackle littering when we talk about for example ice-cream wrappers.





## Completed questionnaire no. 2

Company name: **Compass Group**

### Can you describe the product type contained in the package?

- Pharmaceutical
- Food
- Cosmetic
- Chemicals
- Other

(Other) Please specify:

### Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?

- Blister packaging
- Pouch
- Other

(Other) Please specify:

### What are the primary functions of the package (containment, protection or both)?

- Containment
- Protection
- Both

### What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?

- Moisture
- UV
- Oxygen
- Temperature (hot or cold)
- Physical damage
- Biological contamination
- Other

(Other) Please specify:

### Are there any specific stability requirements for the packaging material?

no

### Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)

Other than staining by certain components, no

### Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)

no

### Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?

no



**Are there any standard or preferred material combinations for blister packs/pouches?**

We don't use blister packs or pouches in our process

**Are there any standard company or industry product information labels or codes applied to the packages?**

Yes

No

(Yes) Please specify:

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

Was PP & PET, recent move to 100% PET

**Are any inks, adhesives and/or coatings applied to the packages? If so, can you supply further information including the composition?**

Lidding film has PET seal coating extruded by DuPont

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

Easier for us to process but limits recyclability so ending this route

**Can you please provide a typical cost of a multi-layer package?**

Cheaper than mono PET, estimate 2/3 the price

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**

Working with packaging suppliers for them to collect and recycle back into same packaging

**What restrictions and challenges do you face when considering recycling?**

Logistics of collecting. Waste contractors not ready for segregated collections from schools & hospitals



### Completed questionnaire no. 3

Company name: BASF

#### Can you describe the product type contained in the package?

- Pharmaceutical
  - Food
  - Cosmetic
  - Chemicals
  - Other (agricultural products)
- (Other) Please specify:

#### Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?

- Blister packaging
  - Pouch
  - Other
- (Other) Please specify: Lid film, lamination film, thermoforming web, inliner

#### What are the primary functions of the package (containment, protection or both)?

- Containment
- Protection
- Both

#### What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?

- Moisture
  - UV
  - Oxygen
  - Temperature (hot or cold)
  - Physical damage
  - Biological contamination
  - Other
- (Other) Please specify:

#### Are there any specific stability requirements for the packaging material?

No, except for specific applications, e.g. roasting bags

#### Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)

Yes

#### Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)

Yes, food-contact legislations and more

#### Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?

Yes, not all, but there are packages which are sterilized by hot steam, autoclave, irradiation, ethylene oxide, etc.

#### Are there any standard or preferred material combinations for blister packs/pouches?



Yes, there are many standards, e.g. PE/PA; PE/PA/EVOH, OPA//PE, CPA//PE, etc.

**Are there any standard company or industry product information labels or codes applied to the packages?**

Yes

No

(Yes) Please specify: not possible in detail because we are just a resin supplier

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

Can't be answered in a short way, up to 13 layers is common, numerous combinations and thicknesses are used

**Are any inks, adhesives and/or coatings applied the packages? If so, can you supply further information including the composition?**

Many of these packages are printed or laminated, too many variations are present in the market to provide a concise overview here

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

Complex technology, right material selection and combination, minimal thickness variations

**Can you please provide a typical cost of a multi-layer package?**

Not really, it depends on structures and final requirements

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**

We don't produce packaging, we are resin supplier (one component of the packaging) but we have a sustainability strategy in place (reducing CO<sub>2</sub>, increasing resource efficiency, using alternative resources like bio-based and recycled materials, working on recyclability of our materials, etc.)

**What restrictions and challenges do you face when considering recycling?**

The key challenge we perceive is the so-called politically-driven "mono-material approach": Mechanical recycling industry processing packaging waste, polyolefin industry as well as some recycling certification bodies are pushing to reduce the number of polymers (thus phasing out the use of e.g. PA, PET, EVOH, aluminium, etc.) as far as possible.". Motivation is to expand their markets and to avoid additional investments in new sorting and recycling technology modifications. Based on that, minimum levels of polyethylene in packaging structures were implemented to be classified as "fully recyclable." This approach does not support sustainability packaging needs to deliver (e.g. resource-efficient use of raw materials, reduced weight, downgauging, product protection, easy handling, etc.). This recycling for the sake of recycling. Technical results and arguments showing that e.g. PA can be mechanically recycled in polyolefin streams are available and show excellent performances, but this is not accepted by the above-mentioned parties.



## Completed questionnaire no. 4

Company name: SIG

### Can you describe the product type contained in the package?

- Pharmaceutical
- Food
- Cosmetic
- Chemicals
- Other

(Other) Please specify:

### Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?

- Blister packaging
- Pouch
- Other

(Other) Please specify: Aseptic Beverage Carton

### What are the primary functions of the package (containment, protection or both)?

- Containment
- Protection
- Both

### What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?

- Moisture
- UV
- Oxygen
- Temperature (hot or cold)
- Physical damage
- Biological contamination
- Other

(Other) Please specify:

### Are there any specific stability requirements for the packaging material?

yes

### Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)

no

### Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)

Food packaging standards

### Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?

Yes, sterilisation for aseptic packaging



**Are there any standard or preferred material combinations for blister packs/pouches?**

Standard composition of beverage cartons: Fibre/Alu/LDPE or Fibre/LDPE

**Are there any standard company or industry product information labels or codes applied to the packages?**

Yes

No

(Yes) Please specify: depends on customer requirement, FSC, ASI

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

Standard composition of beverage cartons: Fibre/Alu/LDPE 75%/4%/21% or Fibre/LDPE

**Are any inks, adhesives and/or coatings applied the packages? If so, can you supply further information including the composition?**

LDPE coating and inks, adhesives for the closure

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

**Can you please provide a typical cost of a multi-layer package?**

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**

Yes, see our Association ACE with Industry Roadmap for EU, by 2030 90% collection of beverage carton and 70% recycled

**What restrictions and challenges do you face when considering recycling?**

National legislation in Member States regarding collection. Sorting and recycling or beverage Cartons. Recycling Capacities for PolyAl



## Completed questionnaire no. 5

Company name: Hollister

### Can you describe the product type contained in the package?

- Pharmaceutical
- Food
- Cosmetic
- Chemicals
- Other

(Other) Please specify: Medical device

### Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?

- Blister packaging
- Pouch
- Other

(Other) Please specify: Flow wrap

### What are the primary functions of the package (containment, protection or both)?

- Both

### What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?

- Moisture
- UV
- Oxygen
- Temperature (hot or cold)
- Physical damage
- Biological contamination
- Other

(Other) Please specify:

### Are there any specific stability requirements for the packaging material?

Hermetic seal must be guaranteed for a minimum of two years

### Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)

No

### Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)

No

### Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?

No pre-treatment. Product is gamma sterilised post-sealing

### Are there any standard or preferred material combinations for blister packs/pouches?

Standard is aluminium with polyethylene inner layer (for sealing) and either nylon or polypropylene on the outside

### Are there any standard company or industry product information labels or codes applied to the packages?



Yes

**(Yes) Please specify: Regulatory labels such as medical device, single use, prescription only, read the IFU before use, etc.**

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

Flow wrap: Three layers; OPA 15  $\mu\text{m}$ , Alu 9  $\mu\text{m}$ , PE 60  $\mu\text{m}$  (PE is the product-contacting layer)

Pre-made pouch: Three layers; MOPP 30  $\mu\text{m}$ , ALu 9 $\mu\text{m}$ , PE 50  $\mu\text{m}$

**Are any inks, adhesives and/or coatings applied the packages? If so, can you supply further information including the composition?**

Inks only to the outside. We use VideoJet inks

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

Sometimes delamination can occur, which is a nuisance

**Can you please provide a typical cost of a multi-layer package?**

Commercially sensitive information. You should ask Nelipak, Huhtamaki, etc. to provide guidance pricing

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**

No. We are currently developing a global Environmental Change Network which will look at packing as part of CSR program.

**What restrictions and challenges do you face when considering recycling?**

Separating the aluminium foil from the two polymer layers





## Completed questionnaire no. 6

Company name: Nutra-med company

**Can you describe the product type contained in the package?**

- Pharmaceutical
- Food
- Cosmetic
- Chemicals
- Other

(Other) Please specify:

**Describe the multi-layer packaging type (Blister, Pouch) Specification (food grade)?**

- Blister packaging
- Pouch
- Other

(Other) Please specify: bottle HDPE, and PET

**What are the primary functions of the package (containment, protection or both)?**

- Containment
- Protection
- Both

**What type of barrier does the blister packaging or pouch have to provide (moisture, UV, oxygen, heat or cold, physical damage, biological contamination)?**

- Moisture
- UV
- Oxygen
- Temperature (hot or cold)
- Physical damage
- Biological contamination
- Other

(Other) Please specify:

**Are there any specific stability requirements for the packaging material?**

Must provide minimum 18 months stability

**Do the packaging contents leach or interact with the packaging material? (adsorption/absorption)**

No

**Does the packaging need to conform to any international or local standards/guidance? Including handling/management End-of-Life (EoL)**

Yes, must meet FDA requirements for food and drugs

**Does the packaging material have to undergo sterilisation or any specific pre-treatment before filling/final assembly? Are the effects of pre-treatment on the packaging materials known?**

No pre-treatment required

**Are there any standard or preferred material combinations for blister packs/pouches?**



Yes, PVC with Alu, else Alu with Alu where 100% moisture barrier is required.

**Are there any standard company or industry product information labels or codes applied to the packages?**

Yes

No

(Yes) Please specify: FDA label requirements for supplements and/or drugs

**What is the number of packaging layers and layer composition? What is the typical thickness of the layers?**

Varies – from single layer 10 mil PVC to multi-layer complex structures (PVC + PVDC, or PVC + Aclar + PET, etc.)

**Are any inks, adhesives and/or coatings applied the packages? If so, can you supply further information including the composition?**

Yes. Typically, UV inks are used to print on the blister packages, and plenty of studies done to confirm no leaking to product.

**What challenges do you face when manufacturing and/or utilising multi-layer packaging materials?**

Formability, seal ability, barrier properties, stability.

**Can you please provide a typical cost of a multi-layer package?**

Can range from \$2.00 / lb to \$50 / lb depending on the structure and volume.

**Does your company have an end-of-life strategy for the packages? Are there any specific waste policies?**

NO

**What restrictions and challenges do you face when considering recycling?**

Too expensive for recyclers to separate the PVC from the aluminium layers (forming from sealing) or even to separate aluminium from aluminium layers. The materials are independently recyclable. The problem is the cost required to separate the materials exceeds the value.