Packaging

eco-design

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Introduction

imageen

This booklet has been prepared within the framework of the Imageen project – Introducing eco-design to small and medium-sized companies through the Enterprise Europe Network.

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enterprise europe network
Business Support on Your Doorstep

European Commission

This booklet has been prepared for professionals encountering packaging issues - whether they find themselves in the role of packaging material producers, packers, importers of packaged goods, distributers placing packaged goods on the market, packaging designers and developers working in companies or consumers and others with a responsible attitude towards the environment.

Extended producer responsibility

Producers/packers/importers placing packaging and/or packaged products on the market are responsible for the appropriate management of the product/packaging, even after it has been discarded by the consumer. This is known as extended producer responsibility, which applies to packaging and waste packaging in the EU.

Waste packaging management is more efficient and less expensive, if the producer/packer/importer considers the environmental effects of packaging throughout its whole life cycle and not just when it becomes waste. This way, environmental effects can be mitigated during product and packaging design.

Product eco-design

Consideration of product's environmental effects through its whole life cycle with the objective to reduce these effects during product design, development and planning is known as eco-design.

Packaging eco-design

Measures to reduce resource consumption along the value chain must be envisioned during packaging design and appraisal.

A balance between a reduction in the quantity of resources used for packaging and possible damages or spoilage of packaged goods, which could occur due to insufficient packaging, must be sought.

Packaging

„Packaging“ shall mean all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer. „Non-returnable“ items used for the same purposes shall also be considered to constitute packaging.

The packaging system

„Packaging“ constitutes a system which is normally made up of:

- **sales packaging or primary packaging**, i. e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase;

- **grouped packaging or secondary packaging**, i. e. packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units, whether the latter is sold as such to the final user or consumer or whether it serves only as a means to replenish the shelves at the point of sale; it can be removed from the product without affecting its characteristics;

- **transport packaging or tertiary packaging**, i. e. packaging conceived so as to facilitate handling and transport of a number of sales units or grouped packaging in order to prevent physical handling and transport damage. Transport packaging does not include road, rail, ship and air containers.

Various packaging elements complement each other and constitute a system which must be assessed as a whole in order to find the best solution, for example required packaging strength is achieved through varying combinations of sales, grouped and transport packaging, which could include combinations of higher outer layer strength and weaker sales units or sales units with increased strength and weaker outer layers.

Packaging and the product

Packaging

- **protects the product**: provides a barrier between its contents and the outside environment. It helps to preserve goods and protects them from negative impacts. Packaging may block access to sunlight or oxygen and therefore guarantees additional protection. Packaging ensures a defined time of product preservation within anticipated temperature, humidity and sunlight conditions;
- **enables product handling**: facilitates warehouse stacking and storage, protects the product from damage and ensures impact protection;
- **provides hygienic and sanitary conditions**: packaging material must be pure. No odours or impurities may be transferred to the contents. Certain foodstuffs, such as chocolate or teas are susceptible to acquiring odours from packaging materials which have not been chosen appropriately;
- **prevents pollution**: a limited content of hazardous substances in packaging materials prevents hazardous materials being transferred to the environment during packaging use, disposal or recovery.

Honesty in presentation

Packaging intended for consumer products must not generate false expectations regarding the content's characteristics, quality or quantity.

- **Packaging should be of the optimum size, strength and performance in accordance with the essential requirements and other required packaging qualities:**
  - **application of multi-skinned packaging** is justifiable only if this is required due to plausible technical requirements. A small content hidden in a much larger volume of packaging is not appropriate;
  - **minimisation of headspace**; some products and processes require headspace due to changes in density related to settlement or volume. This should be kept to a minimum;
  - **gifts**; when the product is packaged as a gift or luxury item, the packaging may be also more elaborate. Even in this instance it must not be excessive;
  - **environmental claims** on packaging must be substantiated and verifiable. The claim must apply to the whole product life cycle of the packaging and/or product.

Communication, information and instructions

Packaging provides a mode of communication between producers and buyers/consumers.

Information related to the packaged product may encompass: warnings of potential hazards, instructions for opening and closing, storage specifications and instructions for product usage, shelf life and expiration dates, as well as instructions for correct waste management of the product, when it is discarded.

Information concerning responsible waste packaging management: symbol for packaging material composition directs the consumer or waste recovery operators towards appropriate separation of waste materials and their appropriate recovery.

Special signs, such as „Tidyman“, are recommended on packaging of products intended for wide consumption in order to prevent littering.

Information must be:

- clear and legible, instructions and graphics must be resistant and evident throughout the product life cycle;
- useful, in simple language, with explicit and unambiguous graphics.

Health, safety and consumer protection

Packaging must not compromise the consumer protection or health and safety in the workplace throughout the supply chain. If hazards exist, warnings should be issued on potential risks.

Special attention should be attributed to:

- product protection at the place of sale; packaging could contribute towards pilferage prevention or malicious tampering with the product. Packaging may provide evidence the product has not been tampered with;

- child protection:
  - medicinal products and products not intended to be swallowed may present a specific danger to children. Packaging of such products must not resemble packaging used for beverages, sweets or other products intended for children;
  - child resistant packaging should be considered if packaged contents have dangerous characteristics. Any claim of child resistant packaging must be substantiated with records of packaging being subjected to independent testing protocols;
- dispensing and closure devices; if packaging is equipped with special dispensing and closure devices, their operation should be obvious, easy to use, avoiding leakage and incorrect dosing. Requirements of users with disabilities also need to be considered;
- occupational health and safety; packaging systems need to adhere to occupational health and safety.

Packaging regulations

Packaging must comply with relevant legislation which could be linked to contact of food with packaging materials or transport of dangerous goods and essential environmental requirements.

Additional requirements for packaging may be defined, but not limited to legislation pertaining to:

- consumer protection;
- metric requirements;
- weights and measures;
- trade marks;
- contact with food and beverages;
- extended producer responsibility;
- recovery and recycling;
- transport of dangerous substances;
- heavy metal content;
- ...

Essential requirements for packaging

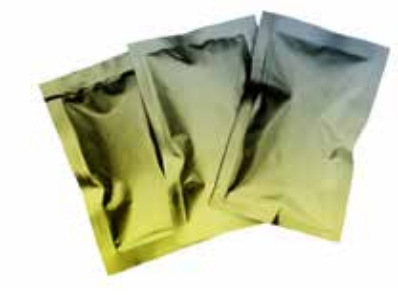
In addition to extended producer responsibility, essential requirements must be respected. These define:

- limited contents of Lead, Cadmium, Mercury and Hexavalent Chromium in packaging and its components;
- packaging volume and weight shall be limited to the minimum adequate amount;
- packaging design shall incorporate possibilities for material and energy recovery or composting, when it becomes waste (packaging being reused must also have waste management options defined);
- packaging must be produced with a minimum presence of dangerous substances in order to limit their emission into the environment during waste management procedures.

Conformance with basic requirements must not jeopardise the fundamental functions required from packaging in order to protect both consumer/buyers as well as the packaged goods.

Obligations related to essential requirements?

- prevention by source reduction — **obligatory**
- reuse — **voluntary**
- recovery — **one choice is compulsory**
  - by material recycling
  - with energy recovery
  - by composting
  - biodegradation to carbon dioxide, biomass and water



Harmonised* standards

Production and composition	Reuse	Recovery
Prevention by source reduction (EN 13428:2004)	Reuse (EN 13429:2004)	Material recovery (EN 13430:2004)
Requirements for measuring and verifying the four heavy metals present in packaging (CR 13695-1:2001)		Energy recovery (EN 13431:2004)
Requirements for measuring and verifying dangerous substances present in packaging (CEN/TR 13695-2:2005)		Organic recovery, composting and biodegradation (EN 13432:2001)
Requirement for the use of European Standards in the field of packaging and packaging waste (EN 13427:2004)		

*Conformance with standards provides assumption of compliance with essential requirements

EN 13428:2004
Prevention by source reduction

Before measures may be instigated to reduce the volume and quantity of packaging, the following issues need to be examined:

- technical properties of the packing material;
- product protection requirements;
- parameters determined by the packing/filling line;
- logistics;
- marketing;
- users/consumers;
- communication, information and instruction;
- legislative requirements;
- other…

Product safety

The basic purpose of packaging
is protection of the product
from the packaging line
to the point of usage of the consumer.

Packaging:

- preserves the product, extends shelf life, ensures taste etc.;
- protects the product from harmful external influences, such as humidity, temperature, Oxygen, UV rays and mechanical impacts and damage during storage;
- contains the product and ensures its integrity;
- ensures hygienic conditions and protection from pests and prevents microbiological contamination...

Packaging material production

Different materials have different characteristics which are important for the packaging design of a certain product, such as:

- shape;
- thickness;
- tolerances;
- size;
- feasibility;
- treatment with tools;
- waste management:
  - dangerous substance contents;
  - limit values for Hg, Cr^{6+}, Cd, and Pb.

Packing, filling

The packer determines the parameters which are important for processing materials into packaging on packing and filling lines:

- impact resistance;
- hardness;
- packing line velocity, packing and filling efficiency;
- stable transfer along the packing/filling line;
- thermal resistance;
- effective closing;
- maximum efficient usage of the available volume;
- hygiene.

Logistics

Packaging must accommodate logistic requirements relating to transport and existing handling systems:

- combinations of primary, secondary and tertiary packaging;
- efficient use of volume;
- stacking on pallets;
- prevention of damage and impact resistance;
- ...

Marketing

Packaging ensures product recognition and encourages sales through:

- brand marks;
- other designations, marks and declarations;
- presentation of goods at the point of sale.

In addition to product recognition aspects, also refilling of reusable packaging and product protection from shop lifting may be important for marketing.

Consumers/Buyers

Packaging must fulfil the expectations of buyers and consumers, such as:

- the appropriate amount of goods packaged in relation to consumer requirements;
- simple and ergonomic handling;
- resealing and storage of packaged goods;
- efficient emptying of packaging;
- attractiveness.

Information and instructions

Packaging enables communication between the product producer and the buyer. Instructions and guidelines may be required due to:

- demands for food health and safety (nutritional value, additives, shelf life, expiration dates, food preparation, cooking time etc.);
- storage conditions and demands;
- marking requirements, statements or declarations, bar codes, packaging composition information and other environmental claims, such as the Mobius Loop, Tidyman, Green Dot etc.;
- ...

Safety

Packaging must fulfil consumer and user safety requirements with consideration also to occupational health and safety, especially during handling. These demands assure:

- safe handling;
- protection of children;
- recognition of purposeful damage or contamination of the product;
- easy identification of the content.

Legislation

Some packaging demands originate from legislative demands, regulations and international agreements.

Special requirements are characteristic for food and beverages, dangerous goods and chemicals as well as consumer safety and protection.

Some additional requirements need to be considered for different modes of transport, such as air, rail and/or sea transport.

Additional requirements

Possible additional requirements may occur due to:

- economic and social conditions;
- cultural conditions;
- additional environmental commitments, voluntary initiatives, internal environmental targets and business decisions.

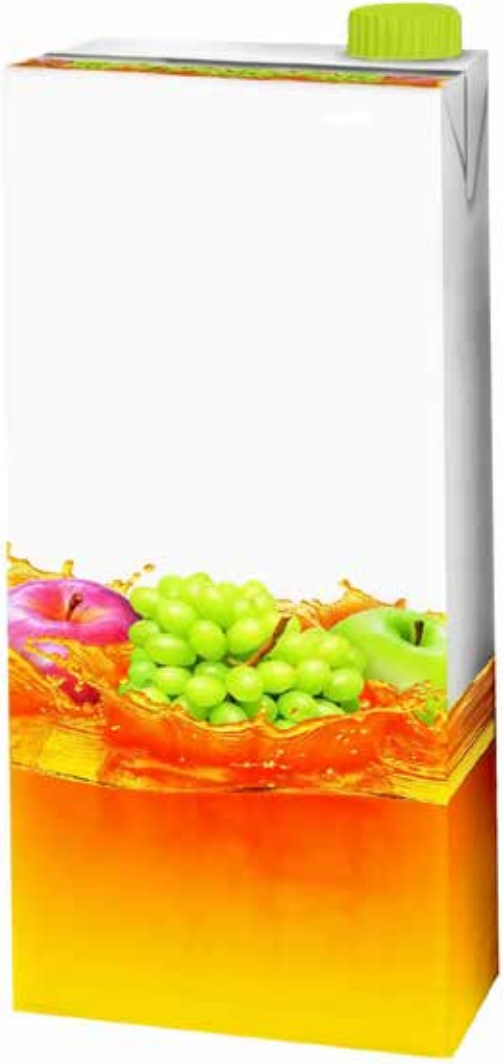
EN 13429:2004
Reuse

- Is not compulsory
- Packaging intended to be refilled or used for the same purpose for which it was conceived, must :
  - accomplish a minimum number of trips or rotations during its life-cycle (a system must be existent to facilitate reuse);
  - fulfil occupational health and safety requirements (also during preparation for reuse – cleaning, refilling, maintenance, redistribution);
  - waste management must be determined when reuse is no longer possible as the packaging has become waste.

EN 13430:2004
Recovery by material recycling

Before waste packaging can be recovered by material recycling, the following issues must be checked:

- does the packaging contain materials which could have a negative influence on recycling:
  - material and design combinations which could make collection and material separation more difficult;
  - substances which contaminate the material intended to be recycled – influence on the quality of the recycled material;
- material compatibility with recovery technology;
- statement, declaration of weight of component (%) of packaging which may be recovered.



EN 13431:2004
Energy recovery

Energy recovery of waste packaging is feasible, if the waste packaging:

- exhibits a minimal threshold calorific value;
- releases energy during combustion.

The calorific value does not have to be verified for packaging:

- made from Aluminium with a thickness below 50 µm;
- with $q_{net} \geq 5$ MJ/kg;
- where the organic component exceeds 50% of weight.

The content of heavy metals and dangerous substances must be limited.

EN 13432:2001
Composting and biodegradation

Material is biodegradable if it disintegrates physically, chemically, thermally or biologically ⇒ carbon dioxide, biomass and water:

- materials of natural origin are considered biodegradable with no additional testing requirements (wood, paper, cotton...), however:

biodegradability ≠ composting ⇒ composting needs to be evaluated beforehand to establish the effects of the material on the quality of compost.

EN 13427:2004
Umbrella standard

Provides a link between all the reference packaging standards:

- EN 13427:2004 Packaging – Requirements for the use of European Standards in the field of packaging and packaging waste
- EN 13428:2004 Packaging – Requirements specific to manufacturing and composition – Prevention by source reduction
- EN 13429:2004 Packaging – Reuse
- EN 13430:2004 Packaging – Requirements for packaging recoverable by material recycling
- EN 13431:2004 Packaging – Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value
- EN 13432:2000 Packaging – Requirements for packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of packaging

Statement of compliance

The packaging conforms with EN 13427 requirements			
Packaging designation - traceability:			
Packaging composition - main materials:			
Evaluation summary			
Essential packaging requirement:	**Reference standard:**	**Yes / No**	**Note:**
Composition and Production:			
- prevention at source	SIST EN 13428		
- heavy metal content	SIST CR 13695-1		
- dangerous substance content	SIST EN 13428, SIST-TP CEN/TR 13695-2		
Reuse (a circulation system is implemented)	SIST EN 13429		
Packaging may be recovered with a least one or more of the following procedures:			
- material recycling	SIST EN 13430		
- energy recovery	SIST EN 13431		
- composting and biological degradation	SIST EN 13432		
Statement of conformity			
The packaging is compliant with the essential requirements regarding composition, production and packaging and waste packaging management: Personnel responsible (Supplier name and address): Signature: Position: Date:			

Packaging eco-design benefits

- cheaper packaging;
- less weight;
- simpler materials;
- more recycled materials;
- more recyclable materials;
- packaging from a nearer location;
- less embedded carbon;
- public image;
- compliance with legislation;
- ...

Identification of packaging materials

Appropriate designation of packaging materials makes waste packaging management easier

- Polyethylene terephthalate PET 1
- High density polyethylene HDPE 2
- Polyvinyl chloride PVC 3
- Low density polyethylene LDPE 4
- Polypropylene PP 5
- Polystyrene PS 6
- Corrugated fibreboard PAP 20
- Steel FE 40
- Aluminium ALU 41
- Wood FOR 50
- Jute TEX 61
- Colourless glass GL 70
- Green glass GL 71
- Brown glass GL 72
- Plastic/miscellaneous metals C/* 92
  (*abbreviation corresponding to the predominant material)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PAP

Sources with additional information

This booklet contains information from the following sources:

- DTI, Packaging (Essential Requirements) Regulations 2003, Government Guidance Notes on United Kingdom Regulations;
- Incpen, Responsible Packaging, Code of Practice for optimising packaging and minimising waste, March 2003, second edition;
- Envirowise, Guide GG908 PackGuide A Guide to Packaging Eco-Design;
- Commission Decision 97/129/EC of 28 January 1997 establishing the identification system for packaging materials pursuant to European Parliament and Council Directive 94/62/EC on packaging and packaging waste
- packaging standards:
  - EN 13427: Packaging – Requirements for the use of European Standards in the field of packaging and packaging waste;
  - EN 13428: Packaging – Requirements specific to manufacturing and composition – Prevention by source reduction;

- EN 13429: Packaging – Reuse;
- EN 13430: Packaging – Requirements for packaging recoverable by material recycling;
- EN 13431: Packaging – Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value;
- EN 13432: Packaging – Requirements for packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of packaging;
- CR 13695-1 Packaging – Requirements for measuring and verifying the four heavy metals and other dangerous substances present in packaging and their release into the environment – Part 1: Requirements for measuring and verifying the four heavy metals present in packaging;
- CEN/TR 13695-2 Packaging – Requirements for measuring and verifying the four heavy metals and other dangerous substances present in packaging, and their release into the environment – Part 2: Requirements for measuring and verifying dangerous substances present in packaging, and their release into the environment;

- Eco-design standard, EN ISO 14006: Environmental management systems – Guidelines for incorporating eco-design;

which is recommended reading material for anyone desiring to deepen their knowledge on packaging eco-design.

Partners:

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