



# Ecodesign in Food packaging

## UNIT 6: Metal Cans



# Content unit 6, Ecodesign in food packaging

## 6.1 Requirements

6.1.1 Functions of metal food packaging(cans):

6.1.2 Environmental aspects

6.2 Canned cans, construction and materials.

6.2.1 Construction of preservation boxes

6.2.2 Materials

6.2.3 Thermal treatment

After learning this unit, the student will be able to:

After learning this unit, the student will be able to:

- Know the functions of metal food packaging
- Be informed about the features and possibilities of Ecodesign of metal food packaging.

# 6.1 Requirements

## 6.1.1 Functions of metal food packaging(cans):

- preserves and protects the product,
- resists the chemical actions of the product,
- to withstand the handling and processing conditions,
- resists the conditions of the external environment,
- have the correct dimensions and ability to be practically interchangeable with similar products from other sources of supply (when necessary),
- have the display properties required at the point of sale,
- allows easy opening and simple / safe removal of the product,
- be built of recyclable raw materials.

- In addition, these functions must continue to be satisfactorily fulfilled after the end of the declared shelf-life

## 6.1.2 Environmental issues

- Canned cans are the most recycled food container in the world. So:
- Canned metal cans are 100% recyclable.
- Steel containers can be recycled indefinitely without losing resistance or quality.
- Each tonne of recycled steel saves 2,500 kilograms of iron ore, 1,000 kilograms of coal and 40 kilograms of limestone.

# Canned cans, construction and materials.

The cans can be of various shapes, with a round or oval, rectangular or trapezoidal section, etc.

## 6.2.1 Construction of cans

The processed boxes are typically produced from pre-coated metal rolls (coils).

### Canned three-piece cans

The most used box is the three-piece box: body (thickness 0.2 - 0.24 mm), lid and bottom (thickness 0.24 - 0.26 mm). Prior to forming the case bodies, protective coatings are applied on the inside and outside of the surfaces with a roller on the flat sheet. After forming, the lid and bottom are usually joined by folding (double roll)



Fig. 1 Different cans, folded or detachable caps.

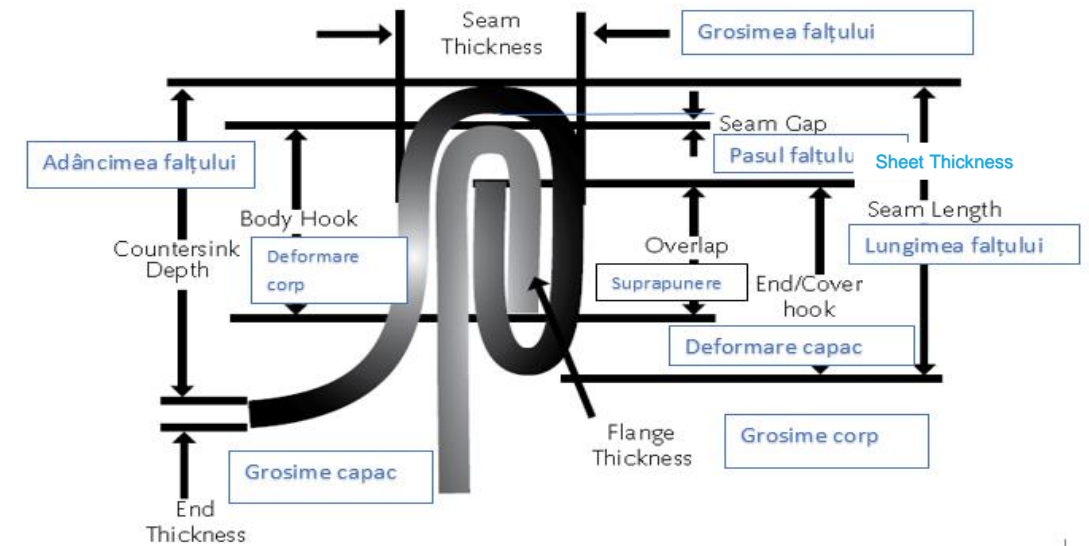


Fig.2 Folding

## 6.2.1 Construction of cans II

Each double stitch is made in two unique operations called "first operation" (A, B) and "second operation" (C, D).

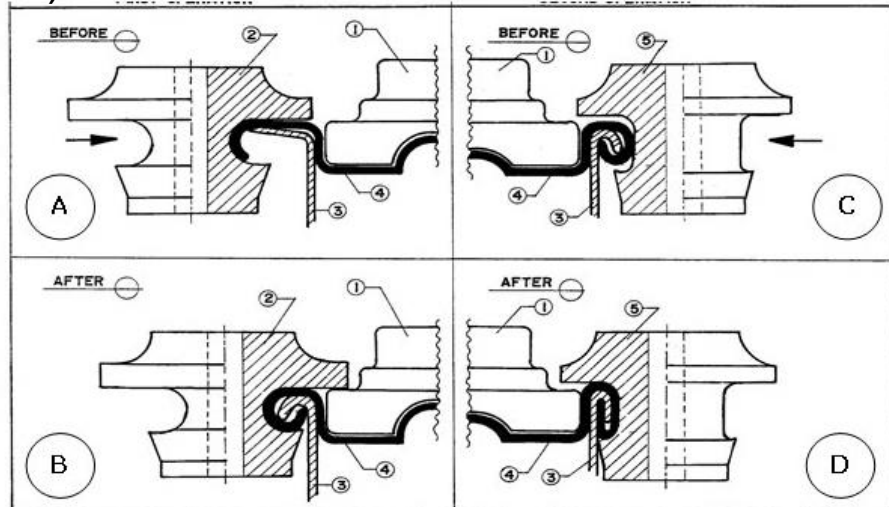


Fig. 4 Different ways to open cans

a - Cantilever opening device with bent lid, b - Round-open lid, c - Side opening of the box, d - Rectangular box full opening. [https://en.wikipedia.org/wiki/Tin\\_can](https://en.wikipedia.org/wiki/Tin_can)

Fig. 3 Example of double rib execution.

<http://www.fao.org/docrep/010/ai407e/AI407E22.htm>

### Two-piece cans

**Aluminum drawers** made of 2-piece pull-and-iron aluminum cans are typically used as beverage containers, food and non-food products.

**Two-piece steel draw-and-iron cans.** They are made of steel, generally less deeply drawn and used as containers for various foods such as tuna, salmon and snacks, and are usually vacuum packed.

## 6.2.1 Construction of cans III

The process of making two-piece multi-drawer boxes includes the following steps

(<http://www.mpma.org.uk/pages/data/2piecedrinksan.pdf>):

a. Used aluminum or steel bands come in the form of large rolls in the box factory. b. A layer of liquid ointment is applied to the tape, then the tape is cut on a punching press. c. Each cut is embossed several times through a series of tungsten carbide rings. Through this multiple pulling process, the box is recovered at a smaller diameter than the initial cut, and the walls are thinner while increasing the height of the piece. d. Adjust the end, opposite the bottom of the piece, to the required size. e. The body thus formed passes through a washing machine, after which it is dried. f. The box is covered with a colorless or pigmented base coat, which is a good surface for the printing ink, after which the coated boxes are dried in the oven. g. The box is printed

### The draw-redraw box forming process

As in the multiple drawing process, the aluminum or steel roll is continuously fed onto a stamping press that cuts metal plates to be molded to become cans. Deep-textured cans can be embossed from one pass. Deeper containers may require one or two additional drawings

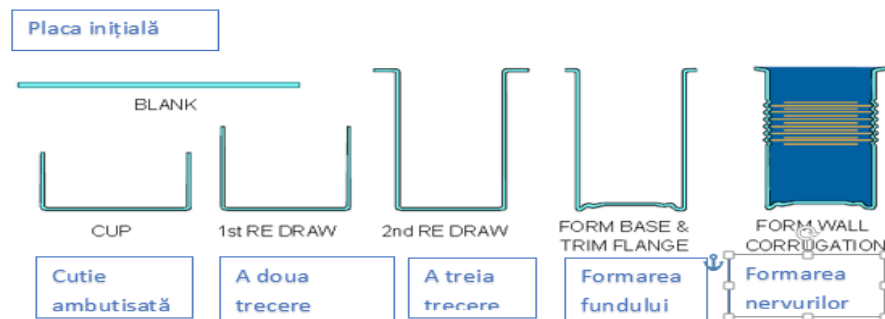


Fig.5 The draw-redraw process, after Eric Wootton, Alcan Deutschland GmbH, Göttingen, TALAT Lecture 3710

<http://core.materials.ac.uk/repository/eea/talat/3710.pdf>

### Steel

- ❑ Steel is used in the form of a very thin covered with tin (0.4 and 2.5  $\mu\text{m}$ ) sheet once or twice, after which it is electroplated with tin - electrolytic tin (ETP) or chromium - oxide electrolytic chromium / chromium oxide coated steel (ECCS) according to EN 10202: 2001 (CEN, 2001).
- ❑ The tin layers may be of equal thickness on the two surfaces of the sheet or may have varying thicknesses. The tin layer of sufficient thickness can be used as a direct contact layer with many foods such as white fruits (eg peaches, apricots, pineapples and pears) and tomatoes (eg tomatoes in brine and beans in tomato sauce).
- ❑ For other products, it is necessary to form a barrier layer by further coating the inner layer of tin with a layer of lacquer.
- ❑ The tin plate has excellent cabinet welding characteristics, while the chrome (cheaper and with a very good adhesion of the lacquer layer) requires removal of the chrome layer in the stitch area and subsequent coating by varnishing.
- ❑ We meet re-varnished boxes (after the lacquered tinplate, another layer of lacquer is applied on the whole surface) or rectified boxes (after making the lacquered tinplate, the lacquer is applied only on the longitudinal fold where it is destroyed due to sheet bending and high temperature during bonding).



## 6.2.2 Materials II

### Aluminum

- Aluminum alloys used to improve mechanical properties have alloying elements mainly silicon and magnesium. Aluminum corrosion resistance is known due to the layer of aluminum oxide ( $\text{Al}_2\text{O}_3$ ) formed on its surface.
- Aluminum tin cans are made by stamping. The inner surface of the aluminum box is always covered with a layer of organic lacquer.
- Examples of used aluminum brands (after the International Alloy Designation System):
  - Shallow drawn body bodies - AA 3005 H46 (lacquered,  $\frac{3}{4}$  hardness)
  - Deep draw can bodies, also easy-open lids - AA 5052 H44 (lacquered  $\frac{1}{2}$  hardness)
  - Plain lids - AA 3207 H48 (lacquered, 4/4 hardness)

# ECOSIGN



Thank you!