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## Safety assessment of the process deSter, used to recycle plastic catering tableware for use as food contact materials

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### Abstract

The EFSA Panel on Food Contact Materials, Enzymes and Processing Aids (CEP) assessed the safety of the recycling process deSter (EU register number RECYC196). The input consists of catering tableware food contact articles from airline on-board services, made of polypropylene (PP), polyethylene terephthalate (PET), styrene acrylonitrile resin (SAN) or acrylonitrile butadiene styrene (ABS). The recycle produced by deSter will be used to manufacture articles for the same on-board services. The Panel considered that the management system put in place to ensure compliance of the origin of the input with Commission Regulation (EC) No 282/2008 and to provide full traceability from input to final product is the critical process step. The process deSter uses only materials and articles intended for food contact and ensures that any contamination can be ruled out, since the input originates from this product loop managed in a closed and controlled chain. Therefore, the Panel concluded that the recycled materials obtained from this process and used within this loop are not of safety concern, when used at up to 100% for the manufacture of plastic tableware for contact with all types of foodstuffs under the conditions of use of the articles before recycling.

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**Keywords:** deSter BVBA, food contact materials, plastic, polypropylene (PP), polyethylene terephthalate (PET), styrene acrylonitrile resin (SAN), acrylonitrile butadiene styrene (ABS), recycling process, safety assessment

**Requestor:** Competent Authority of Belgium: FPS Health, Food Chain Safety and Environment

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## 1. Introduction

### 1.1. Background and Terms of Reference as provided by the requestor

Recycled plastic materials and articles shall only be placed on the market if they contain recycled plastic obtained from an authorised recycling process. Before a recycling process is authorised, EFSA's opinion on its safety is required. This procedure has been established in Article 5 of Regulation (EC) No 282/2008<sup>1</sup> of the Commission of 27 March 2008 on recycled plastic materials intended to come into contact with foods and Articles 8 and 9 of Regulation (EC) No 1935/2004<sup>2</sup> of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food.

According to this procedure, the industry submits applications to the Member States Competent Authorities, which transmit the applications to the European Food Safety Authority (EFSA) for evaluation.

In this case, EFSA received an application, from the Competent Authority of Belgium: FPS Health, Food Chain Safety and Environment, for evaluation of the recycling process deSter, European Union (EU) register No RECYC196. The request has been registered in EFSA's register of received questions under the number EFSA-Q-2020-00231. The dossier was submitted on behalf of deSter BVBA, Belgium.

According to Article 5 of Regulation (EC) No 282/2008 on recycled plastic materials intended to come into contact with foods, EFSA is required to carry out risk assessments on the risks originating from the migration of substances from recycled food contact plastic materials and articles into food and deliver a scientific opinion on the recycling process examined.

According to Article 4 of Regulation (EC) No 282/2008, EFSA will evaluate whether it has been demonstrated that the plastic input of the recycling process deSter originates from a product loop which is in a closed and controlled chain ensuring that only materials and articles which have been intended for food contact are used and any contamination can be ruled out.

## 2. Data and methodologies

### 2.1. Data

The applicant has submitted a dossier following the 'EFSA guidelines for the submission of an application for the safety evaluation of a recycling process to produce recycled plastics intended to be used for the manufacture of materials and articles in contact with food, prior to its authorisation' (EFSA, 2008). Applications shall be submitted in accordance with Article 5 of the Regulation (EC) No 282/2008.

Additional information was sought from the applicant during the assessment process in response to a request from EFSA sent on 20 November 2020 and was subsequently provided (see 'Documentation provided to EFSA').

The following information on the recycling process was provided by the applicant and used for the evaluation:

- General information:
  - general description,
  - existing authorisations.
- Specific information:
  - recycling process,
  - characterisation of the input,
  - characterisation of the recycled plastic,
  - intended application in contact with food,
  - compliance with the relevant provisions on food contact materials and articles,
  - process analysis and evaluation,
  - operating parameters.

<sup>1</sup> Regulation (EC) No 282/2008 of the European parliament and of the council of 27 March 2008 on recycled plastic materials and articles intended to come into contact with foods and amending Regulation (EC) No 2023/2006. OJ L 86, 28.3.2008, p. 9–18.

<sup>2</sup> Regulation (EC) No 1935/2004 of the European parliament and of the council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC. OJ L 338, 13.11.2004, p. 4–17.

## 2.2. Methodologies

The risks associated with the use of recycled plastic materials and articles in contact with food come from the possible migration of chemicals into the food in amounts that would endanger human health. The assessment was conducted in line with the principles described in the guidelines on recycling plastics (EFSA, 2008), in the EFSA Guidance on transparency in the scientific aspects of risk assessment (EFSA, 2009) and considering the relevant guidance from the EFSA Scientific Committee.

## 3. Assessment

### 3.1. General information

According to the applicant, the recycling process deSter is intended to recycle articles made of food contact grade polypropylene (PP), polyethylene terephthalate (PET), styrene acrylonitrile resin (SAN), or acrylonitrile butadiene styrene (ABS) used for serving food and drinks during flights. The ground material may be blended with virgin plastic or used at 100% to manufacture recycled tableware for the same product loop, in contact with all food types and under the conditions of use of the articles before recycling. The articles are intended to be used for: (a) short period of food contact exclusively during meal service (e.g. cutlery), (b) (short) freezer storage, followed by thawing and meal service at room temperature (e.g. salad bowls) or (c) hot fill conditions (e.g. coffee cups).

### 3.2. Description of the process

#### 3.2.1. General description

According to the applicant, the input of the recycling process is tableware and related food contact articles for single and repeated use, used in flights by airline companies for on-board food service. The materials used in this process are PP, PET, SAN and ABS. The articles to be recycled are from post-use collection and recycled in closed and controlled loops of manufacturer/recycler, catering and airline companies.

The process includes the following steps:

- 1) Production of catering tableware (e.g. serving trays, bowls, drinking glasses, cups, cutlery) from virgin materials to be used by catering units belonging to the loop that prepare in-flight meals for the airlines.
- 2) In-flight services of the meals and drinks, and collection after service by the airline crew. The sorting of articles to be recycled from mixed wastes may be performed on-board by the crew or after landing by the catering unit, depending on the airline procedures.
- 3) Cleaning to remove leftovers (manual cleaning, industrial washing, visual checks) at the catering unit according to hygiene practices and returning to use.
- 4) Sorting to withdraw from the reusable cleaned article flow those that are no longer suited to be reused ('end of life'); collection in dedicated containers provided with a unique identification number (a deSter identification code, a unique number and a two-letter code of the respective airline). The containers are supplied by the applicant and used exclusively for this recycling. The sorting of the products to be recycled can be done by product (e.g. cups, trays) or by compatible raw material (ABS, PP, SAN, PET) and by colour.
- 5) The collected 'end of life' articles are transferred to the applicant, visually checked according to standardised procedures for possible remaining contaminants and then ground in a dedicated line removing fines, dust and metal particles. The ground material is collected in containers identified with labels specifying the corresponding article number and batch number.
- 6) Production of recycled articles at the applicant site. The final articles may contain up to 100% of the ground material. Injection moulding (PP, SAN, ABS, PET) or extrusion-thermoforming (PP, PET) are used.
- 7) Recycled articles go through the closed loop with a unique batch number, in an identical manner as the freshly produced articles.

### 3.2.2. Characterisation of the input

According to the applicant, the input material for the recycling process deSter consists of 'end of life', plastic articles that have been used for in-flight food service in a closed loop of catering, airline companies and the recycler.

The plastic articles are collected on-board after use and brought to the catering unit for washing. Pre-cleaning procedures may be performed on-board or before washing at the catering unit. Articles that can be used again are submitted to hygiene practices for re-use in contact with food in the same loop. Damaged articles or articles that are no longer usable ('end of life'), but suitable for recycling, are recycled by deSter.

According to the applicant, the articles are made of plastic materials originally produced in compliance with the Commission Regulation (EU) No. 10/2011 relating to plastic materials and articles intended to come into contact with foodstuffs.

According to the applicant, the existing internal quality assurance system ensures that the input originates exclusively from this closed and controlled loop and provides full traceability of the material processed within its premises.

### 3.2.3. Characterisation of the output

The technical specifications for the recycled flakes are material viscosity, expressed as melt flow rate/melt flow index for PP, SAN and ABS and intrinsic viscosity for PET.

## 3.3. Experimental data

Specimens of the four different materials (PP, PET, ABS, SAN), made at 100% from materials that were reprocessed five times, were tested in food simulants to verify compliance with overall and specific migration limits in the Regulation EU No. 10/2011 under repeated and single use testing conditions:

Overall migration was tested after 10 days at 40°C in 10% ethanol, 3% acetic acid, olive oil (simulants A, B and D2, respectively) and isooctane, as well as after 2 days at 20°C in 95% ethanol. No difference in overall migration among the tested cycles was noted.

Specific migration of monomers and additives with a specific migration limit (SML) was tested in simulants A, B and D2 after 3 days at 20°C. For PP samples instead of simulant D2, isooctane was used for 2 days at 20°C. Different analytical techniques were applied.

Specific migration of primary aromatic amines and metals was tested in 3% acetic acid after 3 days at 20°C.

All the tested parameters were in compliance with the applicable limits in Regulation EU 10/2011.

## 3.4. Process analysis and evaluation by the applicant

The applicant presented a process analysis in which the following points are made:

The recycling process is managed by a quality assurance scheme in which continuous control is performed, ensuring that contamination and the involved risks are avoided. Traceability tools are used and kept in the loop. The possibility of misuse by the users and the catering company is prevented by the design of the loop.

## 3.5. Discussion

The data presented by the applicant allow identifying the process, its input, output and intended uses of final articles. Based on the description of the process, the Panel considers that this process is within the scope of Art. 4 c(i) of the Regulation (EC) No. 282/2008, when the plastic input is supplied by a catering unit belonging to a product loop in a closed and controlled chain.

The recycling process uses input material supplied by catering units belonging to the product loop integrating airlines, catering companies and the recycler company. Within the loop, the articles are used for food services on-board of flights, then collected on-board and sent to catering units for the re-use. At the end of their service life, pre-washed articles (input) are recycled. In the recycling process, the articles are ground and converted by injection moulding or extrusion/thermoforming to new articles to be used in the same loop. The recyclate can be used at up to 100% to manufacture new articles. The traceability system of deSter introduces a number of identifiers for labelling

containers with articles and materials in the recycling loop. During the process, unique identification references and batch numbers are used.

Considering the high temperatures used during injection moulding or extrusion/thermoforming, the possibility of contamination by microorganisms can be discounted. Therefore, this evaluation focuses on the chemical safety of the final products.

The Panel considered the management of the input material as a critical process step, i.e. that the whole process (collection, sorting, recycling and distribution) is operated under a quality assurance system, which includes the use of specific identifiers that are intended to ensure traceability and control of the input.

The Panel especially considered that:

- i) The post-use articles are collected in specific containers and sorted manually by positive selection for articles, colour or material ensuring a high level of selection, hence, of quality of the input.
- ii) Post-use contamination of these articles, the input of the recycling process, can be ruled out because their intended service life in this product loop does not allow for a misuse.
- iii) The recycled articles are only used by airlines that belong to this loop. These articles are intended for repeated use and are used many times before recycling is performed at the end of life. Therefore, the exposure of the users of these articles to potential degradation products from the recycling or ageing is low.

## 4. Conclusions

The Panel considered that the process deSter uses only materials and articles intended for food contact and ensures that any contamination can be ruled out, since the input originates from this product loop managed in a closed and controlled chain.

Therefore, the Panel concluded that the recycled materials obtained from this process and used within this loop are not of safety concern, when used at up to 100% for the manufacture of plastic tableware for contact with all types of foodstuffs under the conditions of use of the articles before recycling.

## 5. Recommendations

The Panel recommends that it should be verified periodically, as part of the good manufacturing practice (GMP) in the meaning of the Regulation (EC) No. 2023/2006, that the input originates from materials and articles that have been manufactured in accordance with the EU legislation on food contact materials and articles (Regulation (EC) No 282/2008, Art. 4b). Specifications for the input (tableware and related food contact articles used within a product loop which is in a closed and controlled chain) should be kept under control to ensure that they correspond to the described process. Supporting documentation demonstrating how it is kept under control should be available.

## 6. Documentation provided to EFSA

- 1) Dossier 'deSter'. July 2020. Submitted on behalf of deSter BVBA, Belgium.
- 2) Additional information, April 2021. Submitted on behalf of deSter BVBA, Belgium.

## References

- EFSA (European Food Safety Authority), 2008. Guidelines for the submission of an application for safety evaluation by the EFSA of a recycling process to produce recycled plastics intended to be used for manufacture of materials and articles in contact with food, prior to its authorisation. EFSA Journal 2008,6(7):717, 12 pp. <https://doi.org/10.2903/j.efsa.2008.717>
- EFSA (European Food Safety Authority), 2009. Guidance of the Scientific Committee on transparency in the scientific aspects of risk assessments carried out by EFSA. Part 2: general principles. EFSA Journal 2009;7(5):1051, 22 pp. <https://doi.org/10.2903/j.efsa.2009.1051>

## Abbreviations

ABS            acrylonitrile butadiene styrene  
CEF Panel    Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids

CEP Panel Panel on Food Contact Materials, Enzymes and Processing Aids  
PET poly(ethylene terephthalate)  
PP polypropylene  
SAN styrene acrylonitrile  
SML specific migration limit