



## A “Toolbox” for the Reduction of Acrylamide in Fried Potato Products / French Fries

### Acrylamide

Acrylamide is a substance that is produced naturally in foods as a result of high-temperature cooking (e.g. baking, grilling, frying).

Acrylamide has been found in a wide variety of cooked foods, including those prepared industrially, in catering and at home. It is found in staple foods such as bread and potatoes as well as in other everyday products such as crisps, biscuits and coffee.

Acrylamide in food potentially increases the risk of developing cancer for consumers in all age groups. It is therefore of major importance for the protection of public health that mitigation measures are applied to reduce the levels of acrylamide in food as low as reasonably achievable.

### The FoodDrinkEurope Acrylamide Toolbox

Following the discovery of acrylamide in food, the industry and other stakeholders, including regulators, took action to investigate how acrylamide is formed and the possible methods that can be employed to reduce levels of acrylamide in foods using the ALARA principle. FoodDrinkEurope initiated and continues to coordinate efforts and pool results together to update the Acrylamide Toolbox.

### What does the Toolbox do?

- Details existing methods to reduce acrylamide in foods
- Allows users to assess and evaluate which reduction measures to use and at which production step
- Assists in implementing Commission Regulation (EU) 2017/2158, with the aim to achieve levels of acrylamide as low a reasonably achievable

### ALARA

ALARA is an acronym for the concept “As Low As Reasonably Achievable”. This simply means that a Food Business Operator (FBO) takes appropriate measures to reduce the presence of a given contaminant in a final product to a minimum: taking account of the risk presented, but also taking account of other legitimate considerations, such as potential risks from other contaminants, organoleptic properties and quality of the final product, and the feasibility and effectiveness of controls.

To ensure continuing compliance with the ALARA concept the FBO should monitor the effectiveness of the implemented measures and should reassess these as necessary.

### What can you do?

- Use this brochure to identify methods that you can use to reduce acrylamide levels.
- You will need to examine your production methods, raw materials, recipes, product quality and national legislation in order to identify the most appropriate “tools”.

- Consider that not all methods will apply to your manufacturing needs.
- You will need to assess the effectiveness of the mitigation measures by monitoring and use of the benchmark levels as performance indicators
- When benchmark levels are exceeded, you will need to review the mitigation measures applied and adjust processes with the aim to achieve levels as low as reasonably achievable below the benchmark level.

### Acrylamide in Fried Potato Products

This brochure is designed to help manufacturers of French fries and fried potato products. For more detailed advice contact the European Potato Processors Association (EUPPA) at [mail@euppa.eu](mailto:mail@euppa.eu)

Read the full toolbox at:

<https://www.fooddrinkeurope.eu/publication/fooddrinkeur-o-pe-updates-industry-wide-acrylamide-toolbox/>

### Methods of formation

- Acrylamide is formed via the reaction of asparagine and reducing sugars (both naturally occurring in potatoes)
- Acrylamide is formed at temperatures higher than 120°C
- The amount of acrylamide formed depends on:
  - Temperature of final cooking
  - Cooking time
  - Amounts of asparagine and reducing sugars in the potato

## Methods of Reduction for finished French Fries

The following “Tools” have been used successfully to reduce levels of acrylamide in French fries. Manufacturers are advised to select those “Tools” that are most suitable to their type of product, process methods and product quality specification.

Raw Material Selection	Recipe and Process Design	Final Product
<ul style="list-style-type: none"> <li>• Select potato varieties with lower sugar content, suitable for fried potato products.</li> <li>• Identify and use the potato varieties that are suitable for the product type.</li> <li>• Potatoes shall be stored at a temperature higher than 6 °C. Check temperature and humidity.</li> <li>• Sprouting shall be suppressed in long term stored potatoes where permitted, using appropriate agents.</li> <li>• Check in-coming potato lots at plant through fry colour testing or other tools to measure reducing sugars.</li> <li>• Remove immature tubers.</li> </ul>	<ul style="list-style-type: none"> <li>• Cut fries thicker if possible; they contain less acrylamide through the surface area/volume effect.</li> <li>• Blanch potato strips to remove some of the reducing sugars from the outside of the strips.</li> <li>• Addition of disodium diphosphate directly after blanching can reduce acrylamide levels in the final product through pH effect.</li> <li>• The frying process is critical and must be carefully controlled to optimize colour development and minimize AA formation.</li> </ul>	<ul style="list-style-type: none"> <li>• Give clear cooking instructions on pack: fry at max 175 °C; do not overcook; cook until a golden yellow colour; when cooking smaller amounts reduce cooking time; More information available at <a href="https://goodfries.eu/en/">https://goodfries.eu/en/</a></li> <li>• Make use of available colour guides providing guidance on the optimal combination of colour and low levels of acrylamide.</li> <li>• Check final colour against product specification after frying according to cooking instruction.</li> </ul>