Industry Guide to Acrylamide: Catering and Food Service: Version 1

NOTE: This is a draft interim guide to help businesses implement mitigation measures for acrylamide from 11th April 2018 in the absence of finalised EU Guidance.

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Foreword

UKHospitality

UKHospitality is the voice of the hospitality sector, representing 65,000 venues across the UK. We focus on the needs of every part of the hospitality sector, big and small, restaurants, pubs, catering and attractions, hotels, serviced apartments and all visitor accommodation, corporate hospitality and events, clubs and leisure establishments.

Prepared by industry, for industry this guide is intended to give advice to caterers on what they need to do to mitigate acrylamide in their food business. This guide has been developed with valuable input from the Food Standards Agency (FSA), Food Standards Scotland (FSS) and other key stakeholders in the catering and food service sector. This one stop document details suggestions for compliance and best practice for all catering businesses working towards compliance.

Kate Nicholls
UKHospitality

Assured Advice

Until publication of the EU Guidance, the final version of this guide cannot be assured by Cornwall Council, Primary Authority to UKHospitality as there may be further amendments.

Acknowledgements

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FSA-FSS Foreword

"The Food Standards Agency and Food Standards Scotland welcome the UKHospitality guide on acrylamide for caterers and food service businesses. This practical and informative guide should help these businesses to comply with the legislation and to put in place simple steps to manage the risks of acrylamide in food."

Jason Feeney, Chief Executive – Food Standards Agency
Geoff Ogle, Chief Executive – Food Standards Scotland

Introduction

This guide has been produced by the UKHospitality and other stakeholders on behalf of caterers and is intended to assist businesses meet the legal requirements of Regulation (EC) 178/2002 General Food Law and Regulation (EC) No 852/2004 on the hygiene of foodstuffs, and Commission Regulation (EU) No 2017/2158. If you are an individual business, you may like to bring to your local authority's attention to the fact that you are following this guidance.

Scope of this guide

This guide applies to all catering businesses. The guide does not cover manufacturing businesses or retail businesses, unless catering is carried out as a distinct part of the business, for example a canteen in a factory, or a café in a farm shop.

Because mitigation of acrylamide can be achieved through controls throughout the food chain, this document is laid out to provide guidance on where businesses may manage acrylamide at various catering steps.

For clarity, as all catering businesses are different, examples of good practice shown in this guide are not to be interpreted as legal requirements or all-inclusive. Businesses will choose the most appropriate mitigation steps from the selection given in the guide and put these into their FSMS.

By following the measures in this guide and amending their food safety management system (FSMS), documentation or procedures accordingly, this will help caterers demonstrate compliance with the legal requirement of putting into effect mitigation processes. Some larger multi-site businesses may be required to implement more enhanced measures and checks, the details of which are given in the guide. Clarification on which businesses fit into this category is currently not available until the publication of the EU Guidance. Businesses are advised to follow general mitigation steps and to engage with their Primary Authority for further clarification, if any can be given at this stage.

This guide includes detailed guidance and instructions for products listed in the Article 1, Paragraph 2 of the regulation. Some foods which may form acrylamide fall outside the scope of the Regulation, however, businesses may still wish to apply acrylamide mitigation measures to them. See Annex 1 of this guide for more information on miscellaneous products.

Background

What is acrylamide?

Acrylamide is a chemical substance formed by a reaction between amino acids and sugars. It typically occurs when foods with high starch content such as potatoes and bread, are cooked at high temperatures (over 120°C) in a process of frying, toasting, roasting or baking.

During high temperature cooking, a process called the Maillard reaction occurs. The naturally present water, sugar and amino acids combine to create a food's characteristic flavour, texture, colour and smell. This process can also produce acrylamide.

Potential health effects of acrylamide

In 2015, the European Food Safety Authority published its first full risk assessment of acrylamide in food. This reconfirmed previous evaluations that acrylamide in food potentially increases the risk of developing cancer for consumers in all age groups.

Acrylamide is a natural by-product of the cooking process and has always been present in our food. It is important to appreciate that it is not possible to completely eliminate acrylamide from foods, but actions can be taken to ensure that acrylamide levels are as low as reasonably achievable. This is what is required by law because acrylamide is considered to be a chemical contaminant [1] and legislation requires businesses to mitigate levels in food.[2]

[1] Council Regulation (EEC) No 315/93 laying down Community procedures for contaminants in food
[2] Commission Regulation (EU) No 2017/2158 Establishing mitigation measures and benchmark levels for the reduction of the presence of acrylamide in food.

The Law

Food businesses are required to produce safe food[3]. Commission Regulation (EU) No 2017/2158 **requires that food business operators (FBO) apply the acrylamide mitigation measures set in the Annexes in this Regulation.**

In practice, this means that businesses will be required to identify where the hazard of acrylamide formation occurs and then to implement mitigation (or reduction) measures to ensure levels are as low as is reasonably achievable. This should be included in any existing FSMS, documentation and operating prodedures.[4]

Whilst Annex IV of the Regulation establishes benchmark levels for the different foods covered by the Regulation, these are broad categories and are not legal maximum limits nor safety levels. Rather they are performance indicators and designed to promote best practice in controlling acrylamide levels.

The ways in which food businesses are required to manage acrylamide in food depend upon the type of business and operation. The levels of action required are proportionate to the nature and size of the business.

The requirements of 2(2) are intended for food businesses "producing foodstuffs listed in Article 1, Paragraph 2, which perform retail activities and/or directly supply only local retail establishments."

For caterers, there are two possible levels of requirement – either just those found in Article 2(2) (which apply to all businesses) or for some businesses further additional, more onerous controls are required which apply to businesses to which Article 2(3) refers.

[3] Regulation (EC) 178/2002 requires that all food placed on the market must be safe to eat

[4] Under Article 5, EC Regulation 852/2004 requires businesses to put in place, implement and maintain food safety management systems based on the principles of Hazard Analysis and Critical Control Point (HACCP).

The additional requirements of 2(3) are intended for food businesses that "operate in facilities under direct control and that are operating under one trademark or commercial license, as a part of, or franchise of, a larger, interconnected operation and under the instructions of the food business operator that centrally supplies the foodstuffs."

Therefore even if a business is part of a large organisation, if the individual unit operates autonomously, then it would need only comply with the requirements of 2(2). Unfortunately until the EU Guidance is published, clarification of which businesses must comply with 2(3) is not available, and businesses, local authorities and primary authorities will have to take a proportionate and pragmatic view on this matter.

For in this guide, where advice relates to businesses that fall into the requirements clarity of Article 2(3) of the Commission Regulation (EU) No 2017/2158 this will be highlighted in a box, demonstrated here.

Due Diligence

In the event of a food safety contravention, businesses may wish to use the due diligence defence. This defence can only be assessed by courts according to the facts of any case.

This best practice guide should assist Food Business Operators (FBOs) as part of their due diligence in fulfilling their obligations to identify and implement mitigation measures to reduce the levels of acrylamide in the food they produce.

General principles for mitigation

Generally speaking the darker the colour of a starchy product, the greater the acrylamide level, so simple rules are:

- cook to a golden yellow colour where appropriate - "go for gold"
- do not over-cook starchy foods
- follow manufacturers' instructions.

Some manufacturers have produced colour charts; however, as all printers may be different, it is best if possible, to get colour charts directly from your supplier as then you will know that the colours are exactly as intended.

Where there are no colour charts for a food you use because you cook it from scratch, you may want to simply provide instructions to cook to a golden yellow colour. If you are a larger company, then you may wish to utilise the photographs in your company cook book or SOPs to show the desired colour of food at service. In this case, original print runs should be used rather than photocopies. It is recommended that colour charts are replaced when necessary, preferably annually, in order to avoid natural fading/discolouration.

What you need to do

For all businesses

Demonstrate that you have put into place measures to mitigate acrylamide in food by taking some or all of the following actions:

- Ensure guidance is readily accessible, understood and is followed
- Assess where the hazards of acrylamide may arise
- Put in place controls to manage acrylamide levels at any catering steps in the business where it is needed
- Write it down in your existing FSMS or documentation, or be prepared to demonstrate your procedures to an enforcement officer
- Make sure staff understand about acrylamide formation and their roles to manage levels to as low as reasonably achievable by following your procedures
- Carry out simple checks to show that measures have been put in place – for example checking that food is cooked in accordance with manufacturer's instructions, or SOPs, is not over-cooked or is checked against a colour chart.

2(3): additional measures:

- Where the business serves French fries and other cut (deep fried) potato products the business should be able to demonstrate that they work with SOPs, which includes following manufacturer's instructions.

- Businesses are **not** required to replace any equipment until necessary for operational reasons, as long as the equipment is fit for purpose and the mitigation control measures in this guide are followed.

- Although not a legal requirement, we recommend that when businesses need to replace fryers, the tender specification should include a requirement for fryers to be fitted with computerised timers which can be programmed to standard time / temperature settings. Businesses without such calibrated fryers should follow measures set out in this guide for French Fries, chips or any other cut (deep fried) potato products[1] and follow SOPs

How to use this guide

The guide is laid out in a format designed to allow caterers to determine quickly and easily whether their current or proposed arrangements already mean that acrylamide formation is managed or whether they need to make simple changes to their policies, procedures and practices.

To benefit from this guide, ensure that you:

- Select the products in the guide that are relevant to your business and check that your procedures are in line with the guide
- Amend your FSMS or any documentation or operating procedures as necessary to incorporate the controls that you choose to carry out. Only add what best practice measures you plan to implement
- Ensure you carry out whatever appropriate, simple checks you have put in your policy. You may wish to record them to demonstrate that you are following your policy. These checks could be carried out by the in-house team and verified by external auditors if you have them. Only put in checks that you need to do and are able to carry out.

Examples of simple checks can be found in Annex 2.

Actions after you have made changes to your FSMS

- If you have an agreement with a Primary Authority, share any amendments with them
- Advise any internal or external auditors of changes to the FSMS or SOPs and ensure that verification checks are incorporated into audits (see suggested questions and checks in Annex 2)
- Train or instruct staff so they understand what they need to do. Document this in the normal way
- Include acrylamide in your regular FSMS review and adjust processes and controls as appropriate.

When the Enforcement Officer visits

- Ensure all relevant staff can show Enforcement Officers how you are taking all reasonable steps to mitigate acrylamide in your business through demonstrating your procedures, or by showing them your amended FSMS, and any supporting documentation, including any colour charts and checks that you may do
- Show that you are following manufacturer's instructions
- If you have any posters and charts, then make sure they are displayed so that it is clear that you are aware of the controls required.

2(3): additional measures:

For businesses in the 2(3) category, provide information in your in-house documentation for how enforcement officers can obtain information on verification, sampling plans, analytical results and specifications including that of coffee from Head Office, or refer to the Primary Authority where appropriate. You do not need to keep this information locally.

Guidance on sampling (Article 2(3) businesses only)

Larger businesses for which Article 2(3) applies will need to set out a sampling plan which is to be reviewed at least annually together with analytical results. This would be planned centrally, and the sampling plan and results held at Head Office. It should, however, be done using representative samples taken at outlet level, and not those prepared in a trial kitchen.

The plan should be devised on a risk basis, for foods that are likely to have higher levels of acrylamide and those for which further mitigation measures are feasible. However, if there are significant changes to recipes or processes within a year, then further sampling may be required.

Purchasing and receipt

Purchasing is a very important stage for acrylamide mitigation in food, for example in ready-to-eat (RTE) foods such as bread where the goods are served directly to the customer. Therefore, such foods need to have levels of acrylamide that are as low as reasonably achievable. Suppliers will have to also comply with this legislation, so they will need to take action to reduce levels of acrylamide. Therefore, it is important to talk to your suppliers to ensure that they are following the relevant mitigation measures. You could also include acrylamide mitigation in any tendering documents when seeking new suppliers.

Where you intend to cook foods after receipt, ensure that your suppliers provide instructions and original colour charts, if available. These should be easy to follow and practical, so you know how to cook foods to keep acrylamide levels as low as reasonably achievable.

Hazards

- RTE foods may be over-cooked and could have higher levels of acrylamide.

General suggested controls

- Supplier specification not to supply over-cooked products susceptible to acrylamide. Reject over-cooked products.
- Agree with your supplier an acceptable colour, based on the principles of ‘golden yellow’, for each product when supplied (RTE food) and when cooked
- Ask your supplier to provide a colour chart if possible.
- Select potato varieties suitable for purpose.
- Manufacturers to provide detailed instruction on cooking times, temperatures and colour of the final product when cooked. This could include colour photographs.

- Suppliers should be able to provide evidence that they have applied relevant mitigation measures.

2(3): additional measures:

Specify to suppliers that they must have followed mitigation measures applicable to them in the Regulation and that the level of acrylamide in coffee must be lower than the benchmark level specified in Annex IV unless a justification is provided by the supplier (because some coffee types may have higher levels depending upon blend and roast characteristics

Detailed instructions and suggestions

Purchasing practices

Potato products

When purchasing potato products, you should be provided with information from suppliers on best practice for storing, preparing and cooking their products.

Raw potatoes for chipping/producing 'home-made' crisps

- Choose potato varieties recommended as being appropriate for purpose.
- Suppliers should ensure that controls are in place to avoid bruising potatoes throughout the picking, packing and distribution chain.
- Caterers should check on receipt for bruised or damaged potatoes and reject as necessary. Check for moist or damp packaging on packs.
- Deliveries should be made following good practice, for example whole potatoes should be preferably stored and delivered out of refrigeration throughout the food chain preferably above 6°C.

Prepared chilled or frozen potato products to be cooked

- Manufacturers should provide detailed instructions for storage and cooking of their products (which may include colour charts) to help caterers keep acrylamide levels as low as reasonably achievable.
- This will involve instructions on temperature of oil, frequency of changing the oil, and acceptable colour of cooked products.

Ready-to-eat bread and fine bakery wares

Bread, fine bakery wares (cookies, biscuits, crackers, rusks, cereal bars, scones, cornets, wafers, crumpets, gingerbread, crackers, crisp breads and bread substitutes)

- Caterers should expect suppliers to follow good practice guidance to "go for a golden yellow colour" where possible.
- Oven-baked and fried products should be rejected upon delivery if they are over-cooked
- For clarity, if possible you could arrange with your supplier to provide colour photographs of what is acceptable.
- Suppliers should be able to provide evidence that they have applied the relevant mitigation measures and checks to ensure products are compliant.

Par-baked goods

Including bread and bread rolls

- Caterers should ensure that suppliers provide validated instructions for time and temperature of cooking to ensure that acrylamide levels are as low as reasonably achievable
- Goods should not be over-cooked on receipt.

Product pre-mixes to be baked in catering establishments

Caterers should ensure that manufacturers provide preparation instructions to ensure that the acrylamide levels are as low as reasonably achievable in the final products.

Coffee

Caterers should specify to suppliers an expectation that acrylamide levels in coffee supplied are as low as reasonably achievable

Storage and preparation

Storage practices

Hazards

Potatoes that have been bruised or stored under refrigeration are more likely to produce higher levels of the chemical acrylamide when cooked.

Suggested controls

Potato products

- Follow manufacturers' instructions on storage.

Whole potatoes

- Do not store in the fridge – they are best stored above 6°C.
- Keep in a dark place or container that does not let in the light and keeps them aired and cool (dry store is ideal).
- Do not bruise.
- Ensure that bags are not resting against walls.

Did you know?

Storing raw potatoes in the fridge may lead to the formation of more free sugars in the potatoes (a process sometimes referred to as 'cold sweetening') and can increase overall acrylamide levels especially if the potatoes are then fried, roasted or baked.

Ready-to-eat baked or fried products and par-baked products

- Follow manufacturer's storage instructions.

Preparation practices

Hazards

- Unequal size pieces of potato will cook at different rates, meaning that some may become overcooked.

Suggested controls

Potato products

Follow manufacturer's instructions

Potato cooked from scratch (e.g. chips/ 'home-made' crisps)

- Keep chips the same size so that they cook evenly
- Soak pieces/strips for a few minutes in warm water and then shake them to reduce sugars
- Rinse the potato pieces with clean water
- Dry the pieces/strips on kitchen roll
- A potato preservative soak can be used to reduce sugars during preparation.

Par-baked products

Follow manufacturer's instructions about, for example, the pre-heating of trays and ovens.

Cooking practices

2(3) additional measures:

Businesses with computerised fryers can set the programme to standard time/temperature settings.
There is no requirement for businesses to replace fryers until there is an operational need to.

Hazards

- Acrylamide can form at higher levels if certain foods containing starch (such as potatoes and bread) are over-cooked.

General suggested controls

- Follow recipes or manufacturers' instructions relating to time, temperature and colour of finished product and use their colour chart if provided
- Frying temperature should be below 175°C or as low as possible
- Select cooking oil which allows food to fry quicker and/or at lower temperatures
- Cooking oil suppliers should be consulted for the best suited oil, some oils have a lower level of acrylamide formation compared to other.
- Frying oil quality shall be maintained by skimming frequently to remove fines and crumbs
- Do not serve over-cooked products.

Detailed instructions and suggestions

Potato products

Following manufacturer's instructions

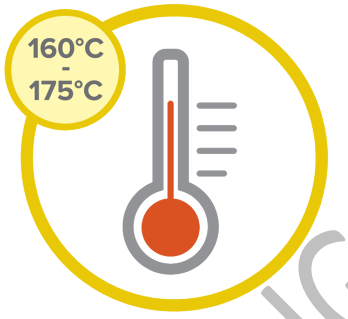
Cooking instructions for different products vary. Always read and follow the instructions given on the packaging.

These methods will be in agreement with customer specification and requirements for professional end users and are validated per product type to ensure products have optimal sensory quality at the lightest acceptable colour, per cooking method specified.

Manufacturers may also recommend to professional end users that they should have tools available for chefs to ensure good cooking methods and also provide calibrated equipment (e.g. timers, frying curves, colour grading charts (e.g. USDA/Munsell) and at minimum, clear pictures with targeted final prepared product colours. Ask your manufacturer to provide you with a colour chart for your product if they have one.

Manufacturers may refer end users to the golden frying recipe provided by Good Fries (for details please see 'Information Sources'). The following points should be noted:

- **Keep the temperature between 160°C and 175°C when frying**, and advice generally is to use temperatures between 180-220°C when using an oven (use the lower temperature when fan switched on)



- **Cook until a golden yellow colour;** use manufacturers' original fry colour charts for reference, for a quick assessment of finished fried/ baked product based on their colour
- **Do not overcook** (always avoid frying/ baking until the product colour gets brown / too dark), turn over products after 10 minutes or halfway through the total cooking time
- **Strictly follow the recommended cooking instructions**, as provided by the manufacturer
- When preparing **smaller quantities** than indicated on pack, **reduce the cooking time, to avoid excessive browning of the product**

Useful Tip

- For optimal product quality **do not overfill the frying basket**; fill the basket up to the halfway mark to avoid excessive oil uptake by extended frying times.

Chips

Cooking in fryer

Frozen, fresh prepared and from scratch

- Do not season before cooking – do it afterwards
- Keep the temperature at maximum 175°C. When applying 'two-step frying', do the first step (pre-frying) at 160°C
- Do not overfill the frying basket. Only fill the basket up to the halfway mark
- Always cook until a golden yellow colour

- Do not overcook. Discard any fries that are darker than golden yellow.

- When deep-frying smaller quantities (less than a half-full frying basket) reduce the cooking time
- Do not fill the basket above the oil level
- Filter the oil and clean the fryer using safe practices after using it
- Change the oil regularly, or at an interval specified by the manufacturer of the food product

<u>Double or triple cooked chips</u>

In the absence of manufacturers instructions:

- Keep the temperature at maximum 175°C.
- Always cook to a golden yellow colour.
- Do not overcook. Discard any fries that are darker than golden yellow.

Please refer to Annex 3 for some suggested industry best practice methods for making double or triple cooked chips.

<u>Cooking in an oven or air-fryer</u>

Prepared or frozen potato products

- Do not season before cooking – do it afterwards.
- Preheat the cooking device (e.g. air fryer) following the instructions provided by the supplier or preheat the oven to a maximum 220°C.
- Always cook until a golden yellow colour.

- Do not overcook. Discard any products that are darker than golden yellow.
- When cooking smaller quantities reduce the cooking time.

Home-made crisps

- Do not season before cooking – do it afterwards.
- Keep the temperature at maximum 175°C. When applying 'two-step frying', do the first step (pre-frying) at 160°C.
- Do not overfill the frying basket. Only half-fill your basket.
- Always cook until a golden yellow colour.
- Do not overcook. Discard any crisps that are overcooked.
- When deep-frying smaller quantities (less than a half-full frying basket) reduce the cooking time.
- Do not fill the basket above the oil level.
- Filter the oil and clean the fryer using safe practices after using it.
- Change the oil regularly.

Baked products

Caterers producing bread and other fine bakery wares could:

- Use a lower oven temperature and extend the cooking time. Products shall be baked to a lighter colour endpoint and do not over-cook the crust.

Some products are darker in colour such as artisanal rye and darker flour baked goods. In this case simply ensure that they are not over-cooked.

Baking bread and crispbread from scratch

- Do not over-cook.
- Discard any products that are over-cooked.

Baking biscuits and other fine bakery wares

- Do not over-cook.
- Discard any products that are over-cooked.

Par-baked products

This includes bread, bread rolls

- Caterers should ensure that suppliers provide good validated instructions for time and temperature of cooking to ensure that the products meet the expected benchmark levels
- Follow manufacturer's instructions
- Check colour is not darker than the products expected characteristic
- Discard any products that are over-cooked.

Toasting and toasted sandwiches

- Toast until the lightest level acceptable (optimal colour) – do not over-cook.
- Discard any products that are over-cooked.

Annex 1

Foodstuffs within scope Commission Regulation (EU) 2017/2158, as referred to in article 1(1):

a) French fries, other cut (deep fried) products and sliced potato crisps from fresh potatoes;
b) Potato crisps, snacks, crackers and other potato products from potato dough;
c) Bread;
d) Breakfast cereals (excluding porridge);
e) Fine bakery wares: cookies, biscuits, rusks, cereal bars, scones, cornets, wafers, crumpets and gingerbread, as well as crackers, crisp breads and bread substitutes. In this category a cracker is a dry biscuit (a baked product based on cereal flour);
f) Coffee;
    i) roast coffee;
    ii) instant (soluble) coffee;
g) Coffee substitutes;
h) Baby food and process cereal-based food intended for infants and young children as defined in regulation (EU) No 609/2013 of the European Parliament and of the Council

Available benchmark levels[5,6] for the presence of acrylamide in foodstuffs referred to in Article 1(1):

Food	Benchmark Level (µg/kg)
French fries (ready-to-eat)	500
- Potato crisps from fresh potatoes and from potato dough - Potato based crackers - Other potato products from potato dough	750
Soft bread a) Wheat based bread b) Soft bread other than wheat based bread	 50 100
Breakfast cereals (excl. porridge) - bran products and whole grain cereals, gun puffed grain - Wheat and rye based products(1) - Maize, oat, spelt, barley and rice based products(1)	 300 300 150
Biscuits and wafers Crackers with exception of potato based crackers Crispbread Ginger bread Products similar to the other products in this category	350 400 350 800 300
Roast coffee	400
Instant (soluble) coffee	850
Coffee substitutes a) Coffee substitutes exclusively from cereals b) Coffee substitutes from a mixture of cereals and chicory c) Coffee substitutes exclusively from chicory	 500 (2) 4000
Baby foods, processed cereal based foods for infants and young children excluding biscuits and rusks (3)	40
Biscuits and risks for infants and young children (3)	150

[5] Benchmark levels do not necessarily exist for all products which are within the scope of the legislation.

[6] Benchmark levels are broad categories and are not legal maximum limits nor safety levels. They are performance indicators and designed to promote best practice in controlling acrylamide levels.

[(1)] Non-whole grain and/or non-bran based cereals. The cereal present in the largest quantity determines the category.[(2)] The benchmark level to be applied to coffee substitutes from a mixture of cereals and chicory takes into account the relative proportion of these ingredient in the final product
[(3)] As defined in Regulation (EU) No 609/2013

Miscellaneous products not covered by the legislation

Many goods containing starch fall outside the scope of the Regulation but are still relevant. Businesses may still wish to apply mitigation measures to these products.

For these products, use the rule of "golden yellow colour" if there is no manufacturing standard. Some foods may be darker due to factors other than overcooking, such as ingredients, wholemeal bread, rye etc.

Examples of products outside the scope of regulation:

- Oven roasted potatoes
- Pies
- Pastry products
- Pizza
- Roasted vegetables (sweet potato, beetroot, carrots, parsnips etc.)

Annex 2

Suggested wording for forms for monitoring, record-keeping & auditing

If you already have monitoring forms and food safety audits in place in place, you may want to simply amend with some of these checks so that you include anything additional added in your FSMS, rather than creating additional forms. Whatever you decide to do, make sure it is achievable and proportionate to the nature and size of your business. Very small businesses may simply write any action taken in a diary – for example *"threw batch of over-cooked chips away."*

Pick out only what you need and don't feel you need to over-complicate it. Some of these checks need only be done once – for example selection of cooking oil.

Make them yours! Make sure that any checks used actually relate to your business and procedures.

Initial Checks
These checks need only be carried out once and recorded, and again if there is a change in procedure or a review carried out.

	✓?X	Detail Action taken	Signature	Date
Any colour chart used is checked to ensure cooking times and temperatures produce colour similar to the chart				
Oil selected as best for reducing acrylamide levels in fried foods - specify				

Receipt of Goods:

	✓?✗	Action taken	Signature	Date
All ready-to-eat baked products are golden yellow colour, and or not overcooked				
Reject out of specification products				

Storage

	✓?✗	Action taken	Signature	Date
Fresh potatoes used for chipping or roasting are not stored in the fridge				

Cooking

	Temp. °C	✓?✗	Action taken	Signature	Date
Oil temperature for first fry (oil blanching) (target 160°C)		Blank out			
Oil temperature for cooking target 175°C)		Blank out			
Ovens are set to temperatures given by manufacturer					
All cooked or baked foods are cooked to within colour specification (as per chart used) [specify]	Blank out				
French fries [specify any other foods] cooked to	Blank out				

golden yellow colour					
Overcooked foods (i.e. darker than golden yellow) rejected before service	Blank out				

Suggested internal and external auditor questions to use as appropriate (this is not exhaustive):

1. FSMS includes detail about acrylamide mitigation
2. Staff have received instructions about acrylamide mitigation
3. Staff understand the importance of rejecting deliveries of over-cooked RTE foods such as bread
4. When staff asked about cooking colour they demonstrate they understand importance of following company guidance on final colour – either demonstrating using chart or describing colour range that is acceptable
5. Staff are following SOPs
6. Staff understand the need to discard over-cooked foods
7. Acrylamide checks are completed

8. 2(3) additional measures:

Head Office specifications (for coffee) and verification information available on request from Head Office

Annex 3

There are different methods of making double or triple cooked chips, two are suggested below. These are industry methods and are considered best practice:

Method 1 – Triple cooked

- Place chips in cold water and bring to a simmer until soft to touch, alternatively steam the chips until soft to touch.
- Drain and dry chips on a cooling rack.
- Chill for 1 hour.
- Do not season before cooking – do it afterwards.
- Fry the chips at 130°C until a crust forms but no colour – around 5 minutes.
- Drain chips and chill for 1 hour.
- Fry the chips again for at maximum 175°C until a golden yellow.
- Fry in small batches – only half-fill the basket to ensure consistency of frying.
- Do not overcook. Discard any fries that are darker than golden yellow.
- When deep-frying smaller quantities (less than a half-full frying basket) reduce the cooking time.
- Do not fill the basket above the oil level.
- Filter the oil and clean the fryer using safe practices at the end of service.
- Change the oil regularly.

Method 2 – Double cooked

- Do not season before cooking – do it afterwards.
- Fry the chips at 130°C until soft but not coloured – around 7-8 minutes.
- Remove chips from oil, drain and allow to cool.
- Fry the chips again for at maximum 175°C until a golden yellow.
- Fry in small batches – only half-fill the basket.
- Always cook until a golden yellow colour.
- Do not overcook. Discard any fries that are darker than golden yellow.
- When deep-frying smaller quantities (less than a half-full frying basket) reduce the cooking time.
- Do not fill the basket above the oil level.
- Filter the oil and clean the fryer after using it.
- Change the oil regularly.

Information sources

Commission Regulation (EU) 2017/2158: establishing mitigation measures and benchmark levels for the reduction of the presence of acrylamide in food http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R2158&from=EN

EFSA Acrylamide http://www.efsa.europa.eu/en/topics/topic/acrylamide

EUPPA Good Fries Guide: http://goodfries.eu/en/

EUPPA: European Potato Processors' Association, For training and other sector specific activities please consult the following website: http://www.euppa.eu/en/

FoodDrinkEurope: Confederation of the Food and Drink Industries of the EU website: http://www.esa.org.uk/EFSA: European Food Safety Authority

FoodDrinkEurope Acrylamide Toolbox
http://www.fooddrinkeurope.eu/publications/category/toolkits

FSA Acrylamide resources https://www.food.gov.uk/science/acrylamide-0

FSA Go for Gold Campaign https://www.food.gov.uk/news-updates/news/2017/15890/reduce-acrylamide-consumption

Guidance for Industry Acrylamide in Foods (FDA)
https://www.fda.gov/downloads/Food/UCM374534.pdf

HOTREC Guide
https://www.synhorcat.com/IMG/pdf/2016_guide_acrylamide_en.pdf

Influence of deep-frying using various commercial oils on acrylamide formation in French fries
https://www.ncbi.nlm.nih.gov/pubmed/25953074

Regulation (EC) No 852/2004 of the European parliament and of the council of 29 April 2004 on the hygiene of foodstuffs http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02004R0852-20090420

Glossary of terms

Acrylamide: A chemical substance formed when asparagine is heated to high temperatures in the presence of sugars. It typically occurs when foods with high starch content such as potatoes, root vegetables and bread are cooked at high temperatures (over 120°C) in a process of frying, roasting or baking.

ALARA principle: ALARA stands for As Low As Reasonably Achievable and is a term used in the Regulation. It means making every reasonable effort to mitigate the levels acrylamide as far as practicable.

Asparagine: A non-essential amino acid that is found in many vegetables, with higher concentrations in some varieties of potatoes.

Fresh-prepared potato products: Potatoes that have been prepared by the manufacturer and chilled ready for cooking. This includes products such as peeled or sliced potatoes, fresh prepared chips and French fries.

From scratch cooking: products cooked from the beginning without using any prepared items.

Frozen potato products: Prepared and frozen potato products ready for cooking. For example, frozen chips, hash browns, potato wedges or roast potatoes.

Food Safety Management System (FSMS): A system based on HACCP used by businesses to identify and assess hazards and to explain and demonstrate how these are controlled in their business. One example of this is Safer Food, Better Business in England and Wales, CookSafe in Scotland and Safe Catering in Northern Ireland.

HACCP*: Stands for Hazard Analysis Critical Control Points*, a system for identifying and assessing hazards to food safety and controlling the risks from those hazards.

Par-baked products: These are bread or dough products that are partially baked and halted at about 80% of the normal cooking time, when it is rapidly cooled and sometimes frozen for storage. The partial cooking kills the yeast in the bread mixture and sets the internal structure of the

proteins and starches (the spongy texture of the bread), so that the inside is sterile and stable, but the loaf has not generated "crust" or other externally desirable qualities that are difficult to preserve once fully cooked.

Parboil: A cooking technique in which food items are added to boiling water and cooked until they start to soften, then removed before they are fully cooked. Parboiling is usually used to partially cook an item which will then be cooked another way such as roasting, frying or grilling.

Toasting: A cooking method used to brown bread by exposure to radiant heat. This browning is the result of a Maillard reaction altering the flavor of the bread and making it firmer so that it is easier to spread toppings on it. Bread is often toasted using a toaster, conveyor toaster, under a grill, or in a toaster oven.

Resources and Links

Training resources
http://goodfries.eu/en/home

Printable colour charts
http://goodfries.eu/en/rules

Acrylamide Testing Resources

To find a UKAS accredited testing laboratory, please follow to following instructions:

1) Go to the Accredited Organisations search page on the UKAS website here: https://www.ukas.com/search-accredited-organisations/

2) Enter the term ‘acrylamide’ into the search box

3) On the left side bar, click ‘organisation type’ and check ‘testing laboratories’

4) The search results will list accredited acrylamide testing laboratories