



CHRISTEYNS

FOOD HYGIENE

WHITE PAPER ON THE MANAGEMENT OF ALLERGENS THROUGH CLEANING

**AC Anaphylaxis
Campaign**
Supporting people at risk of severe allergies



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Introduction

Allergen management through cleaning in the food, dairy, beverage and brewing industries is an essential control to reduce the risks to vulnerable consumers through the unintended cross-contact of allergenic proteins into other products. This process requires diligence, awareness and training to ensure that operatives undertaking cleaning activities understand the need for effective cleaning.

Definitions in this sphere

Some confusion and merging of terms in this sphere can occur, for ease of understanding in this document we will be using: -

Validation	The process of checking that something satisfies a certain set of criterion	Will a cleaning regime “work”
Verification	The act of reviewing, inspecting, testing, etc. to establish and document that a regime meets the requirements	Has a cleaning regime “worked”
Monitoring	Visual inspection, hand-over sheets	Did it happen

Cleaning Considerations

When initially considering the cleaning of food contact surfaces then the first consideration is the “cleanability” of the surface. There is a hierarchy of cleaning from very difficult to relatively easy to clean and this is best represented in this graphic.

Here the easiest to clean surface is stainless steel with the most difficult to effectively remove allergen residues being cloth & wood due to the porosity of the surface.

In all circumstances, this “cleanability”, combined with the material of construction’s reaction to certain chemical types, will dictate the cleaning regime that can be successfully employed to minimise consumer risk.





Methods of Cleaning

Cleaning is a key allergen control measure in many food businesses irrespective of the sector and commonly falls into one of four categories: -

- Dry cleaning.
- Deep – hygiene team undertaken cleaning regimes.
- Inter-product “changeover” cleans often undertaken by production operatives themselves.
- Automated cleaning.

1. Dry Cleaning

Dry cleaning is often employed where water sprays cannot be used due to equipment design or product type, for example in a bakery scenario. In these stations, the first step is often the use of scrapers or brushes to remove gross debris followed by the application of detergent in a “controlled wet” clean to ensure the effective removal of any allergenic ingredients.



The cleaning energy is supplied through manual action from the brush or cloth and the operative and may often be concluded with a wipe from disposable paper towel to dry the food contact surface.

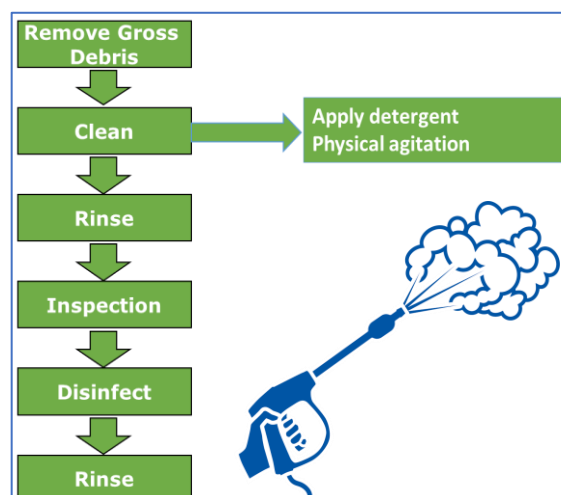
Disinfectant, if applied, is often alcohol based which evaporates leaving a microbiologically clean surface and no moisture.

2. Hygiene Clean.

The hygiene clean often takes place over an extended time period, usually at night, and includes the following steps: -

- Pre-rinse to remove gross debris.
- Application of a detergent – often as a foam or gel.
- Manual agitation of the detergent.
- Prolonged rinsing.
- Application of a disinfectant.
- Possible rinse (depending on local regulations and the disinfectant product used)

This regime may include the use of chlorinated or highly alkaline detergents, together with physical agitation, usually from a brush, green pad or application of a pressurised water jet removing the food debris ensuring that allergenic residue is also removed.



We must identify and acknowledge the need, at this point, for the line supervision to ensure that an effective visual clean is undertaken and that obvious “trap areas” such as rollers, scraper bars and ledges are identified and checked prior to the re-commencement of production operations. The use of a rapid checking system which is specific for allergens can also help to ensure the validity of the clean and assist with ensuring all due diligence has been exercised.

In general terms, a cleaning process that has been effectively designed, managed and validated to deliver a microbiologically clean result will also be sufficient to deliver an effective removal of allergens, **however**



users must ensure that a suitable validation exercise has been undertaken in order to reduce the risks to consumers from allergen carry-over and cross-contamination.

3. Inter Product Cleans.

Moving on to examine the inter-product cleans (sometimes called change-over cleans) we run into some difficulties and potential risks in the removal of allergens from food production equipment. In general terms a product change clean has been found to be less effective than a hygiene clean operation for the following reasons: -

- Lack of staff awareness and training in the correct method of cleaning equipment, an issue further compounded by the potential lack of motivation for the cleaning duties.
- The use of less aggressive, often neutral, detergents which will have less effect on the removal of residues.
- Pressure from Production Management to have the equipment being cleaned returned quickly to production duties thereby reducing down-time.



As with the hygiene clean, the use of visual assessment and the consideration of using a verification testing method should be considered with these cleans.

The use of a neutral based detergent is not, in itself, felt to be a cause for concern as research has demonstrated that in the short contact-time usually available during this type of clean the emulsification of any fat or oil based soiling, and it's subsequent suspension in the liquid matrix, is more effective at lifting the allergenic protein from the surface of food contact equipment than the attempted saponification of fats through the use of an alkaline detergent. The theory is that the lifting of the soiling rather than attempting a chemical change removes the protein by association with the other components, particularly fats and oils, in the food residue rather than releasing the protein to be "free floating".

4. Automated Cleans

Automated cleaning involves any clean where the mechanical energy of the cleaning activity is supplied from automatic means, for example in a tray-wash unit or CIP set. Here the physical energy is supplied through jets and/or impact energy from detergent streams or liquid flow through pipework.

The common concern here is carry-over of allergenic residue from one product cleaning cycle to another, however if the cleaning cycle is effective, has been validated and is operated correctly then these risks are greatly reduced. Specific mitigation measures are detailed in the following breakdown.

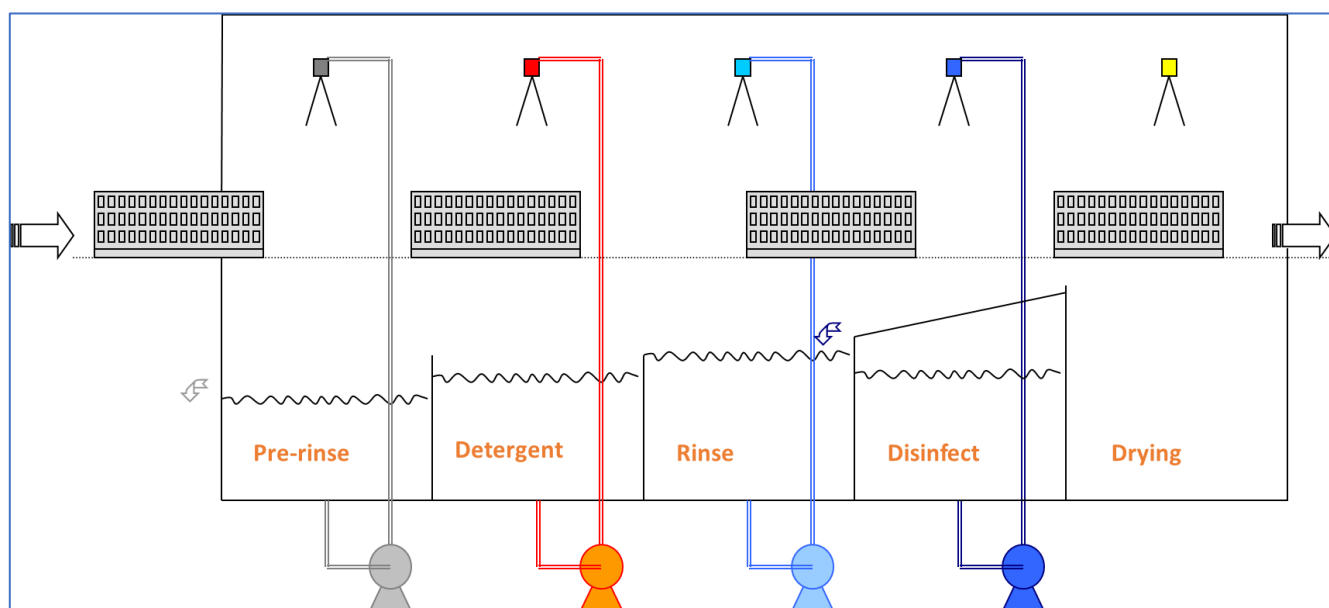
a. Tray-wash.

A tray-wash is, as the name implies, designed to automate the cleaning process involving trays and similar items of food handling equipment.

Typically, these units are a tunnel with a series of tanks connected to spray-bars which apply solution or liquor to the surface of the tray as it is dragged through on a chain.

These chambers are illustrated below (although the pre-rinse tank may be missing on some units and is replaced with a manual rinse or physical removal before the tray is placed into the unit).





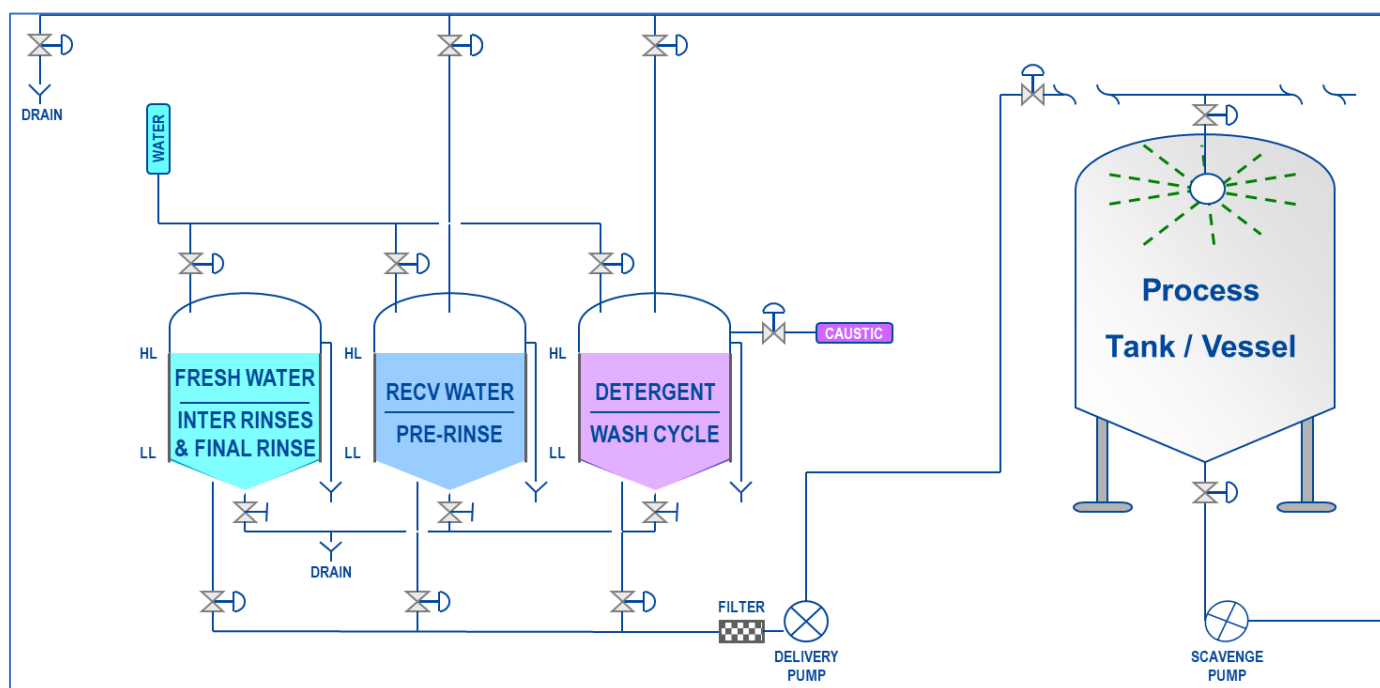
Providing the unit is correctly designed, maintained and operated, then allergen carry-over is mitigated by the following factors: -

- Low level of debris entering the detergent tank as a result of having been removed by the pre-rinse stage (it is good practice to reduce this debris build-up from a purely cost control point of view as the more debris that enters the detergent tank, then the more often that the solution will require replacement).
Further dilution of debris will occur with the “weiring” that can take place between the tanks shown above where the rinse water will routinely over-flow back into the detergent tanks.
- If by chance that allergenic residue does enter the detergent tank, this will be very diluted before being sprayed onto subsequent trays passing through the unit. However, it should be borne in mind that the subsequent rinse spray will effectively remove any residue carried over (indeed, if this spray is ineffective then the risk of detergent carry-over is far greater).
- Finally, whilst the disinfectant solution will not have a material effect on the allergenic protein, the fact that this is a moving spray of solution will further help to ensure that any fragments deposited are removed.



b. Clean In Place (CIP)

Clean In Place (CIP) is a specialist form of cleaning routinely employed in the dairy, brewing and beverage sectors and involves both tanks and pipework. Commonly CIP regimes are being employed in food processing operations such as ready meals, soups and sauces – the below diagram illustrates a typical recovery CIP system.



As with tray-washing, the common concern here is the carryover of allergenic proteins from one product cleaning cycle to another, and once again the design and operation of a correctly validated cleaning regime is essential to success. A typical CIP cycle will include the following stages: -

- i. Pre-rinse
- ii. Detergent cycle.
- iii. Post-rinse
- iv. Disinfectant cycle.

Providing the set is correctly designed, maintained and operated, then allergen carry-over is mitigated by the following factors: -

-  Low level of debris entering the detergent tank as a result of having been removed by the pre-rinse stage (it is good practice to reduce this debris build-up from a purely cost control point of view as the more debris that enters the detergent tank, then the more often that the solution will require replacement).
-  If by chance that allergenic residue does enter the detergent tank, this will be very diluted. It should also be borne in mind that the subsequent rinse will effectively remove any residue carried over.
-  Finally, whilst the disinfectant solution will not have a material effect on the allergenic protein, the fact that this is a moving spray or flow of solution will further help to ensure that any fragments deposited are removed.



c. Cleaning Tools.

The tools and equipment employed during allergen cleaning must themselves be cleaned to avoid them becoming sources of allergenic protein containing debris reservoirs. Typically, operations will utilise specific colour-coded utensils for cleaning post-allergens and these must be hygienically designed, capable of being effectively cleaned and stored safely between uses.



Images courtesy of Vikan



In any event, the key to ensuring allergen control through cleaning processes is to undertake validation trials of all cleans using the test techniques described in a later section of this guide. These trials will need to be repeated on a routine basis to ensure that parameters of the cleaning activities have not changed – this review frequency will be determined by the company's HACCP and risk assessment process and by customer-led demands. In addition, cleaning verification is necessary to ensure that the desired result is achieved consistently.

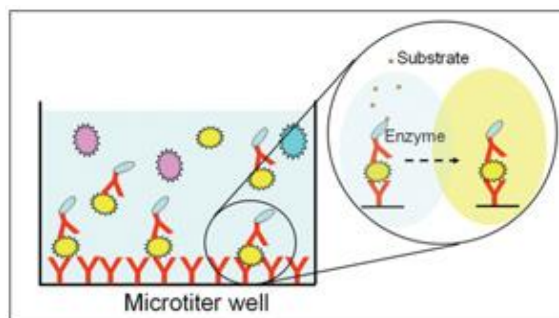


Testing Methods

Validation of the hygiene regime is a critical first step in determining that practices, equipment and chemicals in use are fit for purpose in delivering a safe food production environment.

1. Validation.

Allergen validation is undertaken using ELISA (Enzyme Linked Immunosorbent Assay) which can provide incredibly specific analysis of the allergenic protein present as well as providing quantification information.



As these graphics show, this analysis is undertaken in dedicated equipment often against standards which contain known levels of the allergenic protein of concern, thereby providing quantification of the level of allergenic protein present in the sample.

DNA analysis can also be utilised for the identification of allergens, however in this instance care must be taken as the regime assesses the presence of DNA and **not** allergenic protein presence. As an example, DNA analysis cannot distinguish between milk proteins and the presence of beef or egg protein and the inclusion of chicken meat in a food stuff.

2. Verification.

Since the introduction of allergen labelling legislation in 2004, the pre-packed food industry has become experienced in managing allergen cross-contact including verification of cleaning activities – whilst allergen recalls continue, the majority of those involve incorrect packaging or labeling errors rather than hygiene controls.



To undertake verification testing for allergen presence or absence the only available technology is that based on antibody assessment using either lateral flow or flow-through tests specific to the allergenic protein of concern.

These tests are currently the best available technology for real-time rapid testing and whilst they have their limitations their use is highly recommended where surety is needed that allergen cross-contact is suitably controlled ensuring consumer safety and product integrity. Results are typically delivered in under 10 minutes with limits of quantification around the low PPM level, these results can be documented via photography and recording on monitoring reports.

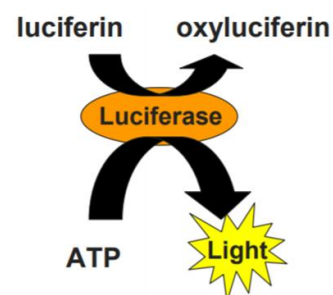




3. ATP

ATP testing has, for many years, been utilised as a non-specific hygiene monitoring tool whereby the level of organic debris present on a surface can be readily assessed utilising the same biochemical mechanism used in the firefly to generate its glow.

As ATP is present in **all** living cells whatever the source, this technology's use as a non-specific tool is well placed, however when considering allergen management care must be exercised. This is because vulnerable consumers react to the allergenic proteins present in the food matrix and **not** the organic matter.



Protein is a cellular component and does not contain any ATP and circumstances often occur where the level of organic debris is low, but there is significant contamination with allergenic proteins which could represent a hazard to consumers.

For this reason, care must be exercised when considering ATP assessment as a method for verifying that a clean involving allergenic protein has been successful. As a rule of thumb, if there is significant organic debris present then it is highly likely that allergenic protein remains, however the reverse is not always the case. For this reason, users are advised to not rely on ATP assessment alone for verifying cleaning standards where allergens are involved.

Training and Awareness

In previous sections, the need for training and awareness has been briefly referenced and the importance of this cannot be over-emphasised. Those engaged in cleaning activities following production of an allergen containing product must be aware of the vital role they play in preventing the cross-contact of allergenic proteins into subsequent batches or items.

The key message is that this type of contamination is unlikely to be homologous as the early part of the run would contain potentially higher levels of extraneous protein simply because it would “harvest” the debris on passing. It is for this reason that cleaning plays a vital role in allergen management and control.

Further areas of knowledge that would benefit hygiene operations are: -

-  That chemicals do not inactivate or “kill” allergens.
-  That disinfectants have no material effect on allergenic proteins.
-  The potential consequences of cross-contact allergens reaching a vulnerable consumer.
-  The prevalence of both allergic and intolerant reactions in the population.

Supervisors and Managers should also undertake more advanced and detailed allergen management training to appreciate the science behind the subject and the role that cleaning plays in the organisation's overall food safety strategy.



Conclusion

A properly considered, designed and executed hygiene validation, verification and monitoring regime will afford the food business operator a high degree of control over the safe, hygienic production of food, dairy and beverage products which will not present a risk to the end-consumer.

The documentation of this system will enable the food business operator to assure both themselves and their customer base that the products produced will have been handled in a clean, hygienic environment as well as allowing for thorough investigation and due diligence should issues occur at a later date. With any system, it is essential that the hygiene professional fully understands both the techniques used as well as the implications of the information delivered by the analysis methods enabling them to implement corrective action should it be needed.

The Anaphylaxis Campaign

This UK charity is dedicated to the support, education and sharing of information to the allergic community and works extensively with food manufacturing, service and retail via their Corporate Panel to ensure that the needs of consumers are considered and met.



For more information and resources on allergen management and control why not join the Campaign as a Corporate member – their website is listed below.

Further Reading

-  Campden BRI – Allergen Control Through Cleaning video ([link](#))
-  Campden BRI – Validation of cleaning to remove food allergens Guideline 59
-  [Christeyns Food Hygiene Training Brochure](#).
-  [Anaphylaxis Campaign website](#)
-  [Food Standards Agency Website](#)
-  [Society of Food Hygiene and Technology website](#).



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