



Food processing and hygiene in Europe: evolutions to ensure food safety

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- **Content**
- **The European working environment**
- **European Law**
- **Importing meat to Europe**
- **Hygiene and hygienic design**
- **Practical examples**
- **Validation**



- Belgium, land of beer and chocolates
- And also



Adolphe Sax, inventor of the saxophone, Justine Henin, womens n°1 tennisplayer, and of course Tintin or Kuifje





- Part of European Union:

- Belgium
- Bulgaria
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy

- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- United Kingdom





- **What is the European Union?**
- A unique economic and political partnership between 27 democratic European countries.
- **What are its aims?**
- Peace, prosperity and freedom for its 495 million citizens — in a fairer, safer world.
- **What results so far?**
- Frontier-free travel and trade, the euro (the single European currency), safer food and a greener environment, better living standards in poorer regions, joint action on crime and terror, cheaper phone calls and air travel, millions of opportunities to study abroad ... and much more besides.



- **How does it work?**
- To make these things happen, EU countries set up bodies to run the EU and adopt its legislation. The main ones are:
 - the European Parliament (representing the people of Europe);
 - the Council of the European Union (representing national governments)
 - the European Commission (representing the common EU interest)



- The European Union is by far the biggest importer of food worldwide.
- Import rules for meat and meat products are fully harmonised and the European Commission acts as the competent authority on behalf of the Member States.
- The EU Commission is the sole negotiating partner for all non-EU countries in questions related to import conditions for meat and meat products.



- **Full application of the new Regulations from 1 January 2006**
- Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April on the hygiene of foodstuffs
- Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April laying down specific hygiene rules for food of animal origin
- Regulation (EC) No 178/2002 of the European Parliament and of the Council laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (also referred to as the General Food Law)
- See http://europa.eu.int/comm/food/food/foodlaw/guidance/index_en.htm



- **Other relevant documents are:**
- Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare.
- Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs
- Regulation (EC) No 2075 of 5 December 2005 laying down specific rules on official controls for *Trichinella* in meat



- **General remarks:**
- Food hygiene import systems for food of animal origin (such as meat, fish and dairy products) are not entirely the same as for food of non-animal origin (such as fruit, vegetables) or as for food containing both ingredients of animal origin and plant origin etc.
- In addition to food hygiene requirements, other sanitary measures may apply such as animal health and plant health requirements.
- For more information see:
http://europa.eu.int/comm/food/fvo/pdf/guide_thirdcountries_en.pdf



- **Specific requirements:**

- With regard to food of animal origin only a third country that appears on list established by the Community can export to the EU.
- Only products from establishments that appear on a list approved by the Community can export to the EU.
- All food businesses after primary production must put in place, implement and maintain a procedure based on the HACCP principles.
- The Food and Veterinary Office (FVO) will continue to carry out inspection missions in both Member States and third countries
- If a food business operator considers or has reason to believe that a food which it has imported is not in compliance with the food safety requirements, it shall immediately initiate procedures to withdraw the food in question from the market where the food has left the immediate control of that initial food business operator and inform the competent authorities thereof.



- **Food hygiene requirements**
- ***Obligations of food business operators in third countries:***
- The relevant requirements with regard to the hygiene of food of animal origin are contained in:
- Articles 3 to 6 of Regulation (EC) No 853/2004, which means that the following rules need to be respected by food business operators in third countries:
 - A general obligation on the operator to monitor the food safety of products and processes under his responsibility
 - General hygiene provisions for primary production
 - Detailed requirements after primary production
 - For certain products, microbiological requirements
 - Procedures based on the HACCP principles
 - Registration of establishments: The approval of establishments is in principle necessary only for foods of animal origin.



- **Other health requirements**
- Under EU food law, a number of requirements may apply in complement or in addition to food hygiene. These include requirements concerning:
 - Contaminants and residues,
 - The use of substances having a hormonal effect
 - The use of food additives,
 - Materials and articles in contact with foodstuffs
 - Radioactivity.
- Product specific requirements also exist concerning :
 - Quick frozen foodstuffs,
 - Foodstuffs for particular nutritional purposes,
 - Genetically modified organisms (GMOs)



- Hygienic design is an obligation
- **Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery – amended by 98/79/EC**
- 1.6.5. Cleaning of internal parts
- The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is absolutely impossible to avoid entering the machinery, the manufacturer must take steps during its construction to allow cleaning to take place with the minimum of danger.



- **2.1. Agri-foodstuffs machinery**

- Where machinery is intended to prepare and process foodstuffs (e.g. cooking, refrigeration, thawing, washing, handling, packaging, storage, transport or distribution), it must be so designed and constructed as to avoid any risk of infection, sickness or contagion and the following hygiene rules must be observed:
 - (a) materials in contact, or intended to come into contact, with the foodstuffs must satisfy the conditions set down in the relevant Directives. The machinery must be so designed and constructed that these materials can be clean before each use;
 - (b) all surfaces including their joinings must be smooth, and must have neither ridges nor crevices which could harbour organic materials;
 - (c) assemblies must be designed in such a way as to reduce projections, edges and recesses to a minimum. They should preferably be made by welding or continuous bonding. Screws, screwheads and rivets may not be used except where technically unavoidable;
 - (d) all surfaces in contact with the foodstuffs must be easily cleaned and disinfected, where possible after removing easily dismantled parts. The inside surfaces must have curves of a radius sufficient to allow thorough cleaning;



- **2.1. Agri-foodstuffs machinery**

- (d) all surfaces in contact with the foodstuffs must be easily cleaned and disinfected, where possible after removing easily dismantled parts. The inside surfaces must have curves of a radius sufficient to allow thorough cleaning;
- (e) liquid deriving from foodstuffs as well as cleaning, disinfecting and rinsing fluids should be able to be discharged from the machine without impediment (possible in a 'clean` position);
- (f) machinery must be so designed and constructed as to prevent any liquids or living creatures, in particular insects, entering, or any organic matter accumulating in areas that cannot be cleaned (e.g. for machinery not mounted on feet or casters, by placing a seal between the machinery and its base, by the use of sealed units, etc.);
- (g) machinery must be so designed and constructed that no ancillary substances (e.g. lubricants, etc.) can come into contact with foodstuffs. Where necessary, machinery must be designed and constructed so that continuing compliance with this requirement can be checked.



- **Food Contact Materials**

- Food contact materials are all materials and articles intended to come into contact with foodstuffs: framework regulation EC/1035/2004 from 6 december 2004
 - All food contact materials should be safe
 - Should not endanger health
 - Should not transfer their components into the foodstuff in unacceptable quantities
 - Should not deteriorate the taste and odour of the food
- From 26 October 2006 food contact materials and articles shall be traceable throughout the production chain.



- **Recent EU laws: Food Contact Materials – Specific measures for:
Active and intelligent materials and articles**
- Adhesives
- Ceramics – EC/84/500: limits on cadmium and lead
- Cork
- Rubbers
- Glass
- Ion-exchange resins
- Metals and alloys



- Paper and board
- Printing inks
- Regenerated cellulose – EC/93/10 – positive list
- Plastics EC/200/72 – list of authorised monomers and additives
- Silicones
- Textiles
- Varnishes and coatings
- Waxes
- Wood



- Vinyl Chloride Monomer – VCM – EC/78/142 In material <1 mg/kg, not in detectable food
- Nitrosamines – EC93/11 Limits in rubber teats and soothers
- BADGE, BFDGE & NOGE EC2002/16 – migration limit of 1mg/kg for BFDGE, BADGE deadline 31/12/2005.



- **Key organisations**
- EHEDG
- FDA –CFR-USDA
- ISO



- The ***EHEDG (European Hygienic Engineering & Design Group)***, an independent consortium formed to develop guidelines and test methods for the safe and hygienic processing of food, provides guidance on the hygienic engineering aspects of manufacturing of safe and wholesome food.
- Production, publication and updating of [guidelines](#), available in several languages
- Equipment approval through [certification](#) to assist equipment suppliers and food manufacturers
- Organisation of [conferences](#), regional meetings and workshops and advisory function to legislators and standards groups (CEN, ISO, etc).
- The group includes representatives from research institutes, the food industry, equipment manufacturers and government organisations in Europe.
- JohnsonDiversey is member of the EHEDG group and is allowed to make use of their logo.
- <http://www.ehedg.org>





- In the USA, the **FDA** listed in the “**Code of Federal Regulations**” specifications for all materials that are allowed to have food contact.
- The CFR is a legal regulation.
- The U. S. Food and Drug Administration (FDA) publishes the *Food Code*, a model that assists food control jurisdictions at all levels of government by providing them with a scientifically sound technical and legal basis for regulating the retail and food service segment of the industry (restaurants and grocery stores and institutions such as nursing homes). Local, state, tribal, and federal regulators use the *FDA Food Code* as a model to develop or update their own food safety rules and to be consistent with national food regulatory policy.
- **21 CFR Food and Drugs (Food & Drug Administration FDA)**



- ISO (International Organization for Standardization) is the world's largest developer of standards. Although ISO's principal activity is the development of technical standards, ISO standards also have important economic and social repercussions. ISO standards make a positive difference, not just to engineers and manufacturers for whom they solve basic problems in production and distribution, but to society as a whole.
- ISO is a network of the national standards institutes of 156 countries, on the basis of one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system.
- ISO 9000 is concerned with "quality management".
- ISO 14000 is primarily concerned with "environmental management".
- ISO 22000 is concerned with "food safety".





- **Going practical: to the basics**
- Stainless steel
- Surface finish
- Welding
- Pipe unions
- Seals and gaskets
- Dead legs

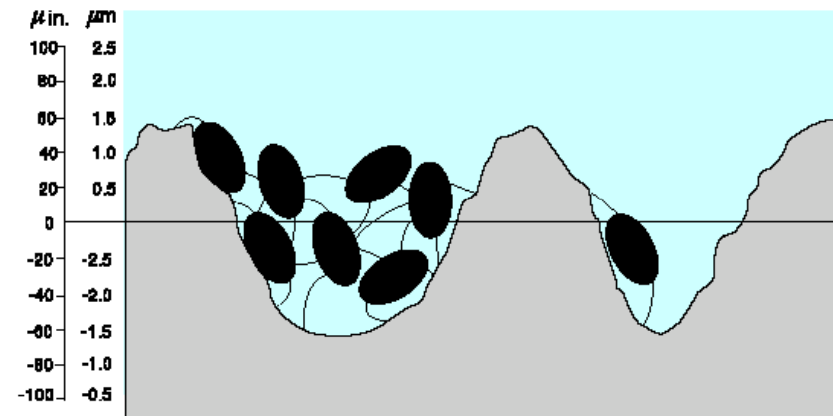


- **Stainless steel**
- Group of corrosion resistant steels containing at least 10% chromium and may contain other alloying elements. These steels resist corrosion and maintain its strength at high temperatures.

| AISI | DIN | Carbon% | Nickel % | Chromium % | Molybdenum % |
|------|--------|---------|----------|------------|--------------|
| 304 | 1.4301 | < 0,07 | 8-12 | 18-20 | - |
| 304L | 1.4306 | <0,03 | 8-12 | 18-20 | - |
| 316 | 1.4401 | <0,07 | 10-14 | 16-18 | 2-3 |
| 316L | 1.4404 | <0,03 | 10-14 | 16-18 | 2-3 |



- **Surface finish** is the allowable deviation from a perfectly flat surface that is made by some manufacturing process.
- The parameter most used for general surface roughness is Ra.
- It measures average roughness by comparing all the peaks and valleys to the mean line, and then averaging them all over the entire cutoff length.



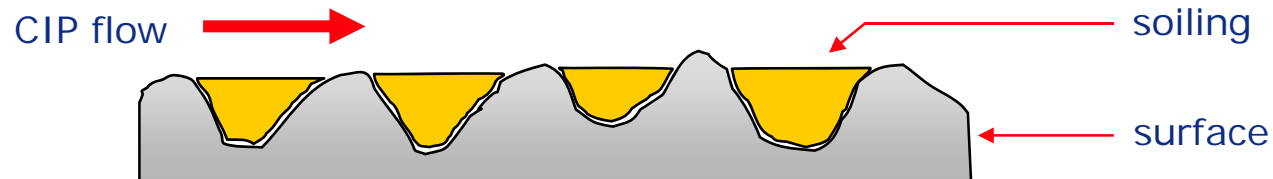


- Surface finish may be denoted by a roughness grade number. Here is a table that specifies the Ra values for roughness grade numbers. (ISO standard – 1992)

| Roughness values Ra | | Roughness Grade Numbers |
|---------------------|----------------|-------------------------------|
| μm | μin | |
| 50 | 2000 | N12 |
| 25 | 1000 | N11 |
| 12.5 | 500 | N10 |
| 6.3 | 250 | N9 |
| 3.2 | 125 | N8 |
| 1.6 | 63 | N7 |
| 0.8 | 32 | N6 |
| 0.4 | 16 | N5 |
| 0.2 | 8 | N4 |
| 0.1 | 4 | N3 |
| 0.05 | 2 | N2 |
| 0.025 | 1 | N1 |



- Surface finish is important as it affects how soiling is attached to surfaces and the ability of a cleaning system to mechanically remove the soil
 - Soil to surface attachment is much stronger for a rough surface than a smooth one.
 - Soil can be protected from the mechanical action by surface roughness.

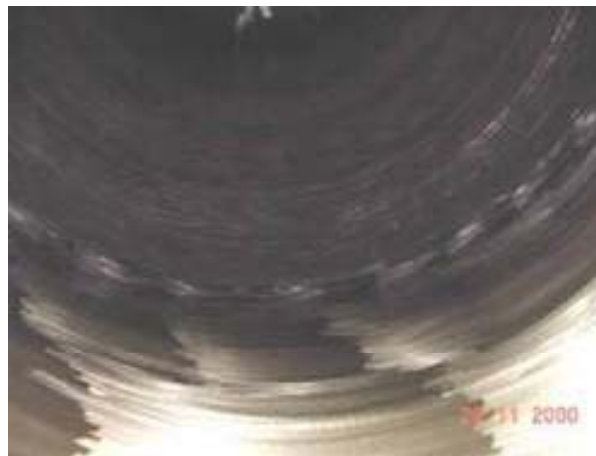




- The specification of surface roughness for stainless steel tubes for the food industry is according to recommendation ISO/R 2037 (1972).
- **Internal**
- For large surface areas product contact surfaces should have a surface finish of 0.8 μm Ra or better (for definition of Ra, see ISO 468 (1982)).
- A roughness of $> 0.8 \mu\text{m}$ may be acceptable if test results have shown that the required cleanability is achieved because of other design features.
- For small areas (e.g. inaccessible welds) a roughness over 0.8 μm might be acceptable if agreed in advance.
- (Note: cold rolled steel has a roughness of Ra = 0.2 to 0.5 μm and therefore usually need not be extra polished).
- **External**
- Surface roughness must be such that manual cleaning is easily done. Sharp corners, edges, dead spaces, crevices must be avoided.



- Whilst surface finish is usually correct when equipment is new, over time the surface can become damaged by:
 - equipment repair and grinding.
 - corrosion of the surface producing “pits”.
- Equipment that has become damaged can usually be recovered by specialist re-surfacing.
- Surface treatments, such as grinding, polishing and passivation are used to improve cleanability.

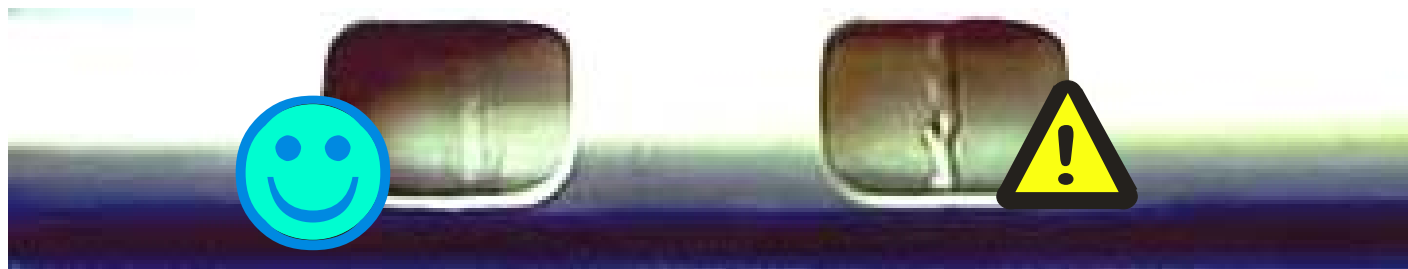




- Continuous welding is the preferred technique for fabrication of stainless steel components.
- From a quality perspective poor welds have much the same affect as poor surface finish. This is quite apart from the mechanical issues of weld strength etc.
- Poor welding typically either leaves an excess of weld material on the surface (overfilled) or too little (undercut).

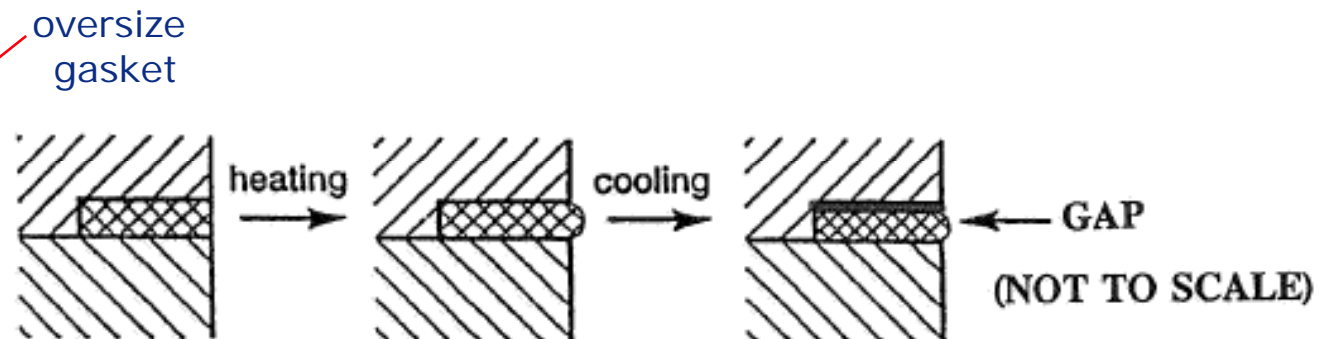


- Evidence of poor welding on the outside of a pipe is almost a sure sign of poor welding inside.



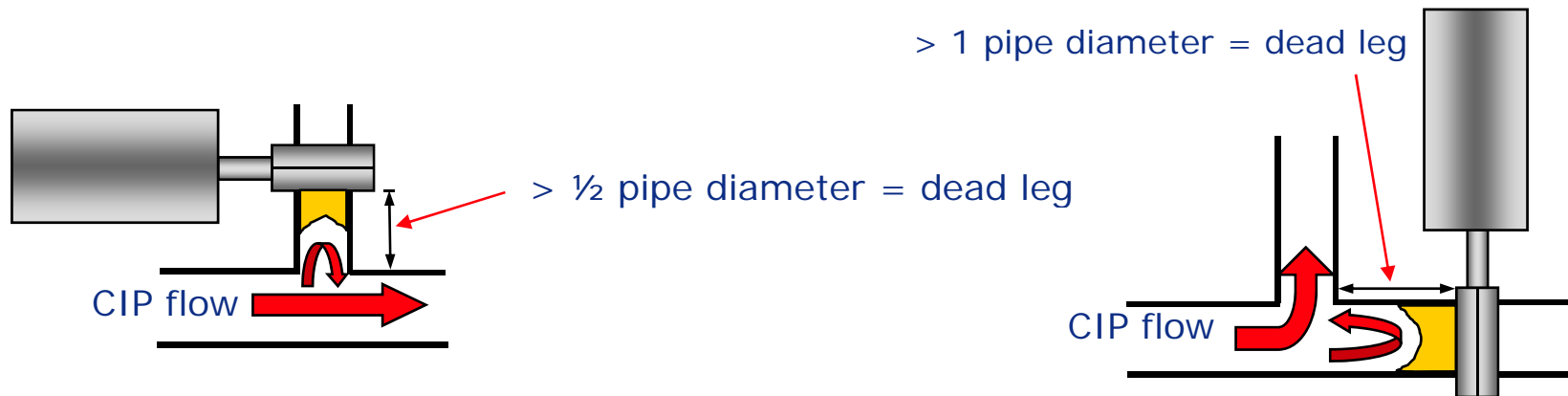


- Seals and gaskets present two potential problems:
 - If they are old and perished or cracked they present a good haven for soiling and microbiological contamination.
 - If they are oversized or incorrectly fitted they impede the CIP flow allowing soiling to collect behind the gasket or seal.





- A process pipe work dead leg, is any "T" piece where the tee pipe length is more than $\frac{1}{2}$ a pipe diameter in the "non flow" direction, or 1 pipe diameter in the "flow" direction.





- If the dead leg exceeds these dimensions there will not be sufficient CIP mechanical action in the dead leg to remove soiling, and the disinfectant may not be able to contact the surfaces during the disinfection step, causing contamination in the next product processed.
- If the dead legs are excessively long, or configured downwards, then they may remain full of “stagnant” product.



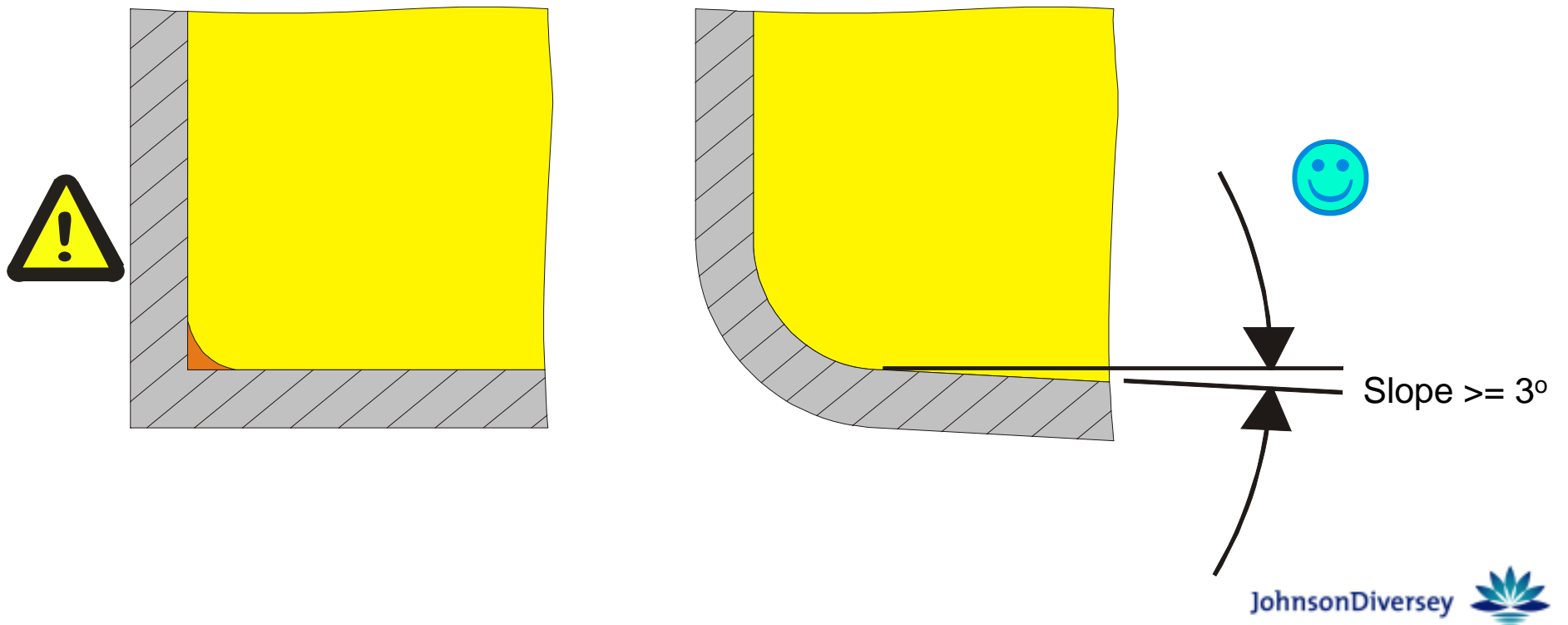


- Some examples: floor draining



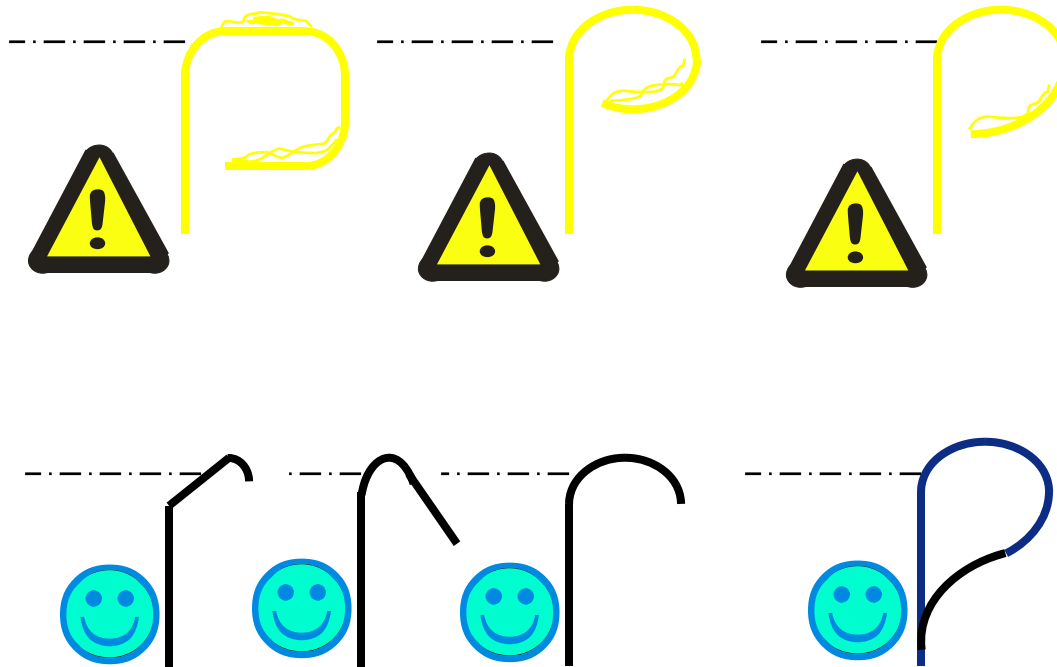


- Some examples: equipment draining



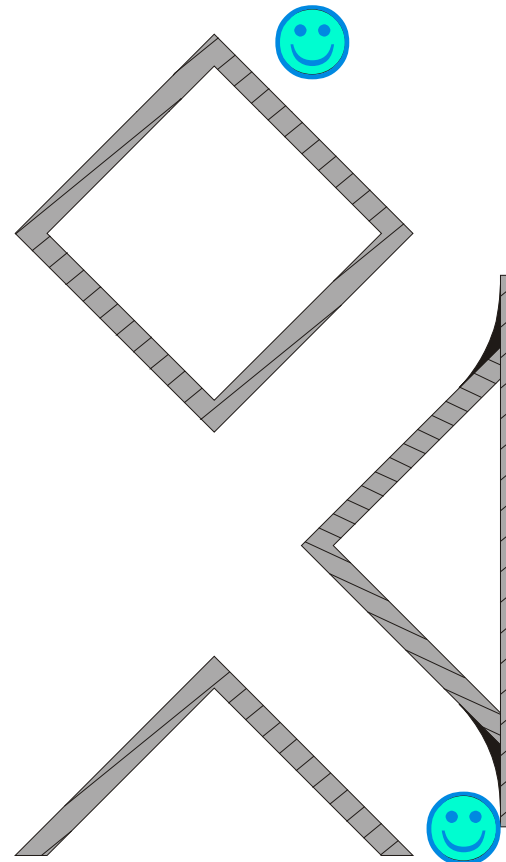
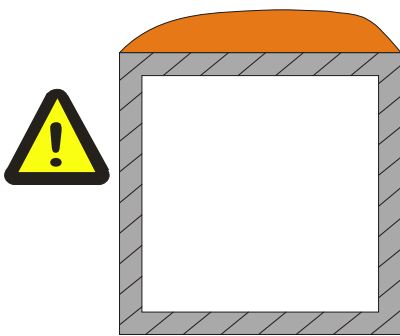
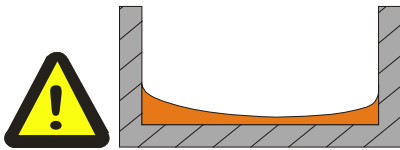
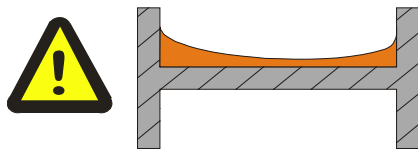


- Some examples: open equipment





- Some examples: framework





- Washrooms should be equipped with:
 - Sinks (detergent - rinse - disinfectant) with no touch taps
 - Soak tanks
 - Hygienic utensil storage
 - Stainless steel tables to clean items off the floor
 - Racks to store cleaned and disinfected items
 - Air-flow should not be directed towards production









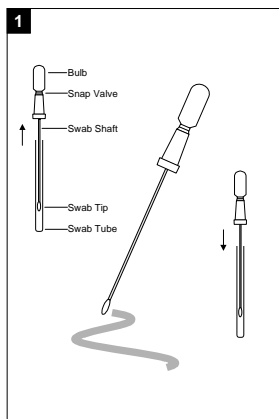
F&B secure
plant
green
value
partner
Best practice for
Food & Beverage



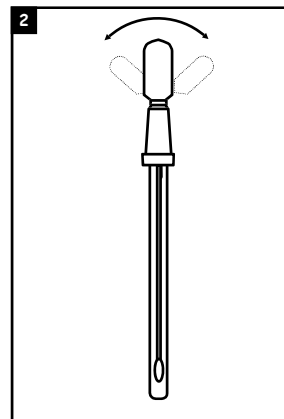
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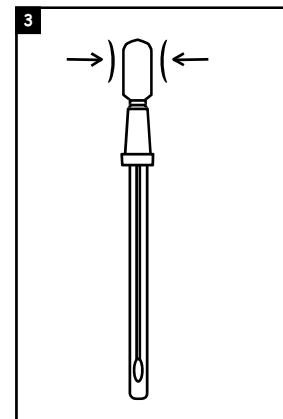
- **Validation:**
- Of hygienic design and cleanability : EHEDG has developed a reference method, the base for their certification of equipment
- Of cleaning: ATP measurement for fast assessments



Swab



Snap



Press



Read



- **Hygiene assesment:**
- SecureCheck is a European Law, IFS, BRC and GMP based assesment to check on hygiene requirements



Questionnaire



Web database



Reports





- **Content**
- **The European working environment**
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- **Practical examples**
- **Validation**
- *Pictures with Courtesy of Roland Cocker and EHEDG*