Diversey
A SOLENIS COMPANY

Dairy equipment and process design to control listeria:

The Real Balance of Food Safety

October/2025

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Diversey

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Global Sector Specialist
Diversey F&B
EHEDG President

Experience

- Over 32 years with Diversey, started in Lever Industrial
- Roles covering Global Strategic Accounts support, training, technical, applications and solutions support
- EHEDG President, authorized trainer and chairman of Working Group CIP

Education

- MSc Food Technology from University of Gent
- MBA Brussels

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Chemical Applications and Innovations

A snapshot of recent industry leading innovation

Open Plant Cleaning (OPC)

Complete portfolio of OPC detergents, disinfectants and application equipment coupled with training and optimisation services

Cleaning in Place (CIP)

CIP detergents and disinfectants, project engineering and optimisation and monitoring services

Conveyor Lubrication

Wet, semi-dry and dry lubrication chemicals and application systems for all packaging types.

Membrane Cleaning

Chemicals and optimisation services for membrane installations and processes.

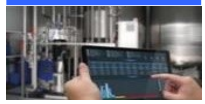
Water Treatment

Treatment of incoming water to enhance quality and reduce corrosion, deposition and bio-fouling. Treatment and recycling of waste water.

Diverclean Sonic

Pioneering pre-clean treatment for high soil environments. Saving time, water and chemical.

Intelligent CIP



Digital monitoring and analytics to maintain food safety while reducing downtime. Saving water, energy, time.

DryFormance

Water fee conveyor lubrication. Saving water, energy and extending asset life. Enhancing operator safety.

Divos ACP

Novel membrane cleaning technology and procedure. Saving water, energy, time and extending asset life

Solenis

Solenis

Full portfolio of innovative water and wastewater treatment solutions.

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Food safety starts with the design

Why is important?

Requirements being incorporated in GFSI Recognized Food Safety Management Certification Programs

efsa

In 2024, EFSA released a scientific opinion on persistent microbiological* hazards in food and feed environments—uncovering critical risk factors such as inadequate:

- zoning and hygiene barriers
- cleaning and disinfection
- hygienic design of equipment and machines

*such as Salmonella, Listeria monocytogenes, Cronobacter sakazakii

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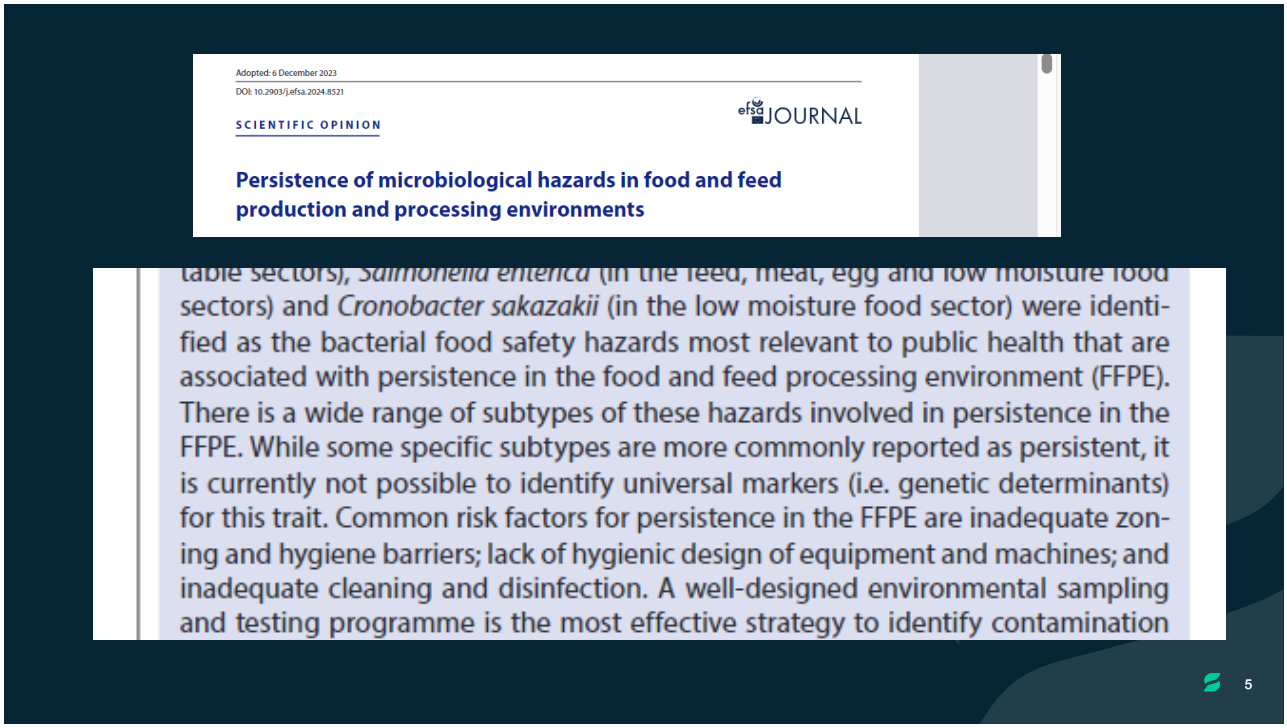
Adopted: 6 December 2023
DOI: 10.2903/j.efsa.2024.8521
SCIENTIFIC OPINION
efsa JOURNAL
Persistence of microbiological hazards in food and feed production and processing environments
table sectors), *Salmonella enterica* (in the feed, meat, egg and low moisture food sectors) and *Cronobacter sakazakii* (in the low moisture food sector) were identified as the bacterial food safety hazards most relevant to public health that are associated with persistence in the food and feed processing environment (FFPE). There is a wide range of subtypes of these hazards involved in persistence in the FFPE. While some specific subtypes are more commonly reported as persistent, it is currently not possible to identify universal markers (i.e. genetic determinants) for this trait. Common risk factors for persistence in the FFPE are inadequate zoning and hygiene barriers; lack of hygienic design of equipment and machines; and inadequate cleaning and disinfection. A well-designed environmental sampling and testing programme is the most effective strategy to identify contamination
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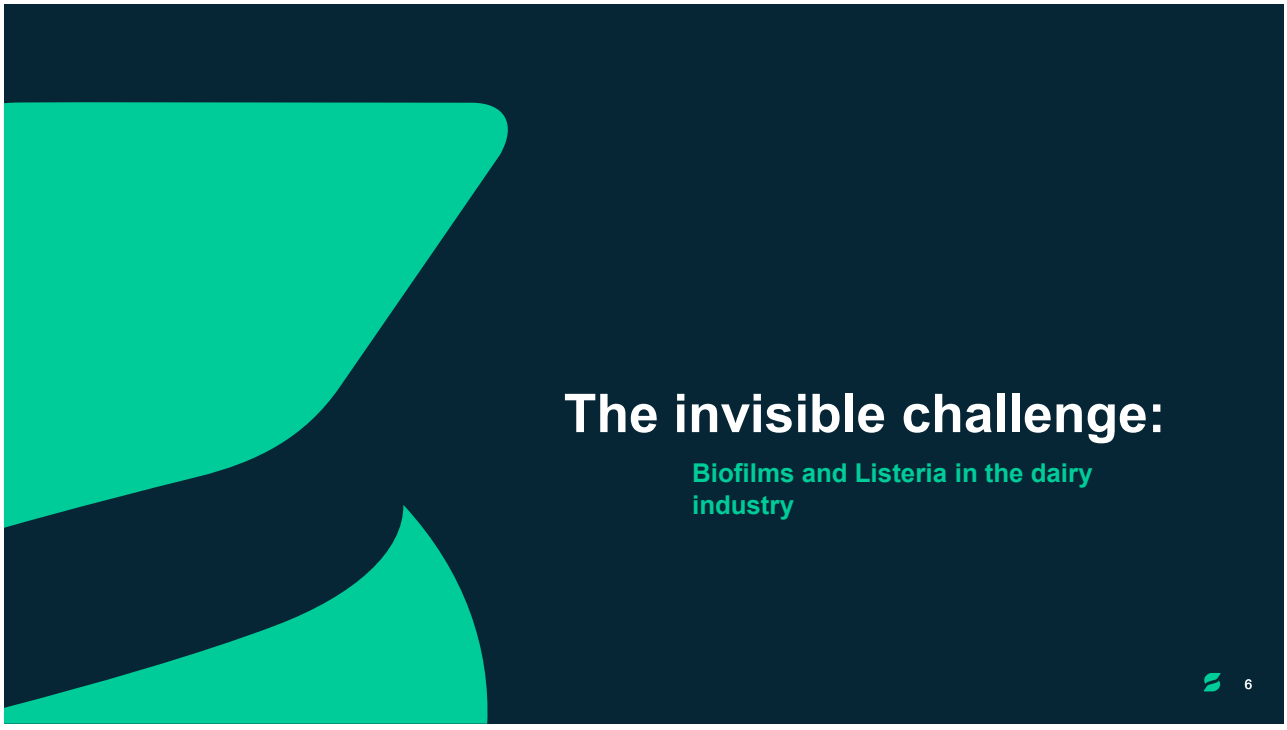
The invisible challenge:
Biofilms and Listeria in the dairy industry
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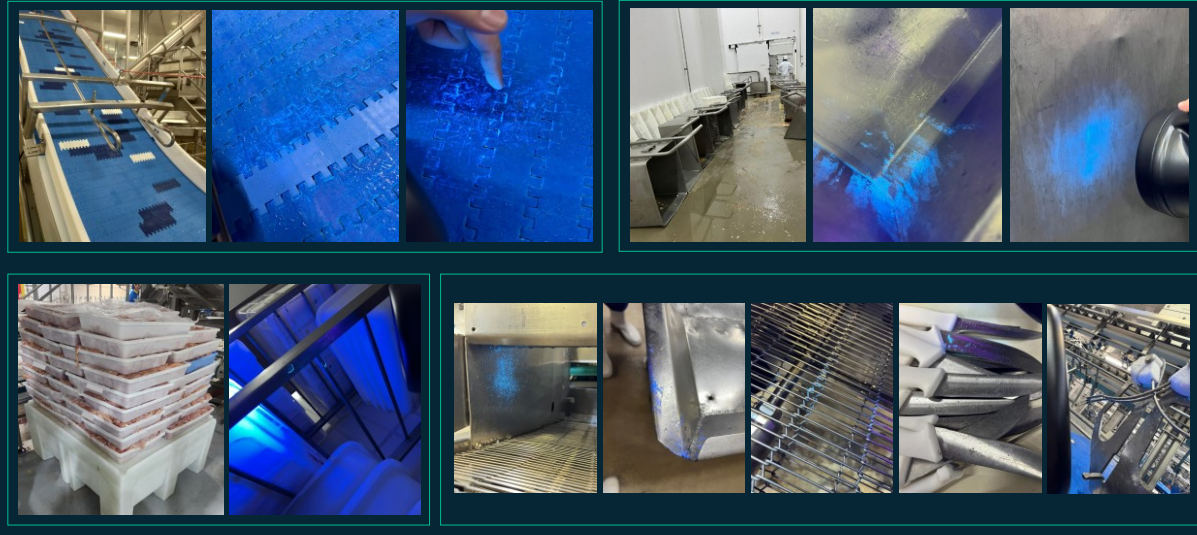
Presence of soils in industrial processes

Real cases identified with ultraviolet light



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When the design does not allow for effective hygiene, pathogens inevitably harbour and food safety is compromised

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Hygienic Design:

If the plant is validated, why does the microbiological risk persist?

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Principles of Hygienic Design

What is the importance of Hygienic Design?

Failures in hygienic design not only lead to the accumulation of residue which in turn leads to contamination, but also lead to the accumulation of residues of cleaning and disinfecting chemicals, increase the risk of corrosion and can contaminate subsequent batches of the product.

Failure of Hygienic Design can lead to contaminants, such as foreign materials, allergens, lubricants, detergents and disinfectants

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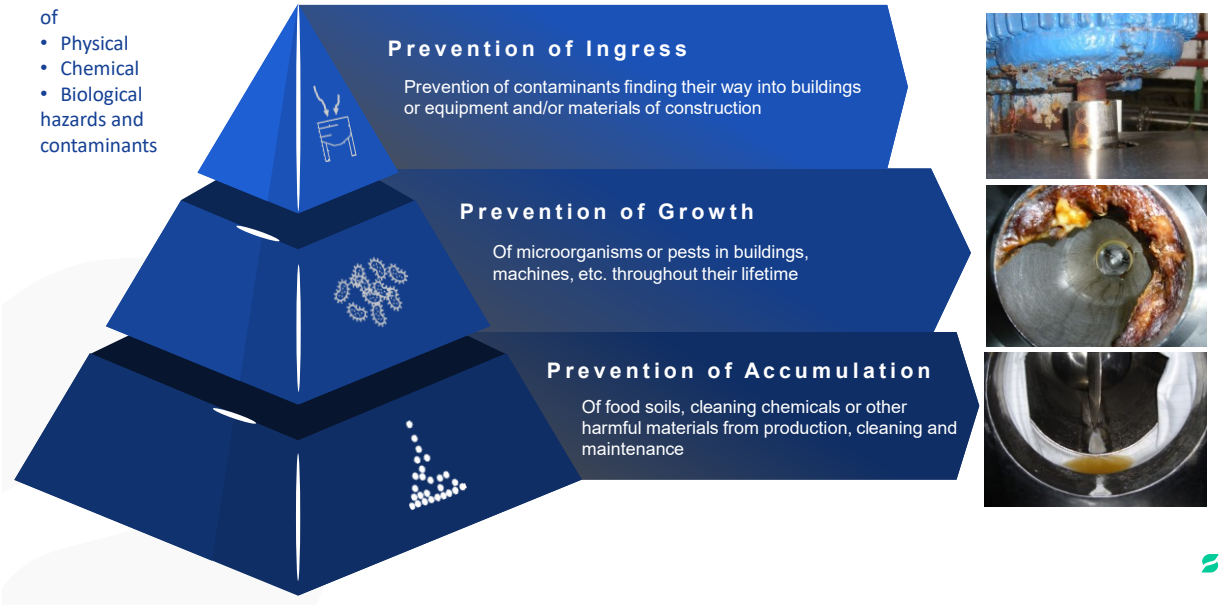
Hygienic Design Objectives



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Lack of Hygienic Design:

What are the impacts?

- **High costs**
- **Increased Water Consumption**
- **Increased effluent for treatment**
- **Reduced production time**
- **Reduced equipment life**

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Hygienic Construction

Basic Rules

Contact surfaces:

They must be easy to clean, non-absorbent and not present a toxicological risk

They must be smooth and free of imperfections (e.g. cracks and cracks)

Superficial microstructures (e.g., pores, sharp peaks, deep valleys, crevices, and cracks) should be avoided.

The surface finish affects the time required for cleaning.

For stainless steel surfaces, a Ra value equal to or less than 0.8 µm

Direct metal joints (Metal – Metal) should not be used

Metal – metal can harbor dirt, liquids and can corrode

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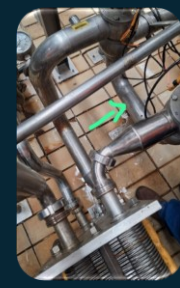
Drainage

- The exterior and interior of all equipment and piping must be self-draining (e.g., inclined pipes) or drainable (e.g., opening a valve or gas purging).
- Horizontal surfaces should be avoided; instead, surfaces should always lean to one side with a minimum angle of 3°.
- In the case of external surfaces, any liquid should be directed away from the main area of the product

Case – Drainage

- Listeria contamination
- Buildup of residue
- Dirt build-up on the valve



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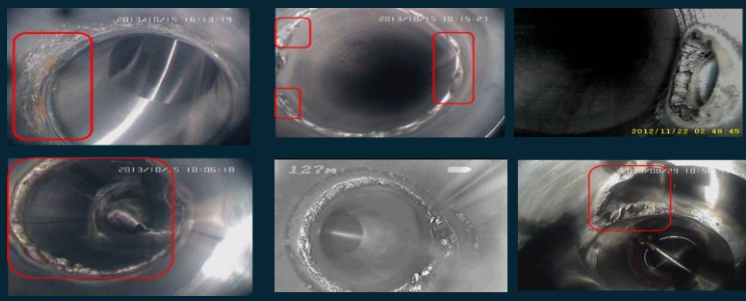
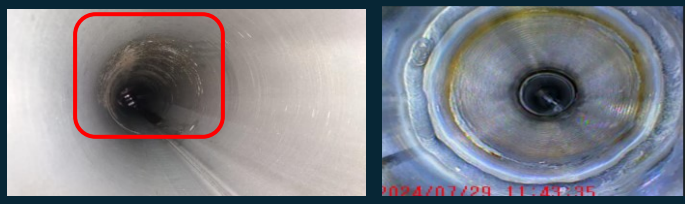
Impact of bad welding



Material difference - high roughness on the inside of the tube



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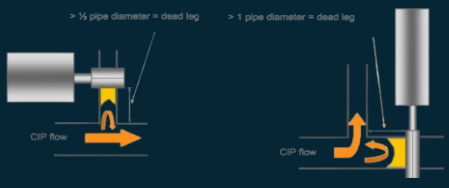
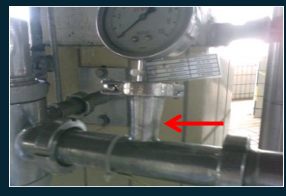
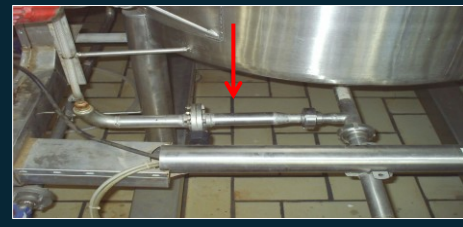
Hygienic design – Dead legs







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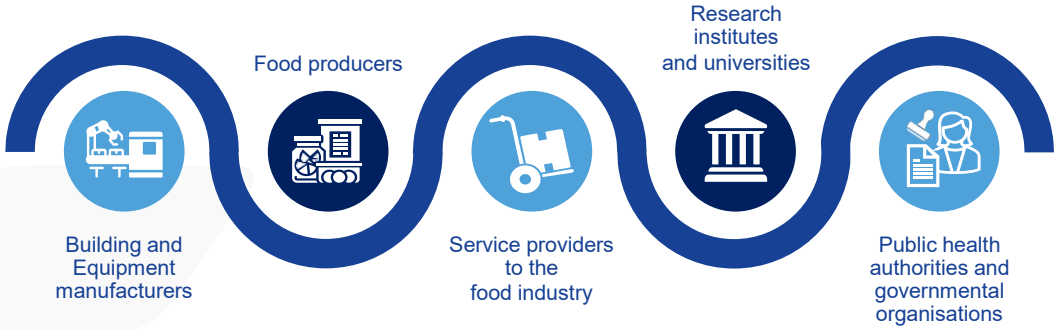
Where to find support?

European Hygienic Engineering & Design Group (EHEDG) founded in 1989 as a non-profit consortium



Platform

The platform to discuss and define hygienic design and engineering requirements to manage food safety and quality, efficiency and sustainable operations

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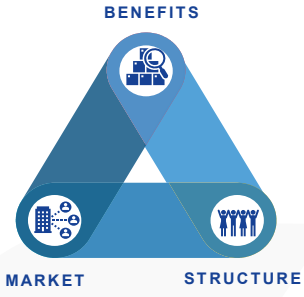
EHEDG organisatie



MARKET

Worldwide 'end-to-end' food production supply chain

BENEFITS

- Health and safety of consumers
- Prevent reputation damage
- Cost effective operations
- Sustainable operations

STRUCTURE

- Voluntary contribution of members
- Interesting for big, medium and small enterprises
- > 750 members and growing

Collaborations

ANUGA FOOD TEC · A3 · IFS International Featured Standards · FOOMA JAPAN · Interclean · SIIIA · FSSC 22000 · Global Harmonization Initiative · Freskon HELEXPO · Cfia · EFFoST · International Association for Food Protection

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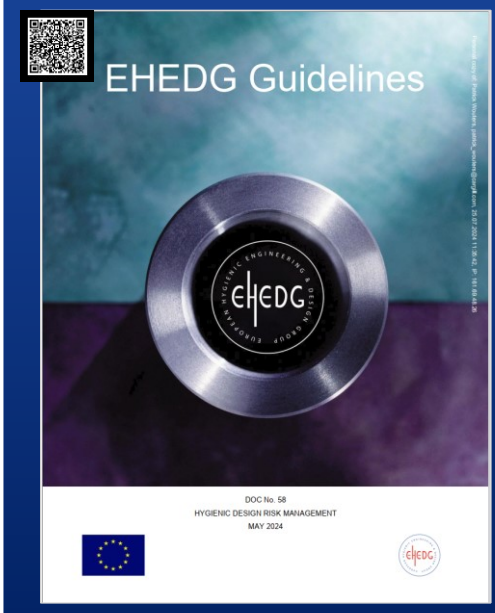

HYGIENIC DESIGN RISK MANAGEMENT (HDRM)

This guideline provides a step-by-step approach to assessing and managing food safety and hygiene risks by hygienic design of food manufacturing buildings and equipment, in accordance with existing standards and GFSI scopes JI and JII requirements.

This HDRM can be applied from:

User perspective to support food safety management programs and/or design specifications.

Supplier perspective when designing, fabricating and commissioning buildings or equipment.

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Benefits of Hygienic Design

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Where we are now

- GMP
- HACCP risk assessment
- Good Hygienic Practices
  - **C&S**
  - **Hygienic design**
  - **EMP**

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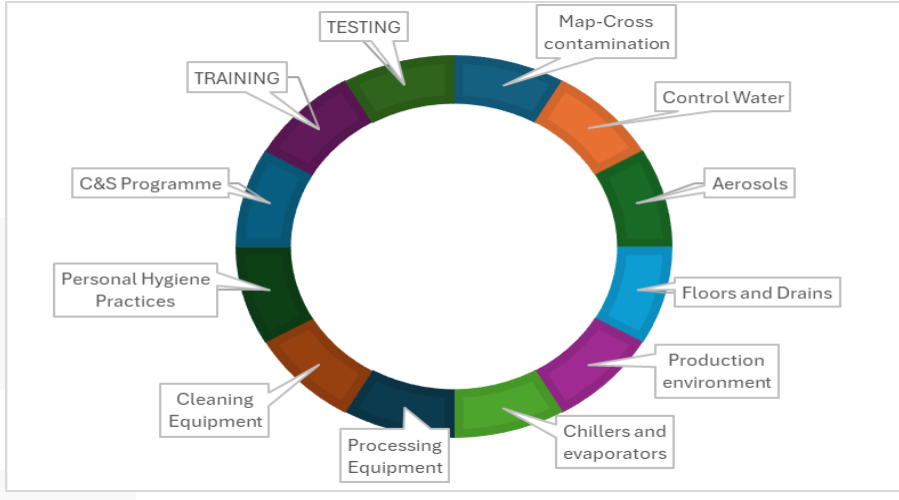
Where we are now



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Where we are now

M&S Approved products list	Description
Divosan Sanisigma VS69	QAC-free detergent-disinfectant
Quatdet Clear VT74	A blended QAC based terminal disinfectant
Tego 2001 VT52	Amfoteric based terminal disinfectant
Diverfoam Activ VT70	Oxidising foam disinfectant based on PAA
Divosan Activ VT5	Non foaming disinfectant based on PAA
Divodes FG	Alcoholic based disinfectant, blend of propilic + IPA
Activate 10A	Cationic biocides disinfectant

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What is an EMP?

Much more than a legal requirement

- Defined in EU Hygiene regulation No. 852/2004, Article 5 (**HACCP**-based procedures).
- EMP is a part of the **Food Safety management system**.
- Detect environmental contamination risks **before** they affect products.

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Why EMPs are Critical

Prevention is always cheaper than a recall

Prevent **pathogen contamination** (e.g., Listeria monocytogenes).

Required for compliance with **EC No. 2073/2005**.

Aligns with GFSI-recognized food safety management schemes: **ISO 22000, FSSC 22000, IFS, BRCGS**.

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Key EMP Components

The 6 pillars of an effective EMP

1. Zoning
2. Target Organisms
3. Sampling Plan
4. Testing & Analysis
5. Corrective Actions
6. Documentation & Review

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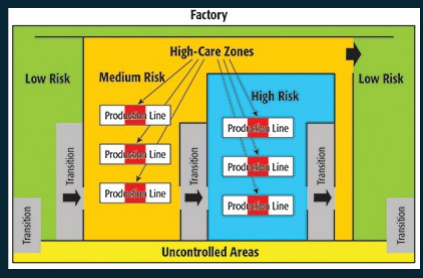
Key EMP Components

The 6 pillars of an effective EMP

Facility Zoning

Smart barriers to control risks

- Clean vs. dirty zones.
- Low-risk vs. high-care areas.
- Follow EU General Hygiene Practices (GHP) guidelines and Listeria monocytogenes (Lm) technical recommendations.



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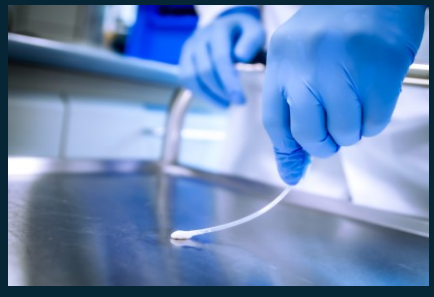
Key EMP Components

The 6 pillars of an effective EMP

Sampling Plan

Where to look for silent contaminations

- Focus on high-risk areas (e.g., drains, conveyors).
- Sampling frequency based on risk.
- European Food Safety Agency (EFSA) scientific guidance recommends rotating sites.



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Key EMP Components

The 6 pillars of an effective EMP

Testing & Laboratory Methods

From lab to action

- Accredited labs (EN ISO/IEC 17025).
- ISO 11290 (Listeria), ISO 6579 (Salmonella).
- Use rapid methods validated by AFNOR, MicroVal, or NordVal.

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Key EMP Components

The 6 pillars of an effective EMP

Data Review & Trend Analysis

Finding patterns before they become problems

- Track and analyze results over time.
- Identify recurring contamination sources.
- Adjust EMP accordingly.

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Key EMP Components

The 6 pillars of an effective EMP

Corrective Actions

Reacting fast saves millions

- Respond to non-compliances immediately.
- Conduct root cause analysis.
- Regulation EU 2017/625 mandates authority notification if required.

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Key EMP Components

The 6 pillars of an effective EMP

Target Organisms

The invisible enemies

- Listeria monocytogenes (Regulation EU 2073/2005 and EU 2024/2895).
- Salmonella spp., E. coli, Enterobacteriaceae.
- Use of indicator organisms to validate cleaning.

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Key EMP Components

The 6 pillars of an effective EMP

Documentation & Continuous Improvement

Always ready for audit

- Keep comprehensive records.
- Validate and review EMP regularly.
- Must be auditable by competent authorities.

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Regulatory & Industry Framework

What the laws and standards say

EC No. 852/2004 – Food hygiene.

EC No. 853/2004 – Animal - origin foods.

EC No. 2073/2005 – Microbiological criteria

EC No. 2024/2895 of 20 November 2024 amending Regulation **No 2073/2005** as regards Listeria monocytogenes

EFSA and **EURL** Lm technical guidance documents.

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EMP Best Practices in the EU

Good practices that become culture

- **Validate** cleaning programs.
- Engage all departments (QA, maintenance, production).
- Foster a **culture** of food safety.

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Thanks!

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