



Hygienic design, EHEDG and Hygienic Design Center at DTU

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Hygienic Design, EHEDG & DTU HDC

Gun Wirtanen, DTU National Food Institute

SP Seminar in Gothenburg on 15th of September 2015

Hygienic Design, EHEDG & DTU Hygienic Design Center at DTU

Gun Wirtanen, Associate Professor

Technical University of Denmark
Division: Production and Microbiology
Research Group: Microbial Food Safety and Quality

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DTU Food
National Food Institute



Agenda



- Introduction of the speaker
- Background to Hygienic Design
- European Hygienic Engineering & Design Group (EHEDG)
- Hygienic Design Center (HDC) at DTU and its activities

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Gun Wirtanen – Curriculum Vitae



Associate Professor at DTU National Food Institute

- Lecturing in course 23521 (main lecturer) and similar level courses
- Lecturing in Hygienic Design Courses for industrial representatives (equipment manufacturers, food and biotech producers & food plant builders) at DTU Centre for Hygienic Design
- Lecturing in the EHEDG Advanced Course in Hygienic Design arranged e.g. at DTU Centre for Hygienic Design
- Research projects in process hygiene
- Tutoring of student theses at BSc, MSc and PhD levels

External Lecturer in Process Hygiene at University of Helsinki, Finland

- Biofilm formation, Surface Microbiology and Cleaning & Disinfection
- Hygienic Design

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Gun Wirtanen – Curriculum Vitae cont.



Main jobs

- 2014- Associate Professor in Hygienic Design and Cleaning Operations at DTU National Food Institute
- 2010-2013 Senior Expert in Process Microbiology and Hygiene at VTT Expert Services Ltd.
- 1997-2009 Senior Research Scientist in Process Microbiology and Hygiene at VTT Biotechnology and Food Research, VTT Biotechnology and VTT
- 1988-1997 Research Scientist in Microbiology at VTT Food Research Laboratory and VTT Biotechnology and Food Research
- 1986-1988 Research Trainee in Microbiology at VTT Food Research Laboratory

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Gun Wirtanen – Process Hygiene Activities



- Project coordinator of the Specific Support Action project SAFOODNET (FP6-022808) 2006-2009, which focused on knowledge sharing of new methods, tools and applications in improved hygiene management in the new EU.
- Involved in coordinating Nordic projects P93156 "Sanitation of dairies" 1994-96, P96049 "Evaluation of cleaning agents and disinfectants for use in dairies: methods and mechanisms" 1997-2000 & P00027 "DairyNet: Hygiene Control in dairies" 2001-04.
- Published more than 350 publications on quality control of foods, food processing hygiene and cleanroom technology as peer-reviewed articles, invited book chapters, articles based on oral and poster presentations and articles in technical journals.

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Introduction – Consequences of poor design and hygiene

Why we are here ?

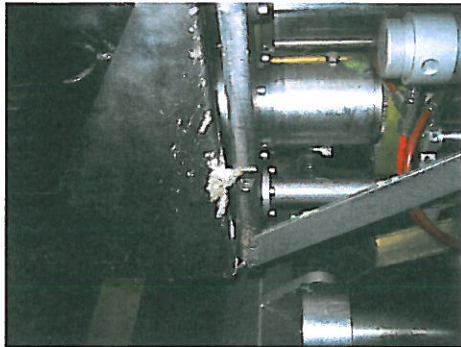
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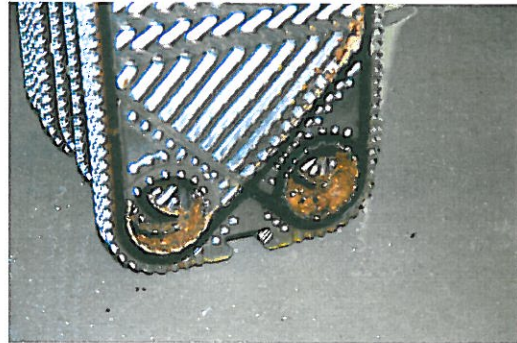
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Example: Poor hygienic design



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Example: Poor hygienic design



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Overall consequences of poor hygiene

Reduced lifetime of process equipment

- Increased cleaning & disinfection efforts
- Costly repairs
- Prolonged downtime of the process line

Product contamination

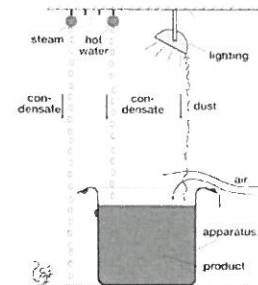
- Bad reputation for brands or retailers
- Single cases influence the whole food industry
- Closing of factories
- Law suits against leading staff

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Five main routes of contamination



- People
- Surfaces and tools
- Air
- Water
- Pests



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Introduction - Good design does not guarantee good hygiene... but it helps

What we can do ?

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We need to know...



- How to construct
- What to avoid
- What to buy
- How to clean & disinfect
- How to evaluate

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Good Hygienic Practise



Hygiene must be included in all planning and production steps

- **Design** of premises and equipment
 - Location, roads, layout, design
- **Maintenance** and **cleaning** in processing facilities
 - Procedures and monitoring
- **Control** of the production process
 - Raw materials, packaging, process water, air, intermediates, tools, pests, products

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How to construct ?



Materials must be...

- Inert to
 - Product
 - Detergents
 - Disinfectants
- Non-toxic
- Smooth and crevice free



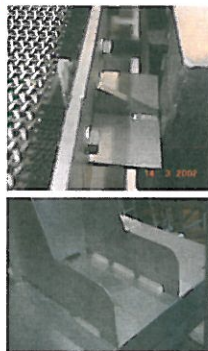
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How to construct ?



Design – accessible, cleanable & drainable

- Smooth surfaces
- No steps/misalignment
- No metal-to-metal contact
- Crevice free
- Use rounded corners
- **Accessible**
- **Cleanable**
- **Drainable**



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What to avoid?



Contaminants can be of

microbiological sources

- Bacteria, fungi, viruses, parasites, insects ...

chemical sources

- Detergent, disinfectants, toxins, pesticides

physical sources

- Metal, rubber, plastic, glass ...
- Dirt, stones
- Personal objects, jewellery, nails



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How to clean?



Priorities to ensure high quality and safe products:

1. Remove soil (fat, protein, carbohydrates, salts & minerals)
2. Remove/kill microorganisms (cleaning/disinfection)
3. Avoid recontamination (rinsing/drying)

By combining proper design and effective cleaning & disinfection we should be able to obtain low microbial loads during processing

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Hayes, 1985

Introduction – Focus areas in hygienic design

Who and what is important?

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Focus areas – demands on equipment



Authorities' demands

- Cleanable and possible to disinfect to a certain (acceptable) level
- Contamination of food must be reduced
- Installations allowing cleaning of equipment and facilities

Producer's demands

- Long processing time, good cleanability → fewer stops

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Focus areas - expertise



Material science

- Which steel, plastic and rubber types can be used
- Demands for surface characteristics
- Demands on process additives e.g. lubricants

Construction and design of equipment

- What is possible to construct
- Working environment

Fluid mechanics (closed equipment)

- Flow conditions in pipe systems and components

Water pressure (open equipment)

- Flow conditions in pipe systems and components

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Focus areas - expertise



Microbiology

- Attachment and detachment
- Which microbes are present and which are critical

Chemical engineering

- Detergents and disinfection
- Interaction between cleaning agent, soil and equipment

Food engineering

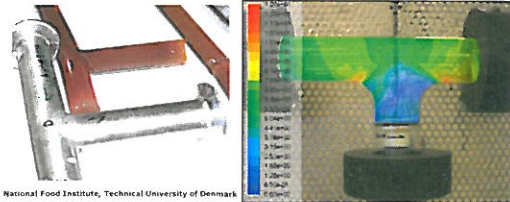
- Knowledge of the whole process (primary use)
- Equipment specification

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How to evaluate?

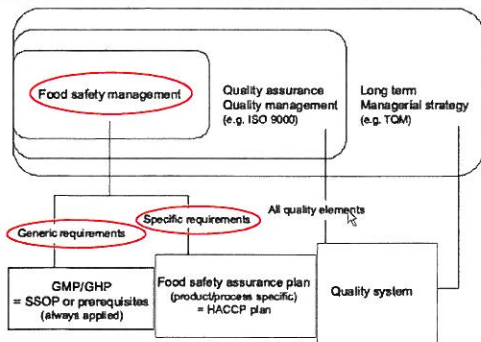


- Visual and physical inspections
- Microbial culturing
- In-use testing
- Soiling test – e.g. β-carotene, buttermilk with indicator organisms, uranine
- Modeling tools (e.g. Computational Fluid Dynamics = CFD)



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Safety and quality assurance systems



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Relevant Harmonised Standards



DS/EN ISO 14159 2008 Safety of machinery – Hygiene requirements for the design of machinery

- General hygiene demands for machinery
- Risk evaluation
- Design features for reduction of risks

Machinery in general

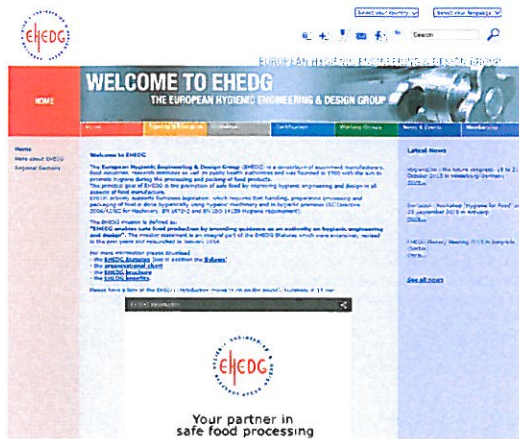
EN 1672 2 + A1 2009 Food processing machinery – Basic concepts - Part 2 Hygiene requirements

- General hygiene requirements for food processing equipment
- Design features for reduction of risks

Food processing machinery specifically

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European Hygienic Engineering & Design Group (EHEDG)



- A private consortium founded in 1989
- www.ehedg.org
- Promotes safe food by improving hygienic engineering and design in all aspects of food manufacturing
- **The members can represent or be**
 - Companies for the manufacturing of food and food equipment, pharmaceutical and cosmetic production
 - Companies supplying engineering services
 - Scientific and research organisations
 - Health authorities and associations and
 - Individual members
- **Activities: produce guidelines & training, provide expertise, carry out certification and networks**
- **Supports European legislative work and cooperates with other organisations e.g. 3-A**

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The Guidelines are prepared in Working Groups and launched by EHEDG ExCo



Working Groups

Product Portfolio Sub-Committee

Employment & Consultants

Development

Engineering Services and Experts

Training & Education

EHEDG Working Groups

Within EHEDG, a number of several hundred international experts are gathered in the Working Groups. These expert teams are responsible for the development of the EHEDG Guidelines. Each Working Group is responsible for an area of expertise, and within each area certain specific scopes are defined. The table below shows the various Working Groups and their expertise. Working Groups with the same focus are pooled together in clusters which are governed by the Product Portfolio Sub-Committee.

Working Group cluster	Working Groups
<p>Equipment & Components</p> <p>Contact Jacques Kesteven</p>	<ul style="list-style-type: none"> • Bakery Equipment • Conveyor Systems • Food Refrigeration • Mechanical Seals • Pumps • Seals • Sensors • Separators • Tank Cleaning • Valves

The Guidelines are prepared in Working Groups and launched by EHEDG ExCo



<p>Infiltration</p> <p>Contact: Dr. Jørgen Rasmussen</p>	<ul style="list-style-type: none"> • Building Design • Design Principles • Dry Materials Handling • Hygienic Systems Integration • Materials of Construction • Testing and Certification • Welding
<p>Processing services & utilities</p> <p>Contact: Dr. John Hsieh</p>	<ul style="list-style-type: none"> • Air Handling • Cleaning in Place • Cleaning Validation • Electric Installations • Fish Processing Equipment • Heat Treatments • Lubricants • Meat Processing Equipment • Process Water
<p>Training & Education</p> <p>Contact: Søren Løvetan</p>	<ul style="list-style-type: none"> • Facilitator • Teachers • Training

National Food

List of the 43 EHEDG Guidelines (2015)



- 1 Microbiologically safe continuous pasteurization of liquid food (1992)
- 2 A method for assessing the in-place cleanability of food processing equipment (2007)
- 3 Microbiologically safe aseptic packing of food products (1993)
- 4 A method for the assessment of in-line pasteurization of food processing equipment (1993)
- 5 A method for the assessment of in-line sterilization of food processing equipment (2004)
- 6 The microbiologically safe continuous flow thermal sterilisation of liquid foods (1993)
- 7 A method for the assessment of bacteria tightness of food processing equipment (2004)
- 8 Hygienic equipment design criteria (2004)
- 9 Welding stainless steel to meet hygienic requirements (1993)
- 10 Hygienic design of closed equipment for the processing of liquid food (2007)
- 11 Hygienic packing of food products (1993)
- 12 The continuous or semi-continuous flow thermal treatment of particulate foods (1994)
- 13 Hygienic design of equipment for open processing (2004)
- 14 Hygienic design of valves for food processing (2004)
- 15 A method for the assessment of in-place cleanability of moderately sized food processing equipment (1997)

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List of the 43 EHEDG Guidelines (2015)



- 16 Hygienic pipe couplings (1997)
- 17 Hygienic design of pumps, homogenizers and dewatering devices (2013)
- 18 Chemical Treatment of Stainless Steel Surfaces (2014)
- 19 A method for assessing the bacterial impermeability of hydrophobic membrane filters (2012)
- 20 Hygienic design and safe use of double-seat mixproof valves (2000)
- 21 Challenge tests for the evaluation of the hygienic characteristics of packing machines for liquid and semi-liquid products (2000)
- 22 General hygienic design criteria for the safe processing of dry particulate materials (2014)
- 23 Production and use of food grade lubricants, Part 1 and 2 (2009)
- 24 The prevention and control of Legionella spp. (and legionnaires disease) in food factories (2002)
- 25 Design of mechanical seals for hygienic and aseptic applications (2002)
- 26 Hygienic engineering of plants for the processing of dry particulate materials (2003)
- 27 Safe storage and distribution of water in food factories (2004)
- 28 Safe and hygienic water treatment in food factories (2004)
- 29 Hygienic design of packing systems for solid foodstuffs (2004)
- 30 Guidelines on air handling in the food industry (2005)

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List of the 43 EHEDG Guidelines (2015)

- 31 Hygienic engineering of fluid bed and spray dryer plants (2005)
- 32 Materials of construction for equipment in contact with food (2005)
- 33 Hygienic engineering of discharging systems for dry particulate materials (2005)
- 34 Integration of hygienic and aseptic systems (2006)
- 35 Hygienic welding of stainless steel tubing in the food processing industry (2006)
- 36 Hygienic Engineering of Transfer Systems for Dry Particulate Materials (2007)
- 37 Hygienic Design and Application of Sensors (2007)
- 38 Hygienic Engineering of Rotary Valves in Process Lines for Dry Particulate Materials (2007)
- 39 Design Principles for Equipment and Process Areas for Aseptic Food Manufacturing (2009)
- 40 Hygienic Engineering of Valves in Process Lines for Dry Particulate Materials (2010)
- 41 Hygienic Engineering of Diverter Valves in Process Lines for Dry Particulate Materials (2011)
- 42 Disc Stack Centrifuges - Design and Cleanability (2013)
- 43 Hygienic Design of Belt Conveyors for the Food Industry (will be published soon)
- 44 Hygienic Design Principles for Food Factories (2014)

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EHEDG Doc. 8: Hygienic equipment design criteria, 2004

- **Guideline No. 8 describes the criteria for the hygienic design of equipment intended for the processing of foods.**
- Its fundamental objective is the prevention of the microbial contamination of food products. It is intended to appraise qualified engineers who are designing equipment for food processing with the **additional demands of hygienic engineering in order to ensure the microbiological safety of the end product.**
- Upgrading an existing design to meet hygiene requirements can be expensive and may be unsuccessful.

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EHEDG Doc. 8: Hygienic equipment design criteria, 2004

- **Hygienic design is most effectively incorporated into the initial stage.** The long term benefits of doing so are not only product safety but also the potential to increase life expectancy of equipment, reduce maintenance and lower operating costs.
- This document was first published in 1993 with the intention to describe in more detail the hygienic requirements of the **Machinery Directive**.
- Parts of The Machinery Directive were subsequently incorporated in the standards EN1672-2 and EN ISO 14159 (16 pages)

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HYGIENIC DESIGN OF CLOSED PROCESS EQUIPMENT AND SYSTEMS

In **Guideline 10 drawings on:** 1) how to **avoid crevices, shadow zones and stagnant product areas**, 2) how to **connect and position equipment in a process line to ensure unhampered draining and cleaning-in-place etc.** & 3) how to **prevent leakages** in processes and thus also product contamination:

- | | |
|----------------------------------------|---------------------------------|
| - pipe joints (Fig. 1) | - swept tee (Fig. 10) |
| - metal-to-metal seal (Fig. 2), | - flow diversion (Fig. 16) |
| - O-ring seals (Figs 3-4) | - poor probe mounting (Fig. 12) |
| - flange connection (Fig. 5) | - temperature probes (Fig. 15) |
| - heating of sealing (Fig. 6) | - screw connections (Fig. 20) |
| - dynamic seal (Fig. 7) | - vessel lid mounting (Fig. 19) |
| - double shaft-seal (Fig. 8) | - metal plate welding (Fig. 18) |
| - pipe transitions (Fig. 9) | - vessel insulation (Fig. 21) |
| - centrifugal and lobe pumps (Fig. 11) | - dead legs (Figs 13-14) |
| - pump by-pass arrangements (Fig. 17) | |

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HYGIENIC DESIGN OF OPEN PROCESS EQUIPMENT AND SYSTEMS

In **Guideline 13 factors affecting operation hygiene and cleanability are dealt with using the following pictures:**

- | | |
|-----------------------------------------------|----------------------------------|
| - corners (Fig. 2), | - product protection (Fig. 12) |
| - screw joints (Figs 4 & 5) | - flange couplings (Fig. 14) |
| - welded joints (Fig. 1) | - foot bearings (Fig. 15) |
| - dismountable joints (Fig. 3) | - belt reinforcement (Fig. 16) |
| - equipment rims (Figs. 8-9) | - conveyor belts (Figs 17-19) |
| - drainability (Fig. 6) | - framework structures (Fig. 22) |
| - equipment covers (Fig. 10) | - horizontal framework (Fig. 23) |
| - shaft arrangements (Fig. 11) | - framework cladding (Fig. 21) |
| - stirrer blade attachment (Fig. 13) | - walkway design (Fig. 27) |
| - equipment accessibility (Fig. 26) | |
| - equipment fixed to floor/walls (Figs 24-25) | |

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General Information about EHEDG Certification

Certification

EHEDG offers two main types of equipment certification:

- **Type EL** for Equipment cleaned with Liquids
- **Type ED** for Equipment Dry cleaned only

The criteria for certification include: a design review according to the EHEDG guidelines and testing according to [EHEDG test methods](#) (where appropriate).

Overview of Equipment Certification Options

Each of the certification TYPES have subcategories (Classes) as shown below:

TYPE EL: (Equipment cleaned with Liquids)

- EL Class I Closed equipment, wet cleaned-in-place (CIP) without dismantling
- EL Class I AUX Open equipment, wet cleaned without dismantling
- EL Class II Closed or open equipment dismantled for wet cleaning
- EL Aseptic Class I Closed equipment, wet cleaned-in-place (CIP) without dismantling, steam sterilisable, and bacteria tight
- EL Aseptic Class II Closed equipment, dismantled for wet cleaning, steam sterilisable, and bacteria tight after reassembly

TYPE ED: (Equipment Dry cleaned only)

- ED Class I Closed equipment dry cleaned only without dismantling
- ED Class II Closed or open equipment dismantled for dry cleaning only

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Certificeringstyper



Certificate Type	EL CLASS I	EL ASEPTIC CLASS I	EL CLASS I/AUX	EL CLASS II	EL ASEPTIC CLASS II
Design procedure	wet				
	cleaning without dismantling			cleaning with dismantling	
Process	closed	closed	open	closed	closed
Fatigue requirements according EHEDG Doc	8 (9-10, 16, 22, 35)**	8 (9-10, 16, 22, 35, 39)**	8 (9-12, 22, 35, 39)**	8 (9-10, 12, 22, 36, 38)**	8 (9-10, 16, 22, 36, 38)**



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Certificate Type	EL CLASS I	EL ASEPTIC CLASS I	EL CLASS I/AUX	EL CLASS II	EL ASEPTIC CLASS II
Design evaluation and relevant area***	area inside the equipment	area inside the equipment	area inside the equipment	area inside or outside of the equipment	area inside the equipment
EHEdg Test methods	cleanability (tab. 2)	cleanability (tab. 2) + sterility (tab. 9) + bacterial tightness (tab. 7)	none	none	sterility (tab. 9) + bacterial tightness (tab. 7)
Equipment Examples	open tank equipment like pumps, valves, sensors	open tank equipment like pumps, with sterile mechanical seal, buffer vessels, sensors	sterile equipment like yeast fermenter	sterile closed tank mounted robot arm conveyor, if not housing, along Pipeline	closed by disassembling and sterilizable and hermetic tight like pressure vessel with double seal

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Certificate Type	ED CLASS I	ED CLASS II
Design procedure	dry	
	cleaning without dismantling	cleaning with dismantling
Process	closed	closed
Fatigue requirements according EHEDG Doc	8 (9, 22, 35, 32, 35)**	8 (9, 22, 26, 32, 35)**
Design evaluation and relevant area***	area inside the equipment	area inside or outside of the equipment
EHEdg Test methods	none	none
Equipment Examples	sterile packaging systems, aseptic robot	sterile robot, hygienic transfer trough, neutralizer

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DTU

Feed and Certification Institutes

The following institutes and organizations are authorized by EHEDG to test and certify equipment by the use of the EHEDG logo.

Denmark

Conformity
 DTU National Food Institute
 Artillerivej 55
 2800 Lyngby, Denmark
 Tel: +45 45 25 2700
 Email: info@dtuhdc.dk

Testing and Evaluation
 Contact: Henrik Erik Falkenberg
 Tel: +45 45 25 2700
 Email: henrik.falkenberg@dtuhdc.dk

Denmark

Conformity
 Center of Expertise in Hygienic Design, Research & Development
 1100 Copenhagen, Denmark
 Tel: +45 33 12 12 12
 Email: info@cehd.dk

Denmark
 Contact: Dr. Søren Madsen
 Tel: +45 45 25 2700
 Email: soren.madsen@dtuhdc.dk

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 DTU National Food Institute (former TMC Certification)
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 2800 Lyngby, Denmark
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DTU Center for Hygienic Design (HDC)

DTU Center for Hygienic Design (HDC), is the **only EHEDG authorized test center in The Nordic countries**, where equipment manufacturers can have their equipment tested and certified for cleanability and design **according to European Hygienic Engineering & Design Group (EHEDG) Guidelines**.

The **other EHEDG test centers** are located in Germany, England, France, USA, Netherlands and Spain.

The HDC is **accredited by DANAK** and it is strategically located **at the DTU National Food Institute**

HDC collaborates with industry and there are links between: **Development, Design, Consulting, Testing, Certification, Research, Training and Education.**

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History of Center for Hygiejnisk Design (HDC) at DTU National Food Institute

- **09/2011** – EHEDG **approves** that the HDC at DTU can be the new EHEDG Test Center in Denmark
- **2012-13** – IPU & DTU National Food Institute cooperate in **building up the centre**
- **11/2013** – DTU HDC **is officially opened**
- **04/2014** - **Accreditation** of DTU HDC is approved by **DANAK** according to ISO 17025, which is **valid until April 2018**
- **05/2014** – according to **EHEDG statutes** HDC must be **witnessed by an EHEDG test expert in the first commercial trials**, this was done in week 20 (2014) with an expert from Munich.

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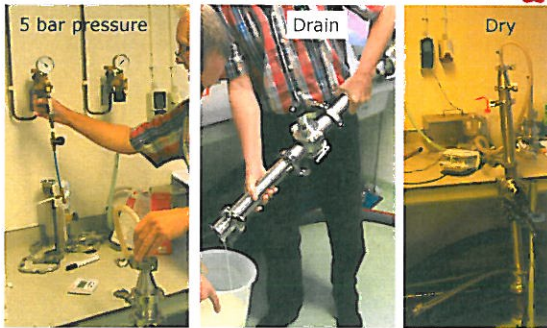
Testing performed at DTU HDC



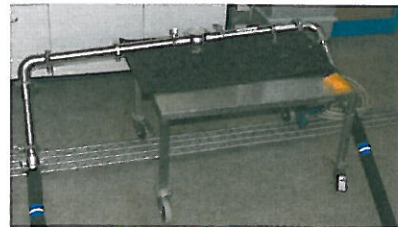
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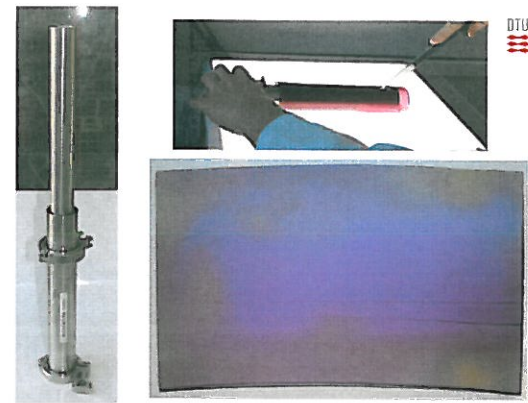
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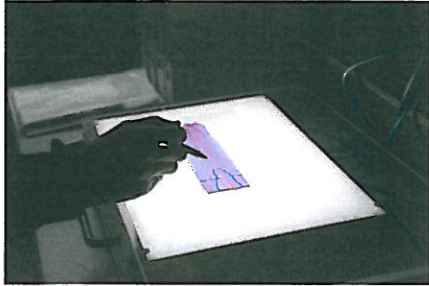


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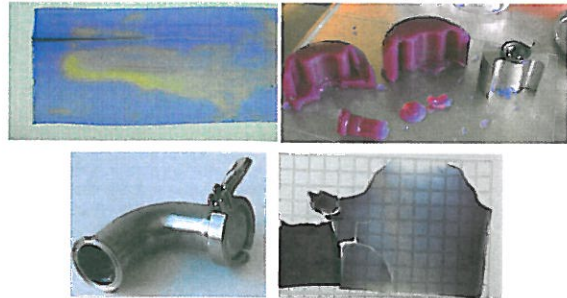
SP Seminar in Gothenburg on 15th of September 2015



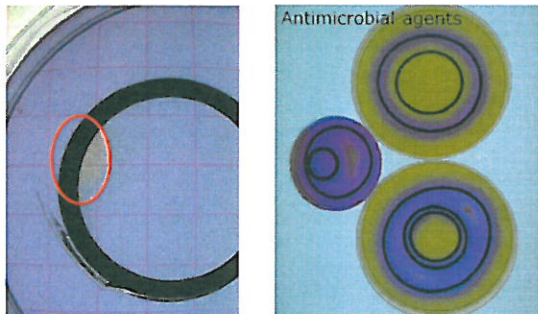
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Changes in colour in the reference pipe Agar from a pump rotor



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Activities at DTU HDC



- **Testing based on EHEDG GL Doc 2 of closed processes**, which is a part of the certification procedure
- **Certification of process equipment**
- **Evaluation of hygienic design** in food and biotech processes **from autumn 2016**
- **Consulting** equipment manufacturers and food producers
- **Training and education** in hygienic design
- **Development of test method(s)** for certification **of open process equipment**

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Courses in Hygienic Design at DTU HDC



- **2 d basic course** in hygienic design (HD) on equipment once a year at DTU in Danish/Swedish/English September 22-23, 2015:
 - Basic Hygienic Design Course - Equipment Manufacturer
- The **basic course** can be **tailored** (1 d or 2 d) for **food producers and food building designers** in Danish/Swedish/English and held in the premises of the client:
 - Basic Hygienic Design Course - Food Manufacturer
 - Basic Hygienic Design Course - Designing Buildings & Cleanrooms
- 2 d course "**Inspection Procedures in Food/Biotech Process Design**" held at DTU by **Dr. Roland Cocker** in English March 8-9, 2016
- **4 d Advanced course in hygienic design** (with exam) is held at DTU once a year in English November 23-26, 2015
- More information at the home page: www.hdc.food.dtu.dk

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Center for Hygienic Design

High Level International Advanced Course

Hygienic Engineering and Contamination Control

- for the food and pharmaceutical industry as well as equipment manufacturers

Registration form

Course on Hygienic Engineering and Contamination Control

23-26 November 2015
Register no later than 1 November

Name _____

Company _____

Address / E.O. Box _____

Zip code, city/town & country _____

Phone direct/GSM _____

E-mail _____

EHEDG Member: Yes No

Inviting address (if different from above given address) _____

Please fill in the enclosed form and send it to: ehedg@food.dtu.dk or ehedg@pharma.dtu.dk

Phone: +45 45 25 25 25
E-mail: ehedg@food.dtu.dk

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Hygienic Design, EHEDG & DTU HDC Gun Wirtanen, DTU National Food Institute SP Seminar in Gothenburg on 15th of September 2015

Day 1	Monday 23/11	Tuesday 24/11	Day 2
08:00 - 09:30	Registration and coffee/tea	08:15 - 08:30	Registration and coffee/tea
09:30 - 11:15	Introduction and participant presentation	08:30 - 09:15	Certification procedure including EHEDG test procedure for closed equipment
11:15 - 12:00	Legal requirements	09:15 - 10:00	Food microbiology
12:00 - 13:15	Lunch break	10:00 - 10:30	Coffee/tea break
13:15 - 14:00	Scientific background to EHEDG documents	10:30 - 11:15	Surface and air microbiology
14:00 - 14:45	Hygienic design of open process equipment	11:15 - 12:00	Equipment material - stainless steel and polymers
14:45 - 15:30	Hygienic design of closed process equipment	12:00 - 12:15	Lunch break
15:30 - 16:00	Coffee/tea break	12:15 - 14:00	Welding stainless steel
16:00 - 16:45	Summary of the day and participant expectations	14:00 - 15:30	Common demonstration on hygienic design
19:30 -	Dinner	15:30 - 16:00	Coffee/tea break
		16:00 - 17:30	Group work 1 - b) Hygienic design of various process lines, surface hygiene and EHEDG test procedure for closed equipment
		19:30 -	Dinner

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Day 3	Wednesday 25/11	Thursday 26/11	Day 4
08:15 - 08:30	Registration and coffee/tea	08:15 - 08:30	Registration and coffee/tea
08:30 - 09:15	Static seals and couplings	08:30 - 09:15	Cleaning & Disinfection - Cleaning Procedures in Open and Closed Processes
09:15 - 10:00	Fluid dynamics	09:15 - 10:00	Cleaning and disinfection - Cleaning agents & disinfectants
10:00 - 10:30	Coffee/tea break	10:00 - 10:30	Coffee/tea break
10:30 - 11:15	Valves	10:30 - 11:15	Prevalence hazards
11:15 - 12:00	Pumps (dynamic seals) and case study on pumps	11:15 - 12:00	Exam (aids allowed)
12:00 - 12:15	Lunch break	12:00 - 12:15	Lunch break
12:15 - 14:00	Best treatment (best transfer)	12:15 - 14:00	Integration, installation and maintenance
14:00 - 15:30	Group work 2 - b) Hygienic design of various process lines, surface hygiene and EHEDG test procedure for closed equipment	14:00 - 14:45	Building and process layout
15:30 - 16:00	Coffee/tea break	14:45 - 15:30	Concluding remarks, course certificates and course evaluation by participants
16:00 - 17:30	Group work 3 - b) Hygienic design of various process lines, surface hygiene and EHEDG test procedure for closed equipment	15:30 - 16:00	Coffee/tea break with sandwiches
19:30 -	Dinner	16:00 - 16:45	Bus to Copenhagen and transfer to the hotel for those who are staying over Friday

National Food Institute, Technical University of Denmark

Registration form

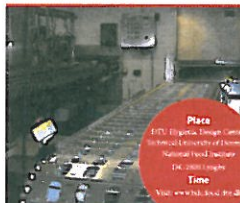
Course in Inspection of Food and Biotech Processes

For information time and date please visit www.hdc.food.dtu.dk

Name: _____
 E-mail: _____
 Day, week, city, home & country: _____
 Phone (day & night): _____
 I would like to attend if possible (please check) _____

National Food Institute, Technical University of Denmark

Invitation to a Course in Inspection of Food and Biotech Processes



Place: DTU, Hygienic Design Centre, National Food Institute, Technical University of Denmark
 Time: Visit www.hdc.food.dtu.dk

National Food Institute, Technical University of Denmark

Day 1	
08:00 - 09:30	Registration and Coffee / Tea
09:30 - 10:00	Aims of the Course and Presentation of Participants
10:00 - 10:45	Knowledge Requirements for Lecturers & Approval
10:45 - 11:50	Legal Aspects & Client Expectations
11:50 - 12:30	Lunch break
12:30 - 13:15	Documentation of Inspection
13:15 - 14:00	Preventive Work in the Inspection
14:00 - 14:30	Coffee / Tea break
14:30 - 15:15	Preventive continuing
15:15 - 16:00	Dinner
16:00 - 22:00	Dinner in Lyngby

National Food Institute, Technical University of Denmark

Day 2	
08:00 - 08:30	Registration and Coffee / Tea
08:30 - 09:15	Course on Building
09:15 - 10:00	Control on Airborne Equipment in the Production Facilities
10:00 - 10:30	Coffee / Tea break
10:30 - 11:15	Process Line Criteria I
11:15 - 12:00	Process Line Criteria II
12:00 - 12:30	Lunch break
12:30 - 13:15	How to Inspect Activities
13:15 - 14:00	How to Inspect Activities
14:00 - 14:30	Coffee / Tea break
14:30 - 16:00	Discussion & Concluding Remarks



European Hygienic Engineering & Design Group

ANNOUNCEMENT

EHEDG World Congress on Hygienic Engineering and Design 2016 - Denmark

2 to 3 November 2016 in Herning / Denmark on occasion of FoodTech

www.ehedg-congress.org

Topics

- In 2017 edition, the Congress will be again a summit in hygienic design, the highlight of the following topics:
 - Food safety & hygiene - regulatory and non-regulatory
 - Case studies of hygienic design
 - Surface hygiene in hygienic food production
 - Solid processing equipment (mixer, filler, bakery packaging)
 - Cleaning processes and hygienic design
 - Hygiene systems integration

Programme

- 2 days International Congress
- Current engineering solutions and exhibition area for companies
- Visit for industry to popular plants
- One to One business meetings and networking
- Official congress dinner
- Guided technical tour
- Inspiring: Banquet during Congress

Venue

The Congress will be held at the exhibition centre of MCH Herning, located in the heart of the Danish food industry area on occasion of FoodTech www.foodtech.dk from 2 to 3 November 2016.

MCH

For all cases and registration please visit www.ehedg-congress.org

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