Renhets TEKNIK
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EU GMP Annex 1

- UTAN GEP FINNS INGET GMP
- CLEANROOM TESTING AND MONITORING
- INBJUDAN SYMPOSIUM 2022 FINLAND
- MINNESORD ARILD SVENDSEN
- RAPPORTER & INBJUDNINGAR

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INNEHÅLL/CONTENT

5-8 Den sista presentationen av föredrag från Webinair 2021: EU GMP Annex 1

16-24 Inbjudan till R3 Nordic Symposium och utställning 2022 i Finland. Abstracts presenteras.

32 Minnesord Arild Svendsen, Norge

For those of you who would like further information in English about the magazine, articles, advertising or others, please contact the editor Alan Friis; alfr@force.dk

OMSLAGSBILD / COVER:
FOTO: -

We invite You all to the R³ Nordic Annual Meeting, May 9, 2022, 17:00 online via Microsoft Teams

REGISTRATION
Sign Up at kansli@r3nordic.org latest Monday, May 2
by sending us information about what e-mail the link should be sent to.

MATTERS OF THE MEETING
All documents will be presented on our website
no later than four weeks before the meeting.

Proposed Statute Amendment must be received by the office (kansli@r3nordic.org) no later than April 15, 2022

r³nordic
Nordic Society of Cleanroom Technology

Renrum för extemporeläkemedel!

Ventilator har precis startat projekteringen av ett nytt renrum för **Västmanlands Läns sjukhus** i Västerås. Renrummet blir i klass B och ska användas för tillverkning av extemporeläkemedel.

Projektering pågår, byggnation startar i vår och sommaren 2022 ska renrummet stå klart.

-Vi började räkna på det här projekt redan 2019 men sedan kom pandemin. Nu är vi glada över att det här uppdraget tagit fart och vi ska genomföra det på allra bästa sätt, säger Bernt Karlsson, projektledare på Ventilator Renrum.

Vi är experter inom renrumsteknologi och erbjuder byggnation, konsultation samt produkter för renrum. Vi har hög kompetens och mångårig erfarenhet av renhetsteknik och byggnation av renrum inom bland annat läkemedels och elektronikindustrin. Konsultation/byggnation av kontrollerade miljöer. Besök oss på **ventilator.se**

Ventilator
System för renrum

KALENDER

2022

Apr

4-6 PDA Annual Meeting, Dallas

May

? Sjukhusdagen, Uppsala

Aug

29-31 R^3 Nordic Årsmöte 2022
Naantali Spa, Finland

Okt

11-12 CTCB-I certifiering, Associate level, Göteborg

11-13 CTCB-I certifiering, Professional level, Göteborg

Nästa nummer
beräknas utkomma den 16 december

Manusstopp / Annonsbokning:
16 november

Företag och medlem som vill delta med artikel eller release, skall sända detta i god tid före manusstopp till redaktör Alan Friis.

LEDARE

Dear member

Now 2022 has stated, a year for which we have expectations for getting more "back to normal" after two very peculiar years with major lock downs which have prohibited travels.

However, the COVID-19 situation is still not over and for that reason it has been decided to move the Symposium in Naantali to 30th-31st of August 2022. We look forward having some inspiring days there.

Further to mention, there will soon be held Hospital days at some point in May; please check up the R^3 Nordic website for actual dates for this upcoming event.

The R^3 Nordic Annual meeting will this year be held 9th of May at 17.00 on Teams (see the call on page 3). The agenda for the Annual meeting can be found in the constitution of R^3 on the website (Om Oss / Stadgar in Swedish – a translation into English will be available on the website too).

We hope that more people will consider to contribute further to R^3 Nordic; we really need you and don't need to make a huge contribution we will enjoy to get new members onboard and expand the 'family'.

This issue of RT is concentrating on the new EU GMP Annex 1, cleanroom technology and selected abstracts from the presenters at the Symposium in Naantali.

Best wishes for the coming spring!

LENE BLICHER OLESEN,
ORDFÖRANDE

ALAN FRIIS
REDAKTÖR

WEBINAIR

EU GMP Annex 1

Regulatory Baseline of Single-Use Systems for Final Filtration and Filling

SIMONE BIEL, MERCK, DARMSTADT, GERMANY

SINGLE-USE SYSTEMS - BENEFITS AND CHALLENGES

Over the past year, biopharmaceutical manufacturing capacities have expanded dramatically due to the dramatic ramp-up of vaccines and therapeutics manufacturing for Covid-19. In addition, new drug modalities such as RNA therapeutics, antibody drug conjugates, and cell and gene therapy increased the number of small production lots for clinical trials. This rapid expansion in manufacturing capacity has increased demand for single-use systems as their key business drivers such as high flexibility, speed to market, and quick changeover of equipment are well suited to meet the current needs of biomanufacturers.

Although single-use technology is well established in the biopharmaceutical industry there is limited guidance on regulatory expectations. The major challenge for manufacturers when moving from stainless steel equipment to single-use systems is the shift of responsibilities for critical quality control of the manufacturing equipment from the manufacturer to their supplier. In final formulation, filtration and filling operations, sterility and integrity assurance, particles risk assessment, and potential interaction of the plastic components and the process fluid are closely reviewed during both submissions and inspections (Figure 1).

Figure 1
Single-use systems used in formulation, filtration and filling. The regulatory focus is on potential leachables out of plastic components, contamination due to loss of integrity, and particles.

The European Commission published a draft revision of Annex 1, on Manufacturing of Sterile Medicinal Products (1). One purpose of the revision was to introduce principles of Quality Risk Management (QRM) to allow the adoption of new technologies and innovative processes. The upcoming Annex 1 revision will include guidance specifically on the use and risk control of single-use systems.

CRITICAL QUALITY CONTROLS SHIFT TO SUPPLIER

A single-use assembly is "a combination of single-use components/assemblies designed to be in one continuous, and often closed, wetted flow path" (2). Typically, the supplier presterilizes the assemblies by irradiation and they are shipped to the manufacturer ready to use. For final filtration and filling in particular, the assemblies are highly customized to the specific filling operation. The validation of each unique assembly design is neither feasible nor cost effective and a family approach to validation is followed, based on risk assessment (3).

When using stainless steel equipment, the drug manufacturer's operator cleans, assembles, sterilizes, controls, and uses the equipment. All measures are validated, described in standard operating procedures, and trained to meet good manufacturing practice (GMP) requirements. With single-use systems, a major part of the drug manufacturing equipment preparation is shifted to the supplier who has an extensive knowledge base about plastic materials and components, best assembly design practice, validation of the assembly, manufacture, control, sterilize, and assure the integrity during transportation (Table 1).

Table 1. Critical steps transferred to the single-use system supplier and examples of points to consider

Steps transferred to supplier	Points to consider
Component qualification	• Toxicity (biological reactivity, potential leachables) • Low particles load, endotoxin, bioburden • Irradiation compatible • Shelf life • Functionality (intended use)
Assembly validation	• Quality by design consideration (i.e., easy unpacking, fastener qualification) • Sterilization validation • Shelf life • Packaging and shipping
Assembly manufacturing	• Validated equipment and process • Equipment maintenance • Clean room controls and maintenance • Operator training
Sterilization	• Development, validation, control • Dose mapping • Quarterly dose audits
In process control	• Visual inspection (proper assembly, cleanliness) • Verification of process performance • Leak/integrity testing
Release test	• Visual inspection (proper assembly, cleanliness) • Fluid path water extract testing (endotoxin, sub-visible particles) • Leak/integrity testing
Transport validation	• Drop and vibration test, package integrity, sterility, functionality tests
Particulate risk mitigation	• Component cleanliness • Optimized manufacturing • Clean room control and maintenance • Operator gowning and training • Appropriate in process inspection and final product testing
Supply	• Sub-supplier management • Change management

REGULATORY EXPECTATIONS TODAY

There are few detailed requirements for single-use systems provided in current regulatory guidelines. However, basic requirements described in the European GMP guidelines to manufacture human drugs can be applied to single-use systems:

- "The manufacture of sterile products is subject to special requirements in order to minimize risks of microbiological contamination, and of particulate and pyrogen contamination. ... Quality Assurance is particularly important, and this type of manufacture must strictly follow carefully established and validated methods of preparation and procedure." (4)
- "Parts of the production equipment that come into contact with the product must not be reactive, additive or absorptive to such an extent that it will affect the quality of the product and thus present any hazard." (5)

Considering the fact that critical quality controls, risk assessment and mitigation steps are transferred to the single-use system supplier the ultimate question of a GMP inspector to the end-user will be: "Do you know what your supplier does?" Topics frequently addressed are, but not limited to:

- Intended use of the single-use system
- Risk assessment and data with respect to sterility/integrity, particles and leachables
- Supplier's data package can be used as basic information, additional validation studies may be required

- Supplier management: audit reports and follow up on findings
- Incoming control, transport, storage, material flow at end-user's site
- Operator training
- Documentation

ANNEX 1 DRAFT AND SINGLE-USE SYSTEMS

In general, inspectors' expectations are consistent in terms of considerations when using single-use technology in aseptic processing. However, the details of how to assure sterility of a single-use flow path often varies. Questions such as where to position the sterile filter (inside or outside the isolator), the use of a sterile connection device after sterile filtration in Grade C, or which measures to take to assure integrity of the single-use assembly can be addressed quite differently. A significant concern is that a biomanufacturer's single-use design, risk assessment and mitigation steps could be accepted by authorities in one but denied in another country.

The Annex 1 draft acknowledges the use of single-use technologies in manufacture of sterile products and includes a dedicated paragraph where "some specific risks associated with [single-use systems] which should be assessed as part of the CCS [contamination control strategy]" are listed: interaction with drug product and single-use system surface, integrity (single-use systems are fragile and complex), and the risk of particulate contamination (1). In addition, a more general than holistic to-do list focuses on:

- Supplier qualification, including sterilization verification
- Evaluation of adsorption and reactivity of product
- Extractables and leachables
- Verification of integrity throughout the process
- Establishment of acceptance criteria and incoming control procedure
- Operator training

INTEGRITY IS MORE THAN TESTING

The Annex 1 update points out that "the use of closed systems [i.e., single-use systems] can reduce the risk of extraneous contamination such as microbial, particulate and chemical from the adjacent environment" (1). A closed system can be defined as "an isolated system that has no interaction with its external environment, preventing contamination and release of the material contained" (6). In summary, the Annex 1 update outlines expectations for closed processing as: to ensure sterility of flow path surfaces and to keep the sterility during processing. "The background in which closed systems are located should be based on their design and the processes undertaken. For aseptic processing and where there are any risks that system integrity may be compromised, the system should be located in a Grade A zone. If the system can be shown to remain integral at every usage (e.g. via pressure testing and/or monitoring) then a lower classified area may be used" (1). Closed single-use systems are typically designed to be used in lower classified areas such as Grade C. The question is now, what could be the process and design considerations and integrity compromises that a single-use system could not be used in lower classified area than Grade A, unless a pressure testing pre-use would be performed.

The implementation of an integrity test of a single-use system at the point of use is technically feasible. However, new risks such as unintended bag interactions with supporting equipment or assembly damage from over-pressurization could be introduced. Furthermore, the desired test sensitivity could be limited due to the typically complex design of single-use systems used in aseptic processing.

The industry (supplier and end-user) is aware of single-use system integrity challenge and takes a more holistic and risk-based approach to tackle it (7). Risk considerations include components, assembly design, manufacturing, packaging, shipping, and end-user's handling procedures (Figure 2). It is the supplier's responsibility to select appropriate components (i.e., resistant bag film), to apply best design principles, a validated manufacturing process including in-process controls and release tests, and to assure integrity during shipment by using qualified packaging procedure and performing transport validation. The end-user should establish incoming control, inspection, and handling

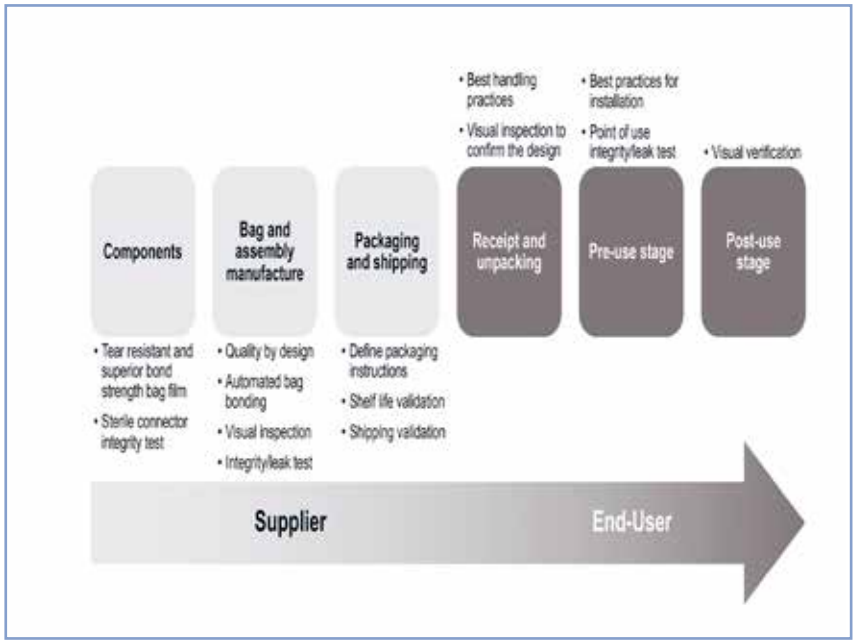

Figure 2.
Integrity assurance risk factors and mitigation proposals throughout the lifetime of a single-use assembly.

procedures in collaboration with their supplier.

The benefits of a point of use integrity test are still under discussion. It has been demonstrated that bacterial ingress does not occur below a defect size of 12.65 µm when bags with known defect sizes were challenged by a high microbial aerosol concentration (7). However, it is not clear if this sized hole could be detected using a pressure decay test and even if it was detected, what is the probability of microbial ingress under Grade C cleanroom conditions to justify a pre-use integrity test.

QUALITY RISK MANAGEMENT

Single-use systems are already today used frequently in aseptic processing. Pharmaceutical manufacturers typically apply principles as described in ICH guideline Q9 on quality risk management (QRM) for their implementation and use (8). The updated Annex 1 emphasizes adopting QRM principles "to provide a proactive means of identifying, scientifically evaluating and controlling potential risks to quality" and requests throughout the guideline to define all critical control points to implement an overall contamination control strategy (CCS).

The principles of risk control outlined in ICH Q9 require biomanufacturers to determine if a risk is acceptable or needs to be reduced/eliminated while considering the right balance of benefit, risk, and resources. Risk control also assesses if additional mitigation measures introduce a new risk. Some examples: a single-use system is designed to be used inside the isolator to minimize the risk of cross-contamination. This results in a more complex handling procedures using isolator gloves and increases the risk of damage to the assembly. A point-of use test could provide more integrity assurance but adds the new risk of damaging the assembly during testing. Elimination of any connections after the final sterile filtration would help keep the system closed, however, using sterile connection devices would reduce the complexity of a single-use system and increase safe operator handling.

Four case studies described by Batt et al. (9) exemplify that there is no "one approach fits all" to assure integrity of a single-use system. The updated Annex 1 guidance will provide a baseline of regulatory expectations for single-use systems. More alignment between the end-user, supplier and regulatory authorities on risk acceptance, risk reduction measures, and technical feasibility could provide a framework to help biomanufacturers implement single-use technology to meet today's increasingly complex drug production demands.

The life science business of Merck operates as MilliporeSigma in the U.S. and Canada.

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Utan GEP finns inget GMP

AV MARKKU MÄKINEN, ELOMATIC OY

Konsulter och entreprenörer har ofta certifierat sin verksamhet enligt olika kvalitetsledningsstandarder med diverse beskrivningar och praxis. Utöver dessa standarder behövs emellertid branschspecifika, mer detaljerade anvisningar för att säkerställa att exempelvis GMP/GxP-projekt kan genomföras framgångsrikt och med ett högkvalitativt slutresultat. I den här artikeln går vi kort igenom de viktigaste punkterna i ISPE-guiden (International Society for Pharmaceutical Engineering) för god ingenjörssed beträffande projektledning, projektering och projektgenomförande.

GEP = Good Engineering Practice är lika med god ingenjörssed
GMP = Good Manufacturing Practice är lika med god tillverkningssed
GxP = Good X Practice är lika med god verksamhets-/tillverkningssed

GEP OCH GMP/GXP FÖR LÄKEMEDELSTILLVERKNING

Vid projektering baseras god tillverkningssed (GMP) för läkemedelstillverkning i stor utsträckning på god ingenjörssed (GEP). Utan kunskaper i GEP kan man inte förvänta sig att kraven på GMP/GxP kommer att uppfyllas och dessa två begrepp kan inte granskas separat. Vad betyder GEP i praktiken? Termen förekommer i nästan all litteratur som rör GMP/GxP-projektering och -byggande. I GMP-projekt används begreppet som en självklarhet och själva innehållet åsidosätts ofta utan att man fördjupar sig i det. Dessutom utgår man ifrån att medlemmarna i projektgruppen besitter ingående GEP-kompetens, vilket ofta också är fallet. I den här artikeln diskuterar vi kort vad GEP innebär för projekteringen och byggandet i ett GMP/GxP-projekt, där målet är att uppfylla de krav som ställts på projektet. Artikeln baseras på den andra upplagan (2021) av guiden Good Practice Guide ”Good Engineering Practice” från International Society for Pharmaceutical Engineering (förkortat ISPE). Syftet med ISPE-guiden är att ge läkemedelsföretag en gemensam uppfattning om vad GEP betyder. Begreppet GEP tillämpas på all sådan projektering och byggverksamhet som styrs av myndighetsbestämmelser och -anvisningar, till exempel sjukhus, laboratorier och industri med hög hygien, säkerhet och kvalitet i centrum. Guiden är inte en myndighetsanvisning och den ersätter inte nyttjandet av erfarna

ingenjörer i ett GMP- eller GxP-projekt. Guiden syftar till att förklara och utreda vad begreppet GEP innefattar. I guiden finns det tretton (13) kapitel som beskriver olika ämnen och elva (11) bilagor som stöder dessa ämnen. Det första kapitlet i guiden öppnar upp begreppet GEP för läsaren, i det andra diskuteras omfattningen av GEP, i kapitlen 3–6 gås kärnkonceptet igenom, i kapitlen 7–12 diskuteras praxis och i kapitel 13 GEP:s roll i en riskbaserad driftsättnings- och kvalificeringsprocess. Bilagorna till guiden innehåller mallar och exempel på kärnkoncepten, praxis och olika tillämpningar. I den här artikeln koncentrerar vi oss på följande kapitel i ISPE-guiden: 8 ”Praxis för projektplanering och byggande”, 9 ”Praxis för systemprojektering” och 10 ”Praxis för anskaffning av system”. Med hjälp av dessa kan vi mer i detalj granska vad GEP betyder för projektering och anskaffning av GMP/GxP-renrum och tillhörande mediesystem.

I kapitel 8 i ISPE-guiden beskrivs förutsättningarna för ett framgångsrikt byggprojekt oavsett storlek. Hanteringen av den tillhörande, mångfasetterade helheten ska baseras på en erkänd process. I regel omfattar processen projektering, hantering av omfattning, definition av leverabler och tidsplan samt uppföljning och övervakning av tidsplan, kostnader, kvalitet, resurser och risker. Fungerande kommunikation mellan parterna i projektet är en förutsättning för att projektet ska lyckas.

I projektplanen fastställs projektets krav, omfattning, syfte och målsättningar. Planen beskriver avtalade affärsmässiga mål, definitioner, begrepp, drivande krafter, antaganden, potentiella risker och väsentliga mellankontroller. Utöver detta fastställs i projektplanen de olika parterna och en eventuell projektgrupp, kostnadsramar, övergripande tidsplaner, konsekvensanalyser och behovsutredningar. Projektplanen godkänns av projektchefen och utvalda parter. Helst bör planen godkännas innan projektet startar (kickoff). I bilaga 5 till guiden finns mer material för framgångsrik ledning av projekt.

I kapitel 9 i ISPE-guiden beskrivs god praxis för att säkerställa kvaliteten vid projekteringen. Kvaliteten vid projekteringen av byggnader och system har en avgörande roll för projektets kostnader, tidsplan och ett bolags eller offentligt samfunds möjligheter att nå de ställda affärsmässiga eller verksamhetsmässiga målen. Projekteringen ska syfta till att trygga kvaliteten hos produkten eller tjänsten, trygga hälsa och säkerhet, anläggningens och systemens användarvänlighet och hållbar utveckling samt uppfyllandet av krav på energieffektivitet eller koldioxidavtryck inom gränserna för vad som är möjligt. Den praxis som beskrivs i kapitel 3 (riskhantering), 4 (kostnadshantering) och 5 (organisation och övervakning) i guiden har integrerats i projekteringen.

Projekteringen av GMP/GxP-system och byggnader består av flera steg, till exempel konceptplanering (CD), förstudie (BD) och detaljprojektering (DD), som alla har sina egna fastställda och erkända mål och leverabler. Projekteringsfaserna och den interna bedömningen av dem framgår av bild 1. Varje projekteringsfas förutsätter att projektledningen på ett dokumenterat sätt har godkänt målen och leverablerna innan man kan gå vidare till följande projekteringsfas. Genom godkännandeprocessen säkerställer man att alla affärs- och verksamhetsmässiga mål kan uppnås, så även tidsplans- och kostnadsmål. När man går vidare till följande projekteringsfas säkerställer man att de observationer som gjorts i godkännandeprocessen för den tidigare fasen blir beaktade. På detta sätt kan man trygga att projekteringen håller hög kvalitet. Bilaga 6 till guiden innehåller tilläggsmaterial för en högkvalitativ projektering. Genom att beakta den praxis som beskrivs i kapitel 9 kan man försäkra sig om att projekteringsfasen i fråga genomförs framgångsrikt.

I kapitel 10 i ISPE-guiden diskuteras god praxis för utrustnings- och entreprenadanskaffningar i projektet. När man tillämpar GEP på utrustnings- och entreprenadanskaffningar stöder det tidsplans- och kostnadshanteringen och att få utrustningen eller byggnaden i den användning den är avsedd för. I kapitlet beskrivs bästa praxis för en framgångsrik utrustningsleverans eller entreprenadprestation med beaktande av

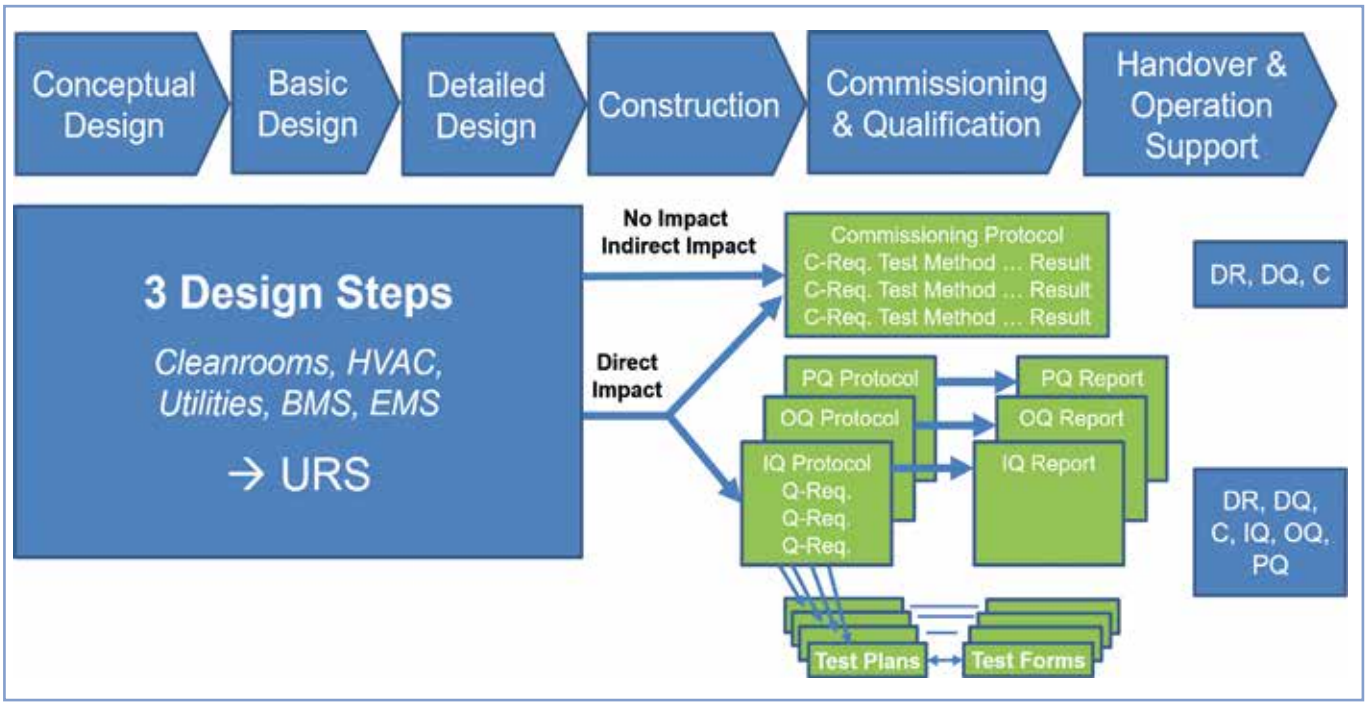


Bild 1.
De viktigaste stegen i projekteringen av ett GMP-renrumsprojekt.

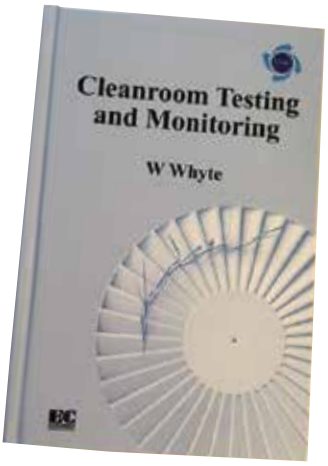
entreprenadledning, byggande, driftsättning och överlämning. Dessa grunder kan tillämpas på ledningen av vilket projekt som helst.

Den dokumenterade processen för val av entreprenör ska inkludera en bedömning om huruvida entreprenörens arbetssätt, praxis och standarder ger en godtagbar risk för ett bolag eller offentligt samfund som berörs av myndighetsbestämmelser. Den viktigaste utrustningen, huvudutrustningen, kan utgöra en stor del av projektets kostnader, och leveranstiden och driftsättningen av denna utrustning kan spela en avgörande roll för projektets tidsplan, varför valet av utrustningsleverantör ska samordnas noggrant med övriga discipliner. Valet av rätt entreprenör och utrustningsleverantör är avgörande för hela projektets framgång. Bilaga 7 till guiden innehåller tilläggsmaterial med avseende på utrustnings- och entreprenadanskaffningar.

GEP-praxisen i ISPE-guiden kan sammanfattas enligt följande: när man följer den beskrivna praxisen kommer man sannolikt att nå GMP/GxP-målen inom den fastställda tidsplanen och budgeten. Trots alla fina anvisningar är det människorna i projektet som avgör projektets framgång. Vi är alla olika och vi agerar utifrån våra egna utgångspunkter och bakgrunder, men i GMP-projekt är det viktigt att alla har rätt attityd – en attityd som utan kompromisser bidrar till målen om hög kvalitet. När projektet leds enligt god ingenjörssed och attityden dessutom är rätt, kan man till beställaren överlämna en utrustning, ett system eller en hel byggnad som bevisligen och dokumenterat uppfyller de angivna kraven.

Artikeln är skriven av ingenjör (M.Eng.) Markku Mäkinen, som besitter över 30 års projekteringserfarenhet av krävande
högskole-, livsmedelsindustri- och GMP-läkemedelsfabriksprojekt inom VVSA-projektering och projektövervakning. Han jobbar på Elomatic som huvudprojektör för VVS-system och renrumsexpert inom bolagets Pharma-verksamhet. Markku jobbar på det finska företaget Elomatic, som medverkar i GMP-projekt till läkemedelsindustrin och sjukhus: Elomatic producerar tjänster för projektering och konsultering, produkt- och serviceutveckling samt för teknisk kalkyl och forskning.

Cleanroom Testing and Monitoring, Chapter 1: Introduction



This article is the first of a short series of extracts from Bill Whyte's new book Cleanroom Testing and Monitoring and is reproduced here with the kind permission of the author, Bill Whyte, the publisher, Euromed Communications, and the owner of the copyright, the Cleanroom Testing and Certification Board – International (CTCB-I). The objective in publishing these extracts is to give readers a flavour of the content and depth of the book which is recommended as a comprehensive textbook and an essential reference for cleanroom managers, cleanroom test engineers, cleanroom service engineers, cleanroom designers and specifiers and anybody who is concerned with cleanrooms. All too often testing and monitoring are insufficiently considered until an installation is physically complete. If you design and build an installation to achieve a certain performance, it is essential that you understand and plan at an early stage for how that performance will be verified and monitored throughout the life of the installation.*

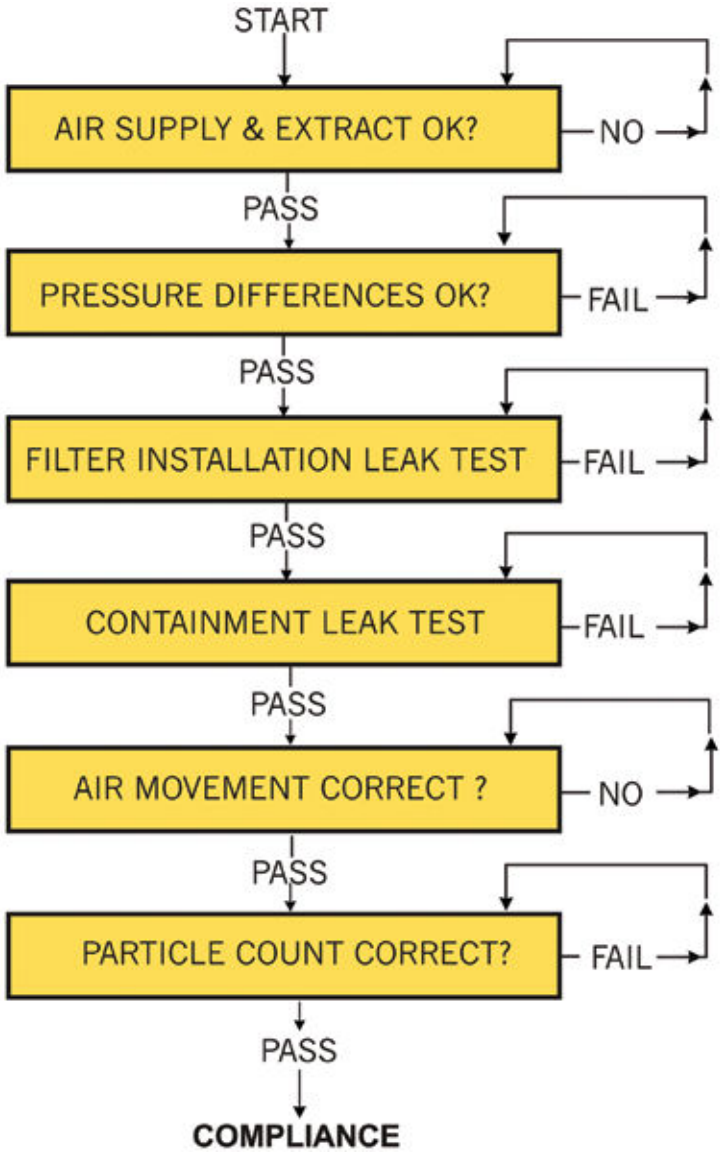


Figure 1.1 Non-UDAF type of cleanroom

CHAPTER 1 INTRODUCTION

When a cleanroom is first installed, or when significant modifications are made to its structure, ventilation system, or equipment and machinery, it should be tested to ensure that it is functioning correctly and providing the correct level of cleanliness for the task for which the cleanroom is designed. The cleanroom should also be tested throughout its life to ensure that it continues to function correctly. Therefore, tests for the quantity and quality of air supplied, air movement within and between cleanrooms, particle (and where necessary microbial) concentrations, and a variety of other tests, are carried out. These tests are discussed in this book.

1.1 TYPES OF CLEANROOM

There are two major types of cleanroom that are differentiated by their method of ventilation i.e. non-unidirectional (non-UDAF) and unidirectional airflow cleanrooms (UDAF). UDAF cleanrooms were originally and incorrectly known as 'laminar flow' cleanrooms but as the airflow is not 'laminar' in the scientific sense they should not be called 'laminar flow'. Non-UDAF cleanrooms are variously known as 'turbulent', 'mixed airflow', or 'conventionally ventilated'.

distinguishing characteristics of the two major types of cleanroom are shown in Figures 1.1 and 1.2. Figure 1.1 shows an example of a non-UDAF cleanroom. This cleanroom is supplied with clean air that passes through a high efficiency filter in an air supply terminal in the ceiling. Contamination generated by people and machinery is mixed and diluted with the supply air and removed through the air extracts at low level. The air supply rate, when expressed as air changes per hour, is likely to be at least 20, and is normally much greater than in ordinary mechanically ventilated rooms such as offices or hotels.

Figure 1.2 shows an example of a UDAF cleanroom. In this example, high efficiency air filters are installed across a whole ceiling. The supply air sweeps through the room in a unidirectional manner at a velocity that is usually between 0.3m/s and 0.6m/s and exits through the floor, thus removing the airborne contamination from the room. This system uses much more air than a non-unidirectional airflow cleanroom but, because of its directed unidirectional airflow movement, it minimises the spread of contamination about the room and sweeps it out through the floor.

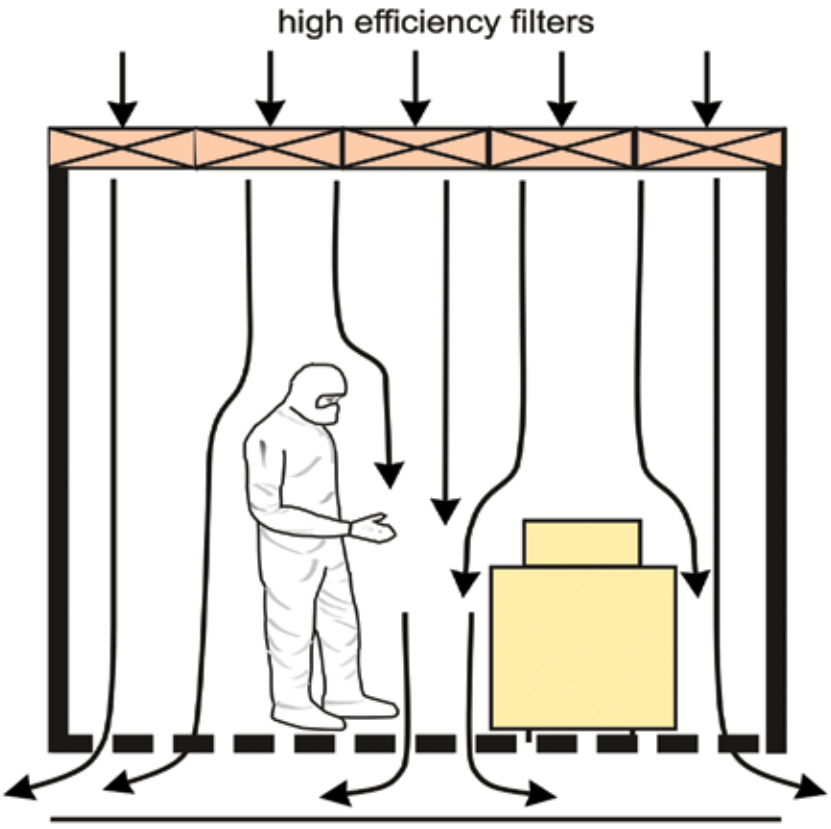


Figure 1.2 Unidirectional airflow type of cleanroom

Clean air devices, such as UDAF workstatio

ns, restricted access barrier systems (RABS), minienvironments, and isolators, can be installed in both non-unidirectional and unidirectional ventilated cleanrooms. These clean air devices provide clean zones where enhanced airborne cleanliness conditions are required, such as critical locations where the product is open to contamination. They normally have a localised supply of filtered air and a physical barrier that protects the critical location against the transfer of contamination from the room in which they are located.

Throughout this book, the word 'cleanroom' will often be used when either a cleanroom, or a clean zone are discussed.

1.2 PRINCIPLES OF CLEANROOM TESTING

To show that a cleanroom is working satisfactorily, it is necessary to demonstrate that the following main principles have been satisfied:

- The air supplied to the cleanroom is of sufficient quantity to dilute or remove the contamination generated in the room to produce the required airborne cleanliness.
- The air supplied to the cleanroom is of a quality that will not significantly add to the contamination within the room.

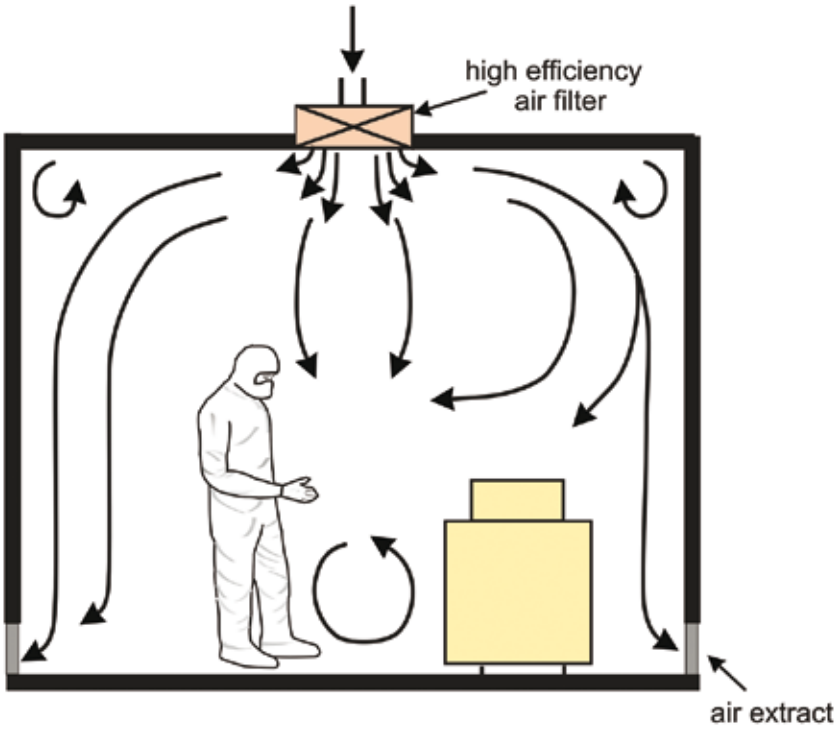
- The air movement within the cleanroom should ensure that there are no critical locations where product or process is subject to high concentrations of airborne contamination.
- The air within the cleanroom suite moves between the different cleanrooms in a manner that minimises the undesirable movement of contaminated air.
- The concentration of particles and, where necessary, micro-organisms, does not exceed the maximum concentration that is specified.

These, and other tests that are carried out in a cleanroom, are described in this book.

1.3 CLEANROOM TESTS

Shown in Figure 1.3 are the main tests that are carried out to demonstrate that a cleanroom fulfils its design requirements. If the cleanroom is being tested just after being built, the tests will normally be carried out in the order shown in Figure 1.3. However, if the cleanroom is being monitored during its lifetime, the tests need not be carried out in the order shown. Other tests that measure segregation, surface contamination, and particle deposition rate, may be carried out and these are discussed in the second part of the book. In some cleanrooms, it is necessary to additionally count the microbial concentrations; these test methods are also discussed in this book. A brief description of these tests is now given.

Figure 1.3 Cleanroom test sequence



Air supply and extract quantities

In the case of non-UDAF clean areas, the correct air supply volume rate should be measured as it is this that determines the concentration of airborne contaminants. In the case of UDAF systems it is the air velocity that determines the concentration of airborne contaminants.

Pressure differential between areas

It is necessary to demonstrate that air flows in the correct direction between areas in a cleanroom suite, i.e. from the clean to the less-clean, to prevent the entry of contaminated air into the cleaner areas. This is ascertained by measuring the differential pressure between areas to ensure that the cleanest area is at a higher pressure than the less-clean areas and the magnitude of the pressure differences are correct.

Filter installation leak test

The high efficiency air filter, and its frame, housing, and gasket, at the entry of the air supply to the cleanroom, should be tested to ensure that no airborne contamination enters the cleanroom as a result of contaminated air leaking through the filter installation.

Containment leak testing

Testing should be carried out to show that airborne contamination does not enter a cleanroom through leaks in its construction materials from areas adjacent to the cleanroom.

Air movement and recovery within the room

The use of air movement and recovery tests is dependent on whether the cleanroom is non-UDAF or UDAF. If the cleanroom is non-UDAF, it is necessary to demonstrate that there are no areas, especially at critical locations, where poor airflow is likely to cause high concentrations of airborne contamination, and that the cleanroom is capable of quickly recovering from the generation of high concentrations of airborne contamination.

If a cleanroom or clean air device has unidirectional airflow, it is necessary to demonstrate that the filtered supply air sweeps away contamination from critical locations, and maintains low levels of airborne contamination. It is also desirable to demonstrate that the airflow does not move contamination to critical locations.

Airborne particle and microbial concentrations

If the above tests are satisfactory, then measurements are carried out to ascertain that the concentration of particles and, where appropriate, the air and surface concentrations of microbes comply with the cleanroom design specification.

Other types of contamination control tests

Other tests, such as segregation tests, surface particle counts, and measurement of the particle deposition rate (PDR), may be carried out to ensure that the cleanroom and clean zones are working satisfactorily. These tests are described in the second part of this book.

1.4 ADDITIONAL NON-CONTAMINATION CONTROL TESTS

As well as the contamination control tests described above, it may be necessary to measure some of the following parameters:

- temperature;
- relative humidity;
- heating and cooling capabilities of the cleanroom;
- sound levels;
- lighting levels;
- vibration levels.

The additional tests in the list are not considered in this book, as they are tests that are carried out in all types of mechanically ventilated rooms and not just in cleanrooms. If required, information about these types of tests is available in various building services textbooks and in guides provided by associations, such as the American Society of Heating Refrigeration and Airconditioning Engineers (ASHRAE) in the USA, and the Chartered Institute of Building Services Engineers (CIBSE) in the UK.

Before discussing the methods required for testing a cleanroom, it is necessary to familiarise the reader with the design and function of an air conditioning plant and its components, especially high efficiency air filters. These topics are discussed in the next two chapters (Chapters 2 and 3). It is also necessary to familiarise the reader with the standards required to be met when cleanroom testing, and this topic is discussed in Chapter 4. In addition, Chapter 13 discusses how people who test cleanrooms should conduct themselves in a cleanroom. Some of the information given in Chapters 2, 3, 4 and 13 is included in the book 'Cleanroom Technology – Fundamentals of Design, Testing and Operation' written by the author of this book. However, it is necessary that this information is repeated to avoid the need to consult another book.

Chapter 5 to Chapter 10 explains the methods used to carry out the more common tests used in cleanrooms. The second part of the book contains Annexes A to J that describe test methods that are not so commonly used in cleanrooms as the first part, and how a cleanroom is monitored to ensure that it continues to function correctly.

*CTCB-I (Cleanroom Testing and Certification Board – International) is an association which promotes, prepares and accredits internationally recognised educational courses for people who design, construct, test, monitor, operate and work in cleanrooms. Only societies set up for the education and promotion of contamination control techniques in cleanrooms can apply for membership of the CTCB-I. They must run or wish to run CTCB-I courses. Current members of the CTCB-I are Belgian Cleanroom Workgroup (BCW), Contamination Control Network (CCN), Cleanroom Technologies Society of Turkey (TTD), Irish Cleanroom Society (ICS), Cleanrooms and Contamination Control Association for Denmark, Finland, Norway and Sweden (R3 Nordic), Scottish Society for Contamination Control (S2C2) and Netherlands CC Society (VCCN). The CTCB-I is run by a Board of Delegates comprising delegates nominated by each member society. The Board of Delegates monitors the written and practical content of the cleanroom courses and the standard of examinations to ensure the maintenance of a common and high standard across the courses, and evaluates the course structure and teaching material from each new submission from a cleanroom society. The aim of the CTCB-I is to help foster the development of cleanroom practitioners in its member societies so that they practice to a very high standard. For further information please visit http://www.ctcb-i.net

Invitation to the 51st R³Nordic Symposium & exhibition

August 29-31, 2022 Naantali Spa, Finland

THE SYMPOSIUM VENUE

The venue of the 51st R³ Nordic Symposium in Cleanroom Technology & Contamination Control is Naantali Spa (www.naantalispa.fi). Naantali is on the southwest coast 15 km north of Turku with approximate distances of 180 km to Helsinki, 160 km to Tampere and 460 km of Kuopio. International guests can e.g. take the ferry (Viking Line or Tallink Silja) from Stockholm to Turku or the train from Helsinki-Vantaa airport.

THE PROGRAMME & FEES

In the scientific programme runs in three replicate sessions on both Tuesday and Wednesday. The programme covers general aspects of cleanroom technology (R³), R³ news, R³ applications and contamination control within the pharmaceutical, biotech and food industries as well as in hospitals. These sessions are 1) Pharma (two days) & 2) Hospital (two days) & 3) R³ News & General (on Tuesday) / Food & Biotech (on Wednesday). All presentations are given in English. The programme with first batch of abstracts are published in this issue of Renhetsteknik (RT) 1:2022. In RT 2:2022, which is published in June 2022, the updated presentation list will be available. This material will also be available on the R³ Nordic's website: **www.r3nordic.org/symposium-2022.**

For participant fees and deadlines, please, see the Registration Form available both in RT and online on the symposium-site. For industrial participants there is a GO3PAY2-offer available until end of June 2022. The "EARLY BIRD" fees are available **online until Friday 3rd of June 2022**. In case you use the offer GO3PAY2, please, give the names of participants in multiple of three. Note, that all participants must either be members or join R³ Nordic at registration. A non-member pay the member fee (70 €/non-member) at registration.

The Exhibition fee covers the symposium participation for one person. 1-4 additional representatives can be registered to a reduced fee (700 €/representative for two days + the member fee for each non-member) for those firms having an A or B stand. For C-stands, one additional representative can be registered to this favorable price. This 2-d offer cannot be split based on days. *Exhibitors, please, contact Gun Wirtanen at guliwi@luukku.com.*

PROGRAMME

Note that the numbers in the brackets after the speakers' names refer to the topic/abstract number on the pages with abstracts.

Monday, August 29, 2022			
8.00-20.00	Exhibitors building their stands		
16.30-18.00	R^3 Olympics		
18.00-20.00	Get-together Dinner		
Tuesday, August 30, 2022			
8.00-9.30	**Registration, Coffee, Exhibition**		
9.30-10.00	Opening of the Symposium & Exhibition		
10.00-10.45	Keynote Lecture: Veli-Jukka Anttila (1)		
10.45-11.30	Keynote Lecture: Pirjo Hänninen (2)		
11.30-12.30	**Lunch & Exhibition**		
	PHARMA (BALLROOM)	**HOSPITALS (LOUISE)**	**CLEANROOM NEWS/GENERAL (KAISA)**
12.30-13.00	James Drinkwater (4)	Kari Solem Aune (15)	Esa Högel (26)
13.00-13.30	Teijo Paavilainen (5)	Berit Reinmüller (16)	Lene Blicher Olesen (27)
13.30-14.00	Tiina Salo & Riikka Peltola (6)	Bengt Ljungqvist (17)	Sampo Saari (28)
14.00-15.00	**Coffee & exhibition**		
	PHARMA (BALLROOM)	**HOSPITALS (LOUISE)**	**CLEANROOM NEWS/GENERAL (KAISA)**
15.00-15.30	TBA (7)	Roberto Traversari (18)	Berit Reinmüller (29)
15.30-16.00	Frans Saurwalt (8)	Bengt Ljungqvist (19)	Aku Karvinen (30)
	Smoothie & exhibition		
16.15-16.45	Pharma Panel		
16.45-17.15	Hospital Panel		
19.00-00.00	**Banquet dinner**		
Wednesday, August 31, 2022			
	PHARMA (BALLROOM)	**HOSPITALS (LOUISE)**	**FOOD & BIOTECH (KAISA)**
8.30-9.00	James Drinkwater (9)	Kari Solem Aune (20)	Alan Friis (31)
9.00-9.30	Simone Biel (10)	Frans Saurwalt (21)	Riina Brade (32)
9.30-10.15	**Coffee & exhibition**		
10.15-10.45	Niels-Erik Kongste (11)	Jukka Vasara (22)	Gun Wirtanen (33)
10.45-11.15	Alan Sweeney (12)	Kim Hagström (23)	Sanna Tietäväinen (34)
11.15-12.15	**Lunch & exhibition**		
12.15-12.45	TBA (13)	Leila Kakko (24)	TBA (35)
12.45-13.15	Lene Blicher Olesen (14)	Matthew Cokely (25)	Steven Deretz (36)
13.15-14.00	**Smoothie & Exhibition**		
14.00-14.45	Keynote Lecture: Piia Sormunen (3)		
14.45-15.00	Closing of the Symposium		

PROGRAMME COMMITTEE MEMBERS

Leila Kakko	PK20 Chairperson, General	leila.kakko@tuni.fi
Kari Leonsaari	Pharma & News	kari.leonsaari@santen.com
Inga Mattila	PK20 Secretary & Social events	inga.mattila@vtt.fi
Raimo Pärssinen	Food &News	raimo.parssinen@turkuamk.fi
Miko Stenman	Pharma & Social Events	miko.stenman@stennova.com
Jukka Vasara	Hospital & News	jukka.vasara@granlund.fi
Gun Wirtanen	Exbibition & Food	guliwi@luukku.com / gun.wirtanen@seamk.fi

Registration Form

NAANTALI

Please return
this registration if you want us to send you an invoice.

R³ Nordic Office
info@r3nordic.org

To obtain discounted prices
please return the filled form at
latest on May 31, 2022

Registrate Online
and charge your credit card
The discounted prices Online are available until **June 3, 2022**, at

www.r3nordic.org

CONFIRMATION
A written confirmation will be sent by E-mail to each participant after we have received the registration form and payment of Grand Total Sum.

ON-SITE PAYMENT FEES are based on full prices for non-member.

PLEASE NOTE!
The number of rooms at Naantali Spa is limited due to other arrangemants in the Turku-area at the time of the R³ Nordic Symposium.
When the rooms are sold out we can only help you with addresses to hotels in the nearhood and the prices will be market prices, which you then pay directly to the hotel of our choice.

The Hotel accommondation must be booked through PK by the participant.

CANCELLATION
All participants cancellation must be submitted in writing. For cancellations received by **May 31, 2022**, all fees will be refunded except for a cancellation fee at 250 €.
No refunds will be made after June 1, 2022. We do not accept neither personal nor company cheques!

PLEASE take a copy of the filled form for your own records.

FURTHER INFORMATION
is available from the members in the Programme Committee.

CONTACT INFORMATION	***Please print!***	**Only one participant per registration form!**
Family name		First name
Company		
Mailing address		
ZIP code and City		
Country		
Telephone		Mobil phone
E-mail		
Another Invoice Address		
Any reference or labeling		
ZIP code and City		

ATTENDANCE CATEGORY

Member of R³ Nordic: ☐ Yes ☐ No ☐ **Participant Commercial**

☐ **Participant Public and Municipal Services**

Exhibitor
Please contact Gun Wirtanen
+358 40 525 74 27 · guliwi@luukku.com

Speakers
are registered through your PK 22 contact

PARTICIPATION

I will participate: ☐ August 30 ☐ August 31 ☐ August 29-30 ☐ Augusti 30-31 ☐ August 29-30-31

REGISTRATION FEES FOR PARTICIPANTS (€)	**Commercial** Before June 4	**Commercial** From June 4	**Public & Municipal** Before June 4	**Public & Municipal** From June 4	**Total EURO**
Registration fee (1) for members, 2 day	**840**	**960**	**670**	**770**	
Registration fee (1) for members, 1 day	**570**	**650**	**420**	**500**	
Registration fee for members (GO3PAY2), 2 days	**1680**	**1920**			
Registration fee (1) for non-members, 2 day	**960**	**1080**	**750**	**850**	
Registration fee (1) for non-members, 1 day	**650**	**730**	**500**	**580**	
Registration fee for non-members (GO3PAY2), 2 days	**1920**	**2160**			

The offer "GO3PAY2" is available to the end of June 2022. In case your register five (5) additional names, please pay the "GO3PAY2"-offer twice. Participants, who are non-members, pay the non-member price or contact the office to add 70 €/non-member.

Below - Register the names of the colleagues in the Go 3 Pay for 2

Name 2: ..... *Name 3:* .....

Name 4: ..... *Name 5:* ..... *Name 6:* .....

SOCIAL PROGRAM	**Amount**	**Price before June 4**	**Price from June 4**	**Total EURO**
Get-together ticket (Monday May 25)		**75**	**90**	
Banquet ticket (Tuesday May 26)		**110**	**125**	
HOTEL ACCOMONDATION	**Nights**	**Price before June 4**	**Price from June 4**	**Total EURO**
Naantali Spa, Singel room		**155**	**160**	
Naantali Spa, Double room		**170**	**180**	

Check-in: ..... / ..... **Check-out:** ..... / ..... I will shared the double room with: .....

GRAND TOTAL **EURO**

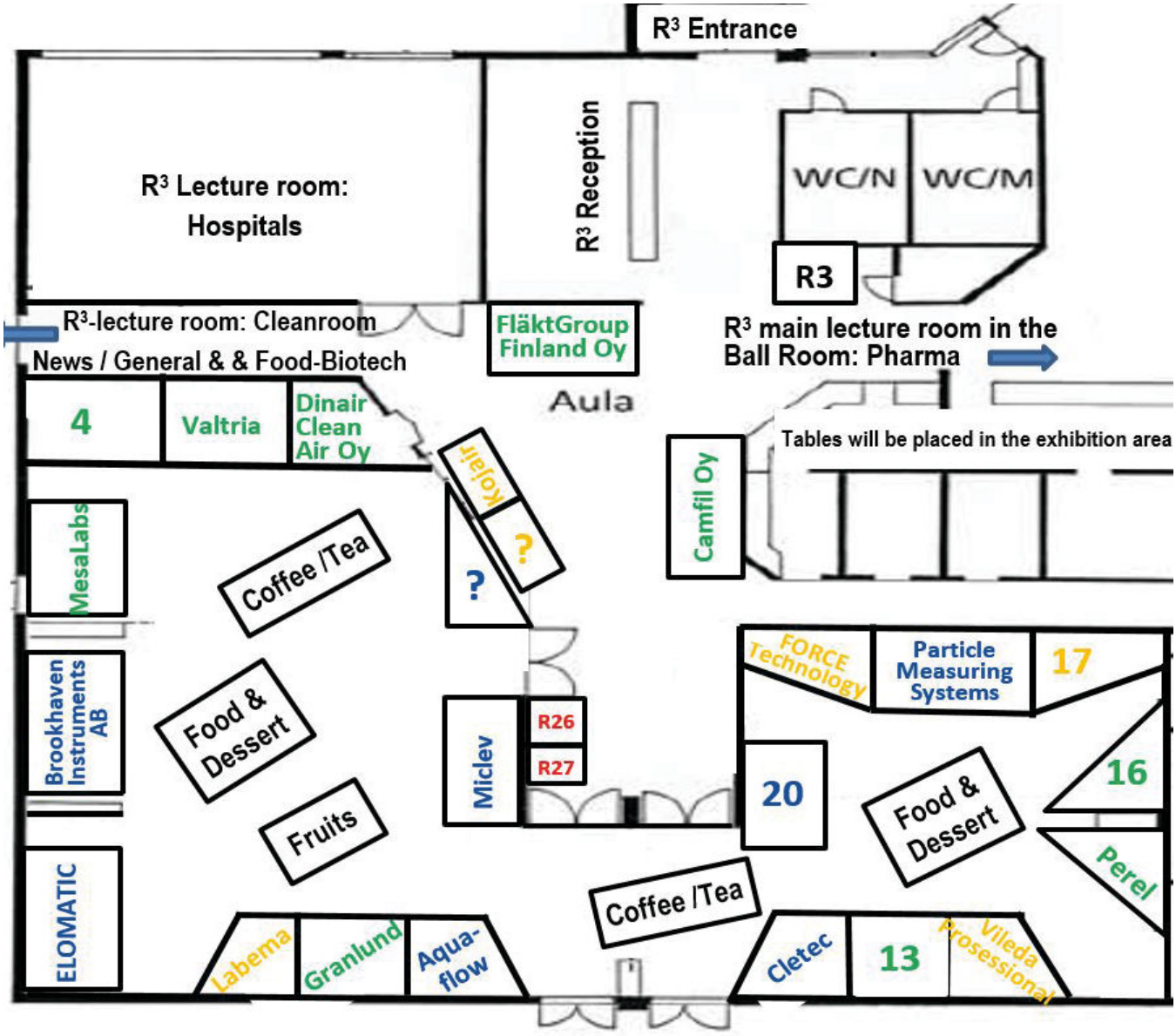
COPY · FILL IN · SIGN · SEND (All payments i Euro)

.....
Signature of authorized signatory

According to GDPR we are publishing only the names of the participants by country; no further information on the participants will be published in the participant list.

EXHIBITION MAP 2022

The exhibition is running both days. In the breaks, the participants can learn about the exhibitors' products / services or just meet with colleagues. There are in total 26 stands in the exhibition area. You will find updates and exact dimensions of the stands on www.r3nordic.org/symposium-2022 under exhibition. Please, contact Gun Wirtanen at guliwi(at)luukku.com for reservation of stands. Stands will be invoiced from March 2022 onwards. The reservation situation in mid-February 2022 is given on the map below. The following exhibition areas are free to book: 4, 13, 16, 17, 20 & R26-R27 (stands starting with an R are for roll-ups). Areas marked with question marks are at the moment reserved but non-confirmed. In case there are new requests non-confirmed or unpaid areas can be sold further.



PRICES FOR EXHIBITORS

	Prices for stands and participants (€)			
	A	B	C	D
Stand price (€) incl. 1 representative; paid according to invoice and at latest on 14th of April 2022	2850	2250	1750	1300
1-4 additional participants per A/B-stand & 1 additional participant per C-stand can register to a reduced 2-d price	700 € additional participant + 70 €/non-member			Normal price
Stand price (€) incl. 1 representative paid from 15th of April 2022 and onwards	3100	2550	2100	1600
1-4 additional participants per A/B-stand from the company must be registered at latest on 3rd of June & paid by 3rd of August 2022	700 € + 70 € for non-member/participant			Normal price
Earlybird 2-4 for(s) for 3 representatives from an industry participating are available to 3rd of June 2022 + member fee/non-members	1660 € + (0-3) * 70 €			
Accommodation/night in single room; our room account is available until 3rd of June 2022 to the price	155 € / person & night			
Accommodation night in double room; our room account is available until 3rd of June 2022 to the price	170 € / 2 persons & night			
Banquet ticket/person (€) available until 3rd of June 2022 to the price	110 €			
Get together ticket/person (€) available until 3rd of June 2022 to the price	75 €			

PRESENTATION TOPICS & ABSTRACTS

In some cases only topics are given

KEYNOTE PRESENTATIONS

1 Operation room ventilation and risk of postoperative infections

Veli-Jukka Anttila, HUS, Finland

Infections are major complications following surgery. The most common type of infections after operations are surgical site infections (SSI), i.e. wound infections. SSIs cause: harm to the patients, longer stay of patients in hospitals, increased mortality and excessive costs to hospitals, health care system and society. According Centers for Disease Control and Prevention (CDC) recommendations wound infections can be classified in three categories: superficial, deep incisional and deep organ infections.

It has been calculated that SSIs could annually cost the Europeanhealth care system up to 20 billion euros. It has been estimated, that about every second SSI can be prevented. In medical literature, there are over 30 means, how to lower the risk of SSIs. The role of operation room (OR) ventilation in the prevention of SSIs is not very well known. There are only a limited number of studies focusing on ventilation in OR and on SSIs. In most of these studies, there are also pitfalls and problems in the methodology used. In 2016, the WHO expert group evaluated 29 different measures for prevention of SSIs. Just one point of the above-mentioned addressed OR ventilation i.e. laminar air flow. The recommendation of the WHO expert group was: "Laminar airflow ventilation systems should not be used for patients undergoing total arthroplasty surgery ". This was a conditional recommendation with low or very low evidence. There are many studies of microbial contamination in different OR-ventilation systems. There is, however, a big need of good studies to handle the role of OR-ventilation systems in the prevention of SSIs.

2 Current topics in GMP and inspection findings in the area of sterile manufacturing

Pirjo Hänninen, Fimea, Finland

This presentation reviews current inspection trends and last updates to Good Manufacturing Practice (GMP) guidelines development status.

3 Pandemic control strategies in smart buildings – individual and shared responsibility

Industry Professor Piia Sormunen, University of Tampere, Finland

The current COVID-19 pandemic has shown the importance of resilience in society and global economics. WHO has presented three C-models, which is an excellent recommendation for improving individual health safety in a built environment. While Swiss cheese model in respiratory virus pandemic defense presents individual and shared responsibilities in pandemics. However, indoor air conditions have had too little role in pandemic response discussion and future prevention actions of pandemics. During the COVID-19 pandemic, more and more evidence has accumulated confirming that airborne transmission plays very important role in the spreading of corona pandemics. Smart buildings will have big role in indoor health safety and mitigation of future pandemics. This paper presents adapted Swiss cheese model for individual and shared responsibilities in smart buildings to improve the health safety of building users.

PHARMA

4 Preparation of a contamination control strategy as an Annex 1 requirement and preparation of an aseptic containment strategy if processing sterile toxic or biologically hazardous products

James L. Drinkwater, Franz Ziel & Pharmaceutical & Healthcare Sciences Society (PHSS), UK

Filling of toxic or biologically hazardous sterile products that cannot be terminally sterilised requires and Aseptic-Containment Strategy (ACS) that fits alongside a Contamination Control Strategy (Annex 1 GMP requirement). The approach to Aseptic-Containment has to balance intrinsic contamination risks that may compromise sterile product quality/efficacy and patient health with measures that protect process operatives from hazardous product exposure that may put their health at risk.

This presentation reviews following subjects: 1.Overview of Aseptic-Containment strategy and alignment with a Contamination Control Strategy (CCS). Including containment levels, OEB bands and containment 'Pyramid'. 2. Examples of Primary and Secondary containment boundaries. 3. Points to consider in application of Aseptic-Containment through process and support steps including Filling line set-up, Filling operations, line clearance, Cleaning/decontamination, recovery from Atypical events; product spills, glass breakage, barrier and barrier glove loss of integrity.

5 The main deliverables and tools to provide successful communication in facility projects

Teijo Paavilainen, Bayer Oy, Finland

Engineering is largely communication. Pharmaceutical facility investment projects from concept though planning with detailed design to construction phases all the way to start-up can be complex and challenging task. The success of the project is dependent on several factors, but the success in information exchange is the key. The role of the communication has been emphasized during global pandemic. Efficient communication process combined with relevant deliverables, communication tools and engineering as well as quality reviews safeguard facilities through their lifecycle and ensures proactive compliance with GMP, health authority expectations and industry best practices. The presentation is based on the customers experience and perspective in the large pharmaceutical CAPEX project where project execution model is based on the engineering service contract with external engineering contractor. The presentation shares first-hand experiences of good practices, deliverables as well as lessons learned from helpful project tools like software platform for information exchange.

PHARMA

6 Risk-based apprach to GMP – Focus your efforts where it matters

Tiina Salo & Riikka Peltola, ELOMATIC Oy, Finland

In the early 2000s, the FDA published a report titled "Pharmaceutical cGMPs for the 21st Century – a Risk-Based Approach". The purpose of this report was to enhance the regulation of pharmaceutical manufacturing and product quality. Ever since, there has been uncertainty in the pharmaceutical industry regarding "risk analyses", especially as to when, where and how they should be conducted. In the past few years, the European Medicines Agency has also revised most of its GMP guidelines to emphasize the importance of conducting risk analyses, in order for manufacturers to understand where they should focus their quality-safeguarding efforts. In this presentation, we discuss how the risk-based approach to qualification and validation in pharmaceutical design projects is implemented, present practical examples of different type of projects and discuss the impact of approach to commissioning and validation phases and possible time and cost savings.

7 TBA

8 Design construction and C&Q of a BSL 3 GAPIII facility

Frans Saurwalt, Kropman Contamination Control, the Netherlands

Amongst pharmaceutical projects a projects combining GMP with BSL3 and GAP III requirements fall into the most complex category. Combining contamination control with containment ads, a separate approach to the design process that covers all systems involved. Risk analysis and failure mode analysis need to be incorporated and at all stages of the process the systems needs to meet the system requirements as well as form part of the integrated system. Inflow/pressure cascade, fail safe systems, fire suppression, filtration, VHP disinfection, incorporating of decontamination devices as autoclave, VHP-chambers and waste disposal/ kill-tanks form a complex system. There is a need to include closed systems, isolators, biosafety cabinets etc. in such a facility. In this case, study the approach and essential challenges and solutions are demonstrated.

9 PHSS initiative in preparation of clarity on GMP guidance notes covering 20 specific GMP topics with MHRA review before publication

James L. Drinkwater, Franz Ziel & Pharmaceutical & Healthcare Sciences Society (PHSS), UK

To provide more applied guidance on environmental control and monitoring the PHSS the PHSS Aseptic processing special interest group are preparing GMP supportive guidance (has a meeting on 7 June 2019 to discuss the guidance initiative of preparation of Clarity on GMP Guidance notes). There was a well-balanced discussion group that included: three ex-MHRA senior GMP inspectors, representation from major pharma industry (GSK, Pfizer Ireland and Belgium, Ely Lilly France & Italy, Filling machine, Barrier technology and environmental monitoring system manufacturers together with academics involved in GMP.

All sixteen proposed guidance note were overview reference; presentation on PHSS Initiative Clarity on GMP Guidance notes 2019, with more detailed discussion focused around four guidance notes:

- Clarity on GMP Guidance note no.1 Assurance of sterility in Aseptic manufacturing of contact product contact parts – New and Existing filling lines.
- Clarity on GMP Guidance note no.2 Rationale for Environmental Classification, Qualification, and Monitoring for Aseptic process filling applications with Barrier technology.
- Clarity on GMP Guidance note no.6 Risk assessment in setting EM Sample locations for monitoring during classification, qualification/ process simulations/ Media fills and during routine production operations.

This presentation reviews key concerns of 2019 meetings above notes and current developments and practices in PHSS Guidance.

10 EU GMP Annex 1 – Regulatory baseline of single-use systems for final filtration and filling

Simone Biel, Merck KGaA, Germany

Single-use systems (SUS) are being utilized more frequently in final sterile filtration and filling operation. The benefits of SUS such as quick process changeover or reduced risks of cross-contamination are well acknowledged. However, there are issues regarding SUS standardization of quality information that limits implementation efficiencies. The EU GMP Annex 1 draft addresses the use of SUS in aseptic processing and provides regulatory expectations how to implement and to use single-use assemblies. In this presentation deals with:

1) Annex 1 and "specific risks associated with SUS"
2) Design considerations using SUS for filtration including PUPSIT
3) Understanding your SUS supplier's quality strategy
4) Ready to use and sterile – how to keep the integrity?

11 Membrane HEPA filtration to life science: History, present and the future

Niels-Erik Kongste, AAF Europe, Denmark

12 Advances of HEPA filtration in pharmaceutical applications and their new use in day-to-day life post pandemic

Alan Sweeney, Camfil EMEA, Ireland

13 TBA

14 The influence of media, temperature and time on growth of microorganisms from cleanrooms

Lene Blicher Olesen, NIRAS A/S, Denmark

This presentation will give an insight on the parameters that affects the growth of microorganisms. The focus will be on microorganisms found in cleanrooms and the influence on the growth of the microorganisms with focus on growth media, temperature and time. Further, the presentation will shortly take relevant cleanroom monitoring guidelines into account.

HOSPITAL

15 Huge risk assessment regarding how prepared the new hospital would be for an upcoming pandemic

Kari Solem Aune, COWI, Norway

16 People as a contamination source in cleanrooms

Professor Bengt Ljungqvist & Berit Reinmüller, Building Services Engineering, Chalmers University of Technology, Sweden

Results are presented from studies performed in a test chamber on cleanroom garments used, laundered, and sterilized (autoclaved 20 minutes at 121 °C), 50, 60, and 70 times, and garments used, laundered, and sterilized with a prolonged autoclave cycle 50 times. The garments are used in aseptic production of sterile drugs (Grade B). The source strength is described as the mean value of the number per second of airborne particles and aerobic CFU, respectively, emitted from one person dressed in the clothing system to be evaluated.

Results are compared to previous presented values of human source strengths in cleanrooms. Furthermore, results of the source strength values of the studied cleanroom garments in the test chamber have been used to calculate theoretical expected mean value concentrations of airborne aerobic CFU and particles (≥0.5µm) in cleanrooms with different number of people present, and at different airflows (m^3/s.). The calculations assume turbulent mixing of air in the cleanroom. It can be noted that the theoretical calculated mean value concentrations of airborne aerobic CFU often are below the detection level of traditional measuring equipment.

17 Protective efficacy of surgical clothing systems and additional clothing components concerning airborne CFUs

Professor Bengt Ljungqvist & Berit Reinmüller, Building Services Engineering, Chalmers University of Technology, Sweden

The number of airborne bacteria-carrying particles, colony-forming units (CFUs) in the operating room is considered as an indicator of the risk of infection to the patient undergoing infection prone surgery. To reduce surgical site infections, it is desirable to keep the bacteria-carrying particles at a low number in the operating room air, especially during orthopedic prosthetic surgery.

The main source of airborne bacteria-carrying particles is the people staff, and patient. It is important that the surgical team and all other people in the operating room wear functional clothing systems. Here, results from measurements studies of the protective efficacy are compared, i.e., source strengths of a clothing system with different additional clothing components. The studies were performed during ongoing surgery. Results show that the use of disposable hood or textile hood and the use of knee-length textile boots have considerable influence of the source strength, i.e., microbial air cleanliness in the operating room during ongoing surgery.

18 TBA

Robert Traversari, TNO, the Netherlands

19 Risk assessment in unidirectional airflow at different air velocities

Bengt Ljungqvist, Johan Nordenadler & Berit Reinmüller, Building Services Engineering, Chalmers University of Technology, Sweden & * Karolinska University Hospital, Development and Innovation, Sweden*

Operating rooms for patients undergoing infection prone surgery often have unidirectional air flow (UDAF) supply air systems. Many UDAF systems installed in Europe have low air velocities i.e., equal to or below 0.3m/s, while other UDAF supply air systems have velocities about 0.4m/s. The velocities, declared by the supplier, is mostly the velocity measured 150 to 300mm below the filter screen. The purpose of this presentation is to describe microbial airborne contamination risks at different air velocities in UDAF systems without blocking obstacles, such as monitors, lamps, etc.

To evaluate contamination risks, the method for Limitation of Risks, the LR-Method is used. The LR-Method, which relies upon visualization of air movements, particle challenge testing, and calculation of a risk factor, presents a fast and reliable way for evaluating microbial safety and detection of potential airborne microbial risks.

The results show that the convection flows and arm movements from a person standing still in the unidirectional airflow system have a great impact on the contamination risks at air velocities below 0.4m/s and that the air velocity should at least be 0.4m/s to give a "sweeping action" and achieve a good protection efficacy.

20 Sterilization department

Kari Solem Aune, COWI, Norway

21 Design considerations for ATMP facilities

Frans Saurwalt, Kropman Contamination Control, the Netherlands

Advanced Therapeutic Medical Products (ATMP) form an increasing part of the pharmaceutical market. The Eudralex Vol 4 ATMP-guideline deals with their specific requirements. As diverse, as they are they generally require a flexible and modular approach. Furthermore, logistics on product, materials and in process quality control pose requirements on routing and layout. This is particularly of importance when autologous products are processed. Developing from manual lab procedures the expected developments to more closed and automated systems require adaptable designs. Based on recent projects and considering the contamination control strategy aspects, design concepts and solutions will be presented including layout concepts, flow/pressure cascades including GMP and containment.

22 TBA

Jukka Vasara, Granlund Oy, Finland

23 Air conditioning solutions in isolation rooms

Kim Hagström, Halton, Finland

24 Surface hygiene in hospital environment

Leila Kakko, Tampere University of Applied Sciences, Finland

CLEANROOM NEWS / GENERAL

25 Cleaning and Disinfection: Regulatory Requirements and Expectations including GMP Annex 1 draft

Matthew Cokely, Ecolab, UK

Cleaning and disinfection processes are often undervalued. This presentation reviews the regulatory requirements and 'best practice' recommendations for cleaning and disinfection of controlled manufacturing areas. The pertinent regulations are considered.

The regulatory guidance relating to cleaning and disinfection in the draft EudraLex Vol.4 Annex 1, version 12 (v.12) issued in February 2020 and potentially the final version are examined. This presentation gives a brief summary of the history of these publications and revisions to date, and discusses the relevance of the revision to the international state members of PIC/s.

Finally, the presentation considers the regulations specifically relating to cleaning, disinfection, documentation and records, cleaning equipment, in-house preparation of detergents and disinfectants, residues, validation, rotation, transfer disinfection, validation, and training of cleanroom personnel. Recommendations for best practice are provid.

26 Through process optimization to reduce production time, energy and costs

Esa Högel, Valtria Swiss AG, Switzerland & Valtria Finland Oy, Finland

Thinking of the warming of the Earth's atmosphere, we all have a responsibility, starting with each of us, companies, and states, because the air is common to us. A good example of this is how all these benefits can be achieved by optimizing production stages by shortening production time and reducing energy use, i.e. energy costs. An example new production plant of the Ecoflac-Plus infusion bottles® at B. Braun, those responsible - among many other criteria - have demanded a time optimization of the process, a short implementation phase and a significant reduction in operating costs for the drying of the bottles between the sterilization autoclave and the bottle labeling.

The mission of this kind of drying tunnels is reducing the drying time spend in between the autoclave and labelling system. During sterilization process, the autoclave in flooded with pressurized water, which creates a problem in labelling, as it will not be possible to stick the labels on the humid bottles. To achieve a complete drying process, airflow is created and directed to the exterior surfaces of the bottles, absorbing the water and humidity of the products. The air involved in the process is treated inside the AHU. The air is insufflated and recirculated in the interior of the tunnel, removing the water and the humidity and cooling the product. Water is drained through the inclined trays and pipeline system.

27 Re-qualification of cleanrooms

Lene Blicher Olesen, NIRAS A/S, Denmark

This presentation will give an insight on the re-qualification of cleanrooms. The focus, of this presentation, will be on the relevant test methods, equipment and guidelines, which are expected to be basis for re-qualification of cleanrooms in a GMP environment.

28 Respiratory aerosol particle emissions and control in the clean room environment

Sampo Saari, Tampere University of Applied Sciences, Finland

29 Microbial risk assessment in safety cabinets/Class II benches with the LR-method

Professor Bengt Ljungqvist & Berit Reinmüller, Building Services Engineering, Chalmers University of Technology, Sweden

Microbiological risk assessment of airborne contaminants in safety benches/class II with the method for limitation of risks, the LR-Method, is described. Results from excerpts of case studies in safety cabinets/class II benches are discussed. The influence of heat sources, movements around the safety cabinet, and monitoring are discussed. The LR-Method, which relies upon visualization of air movements, particle challenge testing, and calculation of a risk factor, presents a fast and reliable way for evaluating microbial safety and detection of potential airborne microbial risks to the product. In e.g., safety cabinets it can be used for tracing dispersion routes of airborne contamination and for the evaluation of single steps of the process. When developing SOPs for aseptic processes and the training of operators, the LR-Method has proven to be very useful.

30 Preparing for the next pandemic - simulation-based solutions

Aku Karvinen, VTT Oy, Finland

FOOD & BIOTECH

31 The hygiene factor as an improved description of the hygienic quality of food contact surfaces

Alan Früs, Annette Baltzer Larsen, Nicole Ciacotich and Thomas Fich Pedersen, FORCE Technology, Denmark

Research articles and studies in literature have highlighted that the intrinsic surface characteristics of a food contact product has a great impact on the cleanability of the surrounding materials and foodstuff. However, a clear correlation between surface topography and cleanability has not yet been scientifically proven and established.

With this aim, we have developed a hygiene factor based on the surface roughness profile and correlated it to practical hygiene testing.

The current guidelines and rules of thumb are based on the characterization of surface roughness given by the Ra value, which is often measured only in one direction across the surface, traditionally moving a physical pickup across the surface. This characterization of the surface characteristics by only one value is a major simplification, and it is evident by simply observing a typical surface topography. Therefore, the hygiene factor we have developed also includes the number of peaks on the surface, giving a more adequate description of its topography. Moreover, the entire measurement is carried out by using an optical 3D microscope, thus avoiding physical contact with the surface. The hygiene factor is defined as the inverse product of Ra (the geometric mean distance from the mean line of roughness profile) and Rpd (the peak density i.e., the number of peaks per cm of the roughness profile).

The validity of the hygiene factor has been evaluated and verified with both stainless steel and plastic plates. The tested stainless-steel surfaces had different finishing (grinding, polishing, bead blasting and ViwaTeq®), and the tested plastic surfaces were obtained by injection moulding using mould with different surface roughness. The overall goal is to provide the industry a tool for the characterization of materials in terms of hygienic quality by using 3D optical microscopy and the calculated hygiene factor. In addition, the hygiene factor can have high practical relevance for industry, e.g. in case of comparing the hygienic between new surfaces and surfaces in use.

32 How do you prepare for future sustainability challenges in food unit investment planning and technology choices?

Riina Brade, ELOMATIC Oy, Finland

Food manufacturing is Europe's largest industry and under unprecedented pressure for change. In the sustainability crisis, consumption, population growth and sustainable food production are the biggest of our longer-term challenges. In addition, during the pandemic, it has become clear how important the food industry is in maintaining a stable and functioning society and ensuring security of food supply both in Finland and globally. Companies now need crisis resilience and innovation. Under the change is the division of labor between different actors, the ownership of raw materials and commodities and, in general, the ways in which companies generate income. The prerequisite for success is smooth cooperation with stakeholders in the food sector, research and development and project planning. The investment planning emphasizes adequate technical functionality studies in the initial stages, as well as profitability and sustainability reviews, utilizing agile design tools. With 3D modeling software with visual modeling, the desired change or expansion can be tested efficiently and proactively. The virtual model also allows you to test the functionality of your equipment or production line and even furniture investment and usability on a real scale. Those who take advantage of new value chains and the opportunities brought by the digitalization platforms will continue to thrive, and overall they will continue to invest in resource-efficient efficiency and productivity programs. There is also a need for the ability to develop, scale and, where necessary, adapt existing technology to suit new types of processes, as well as carbon-neutral energy solutions.

33 Importance of correct materials and structures in hygienic food facilities

Gun Wirtanen, Seinäjoki University of Applied Sciences and Agriculture, Finland

34 Own-checking guidelines for surface sampling in restaurants with some test results

Sanna Tietäväinen, JIK ky, Finland

35 TBA

36 The new era of the cleanroom wall systems

Steven Deretz, CRDB, Belgium

The room is called a cleanroom when it is airtight and easily cleanable. Cleanrooms are traditionally made out of plaster walls, monobloc panels or a kind of cassette system. All of these three systems got their advantages and disadvantages. Plaster walls are fragile and produce a lot of dust during assembling. Second, monobloc panels. They are modular; however, space between the panels is not easily accessible unless the request is specified during the design process. Lastly, the cassette system that has been found practical; however, they are relatively expensive, and they have many joints on the wall surfaces. Moreover, some additional points to make a cleanroom system more practical has been recognized. For example from a maintenance perspective, easily dismountable wall surfaces to offer access between the walls would provide agile entry for wiring and pipes. Furthermore, from an installation point of view, faster assembling of the room building process would offer several advantages. There are two types of systems on the market to answer the demand: a fully metallic system with smaller 'cassettes' and the newest system, with full plates, hung on the metal studs. The advantage of the prior one is that there are much fewer joints than in the traditional cassette system. Importantly, providing higher cleanliness with less cleaning and maintenance cost-efficiently.

Welcome to Naantali Spa

Internationell rapport

BERIT REINMÜLLER

- **Ny PDA Journal of Pharmaceutical Science and Technology January/ February 2022; Volume 76, Issue 1.**
- **Ny PDA Technical Report No. 88 (TR 88) Microbial Data Deviation Investigations in the Pharmaceutical Industry Date of Publication: Jan 2022**
- **The 2022 PDA Annual Meeting, 4-6 April in Dallas**

PDA promises to have something for everyone! The Conference in Dallas will focus on the theme to Level Up: Agility in the New Normal! PDA will highlight what's in store for the future of pharmaceutical manufacturing. Examine how companies are developing new modalities and adapting to the current manufacturing environment through the modernization of aging facilities and the adoption of innovative approaches and processes.

PDA ordnar också webinars kring aktuella teman som mikrobiologisk kontroll och Annex 1 uppdatering.

EJPPS Volume 26 Issue 4, December 2021

Peer Review Papers

- End-to-end qualification of ready-to-use (RTU) product containers in packaging suitable for No-Touch Transfer (NTT) into Grade A filling zones. by Birte Scharf, Patrick Wolf, Holger Kranenburg, Robert Lindner
- Performance of Cleanroom Garment Fabrics When Processed in an Industrial Laundry, Comparing Irradiation and Autoclave Sterilisation by K Broadbridge, D Stoker, G Cochran, G Kuzma

Opinion Papers

- Compassionate Use and other Managed Access concepts – Requirement Landscape across Europe from a QP's Perspective by Andreas Schwinn, Constantinos Kousoulos, Birgit Becker, Kerstin Thaele, Eveline Reininger, Karen Joosen, Karoliina Nurminen, Loretta Dougan, Louise Grundberg, Lucia Dalvit, Maria Krook, Pam Turner, Peter Mayne, Raffaele Misul, Renate Steurer, Sara Taglialatela, Scott Smith, Srikanth Sunkari, Tine Wentzel Bekker

Editorial

- Guest Editorial: Skills to meet the future challenges in Pharma/ Biopharma and ATMP manufacturing
- PHSS News

Regulatory Update by Malcolm Holmes

- December 2021

Out now: Clean Air and Containment Review (CACR) Issue 46 2021 Number Two, that in addition to John Neiger´s editorial, Pearls of wisdom, and Life lines contains the following

- COP26 by Jamie Young
- Cleanroom Testing and Monitoring – Chapter 1 by William Whyte
- Choosing particle sample point locations by Mark Hallworth
- Known knowns and COVID mitigation by Andrew Watson
- Continuous environmental monitoring (EM) and Annex 1 by Andy Whittard
- Cleanroom Technology Conference 2021 by Sophie Bullimore
- News, Events, and Training Courses

Printed with permission of CACR

PHSS arrangerar sin workshop PHSS Aseptic Processing and Contamination Control Workshop Syndicates 2022 virtuellt den 22 och 23 mars och Challenges in Sterile Products Manufacture 2022 den 14 juni 2022.

ISO International Organisation for Standardization

IT'S ALL IN THE NAME

RAPPORT BERIT REINMÜLLER

Because 'International Organization for Standardization' would have different acronyms in different languages (IOS in English, OIN in French for Organisation internationale de normalisation), the founders decided to give it the short form ISO. ISO is derived from the Greek 'isos', meaning equal. Whatever the country, whatever the language, we are always ISO.

The ISO story began in 1946 when delegates from 25 countries.

In London, in 1946, 65 delegates from 25 countries met at the Institute of Civil Engineers in London to discuss the future of International Standardization. In 1947, ISO officially comes into existence with 67 technical committees (groups of experts focusing on a specific subject).

Read more about the first 50 years of ISO (1947 - 1997) in the book: FRIENDSHIP AMONG EQUALS can be downloaded from https\\www.iso.org/about us.html

ISO'S FIRST OFFICES

In 1949, ISO moves into offices in a small, private house in Geneva. In the early 1950s the Central Secretariat has 5 members of staff.

ISO'S FIRST STANDARD

In 1951, the first ISO standard (called Recommendations at this time), ISO/R 1:1951 Standard reference temperature for industrial length measurements, is published. Since then, the standard has been updated numerous times and is now ISO 1:2016 Geometrical Product Specifications (GPS) - Standard reference temperature for geometrical product specification

ISO GENERAL ASSEMBLY - STOCKHOLM

In 1955, ISO members gather in Stockholm for the 3rd General Assembly. At the beginning of 1955, ISO has 35 members and 68 standards (called recommendations). Henry St Leger is the Secretary General

SI - INTERNATIONAL SYSTEM OF UNITS

In 1960, ISO publishes the standard ISO 31 on quantities and units (which has since been replaced by ISO 80 000). ISO 31 is based on SI (Système international d'unités). The SI sets out one unit for each quantity, for example, the metre for distance and the second for time. The objective of the SI system is to reach world-wide uniformity in units of measurement.
ISO 80 000 sets out these units and how to use them.

ISO 9000 FAMILY

In 1987, ISO publishes its first quality management standard. Standards in the ISO 9000 family have gone on to become some of the most well known and best selling standards.

ISO is an independent, non-governmental international organization with a membership of 167 national standards bodies. It is headquartered in Geneva, Switzerland and works in 165 countries.

ISO TC209

Arbetet med standardisering av Cleanrooms and associated controlled environment påbörjades inom Europa med CEN/TC 243 och gick på slutet av 70-talet vidare som ISO TC209. Under samma årtionde bildades International Contamination Control Societies (ICCCS) sitt arbete som stöd till ISO TC209, Nordiska R³-föreningen bidrog mycket till utvecklingen av en internationell´renrumsstandard.

CEN TC156 WG 18

Arbetet inom CEN TC156 WG 18 Ventilation in Hospitals hade ett möte under februari där tidplanen sattes för det fortsatta arbetet. Ca 70 sidor med kommentarer hade gjorts till den senaste versionen av den tekniska specifikationen. Kommentarerna grupperades efter sitt innehåll och en utsedd redigeringsgrupp ska gå igenom dem under mars-april. Kommentarerna gällde bl användarens inflytande, mikrobiologisk kontroll och gränsvärden, operationskläders inflytande på CFU-nivån under aktivitet och ansvaret för funktionen mikrobiologisk renhet efter överlämnande av installation från leverantör. En CEN teknisk specifikation (TS) måste inte tillämpas, de länder som har en egen standard inom området kan välja att behålla sin egen standard. De länder som inte har någon egen standard kan tillämpa en europeisk TS och i nationellt annex ange eventuella undantag. Den tekniska specifikationen beräknas kunna färdigställas och presenteras för TC 156 under hösten.

SIS fyller 100 år!

SIS är en del av ISO och CEN, utsedda av regeringen att representera Sverige i det nätverk av experter som arbetar med att skapa internationella standarder.

Trepunktsbältet, pinkoder, ja till och med färgen på svenska flaggan – i år firar vi att standarder har förbättrat samhället och stärkt svensk konkurrenskraft i ett helt sekel. Det största ligger ändå framför oss, för standardisering spelar en viktig roll i det hållbara samhället.

NYA FRIMÄRKEN OM STANDARDISERING

Containern, flaggans färger, laboratorieglas, rullstolar, vägutrustning, vattenundersökningar... Nu har PostNord släppt en ny serie frimärken som illustrerar ett antal viktiga standarder genom decennierna. Lanseringen sammanfaller, lägligt nog, med SIS 100-årsjubileum.

CTCB-I arrangerade extra certifiering

AV LARS EKBERG

Ett extra tillfälle för certifiering inom CTCB-I anordnades i början av februari, på Chalmers i Göteborg. CTCB-I certifieringen gäller mätspecialister och beställare/granskare/utvärderare av mättjänster för renrum, och den utförs enligt CTCB-I:s internationella riktlinjer, på två olika nivåer.

Ett certifikat på Associate Level visar att man förstått teorin bakom renrumsmätningar och kan bedöma och förstå dokumentation från sådana mätningar.

Ett certifikat på Professional Level intygar att man dessutom behärskar mättekniken och självständigt kan genomföra kontroller. Denna gång kom deltagarna från Norge och Sverige.

Kursens teoridel genomfördes under ledning av Lars Ekberg med stöd av Berit Reinmüller och Bengt Ljungqvist. I de praktiska delarna medverkade även Stefan Aronsson och Mari-Liis Maripuu, CIT Energy Management AB. Dessutom medverkade Emil Andersson och Erik Ristorp från Labkontroll Väst AB, med siktet inställt på att de ska förstärka lärarlaget i framtiden.

Certifieringen resulterade i en re-certifiering och fyra nya certifieringar på nivån Professional, samt två nya certifieringar på nivån Associate.

Ett nytt kurstillfälle för certifiering i Göteborg planeras till 11-13 oktober 2022. Läs mer om detta på nästa uppslag i tidningen eller på websidan www.safetyventilation.com.

Några av de medverkande vid CTCB-certifieringen i februari 2022, från vänster Erik Ristorp, Emil Andersson, Bengt Ljungqvist, Lars Ekberg och Stefan Aronsson.

RÄTTELSE

I föregående utgivning av RenhetsTeknik, nr 4-2021, missade vi att presentera fyra av de personer som re-certifierades i oktober 2021. Dessa fyra presenteras på nästa sida.

Ytterligare information om kandidaterna finns att läsa om på www.safetyventilation.com

CTCB-I certifiering februari 2022

CTCB ASSOCIATE

Fr v: Rickard Olsson och Marco Tidu, båda från Labkontroll SYD, Sverige

CTCB RE-CERTIFIERAD

Girorgos Pelekas, OVK Firman i Stockholm, Sverige

CTCB PROFESSIONAL

Torbjörn Tønnesen, GK Inneklima AS, Norge

Michal Glinka, GK Inneklima AS, Norge

Øyvind Mathisen, GK Inneklima AS, Norge

Kjell Lauritzen, GK Inneklima AS, Norge

CTCB-I certifiering oktober 2021

CTCB RE-CERTIFIERADE

Daniel Laggar, Brookhaven Instruments

Johan Ahnfeldt, Brookhaven Instruments

Nils-Johan Björklund, CRC Clean Room Control AB

Thomas Andersson, CRC Clean Room Control AB

Novo Nordisk investerer mere end 17 mia. kr. i udbygning af produktionsfaciliteterne i Kalundborg.

Novo Nordisk december 2021

Novo Nordisk annoncerer planer om at investere mere end 17 mia. kr. i opførelsen af tre nye produktionsanlæg samt udvidelse af et eksisterende anlæg på produktionsanlægget i Kalundborg.

Investeringsprojekterne forventes afsluttet i 2027 og vil skabe omkring 400 nye arbejdspladser. Flere end 2.500 eksterne personer vil blive beskæftiget i byggefasen.

Novo Nordisks produktionsfaciliteter i Kalundborg blev grundlagt i 1969. I dag dækker faciliteterne et areal på 1.200.000 m2 og beskæftiger omkring 3.200 mennesker. I Kalundborg producerer Novo Nordisk produkter til behandling af svær overvægt og diabetes samt flere biofarmaceutiske produkter. Siden årtusindskiftet og frem til i dag har Novo Nordisk investeret mere end 18 milliarder kroner i produktionsfaciliteterne i Kalundborg. Den investering, der annonceres i dag, fordobler næsten 20 års investeringer.

För ytterligare information: Novo Nordisk A/S Corporate Communication, Danmark
Tel: +45 4444 8888 · www.novonordisk.com

Nya frimärken; Standardisering

PostNord har släppt en ny serie frimärken som illustrerar ett antal viktiga standarder genom decennierna.

Lanseringen sammanfaller, lägligt nog, med SIS 100-årsjubileum.

Invigning av AstraZenecas fabrik för framtidens biologiska läkemedel

På plats i december 2021 i Södertälje fanns bland annat socialminister Lena Hallengren, som klipper bandet tillsammans med Boel Godner, ordförande för kommunstyrelsen i Södertälje, Katarina Ageborg, VD för AstraZeneca AB, och Åsa Manelius, chef för Sweden Biologics Center på AstraZeneca.

SBC har byggts för att tillverka framtidens biologiska läkemedel, som är mer specialiserade och riktade än andra läkemedel. Biologiska läkemedel har på många sätt revolutionerat läkemedelsvetenskapen och används för att behandla komplexa sjukdomar, bland annat olika typer av cancer.

Idag arbetar över 220 personer på fabriken. Stockholms Handelskammare har i en nyligen utgiven rapport räknat ut att för varje nytt jobb i Life Science-sektorn i Sverige skapas ytterligare tre jobb, vilket innebär att SBC redan har skapat uppåt 900 nya jobb.

- Jag är glad för att AstraZeneca har valt att placera tillverkningen av nästa generations biologiska läkemedel i Sverige och i Gärtuna. Det bekräftar det redan mycket framgångsrika arbete som bedrivs här, och den nya anläggningen bidrar dessutom med flera hundra nya jobb, säger socialminister Lena Hallengren.

AstraZenecas styrelseordförande Leif Johansson konstaterar att Sverige är ett attraktivt land att investera i.

- Det är ingen slump att vi öppnar den här fabriken just i Sverige. Sverige är på många sätt attraktivt och vi fortsätter satsa här, givet Sveriges starka ställning som en forskningsnation, som en hub för innovation, utveckling och produktion av nya läkemedel som kan förändra livet för miljoner människor runtom i hela världen, säger han.

Foto/Illustration: Atrium Ljungberg

Life science-miljön som växer fram runt Karolinska i Solna

AstraZeneca flyttar delar av sin verksamhet till Hagastaden i Stockholm och det växande Life Science-klustret vid Karolinska Universitetssjukhuset. Flytten tar AstraZeneca närmare kunder, samarbetspartners och de miljöer där patienterna behandlas.

AstraZenecas nya Stockholmskontor blir bas för det nordiska marknadsbolaget, det vill säga den kommersiella verksamheten, Site Managemant & Monitoring, som är ansvarig för de kliniska studierna i Norden, Corporate Affairs samt Alexion, bolagets enhet för sällsynta sjukdomar som AstraZeneca förvärvade i somras.

Flytten är planlagd till andra kvartalet under 2022 och totalt kommer ungefär 120 personer jobba i de nya lokalerna. Övriga medarbetare på AstraZeneca i Södertälje, cirka 4500 personer, kommer fortsatt vara baserade i Södertälje. Forskningsverksamheten i Göteborg påverkas inte.

Det nya kontoret kommer att ligga i byggnaden Life City, skyltfönstret för Hagastadens Life Science-kluster rakt ovanför E4:an där miljoner människor passerar varje år.

Proteinvaccin från Novavax

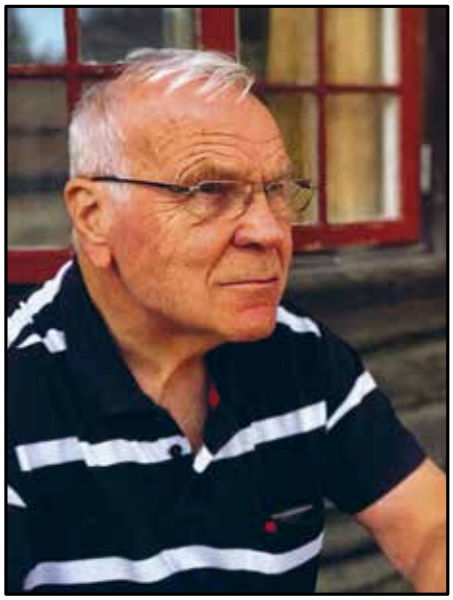
Foto: Google Maps

Vaccinet från Novavax godkändes av den europeiska läkemedelsmyndigheten EMA i december, och svenska Folkhälsomyndigheten (FHM) har nu beslutat att rekommendera det för personer som är 18 år och äldre.

Novavax vaccin är av en annan typ än de övriga covidvaccin som hittills godkänts i EU, de två mRNA-vaccinen från Pfizer/Biontech och Moderna samt de två vektorbaserade vaccinen från Astra Zeneca och Janssen.

Nuvaxovid är ett rekombinant proteinvaccin som där spikprotein i form av nanopartiklar kombinerats med ett särskilt adjuvans, kallat Matrix M, en tillsats som förstärker kroppens immunsvar mot vaccinet. Denna adjuvans, uppfunnen av SLU i Uppsala och framställd av bark från chilenskt tvålbarkträd, har utvecklats i Sverige och tillverkas i företagets anläggning Uppsala,

I Sverige finns fortfarande drygt en miljon svenskar som inte har vaccinerat sig mot covid-19. FHM hoppas nu de ovaccinerade personer som varit skeptiska mot den relativt nya mRNA-tekniken nu ska våga vaccinera sig.



MINNESORD

Arild Svendsen

Arild Svendsen gikk bort 7.januar 2022 etter et kort sykeleie, 82 år gammel.

Med det er en av pionerene og æresmedlem i R³-foreningen ikke iblant oss.

Arild har i flere 10-år vært en aktiv deltager i både Styrets arbeid og i Norske LAU.

Symposiene i Norge i 1998-2002-2007-2011 og 2015 ble profesjonelt gjennomført med Arild som leder av programkommiteen.

Arild var også foreleser på over 20 R³ Grunnkurs i Norge som ble avholdt på Havna, Tjøme.

Arilds fagfelt innen R³-teknikken var filtrering, men han var også opptatt av sykehushygiene og næringsmiddelindustri.

Vi takker Arild for alt han har gjort for R³ Nordic!

Torgeir Stenstad, LAU Norge

R³ NORDIC INBJUDER TILL

Sjukhusdagen

Maj 2022
Uppsala

Säkertställd renhet i Vårdens lokaler

”LÖF, Regionernas Ömsesidiga Försäkringsbolag, har som ett av sina viktiga uppdrag att arbeta för ökad patientsäkerhet. Detta sker bland annat genom att presentera olika expertdokument.

I samverkan med R³ Nordic, presenteras nu skriften ”Krav att beakta i projektprocessen för att uppnå optimal lokalfunktion med avseende på renhet”. Denna lägger fokus på renhet, mikrobiologisk, visuell och partikulär, i vårdens lokaler. Detta ska ske i projektprocessens alla skeden; från utrednings- och programarbeten, under projekteringsprocessens olika delar, under byggnation samt under driftskedets olika faser.

Arbetet syftar till att verksamhetens behov och rutiner får ett genomslag i utformningen av lokaler och tekniska försörjningssystem. Detta sker genom att stärka en aktiv medverkan från verksamheten i utrednings- och programarbete. Detta tydliggörs genom att redovisa arbetsmetodik, förväntade person- och materielflöden och definiera erforderliga renhetsnivåer.

En metod för riskbedömning presenteras och exempel på tillämpning exemplifieras. Denna ska kunna användas i projektprocessens alla skeden. Resultatet, förändrade förutsättningar och eventuella avvikelser och konsekvenser ska redovisas för verksamhetens representanter. Riskbedömningen blir således ett verktyg för att säkerställa att uppställda krav uppfylles.

Projektledare för arbetet har varit Lennart Hultberg.”

Prof Jan Gustén, Chalmers Tekniska Högskola

Anmälan på mail till Lennart Hultberg
lennart@processhygien.com

R³ NORDIC INBJUDER TILL

Grundkurs i renhetsteknik

2022
Prel Uppsala

PREL PROGRAM DAG 1:

09.00-11.00	Kontaminanter och partikelmätning
11.00-12.00	Mikrobiologiska testmetoder
12.00-13.00	Lunch
13.00-13.30	Mikrobiologiska testmetoder
13.30-14.30	Standarder (Renrum)
14.30-15.00	Kaffe
15.00-15.30	Standarder (Renrum)
15.30-16.30	Luftrörelser

PREL PROGRAM DAG 2:

09.00-10.00	Konstruktion av ren rum, ventilation och design av utrustningar (maskiner, kärl, kranar och ventiler).
10.00-12.00	Människan i renrum, arbetssätt och kläder
12.00-13.00	Lunch
13.00-14.30	Kläder, tvätt och rengöring
14.30-15.00	Kaffe och grupparbete
15.00-16.00	Genomgång av grupparbete och avslutning.

Kursavgift SEK 7.850,- (R³-medlem 7.200,-)

Inkluderar kursmaterial, diplom, lunch, kaffe fm och em.
Information om kursen lämnas av Lennart Hultberg
Telefon +46 (0)760 399 500/ lennart@processhygien.com

Kursansvarig:
Lennart Hultberg, R³ Nordic

Anmälan
www.r3nordic.org

Anmälan till alla våra kurser ska vara skriftliga och är bindande. Avbokning ska ske skriftligen och inkomma minst en månad före kursstart för att kursavgiften, minus avdrag med 500 kr, ska återbetalas. Vid avbokning senare, minst 14 arbetsdagar före kursstart, återbetalas halva kursavgiften. Vid avbokning senare än 14 arbetsdagar före kursstart sker ingen återbetalning. Ersättare kan registreras fram till och med första kursdagen. R³ Nordic förbehåller sig rätten att ändra kursinnehåll och föreläsare utan att meddela deltagare eller att ställa in kursen. Föreningen ansvarar inte för merkostnader i samband med kursens inställelse. Vid inställelse återbetalas kursavgiften i sin helhet.

R³ NORDIC, CTCB-I OCH CHALMERS INVITE TO

Cleanroom Testing & Certification

11-13 Oktober 2022

Installationsteknik, Chalmers, Göteborg

The course material is intended for self-study prior to attending the lectures.
The content of the course notes, written in English, forms the basis for the lectures.
The course notes will be delivered after payment of a registration fee, at latest one month before the start of the course.
Candidates can apply for either of two levels of certification; Professional or Associate. As proof of the certification, a diploma will be issued to each participant who completes the course and passes the examination.

ASSOCIATE LEVEL

For people who are either familiar with some aspects of cleanroom testing, and wish to gain knowledge about the subject (purchasers and evaluators of clean room testing), or have been working less than two years as a cleanroom tester, but wish to use the certification course as a basis of training and working towards professional status. If you apply for the associate course, and have suitable qualifications, you will be required to:

- study the self-study course notes that will be sent to you, attend a lecture course, and then pass a written examination on cleanroom testing
- attend a demonstration exercise on practical aspects of cleanroom testing.

PROFESSIONAL LEVEL

For people whose profession is cleanroom testing, and who routinely carries out all aspects of cleanroom testing. At the time of their exam they should have a minimum of two years' experience. If you apply for, and have suitable qualifications, you will be required to:

- study the self-study course material that will be sent to you, attend a lecture course, and then pass a written examination on cleanroom testing
- Complete a particle counting exercise.
- pass a practical exam by showing a high level of competence in (a) filter integrity testing and (b) measuring air velocities and volumes and write adequate reports

  Note that certificates on Professional Level are valid for five years. Recertification is required to maintain certification on Professional Level beyond five years.

COURSE FEES 2021

CTCB Associate Level - 2 days in Gothenburg
Included: Course notes, lecture notes, written exam, practical demonstration and lunch both days.
Registration fee: SEK 3 950
Course and exam fee: SEK 12 000

CTCB Professional Level - 3 days in Gothenburg
Included: Course notes, lecture notes, written and practical exams and lunch day 1 and 2.
Registration fee: SEK 3 950
Course and exam fee: SEK 15 000

Exam Re-sit and Upgrading from Associate to Professional Level - 1 day in Gothenburg
Candidates who do not pass a practical exam (filter leak testing and/or air velocity) can "re-sit" the exam within one year. Candidates who wish to upgrade their certificate from associate to professional level can complement with the practical exam within one year.
Registration fee: SEK 2 950
Practical exams fee: SEK 3 500 *(per exam)*

Recertification CTCB Professional Level - 3 days in Gothenburg
Included: Course notes, lecture notes, practical demonstration, written and practical exams.
Registration fee: SEK 3 950
Course and exam fee: SEK 12 500

Note 1: Candidates who are not already members of R³ Nordic or another ICCCS affiliated society will also be charged the cost of one year's individual membership - currently SEK 650,- in R³ Nordic.

Note 2: VAT will be added to all prices given above.

Note 3: Any costs required for accommodation are the responsibility of the candidate.

Further information is available at www.safetyventilation.com
Questions and application form: Lars Ekberg,
lars.ekberg@chalmersindustriteknik.se /+46 (0)703 15 11 55

The number of seats is limited. ***Apply no later than August 15, 2022.***

MARKNADSGUIDE

FÖRETAGS- & BRANSCHREGISTER ÖVER STÖDJANDE MEDLEMMAR I R³ NORDIC

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FÖRBRUKNINGSMATERIAL FÖRPACKNING PROCESS

AET ARBEIDSMILJØ OG ENERGITEKNIKK AS (NO)
Ing.firma, prosjektering, produkter for renrom.
Tel 23 06 73 30 / info@aet.no

INREM AB (SE)
Pincetter, kläder, torkdukar, svabbar, handskar, klibbmattor, renrumspapper, skor, stolar mm
Tel 08-59080720 / info@inrem.se

INSTRUMENT ÖVERVAKNING VALIDERING KALIBRERING

MY AIR AB (SE)
Kontroll och validering för att minimera luftburen smitta och säkerställa processer
Tel 072-503 84 59 / lars.jansson@myair.se

NINOLAB, AB (SE)
Partikelräknare, automatisk övervakning. Bänkar. LAF-tak, luftduschar. Niklas Nordin.
Tel 08-59096200 / info@ninolab.se

PARTICLE MEASURING SYSTEMS (DK)
Partikelräknare, sensorer och system.
Lars Peter Kristensen, Tel: 25 21 82 88
lpkristensen@pmeasuring.com

PSIDAC (SE)
Gain control and safer healthcare environments - CPS 6000 Monitor System
Björn Österlund / www.psidac.com

MIKROBIOLOGI STERILISTERING

GETINGE FINLAND OY (FI)
Peter Holmberg
Tel 040 900 4620 / peter.holmberg@getinge.fi

MICLEV AB (SE)
Biologiska indikatorer, färdigberedd media, sterilisering, luftprovare, mikroorganismer.
Tel 040-365400 / info@miclev.se

NINOLAB, AB (SE)
Inkubatorer, värmeskåp, class100 sterilasatorer. Autoklaver - diskmaskiner. Niklas Nordin.
Tel 08-59096200 / info@ninolab.se

CRC CLEAN ROOM CONTROL AB (SE)
Kvalificering av renrum, LAF, säk-bänkar och skyddsventilation. Mikrobiologiska tester. Rök.
info@cr-control.se / www.cr-control.se

KONSULTER PROJEKTERING

CIT ENERGY MANAGEMENT AB (SE)
Teknisk utveckling, validering och funktions-kontroll inom luftrenhet, klimat och energi.
031-772 11 51 / stefan.aronson@cit.chalmers.se

COWI AB (SE)
Teknikutveckling, miljöteknik och projektledning
Torbjörn Lång / trla@cowi.com

CRC CLEAN ROOM CONTROL AB (SE)
Rådgivningar, förstudier och projektering. Utbildning. Tel 018-246460 / 070-5926604.
info@cr-control.se / www.cr-control.se

VENTILATOR RENRUM, INDUSTRI AB (SE)
Renrum, säkerhets- och sterilbänkar. Lufttak. Projekt ventilation, entreprenader, utrustning.
Tel 070-9711454 / bjarne.osterberg@ventilator.se

RENRUM OP-RUM LAF INREDNING BÄNKAR TAK

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Tel 23 06 73 30 / info@aet.no

CRC MEDICAL AB (SE)
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anders.lofgren@menardifilters.com

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Tel 08-59096200 / info@ninolab.se

INREM AB (SE)
LAF-enheter, moduler, säkerhetsbänkar etc
Tel 08-59080720 / info@inrem.se

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Tel 070-9711454 / bjarne.osterberg@ventilator.se

RENGÖRING STÄDNING

PHARMACLEAN AB (SE)
Konsultation, lokalvårdsutbildning och lokalvård för renrum. Regina Björnsson.
Tel 0708-986428 / www.pharmaclean.se

PIMA AB, SERVICEFÖRETAGE (SE)
Bemanning - Entreprenad - Konsultation
www.pima.se
Tel 08-55424610 \ kontakt@pima.se

RENRUMSKLÄDER TEXTILIER TVÄTTNING

DFD CLEAN ROOM (DK)
De Forenede Dampvaskerier A/S
V. Henriksens Vej 6, 4930 Maribo
Tel 5476 0509 / crmar@dfd.dk

BERENDSEN TEXTIL SERVICE AB (ELIS) (SE)
Renrumstvätteri. Renrumskläder.
Tel 020-740116 / goran.nilsson@elis.com

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