

III. DRESSING FOR THE CLEAN ROOMS

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Abbreviations

Demi-water — de-mineralized water
EH — experiment hall in the 2.PP
EN — European norms
HEPA — High Efficiency Particulate Air
CR — clean rooms
ČSN — Czech Technical Standards
IPA — isopropyl alcohol
ISO — International Organization for Standardization
LH — laser hall on the 1.NP
MP — material past
un-CR — non-clean rooms (undefined cleanliness class)
PAA — peroxyacetic acid
PP — personal past
VZT — air conditioning

Summary

This document is intended as a guide to proper ELI-Beamlines CR dress up procedure.

Clean Rooms

CRs are defined by ČSN EN ISO 14644. In general, they are a space with controlled concentration of particles suspended in the air. They are divided into several classes by the maximum allowed concentration of those particles.

There are going to be classes ISO 8 to ISO 5 in ELI-Beamlines. Lower class numbers represent higher levels of cleanliness.

Motivation

The vast majority of contaminants introduced to CR comes from the people. A single person

emits almost 30g of skin, hair, beard and other particles during a single day. Sitting person emits 10^5 particles per minute. A person walking at the speed of 3 km/h emits 10^6 particles per minute. Finally, a person running at the speed of 8 km/h emits 10^7 particles per minute. Every person breathes out particles from their airways. Regular smokers release the largest amount of particles.

For this reason (and to ensure high quality of the CR environment in general) it is important that you adhere to the CR rules. Most importantly, to the rules relating to the dress code inside the CR.

Notions

Personal past is a transitional room between CR and un-CR, designated for people only. This is where preparations to enter CR according to applicable rules and regulations take place.

Material past is a transitional room between CR and un-CR, designated solely for material transport in accordance with applicable rules and regulations.

Entering the Laboratory Building

In order to protect both MP and PP from mud, sand and other large contaminants, it is essential to use clean laboratory shoes or shoe covers before entering. It is prohibited to enter with extremely dirty shoes, even with shoe covers on.

Dressing and Entering Correctly

- It is prohibited to enter with your make-up on. All make up needs to be removed before entering.
- It is prohibited to enter with polished fingernails. Gel nails are permissible.
- Wearing jewellery is generally prohibited, but small earrings covered by a hair net are permissible.
- Long hair is to be held up and restrained.
- Gentleman with long beards must use beard cover.
- Always wear a face mask. When feeling sick, wear two.
- All of your skin, hair and beard must be covered. Facial skin does not need to be.
- Do not touch the outside of clothing or gloves with your bare hands.
- Minimize contact between your clothing and both the CR equipment and your gloves.
- Do not use clothes after their expiration period of one week since unpacking. Once

expired, unpack new ones.

- Clothes may not touch the floor. If they do, they may no longer be used. Replace them with new ones.
- Fasten all zippers before entering and only unfasten them when undressing in the PP.
- Put all visibly dirty or wet clothes in the dirty clothes bin located in the PP.
- Clean clothes with damaged plastic containers are not to be used. Put them in the dirty clothes bin.
- Keep PP and MP doors open only for the duration of personal or material transit, never longer.

Passages

Anti-dust Doormat

Strategically placed anti-dust doormats serve to remove large contaminants from your shoes. Make sure to step on them with the whole surface of both your shoes' soles at least once each. Do not step over!

Air Shower

Air shower is a separate, hermetically sealed airlock between two different cleanliness classes. Once in:

- Close the entrance door.
- Raise your arms and hold them out in front of you.
- Wait for the high-velocity air to stop flowing.
- Wait for the both auditory and visual signal before opening the exit door.

Colour Door Signalization (Semaphore)

Semaphores are installed by every door that connects different classes of CR, PP and MP.

Green signals it is possible to open the door, triggered when second door is fully closed.

Red signals not to open the door, triggered if second door is still open.

When both doors are open at the same time, it negatively impacts air conditioning and subsequently the cleanliness of the CR. If you open the door while the semaphore is still red, an alarm will be raised. Immediately close either door when this situation occurs!

Entering the CR from un-CR

CR class ISO 8 or ISO 7 can be entered from un-CR at several points. In most cases, the entrance leads to corridors and hallways with cleanliness class ISO 8. In some cases, e.g. PP LB.02.15 (followed by MP LB.02.27) entrance leads directly from un-CR to CR class ISO 7.

- If you plan on working in the cleanliness classes ISO 8-7, wear a single-piece overall. If you intend to work in higher cleanliness classes, put on the two-piece suit (so-called pyjamas).
- After entering the PP, remove your shoes, jewellery, socks, jackets, sweat shirts, jumpers and thick trousers such as jeans. We recommend undressing from everything except for your undergarments, undershirts or T-shirts for your own comfort.
- If you wish to continue to CR class ISO 6 or higher, undressing from everything except for your undergarments and undershirts, T-shirts is mandatory.
- Disconnect your entrance card from the lanyard and put it on the shelf across the bench. Leave the lanyard with your regular clothes.
- Tie up your hair. Put up a hair net, a face mask and a beard net (if you have a beard).
- Use the mirror to check that all of your hair and beard are completely covered.
- Wash your hands thoroughly with soap and then dry them up with a paper towel.
- Apply the disinfectant and thoroughly rub hands according to image **Annex 1** of this document. Let the disinfectant dry. You can wave your hands to make it dry faster.
- Put on the gloves, touching them only on the inside and along the hem.
- Take a pair of shoes from the shoe rack in the clean area and prepare them on the floor behind the step-over bench. Touch them on the inside only.
- Take a pair of clean CR socks from the shelf next to the step-over bench. Touch them only on the inside or along the hem.
- Put one of the socks on your leg and step with that leg into one of the shoes prepared behind the step-over bench. Repeat with the other one.
- Pick up a clean overall, holding it only by the label in the neck area or by the inner side of the neck area itself. When possible, reuse the one kept in your locker. Once it expires, unpack a new one.
- Put the overall on, touching only its inner side. Be careful not to let any part of the overall touch the floor.
- Pick up your entrance card and place it in your left arm pocket.

- Make sure all your zippers are fastened.
- Use mirror and the picture **Annex 2** of this document to verify that you are dressed correctly.
- Spray the gloves on your hands with ethanol, rub it in and let it dry.
- If you intend to visit the laser building, take the dosimeter assigned by Safety Management.
- Proceed to the CR through an air shower or a door with colour signalling.
- Upon entering, spray the gloves on your hands with ethanol, rub it in and let it dry.
- Welcome to the CR!

Entering the EH

Entrances to experimental hall PPs are located in the respective control rooms.

- Prepare a pair of class ISO 7 shoes on the cleaner side of the step-over line.
- Change to the prepared CR shoes, stepping over the line. Pick up and place your old shoes on the designated shelf.
- Remove your current gloves and put on the new gloves from PP, touching them only on the inside and along the hem.
- Upon entering the EH, spray the gloves on your hands with ethanol, rub it in and let it dry.
- You can start working in experimental hall now.

Laser Halls

Laser hall can be entered directly through a personal entrance in the corridor L.00.04.

- Put on the new gloves right after entering the LH. Touch them only on the inside and along the hem.
- Spray the gloves on your hands with ethanol, rub it in and let it dry.

Dressing for the CR Class ISO 6

- Entering through PP LB.02.08 or LB.02.36, unpack a new face mask and a pair of sterile, pair-packed gloves intended for the CR class ISO 6. Do not touch them directly and only lay them down on the inner side of their original cover to prevent contamination.
- Prepare the CR class ISO 6 overall. Either a new, unpacked one or the one stored in

your locker. When unpacking a new one, start by the label and leave it with the gloves. If you are planning to use the one in your locker, open the locker door now.

- Remove your old gloves and the face mask. Do not remove the beard cover!
- Apply the disinfectant and thoroughly rub hands according to image **Annex 1** of this document. Let the disinfectant dry.
- Put on the gloves with your bare skin touching them only on the inside.
- Put the prepared overall on, touching only its inner side. Be careful not to let any part of the overall touch the floor.
- Put the cape on and tighten it up.
- Make sure all your zippers are fastened.
- Put the face mask on, touching it with your gloves as little as possible.
- Prepare a pair of shoe covers.
- Put one the first shoe cover and step over the step-over line into the cleaner area of the PP. Repeat with the other shoe cover.
- Use mirror and the picture **Annex 2** of this documentation to verify that you are dressed correctly.
- Proceed through the air shower No. 3 into the CR class ISO 6.
- Upon entering, spray the gloves on your hands with ethanol, rub it in and let it dry.

Working in the CR Class ISO 5

The CR class ISO 5 work is conducted in a small area on the optical table in the metrological laboratory, room LB.02.10. This room is separated from the CR class ISO 6 by a CR tent and laminar airflow.

Work Instructions

- Clean up and prepare your tools and materials inside the class ISO 5 area first.
- Put on another pair of new gloves over your current ones before starting.
- Do not remove your hands from the class ISO 5 area while working. You need to put on new gloves when you do.
- Instead, if you need a tool or some material from outside the working area, you must ask your assistant to clean it up (using a dust-free wiper and IPA). Then he can hand it to you.

- If your gloves get dirty or perforated, replace them with a new pair immediately.

Final Words

Thank you, and have a safe and productive day!

Annex 1: Washing and Disinfecting Hands Properly

Proper hands washing and disinfection procedure can be seen at the pictures. We are probably going to shoot our own photos or a video.

Annex 2: Final Appearance of a CR Worker

Photographic documentation of fully dressed worker for all relevant CR classes will be taken after the equipment is purchased and permanently featured in every PP.