Personal protective equipment

Introduction

Personal protective equipment (PPE) refers to equipment that must be worn or held by an individual as a preventive measure to protect against risks that threaten their health or safety. A safe workplace that ensures the personal safety of employees can prevent illness and even work-related disability among employees. The use of personal protective equipment is the final step in the occupational health and safety strategy. It should only be worn once all other steps of the occupational health and safety strategy (source control measures, technical and organizational measures) have been implemented and risks cannot be effectively addressed in any other way.
When used properly, personal protective equipment protects vulnerable and/or vital body parts, such as the head, eyes, ears, respiratory system, hands and feet. If personal protective equipment is not used, or is used incorrectly, both the employer and the employee may be in violation. Both the employer and the employee are responsible for its proper use.

Working method

The decision on whether or not to use personal protective equipment is based on the risk assessment. One key requirement goes without saying: the selected protective equipment must provide adequate protection against the identified hazard in order to minimize the potential risks arising from it as much as possible. In addition, it is very important that the employee uses the protective equipment correctly. Therefore, it is recommended that the supervisor, together with the Armico and the employee, discuss what the most optimal protective equipment is for the specific work situation.
The use of personal protective equipment is a temporary measure, and the equipment may only be used for short-term activities. Lab coats must be worn at all times in high-risk environments. Laboratories at the FHML-FPN are, by definition, classified as high-risk environments. Frequent evaluation of the use and the process is an obligation of both the employer and the employee. Finally, it is recommended to use personal protective equipment in the event of a CBR (chemical/biological/radiological) spill.

In the following paragraphs, the most common personal protective equipment for the most common hazards within the FHML-FPN faculties is described in more detail.

Laboratory coats

When entering the laboratory areas, one should wear a clean closed laboratory coat (even for a short-term visit). For the specific ML-I and ML-II areas, laboratory coats with a green collar are mandatory. In addition, other locations, including the Radionuclide Laboratory (RNL), the anatomy dissection rooms, and the CPV, have additional rules. The department's Armico can provide you with more information on this.
Company clothing of the MUMC+ is not considered UM clothing and is not personal protective equipment in this context.

A centralized distribution facility for laboratory coats has been established within the FHML. This Central Research Facility (COV) is located in the central section of UNS50, 2nd floor (G2.202A). The cupboard for dirty laboratory coats is also located here. This area is accessible only to UM employees with their own UMcard (card reader). For more information about this facility, please contact the COV administrator.

Laboratory gloves

A glove is a form of protective equipment that, like other safety equipment, must be appropriate for the risk involved and protect against potential hazards to prevent adverse health effects. In this case, the risk involves skin exposure to a (hazardous) substance. However, this is only effective if the correct gloves are used (suitable for a specific substance during certain tasks). The choice of gloves must be based on a thorough risk assessment and never on financial considerations.

Given the wide variety of (hazardous) substances found in our laboratories, a so-called universal glove was selected through a European procurement procedure. Click here for the link. This glove offers protection against a wide range of substances, but not against all of them. For substances with specific properties that are not adequately covered by the universal glove, additional specialized gloves are required.

The level of protection provided by a glove is determined by the so-called breakthrough time: the time it takes for a substance to penetrate the glove material. This breakthrough time varies by substance and glove type and should be consulted in the supplier's information.

The table below lists common substances with the corresponding recommended glove type.

Gloves are primarily intended to provide protection against incidental exposure, such as splashes and spills. If a glove becomes contaminated with a substance, it must provide sufficient protection to safely complete the task. For this reason, a minimum breakthrough time of 3 minutes for the substance in question is used as the lower limit. Gloves are not intended for immersion in liquids. In such situations, appropriate tools, such as tweezers, a spoon, or other equipment, should be used.

It may happen that someone needs to work with chemicals that require a type of glove not listed in the table below. For this type of special work, exceptions may be made to the two standard gloves. This decision must be based on the MSDS, glove specifications, the Risk Assessment and Evaluation (RI&E), and in consultation with HSB. Purchasing gloves(*) with a lower breakthrough time (downgrading) is not permitted.

If you are unsure or have specific questions about glove types and their intended use, please contact info-HSB@maastrichtuniversity.nl

Table 1. Selected standard laboratory gloves; properties and examples of substances against which they provide adequate protection in the event of splashes or spills.

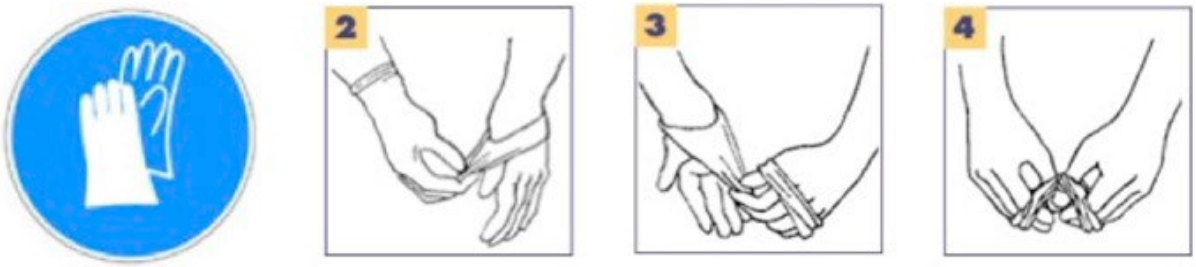
SHIELDskin™ **ORANGE NITRILE™ 260/300**	**SHIELDskin CHEM™** **NEO NITRILE™ 300**
	
Double-layer **Orange** nitrile/neoprene disposable glove	Double-layer **RED** nitrile/neoprene disposable glove
Chemical protection class B Biological protection AQL 0.25 Level 3 Virus resistance Chemotherapy drugs Yes	**Chemical protection class A** Biological protection AQL 0.25 Level 3 Virus resistance Chemotherapy drugs Yes
For use (but not limited to) with: - Acetic acid - Ammonium hydroxide 25% - Dimethyl sulfoxide (DMSO) - Ethanol - Formaldehyde 37% - Formamide - Formic acid - Glutaraldehyde 25% - Hydrochloric acid 37% - Hydrogen peroxide 30% - Isopropanol - Methanol - Nitric Acid 70% - Phenol 50% - Sodium Hydroxide 50% - Sulphuric Acid - Xylene	**For use (but not limited to) with:** - 2-Mercaptoethanol - Acetone - Acetonitrile - Chloroform - Diethyl ether - Ethyl acetate - Ethylene diamine - Phenol 85% - Phenol:Chloroform:Isoamyl Alcohol 25:24:1 - Pyridine - Toluene - Trifluoroacetic acid
Allergy info: Latex-free Accelerator-free Double chlorination Accelerator and Sulphur free	Allergy info: Latex-free Free of Thiurams Single chlorination

- Available in sizes 6/XS, 7/S, 8/M, 9/L, and 10/XL
- 260 mm is the “standard” cuff length; packaging: 90 gloves per dispenser
- 300 mm is the extended cuff length; 40 gloves per dispenser

Guidelines for glove use:

- The use of gloves should be based on the properties of the substance (as described in the MSDS) and should only occur when absolutely necessary.
- Wear gloves only for substances that must not come into contact with the skin: Highly irritating substances, substances with a skin hazard notation, (extremely) toxic, carcinogenic, mutagenic, and reprotoxic substances, radioactive substances, and/or (secretions from) laboratory animals.
- Wear gloves as needed during aseptic work (microbiology, cell culture, DNA/RNA) as PPE and/or for product protection.
- Do not use gloves when not necessary; consider costs and sustainability.
- Check before and during use that the gloves are not damaged or torn. Keep your nails short; avoid wearing hand and wrist jewelry.
- Work carefully while wearing gloves, “as if you weren’t actually wearing gloves.” Do not develop a false sense of security. Even with gloves on, a lot can still go wrong!
- Change gloves in a timely manner (max. 2 hours). Wearing gloves for too long creates a false sense of security. Tiny, unseen droplets can still penetrate the glove and come into continuous contact with the skin.
- Gloves are not designed or tested by manufacturers for repeated use! Reusing disposable gloves is therefore not permitted.
- Gloves must not be used after the expiration date has passed.
- Disinfecting gloves with ethanol is not recommended, as this negatively affects their protective efficacy (breakthrough time) and disinfection is often ineffective (ethanol contact time must be at least 30 seconds).
- Wearing gloves outside the laboratory, such as in hallways, is not permitted. If this is necessary in exceptional cases, the “one-glove principle” must be applied, whereby contamination of surfaces is prevented by performing actions with the “clean, other hand”
- Users must be aware of the risk of self-contamination, for example by touching the face, eyes, or hair with contaminated gloves.

After working with substances, always remove your gloves to prevent contamination of the surrounding area (workbench, chairs, handles, computers, phones, etc.) with the substance. Pull the inside of the glove over your hand starting from the wrist, so that any substance or contamination is contained within the glove, which has been turned inside out. Do not pull them off by the fingertips:



(*) The Skillslab uses the same type of gloves as the MUMC+. Students must experience the “touch and feel” of the examination gloves when examining (simulated) patients. These gloves must not be used when handling hazardous substances.

Cryogenic gloves

Cryogenic gloves are special gloves that protect the hands and arms from the dangers of working at/with very low temperatures down to -160 °C. The basic version is water-repellent and are suitable for protection against splashing liquid and for work at very low temperatures, for example: handling dry ice and working in freezers.

For applications with liquid nitrogen, the waterproof version is recommended. Store cryogenic gloves in a clean and dry place. Check the condition of the gloves regularly and replace them if they show wear or tears: if in doubt, do not take any risk.

A cryogenic glove should never be immersed in liquid nitrogen!

Heat gloves

On the other hand, gloves are available for handling heat sources. Note do not use cryogenic gloves for this.

Safety glasses

Laboratory work can lead to an increased risk of eye injury. Therefore, wearing safety glasses is an absolute requirement.

The number of historical splash incidents in recent years has once again confirmed that wearing safety glasses is definitely not an unnecessary luxury. And that is why wearing safety glasses has been made mandatory from 2017 within the FHML-FPN laboratory areas and within other locations where a risk of splash and/or mechanical impact is present (such as a workshop or technical area, for example).

Only safety glasses complying with the NEN-EN 166 standard may be used within the aforementioned laboratories and other areas. Safety glasses come in all shapes and colors, but the most important aspect is wearing comfort, especially if one has to wear them for several hours a day.

Note, that safety glasses should be in good condition and should be replaced in case of damage or outdated condition/fragility. To enjoy safety goggles for as long as possible, it is recommended to store them in an appropriate goggle storage box.

Face shields

Face protection, also known as face shield, should be used when there is a risk of injury to the whole face, and the use of safety glasses alone is not enough. The face protection should not restrict the field of vision of the person using it. It is important to have a good view of the work and the surroundings.

In work where particles can fly around, there is a risk of injury to the face. Face protection is also necessary against splashing hazardous and/or hot/cold liquids (e.g. working with liquid nitrogen) and or working with UV light (EN 170, 2002). A face shield (EN 169, 2002) should also be worn when welding to avoid skin and eye damage.

To use face shields safely, they must have the right fit and regular maintenance and inspection must also be carried out. When doing so, also note the maximum service life as stated by the manufacturer.

Respiration protection

Respiratory protection allows breathing air free of hazardous substances. This protection may be needed as additional protection in the workplace if source, technical and organizational measures prove inadequate. The form in which hazardous substances can occur in the air are gases, aerosols, (fine/ultrafine) dust and fibres.

The risks are not always the same. How great the risk to a person is depends on:

- Which substance is present;
- How much of the substance is present;
- In what form the substance is present;
- Vapour pressure and health limit value;
- How long a person is at work in polluted air.

The consequences of inhaling hazardous substances depend on exactly what has been inhaled. Various symptoms can occur, and this can happen immediately after inhalation. But symptoms and health damage can also occur only after a longer period of time.

Various activities require different types of masks to reduce risks, for more information contact the department's Armico.

Hearing protection

Impaired hearing due to noise exposure in the workplace is a common occupational disease. Impaired hearing can lead to serious social and medical consequences. Hearing protection is necessary to prevent noise-induced hearing loss. Noise-induced hearing loss occurs when the noise level (volume) in the ear canal is too high. For employees this starts at 80 dB(A). Above this value, the employer must offer hearing protection according to the Occupational Health and Safety Act. There are several types of measures that can be taken in the workplace to protect the hearing of employees and others in the workplace, such as purchasing an alternative source, enclosing the source and fitting sound-deadening/repellent material. For more information, contact your department's Armico.

Wearing hearing protection can have a negative effect on normal communication in the workplace. This could include less contact with colleagues and not being able to perceivably hear alarm signals from equipment or even a slow-whoop. Make sure this does not lead to other unwanted risks and discuss wearing with immediate colleagues.

Safety shoes

Safety shoes are required in work where heavy objects are lifted, there is a risk of falling objects or sharp materials on the ground. Safety shoes are also mandatory in situations where the workplace can be slippery.

There are different types of safety shoes available, each with their own safety standards. These include safety shoes with a steel toecap, safety shoes with a steel sole and safety shoes with an over-nose. It is important to choose the right safety shoe to suit the work being carried out.

Information and advice

For more information and advice on the various personal protection equipment, contact the Armico or HSB

List of abbreviations

Armico	Occupational Health & Safety & Environment Contact
COV	Central Research Facility
FHML	Faculty of Health, Medicine and Life Sciences
FPN	Faculty of Psychology and Neuroscience
HSB	Health, Safety and Buildings
PPE	Personal Protective Equipment
UM	Maastricht University