

Centro di Risonanze Magnetiche - CERM

Via Luigi Sacconi 6 – Sesto Fiorentino

Safety forms - Users' short visit - Criteria and rules of conduct for safety and risk prevention in CERM workplaces. (First version: 2 January 2025)

1.1 Access to and use of CERM facilities.

Access to CERM facilities is strictly personal and allowed only together with the reference person (Activity Supervisor) agreed in advance and in any case after identification of the reception. Access times will be defined on the basis of mutual needs.

1.2 Rules of safety and conduct.

All users of CERM's facilities are required to comply with the regulations set out herein and will issue a declaration of acknowledgement; where applicable, they must also work under the direct supervision of the scientific or laboratory supervisors. New users must also immediately take note of the safety devices and be instructed in their use.

1.3 Safety equipment

- Emergency exits
- Emergency showers
- Fire extinguishers
- First aid kits
- Eye washers
- Alarm signs
- Personal and collective means of protection
- Forced aspiration with oxygen sensor start and/or manual activation in NMR laboratories

1.4 Rules of Conduct in Chemical and Biotechnology Laboratories

All laboratories must adhere to the following rules of conduct:

- Unauthorized persons are not allowed to enter the laboratories.
- Never work alone in the laboratory.
- Appropriate clothing must be worn in the laboratory, and a protective lab coat (made of cotton or non-flammable material) and safety goggles must always be worn.
- Footwear that leaves feet exposed (such as sandals or slippers) is prohibited.
- Long hair must be tied back.
- Stay in laboratories and hallways only as long as necessary to carry out work activities. Backpacks, bags, coats, raincoats, umbrellas, etc., must be stored in designated office spaces.
- Smoking, running, eating, and drinking are prohibited in the laboratory.
- Do not use laboratory containers to store food (even outside the lab).
- Keep the work environment clean and organized. In case of spills, broken glassware, etc., clean up immediately following safety regulations and inform the supervisor.

- Do not leave commonly used materials lying around in the laboratory (glassware, pliers, scissors, etc.).
- Avoid transferring acids, bases, or hazardous substances while holding the containers at eye level.
- Always wear safety goggles when using UV lamps. Other exposed body parts (face, hands, legs, etc.) must also be adequately protected.
- Do not look directly into the opening of a container holding a reaction mixture.
- Always use protective gloves suitable for the specific type of work.
- When handling dry ice, liquid nitrogen, or liquid helium, wear protective goggles, shields, and gloves.
- Wear appropriate gloves when using a -80°C freezer.
- When using steam autoclaves, hands and face must be adequately protected.
- When using heat-generating equipment (e.g., heated baths, hot plates), wear heat-resistant gloves.
- Avoid handling hot glassware. If necessary, use heat-protective gloves when working with glass (e.g., forming capillaries, stretching Pasteur pipettes, bending glass tubes or rods). Always wear safety goggles.
- Wear appropriate clothing when entering a cold room. Do not use or leave liquid nitrogen containers inside the cold room.
- Use appropriate pipette aspirators for liquid aspiration; never use mouth pipetting.
- Handle reagents with extreme caution, working under a fume hood when dealing with volatile, toxic, or strong-smelling substances.
- Use containers for flammable, toxic, or hazardous solvents and substances only for the time required for weighing or dispensing. Store them immediately in designated safety cabinets, ensuring they are well-sealed and properly positioned.
- Before carrying out any risky operation, warn your neighbouring colleague.
- Never heat flammable solvents over an open flame and always proceed with extreme caution. Do not use laboratory burners near flammable substances.
- Be cautious when using centrifuges. Ensure all parameters are set correctly.
- Equipment and instruments should not be left in operation unnecessarily.
- Turn off unnecessary equipment and instruments when not in use.
- Do not dispose of liquids or materials in sinks.
- Do not place containers or other objects (especially heavy or glass items) on the edges of tables.
- Clearly and visibly label all containers with the content, operator's name, and preparation date of the substance/solution/mixture.
- Never place substances in a labeled container that do not match the label's description.
- Ensure all gas supply valves are closed before leaving the laboratory.
- Minimize the amount of solvents stored in the laboratory.
- In case of fire, immediately notify the responsible person and prepare to evacuate in an orderly manner, turning off open flames and electrically powered equipment.

The user must always refer to their activity supervisor, who will operate according to the established CERM protocols.

1.5 Safety Data Sheets for Chemical Agents

All persons handling chemical agents must read the label carefully, paying particular attention to the meaning of the pictograms and H and P phrases. Material Safety Data Sheets (SDS) for chemical agents are available in printed form in the laboratory near the reagent storage area, in electronic form on laboratory computers through the Biolab program in the SDS section (available in Italian and English) and online on the manufacturer's website. In case of doubt, please contact the laboratory supervisor, whose name is displayed on the laboratory door.

1.6 Carcinogenic Agents

All procedures involving substances classified as H350 - May cause cancer and H351 - Suspected of causing cancer must be avoided by substituting less harmful alternatives.

If substitution is not possible, these procedures must be performed using a system that controls and limits exposure, such as a fume hood, while wearing personal protective equipment (PPE) (masks, lab coats, goggles and gloves). The use of these agents is strictly forbidden in laboratories without fume hoods that comply with current workplace safety regulations. In our laboratories, only one carcinogenic, mutagenic, or reproduction-toxic substance is routinely used: acrylamide in solution.

1.7 Biological Agents

At CERM, only class 1 microorganisms, as defined by D. Lgs. 81/2008, are handled. The use of biological agents of higher classes requires specific authorization from the competent authorities (local health authorities and/or the Ministry of Health).

The Centre is also authorized to use animal by-products and derived products not intended for human consumption in accordance with Regulation (EC) No 1069/2009.

Technical, Organizational, and Procedural Measures

For all activities involving health risks, technical, organizational, and procedural measures are implemented to prevent any exposure to biological agents:

- The use of harmful biological agents is avoided whenever possible.
- Worker exposure to biological risks is minimized.
- Work processes are designed appropriately.
- Collective protective measures are adopted; if exposure cannot be avoided otherwise, individual protective measures are implemented.
- Hygiene measures are enforced to prevent and minimize the accidental spread of biological agents outside the workplace.

The following precautions must be followed when handling Group 1 biological agents:

- Sterilize bottles and tools in an autoclave at 15 psi for at least 15 minutes at 121°C.

- Use a 10% sodium hypochlorite solution to clean the laboratory bench before and after working with microbes or nucleic acids (DNA/RNA).
- Decontaminate work areas at least once a day and after any spills.
- Nucleic acids, enzymes, microorganisms, and chemicals must not be stored in refrigerators together with food and beverages.

Users handling biological agents must have access to information and instructions, specifically regarding:

- Health risks associated with the biological agents used.
- Precautions to avoid exposure.
- Hygiene measures to be observed.
- The function and proper use of work clothes, protective clothing, and personal protective equipment (PPE).
- Procedures for handling Group 1 biological agents.
- How to prevent accidents and minimize their consequences.

1.8 Cryogenic Liquids

Users of cryogenic liquids (liquid helium and liquid nitrogen) must protect their eyes, face, and skin from liquid splashes by wearing:

- Safety goggles or a protective face shield
- Cryogenic gloves
- Lab coat and closed-toe shoes

Additionally, all work must be conducted in well-ventilated conditions.

1.9 Equipment

1.9.1 Ultrasonic Devices

Ultrasonic equipment (e.g. ultrasonic baths or high-power sonicators) should be placed in a separate, sound-proofed room. Users should only remain in the room for the time strictly necessary to start the equipment.

1.9.2 Magnetic Resonance

In NMR (Nuclear Magnetic Resonance) and EPR (Electron Paramagnetic Resonance) laboratories, intense magnetic fields are present. According to D.Lgs. 81/2008, the following zones are identified, with the 0.5 mT line clearly marked in every NMR laboratory:

Areas where access by the general public and particularly vulnerable workers is normally prohibited: areas where the magnetic field exceeds the Action Values (AV) ≥ 0.5 mT (5 Gauss).

Areas where the Exposure Limit Values (ELVs) for workers are met, i.e. under normal working conditions the areas affected by external magnetic induction stray field values of up to 2T (20000 Gauss), and up to 8T (80000 Gauss) for localised limb exposure or under controlled working conditions.

All areas where electromagnetic fields exceed Action Values (AV) for the general public and workers at particular risk are clearly marked and restricted.

Only authorised personnel, approved by the President of CERM, may enter areas where the electromagnetic field is equal to or greater than 0.5mT (5 Gauss). These areas are strictly off limits to persons with contraindications to radiofrequency who are at particular risk of exposure to electromagnetic fields, including

- People with implanted electrical medical devices (e.g. pacemakers, defibrillators, metal prostheses).
- People with severe organ or system impairments affected by non-ionising radiation (e.g. nervous system, gonads).
- Pregnant women.
- Minors.
- Persons with sickle cell anaemia.

Appropriate permanent signs are posted at the entrances to controlled areas and equipment room. No study or work stations may be set up in the controlled access area, nor may activities be carried out that require prolonged periods of time. Standing in the vicinity of the magnets is permitted only for the time strictly necessary to perform their tasks (e.g., insertion of samples, optimisation of parameters).

These rooms are not recommended for magnetic cards, watches and mobile phones, which could be damaged, or for ferromagnetic objects, which could be accidentally charged and attracted by the magnetic field.

According to D.Lgs. 81/2008 and ICNIRP (International Commission on Non-Ionizing Radiation Protection), the reference levels for static magnetic field exposure are:

Exposure Condition	VLE (Limit for Magnetic Induction) [mT]
Normal working conditions	2000
Localized limb exposure	8000
Controlled working conditions	8000

Exposure Condition	VA (Action Value for Magnetic Induction) [mT]
Interference risk with active implanted medical devices (e.g., pacemakers)	0.5
Risk of attraction and propulsion in peripheral fields of high-intensity sources	3

In the event of a magnet quench (a sudden loss of superconductivity leading to rapid helium release), the forced ventilation system will automatically activate in the laboratories.

All personnel must evacuate the laboratory immediately.

For more detailed information, refer to the CERM risk assessment document.

1.9.3 Centrifuges

- Always operate centrifuges according to the manufacturer's manual.
- Ensure proper balancing of samples before starting the centrifuge.
- Do not remain near the centrifuge while it is running unless necessary.

1.9.4 Autoclaves

- Follow all operating instructions carefully.
- Wear protective equipment (e.g., safety goggles, gloves) to avoid burns or injuries.
- Avoid standing near autoclaves while they are in operation.

1.9.5 UV-Emitting Equipment

- Minimize exposure time to ultraviolet radiation.

UV Transilluminators

- Always use fixed protective screens and UV safety glasses.
- Face shields (available near the transilluminator) should also be worn to protect facial skin.

Germicidal Lamps (Biological Safety Cabinets & Portable UV Lamps)

- Use only for the necessary sterilization period.
- Maximum exposure times:
 - Biological safety cabinet UV lamps: ≤ 30 minutes.
 - Portable UV lamps: ≤ 10 minutes.

- UV radiation can penetrate safety cabinet glass. Avoid staying near cabinets with the UV lamp turned on.

1.9.6 Ultrafreezers (-80°C)

- Wear thermal gloves for protection against extreme cold.
- Minimize door opening time to maintain internal temperature stability.
- Ensure proper door closure after use.
- If ice accumulates on the freezer door, remove it to ensure proper sealing.
- Check for water spills near the freezer and dry any excess water to prevent slipping hazards.

1.9.7 Cold Room

Minimize time spent inside the cold room. Wear a jacket or appropriate protective clothing to reduce exposure to low temperatures. The cold room is thermally and acoustically insulated. In order to be able to intervene in a timely manner in the event of an illness, it is necessary to inform someone (laboratory colleague or other person) that you intend to enter the cold room.

1.9.8 Transport of Cultures and Chemical Agents

- All glass or plastic containers (e.g., flasks, centrifuge tubes) carrying *E. coli* cultures or chemical agents must be transported inside plastic buckets with handles.
- For heavy loads, use a cart to prevent spills and injury.
- Compressed gas cylinders must be:
 - Fitted with a protective cap during transport.
 - Moved using a trolley with a securing chain.
 - Stored separately if incompatible (e.g., Oxygen/Hydrogen, Oxygen/Ammonia, Chlorine/Hydrogen, Chlorine/Ammonia).
 - Firmly secured to a wall with an appropriate chain.

1.9.9 Transport of Cryogenic Gases

- Use only approved insulated containers (Dewar flasks).
- Wear protective glasses, cryogenic gloves, and closed-toe shoes.

1.10 Chemical and Biological Waste Management at CERM

- Special collection tanks for liquid waste and plastic bins for solid waste are available in CERM laboratories.
- All lab waste is considered hazardous and must be disposed of accordingly.
- It is illegal to dispose of chemical or biological waste down sinks, drains, or in the environment.

- Personal protective equipment (PPE) must be worn when handling waste, including: Lab coats, gloves, masks, and safety goggles.

A table listing waste categories, identification codes, and specific contents follows.

Waste Code (EWC)	Description	UN Number	RID/ADR Transport Class	Hazard Class	Contents
180103*	Infectious or potentially infectious waste (liquid)	3291	6.2	H09	Large-scale culture media for microorganisms, liquids in contact with microorganisms, proteins, DNA
180103*	Infectious or potentially infectious waste (solid)	3291	6.2	H09	Petri dishes, test tubes, non-powdery solid materials contaminated with microorganisms, proteins, DNA
160506*	Laboratory chemical substances (liquid)	3287	6.1	H04, H05, H06, H3B	Chemical solutions containing acids, bases, salts; destaining solutions for acrylamide gels
160506*	Laboratory chemical substances (solid)	3288	6.1	H04, H05	Acrylamide gels, agarose gels, contaminated materials
150202*	Absorbents, filtering materials, rags, protective clothing	3077	9	H04, H05	Contaminated paper, filter paper, gloves, chromatography residues
150110*	Containers contaminated with hazardous substances (glass, plastic, metal)	-	3 – 6.1	H05	Reagent bottles, Pasteur pipettes, syringes, broken glass, plastic or metal containers contaminated with chemicals
160211*	Refrigerators	NO ADR	-	H14	Refrigerators containing CFCs, HCFCs, HFCs
160213*	Video equipment	NO ADR	-	H05	Video terminals
160214*	Decommissioned equipment	-	-	-	Computers, printers

Notes:

- Waste marked with * is classified as **hazardous**.
- Transport and disposal must comply with **safety regulations**.
- It is mandatory to **follow the specific collection and disposal procedures** for each type of waste.

For other types of waste, the user should refer to their activity supervisor. Waste must be collected according to the various types in the appropriate collection containers. Each container has a label clearly indicating the type, the code, and the laboratory of origin. It is prohibited to add substances to a container whose contents cannot be identified, as well as to leave or keep unmarked containers in use.

In the case of producing organic solvent waste, it is necessary to keep halogenated compounds separate from non-halogenated ones (waste containing a halogen concentration greater than 0.5% is considered halogenated waste). Chemical and biological waste must be stored away from heat sources, solar radiation, and electrical panels. They must be closed and should not be placed high or in unstable positions.

2 Application of Safety and Prevention Measures

2.1 Safety and Prevention Instructions

In the event of an accident, provide immediate first aid and seek medical assistance if necessary. Do not touch wounds or dressing materials without protective gloves.

Never give drinks to unconscious individuals.

If any substance splashes into the eyes, always rinse thoroughly with running water for at least 15 minutes..

In the event of minor burns or accidental contact of any body part with chemical reagents, wash thoroughly with water.

If chemical agents are accidentally ingested, do not induce vomiting and seek medical attention immediately.

Injured visitors, after going to the Emergency Room, must notify the President of CERM (cerm@unifi.it) as soon as possible and provide a written account of the incident, attaching any medical certification they may have.

2.2 Emergency procedures

The emergency plan prepared by the University for CERM is as follows.

EMERGENCY PLAN FOR THE CERM BUILDING

All those who periodically visit, even occasionally, the CERM facilities must be aware that:

1. In case of an emergency, there is an emergency plan in place to safely manage the situation.
2. There are trained personnel within the facility to handle a medium-risk situation in case of fire, and they have completed first aid courses. They can be recognized during an emergency by their orange vests. In case of an emergency, every visitor is required to follow their instructions. This

group of individuals (Marco Allegrozzi, Leonardo Gonnelli, Rebecca Del Conte, and Maria Cristina Mescalchin), referred to as the "Emergency Team," is ready to respond on all working days.

3. Inside the building, there is a public address system that signals the state of emergency. In the presence of a continuous siren, with an invitation to evacuate the premises, every visitor must leave the building without delay, heading towards the nearest exit route, which will be indicated in green on the appropriate maps posted in various locations within the building. The presence of a short-duration siren, accompanied by flashing visual alarms, serves as a pre-alarm signal for the emergency team members. In the event of a pre-alarm, every visitor can maintain their duties and position within the building, but they must follow the instructions of the emergency team personnel when necessary.

In any case, maximum cooperation is required. In the event of an evacuation, it is essential to follow the instructions of the emergency team personnel, leaving your workplace, restroom, or laboratory without delay, in an orderly manner, calmly, without running or creating confusion and alarm. Proceed along the marked escape routes; do not use elevators or lifts. Do not carry bulky items with you; **do not go back for any reason**, nor obstruct access or escape routes. It is important to **go to the designated assembly point outside the building** at the corner of Via Sacconi and Via Guerri and remain available to the competent authorities until the operations are complete.

GENERAL PROVISIONS

Every visitor to CERM must follow the following general provisions: Locate, within the CERM premises, the sign that specifies:

- the CERM emergency number: 4252, dialable from any internal phone (055 457-4252 if calling from a private phone). The reception answers this number during working hours (7:30 AM - 7:30 PM); outside working hours, the security service at the Scientific Campus responds at the internal number 3818, that is noted via a sticker on the phones (from other phones 346 6973395);
- the short numbers for calling fire brigade, ambulance, and police;
- the signs for the nearest exit route from the location.

Identify the "assembly point" outside the building, marked by a specific sign.

In case of injury:

If you find an injured person or someone who needs assistance, call 4252 (055 457-4252 if calling from a private phone), follow the instructions received, and remain on-site awaiting help. If the injury is particularly severe or if, for any reason, you do not receive a timely response at 4252, call the emergency number 112 directly, providing clear indications of the building's address, the location within the premises, and the condition of the injured person. It will also be necessary to notify 4252 that help has already been called.

In case of a minor fire:

If you notice a small amount of smoke, the smell of burning, or a small fire, call 4252 and follow the instructions received. If, for any reason, you do not receive a timely response at 4252, activate the fire

alarm by pressing one of the red buttons located along the building's corridors, generally near the fire extinguishers. The location of these switches is indicated on the maps posted on the building's walls.

In case of a serious fire:

If you notice a fire that poses an immediate danger to your safety or that of others:

1. Give a verbal alarm to the people present in the same room;
2. Leave the room where the fire has developed, closing the door behind you (but without locking it);
3. Press one of the fire alarm buttons located along the corridors, generally near the fire extinguishers (the location of these buttons is indicated on the maps posted along the building's walls);
4. Exit the building, following the nearest escape route;
5. Reach the external "assembly point," where you must remain available to provide information about the incident to the rescuers.

In case of a general evacuation alarm:

If an evacuation message is broadcast via loudspeakers and/or continuous sirens:

1. Leave the room you are in without delay, closing the door behind you (without locking it);
2. Proceed orderly to the outside of the building, using the nearest accessible escape route;
3. Reach the assembly point located at the corner of Via Sacconi and Via Guerri) and indicated by a specific sign;
4. Remain outside until the relevant services declare the emergency over.

In any case:

- Leave the area without delay;
- Never use elevators or lifts;
- Assist the evacuation of colleagues who are disabled or in difficulty, while ensuring your own safety. If unable to assist them, exit and report their presence.
- Do not go back for any reason.

When leaving a workplace, if possible:

- Secure equipment, experimental systems, and machinery;
- Shut down operating services (close any open taps, gas cylinders, or compressed gas lines, turn off electrical equipment, etc.).

This document is also available online at <https://www.cerm.unifi.it/documents-and-templates> and at the reception.

Centro di Risonanze Magnetiche - CERM
Università degli Studi di Firenze

Safety Handbook Risk Assessment Document

I, the undersigned, born in, country, on, declare
that I have read and understood the Safety Handbook and the Risk Assessment Document.

Signature

In the presence of the Scientific Supervisor _____

The President of CERM _____

Sesto Fiorentino, _____