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Organizational guideline Safety provisions for work in laboratory

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1 INTRODUCTION

This Organizational Guideline lays down requirements to ensure safety during work in the laboratory in compliance with the following legislation (as amended):

- Act No. 262/2006, Labour Code,
- Act No. 350/2011 on chemical substances and chemical mixtures and on the amendment of some acts (Chemical Act),
- Act No. 22/1997 on technical requirements for products and on the amendment of some legislative documents,
- Regulation 48/1982 Coll. stipulating basic requirements for occupational safety and safety of technical equipment,
- Government Decree No. 101/2005 on detailed requirements for workplaces and working environment,
- Government Decree No. 378/2001 stipulating detailed requirements for safe operation and use of machinery, technological equipment, instruments and tools,
- Government Decree No. 495/2001 stipulating detailed conditions of provision of personal protection equipment and washing, cleaning and disinfecting agents,

Related legislation:

- ČSN 01 8003 Principles of safe work in chemical laboratories
- ČSN 07 8304 Pressure gas vessels – Operation rules
- ČSN 07 8305 Metallic pressure vessels for gas transport Technical rules.
- ČSN 65 0201 Flammable liquids – Production, storage and handling areas
- ČSN 42 3898 Technical mercury
- ČSN 50110-1 ed. 2 Operation of electrical installations
- ČSN 50110-2 ed. 2 Operation of electrical installations – Part 2: National annexes

This Organizational Guideline lays down requirements to ensure occupational safety in the laboratory, including requirements for the use, maintenance, repair and inspections of laboratory equipment and other equipment in the laboratory at (the organization):
....., address:

This Guideline governs the above activities and is mandatory for those employees of the organization who have been assigned to such activities and for any other persons performing work related to the above activities.

Manufacturers' instructions for use of the installed equipment constitute an integral part of this Organizational Guideline. Manufacturers' instructions for use constitute a mandatory part of training pursuant to this Guideline.



The employees are obliged to comply with the above regulations to the applicable extent. This requirement does not relieve them of the obligation to comply with other applicable provisions of general legislation with which they have been made familiar.

2 DEFINITIONS

Source: ČSN 01 8003 Principles of safe work in chemical laboratories

Laboratory

- A room equipped for experimental, checking, developmental and other professional or scientific work in various branches of science and technology, such as chemistry, physics, biology, food research, electrical engineering or physiology.

Laboratory unit

- Separated area usually encompassing more than one laboratory and other equipment; laboratory units also contain sanitary facilities, in particular changing rooms, washing rooms, personal hygiene facilities, toilets, smoking room, canteen, offices and other rooms for laboratory personnel; they can also include corridors within the reach of the laboratories.

Direct heating of flammable liquids

- Heating of a vessel containing a flammable liquid by means of flame through a wire mesh and heating with a bare resistance coil or resistance wire.

Indirect heating of flammable liquids

- Heating of a vessel containing a flammable liquid by means of a water, salt or another liquid heating bath, an electrical heating mantle or another electrical heating element with a covered heating coil, steam, or hot air.

3 SAFE OPERATION PROVISIONS (GENERAL)

This safety standard defines working procedures for the use of equipment and rules for the motion of persons in the laboratory, with the aim to minimize any opportunity for injury at work in the laboratory. Furthermore, this document points to specific health and life threatening risks arising when working with the equipment and identifies available options to reduce the risks.

3.1 INDUCTION TRAINING AND HANDS-ON TRAINING

- Only employees who are professionally competent, have an adequate health status and have been assigned to this work by the authorized manager are allowed to work in the laboratory.



- Assessment of the employees' professional competence is the responsibility of the appropriate manager, assessment of their health status is the task of a physician.
- An employee's professional competence includes successful completion of induction and hands-on training.
- Within the induction training the employee must demonstrably be made familiar with the following documents:
 - This operational safety guideline
 - Manufacturers' instructions for use of the equipment
 - Legislation listed in Section 1 - Introduction (to a limited extent)
- The scope (extent) of familiarization with applicable provisions of the above documents shall be determined by the trainer, who will also make the trainee familiar with them.
- The trainer who will train the employees within the entire scope outlined above shall be an adequately qualified person. A record of the training shall be developed by the trainer. This training shall be organized within the induction and repeated SHE training.
- After completing the training, the employee shall sit for an examination in the content of the regulations, which he must pass by showing adequate knowledge. This training with examination shall be repeated periodically. See the guideline Organizational SHE provisions
- Organization of adequate hands-on training on the equipment shall be the responsibility of the appropriate manager, who shall specify the required time and scope.
- During the hands-on training the employee must primarily master the following:
 - Observance of safety regulations
 - Routine operation of the equipment
 - Safe handling of the equipment
 - Adequate use of prescribed personal protective equipment

3.2 SAFETY REQUIREMENTS FOR THE WORKPLACE (LABORATORY)

- The entrance to the laboratory must not be freely accessible, it must be kept locked.
- Laboratory work must be performed in laboratories which are equipped for it.
- The workplace must be kept clean and tidy so it should not endanger human safety or health.
- The laboratories must be equipped with the following items:
 - Personal protective equipment
 - Fire-fighting equipment
 - First aid equipment (box)
 - Drinking water source
 - Portable light (unless emergency lighting is installed)
 - Sanitation and neutralization agents depending on the operations performed



- The entrance to the laboratory must be provided with warning plates depending on the nature of work. (A list of the warning symbols is included in one of the annexes hereto.)
- The power and media (gas, air, water) distribution systems must be adequately marked to indicate the medium transported. (A list of the labels is included in one of the annexes hereto.)
- Escape routes and handling areas, water and gas shutoff valves and power ON/OFF switches must be kept free and accessible at all times.
- The workplace must be adequately lit.
- Any spilled liquid must be removed from the floor promptly.
- If the formation of explosive environment in the laboratory is conceivable, explosion protection documentation must be developed in compliance with Government Decree No. 406/2004 on detailed requirements for safety and health protection provisions in areas with the explosive hazard, and appropriate engineering and organizational provisions must be in place.

3.3 SAFETY REQUIREMENTS FOR THE EQUIPMENT, INSTRUMENTS AND TOOLS

- The equipment must be freely accessible and the handling area must be adequate to enable the equipment to be safely used.
- The equipment must be operated in line with the respective instructions for use and/or with other operational safety rules.
- The equipment, instruments and tools must be kept in an operational and safe condition.
- Prior to starting work, the condition of the instruments must be inspected in line with the instructions for use.
- Gears and moving parts of machines and equipment must be fitted with guards. The equipment must be easy to switch off from the operator's site.
- Analytical instruments, laboratory centrifuges and other equipment must be installed and operated in line with manufacturers' instructions or other approved recommendations in a manner minimizing any hazards associated with the use of high-voltage power, with the evolution of smoke or fumes, and with the presence of radiation, flame, and explosion.
- Carefully assembled apparatuses must be used. Any glass apparatus, especially if designed for vacuum distillation, must be thoroughly inspected for cracks and scratches prior to use. Glass with defects must not be used.
- Suitable vessels must be used for a glass apparatus operated under a vacuum or at a high pressure. A glass apparatus must be located in a closed fume hood or else protected with a guard (made of organic glass or of a metallic mesh). Exceptionally, a face shield or safety goggles with side shields may be used in substitution for a missing guard.



- Fused-in glass tubes in which chemical reactions are conducted must be protected with metallic guards. When handling such tubes, especially when opening them, wear a face shield and protective gloves.
- Use steel containers for Wood's metal baths. Do not use glass vessels or aluminium vessels.
- Equipment, instruments, tools and laboratory glassware to be repaired must be clean and dry and free from any residues of chemicals.
- Any damaged glassware and porcelain ware must be discarded.

3.4 SAFETY REQUIREMENTS FOR WORK IN THE LABORATORY

- Provisions adequate to the hazards that can be expected in view of the properties and amounts of substances to be used during the laboratory work must be taken.
- Air exhaust must be installed if release of harmful chemical substances during the work is possible.
- The temperature of an oil bath must not exceed the flash temperature of the oil. Discontinue the heating of an oil bath and replace the oil if water has entered the oil.
- Take into account the possibility of local overheating (resulting in decomposition) and the considerable run-down time when using electric heating mantles to heat or distillate materials. The heated flask bottom must be protected with a piece of glass fabric.
- Protect your hands with textile gloves (or an adequately thick piece of cloth) while forcing glass tubes, thermometers and the like into stoppers, plugs or tubes. The glass object must not have sharp edges and its front end must be greased or wetted.

3.5 SAFETY REQUIREMENTS FOR THE STORAGE OF CHEMICALS

- Every container with a chemical substance must be provided with a label displaying its chemical name or symbol/formula. In addition, every container with a hazardous chemical substance or mixture must display a hazard pictogram (a list of hazard pictograms is included in one of the annexes hereto).
- Very toxic materials must be kept locked to prevent access of unauthorized persons. Very toxic materials and toxic materials may be stored together in a common area, however, clearly separated. Their storage together with other chemicals in a common room is allowed only if stored separately, e.g., in a dedicated cabinet or on a dedicated shelf.
- The storage of flammable gases and liquefied gases in a laboratory is governed by ČSN 65 0201.
- Substances that react with glass (such as hydrofluoric acid) or decompose when in contact with glass (hydrogen peroxide) must be stored in plastic or metallic containers or in glass containers lined with a paraffin layer.



- Materials that are decomposed by light must be kept in dark glass containers or containers made of an opaque material. Containers that contain liquids and whose rounded surface acts as a convex lens must be protected from sunlight.
- Alkali metals must be stored under a layer of an inert high-boiling liquid (lamp oil, paraffin oil). White phosphorus must be stored under a layer of water. Any loss of the liquid must be made up for periodically.
- Containers with alkali metals and hydrides must be stored in a dedicated cabinet at a fire safe site beyond the laboratory. This cabinet must be labelled with the indelible text "Do not extinguish with water".
- Glass vessels with self-igniting materials must be stored in unbreakable containers of such size that the self-igniting material will remain under the protective liquid if the glass vessel breaks down.
- Materials with the explosion hazard and materials that react dangerously when in mutual contact must be stored separately with respect to their chemical nature. Examples of chemicals storage combinations that should be avoided are given in one of the annexes hereto.
- Containers with aggressive liquids must be stored so that they are safety accessible by all staff of the laboratory.
- Bromine vapour release into the surrounding area must be prevented when storing bromine.

3.6 ACTIVITIES THAT MUST BE AVOIDED – DON'TS

- Unauthorized persons are not permitted to work in the laboratory.
- Do not eat, drink or smoke in a laboratory.
- Do not use inappropriate or damaged equipment, instruments, tools or glass/porcelain ware.
- Do not use defective glass.
- Do not use glass vessels or aluminium vessels for Wood's metal baths.
- Do not have glassware/porcelain ware which is contaminated with strong acids or alkalis or with toxic, irritating or vigorously decomposing materials washed.
- Do not use laboratory glassware/porcelain ware as dishes for eating or drinking or for storing foods.
- Do not store foods or beverages intended for consumption in refrigerators or freezers assigned for the storage of chemical or biological materials.
- Do not relocate containers with toxic/very toxic or corrosive materials open.



- Never use your mouth to draw a toxic/very toxic or corrosive fluid into a pipette.
- Do not drain spilled mercury into the drain system.
- Do not leave a running distillation apparatus with a flammable liquid unattended.
- Do not sweep spilled nonpolar solvents over a plastic floor or pad (static charge hazard!).
- Do not use heating mantles or direct flame to heat vessels with solvents.
- Do not use water or alcohol to cool reaction vessels containing alkali metals, hydrides, or organometallic compounds.
- Do not heat strong oxidants by means of open flame or an oil bath.
- Do not drain in the drain system solvents that are not fully miscible with water; toxic/very toxic materials, acids and hydroxides above the specified concentration; explosive materials or materials producing toxic or irritating gases when in contact with water; acids or hydroxides.
- Do not pour chemicals or reaction waste into sanitary facilities.
- Do not use plastic containers to collect waste solvents.
- Do not put materials that can induce fire into containers for waste.
- When using cylinders with technological gases, do not:
 - use cylinders whose periodic retesting has expired or which are damaged
 - use unsuitable or damaged pressure regulators
 - use excessive force or unsuitable tools (extension pipes) to open or close valves
 - use the cylinders for any other purpose or for any other gas than as designated for
 - repair the cylinders or valves or change their labelling
 - speed up the gas discharging process by heating the cylinder
 - release the gases freely into a confined area unless this is a step of the operating procedure (e.g. in gas chromatography)
- Never leave any burning burners unattended.
- Persons without adequate qualification in electrical engineering are not allowed to perform any work on the electrical system/equipment.
- Persons without adequate qualification or permission are not allowed to make any activities or interventions into the technical equipment of the laboratory.
- Do not work without wearing your personal protective equipment.



4 SPECIAL REQUIREMENTS

4.1 HANDLING HARMFUL MATERIALS

- Technical provisions must be in place to prevent permitted exposure limits (PELs) or the highest admissible concentrations at the workplace from being exceeded during any work with materials that can endanger human health, including toxic/very toxic and corrosive materials, flammable liquids, chemical carcinogens and explosives.
- Direct personnel contact with such materials must be avoided through technical provisions.
- Personnel must wear adequate personal protective equipment.
- Personnel must have available and use protective ointment (such as Indulona) when working with materials that irritate or degrease skin, such as corrosive materials and organic solvents.
- Work with harmful materials must be minimized.
- Prior to any handling of materials that may be harmful must be preceded by thorough inspection of the technical and organizational health protection provisions, and sanitation means must be available in case of accident.
- Very toxic materials must be stored in a manner preventing their abuse. They must be kept locked, and appropriate records documenting their use and storage must be maintained.
- Do not relocate containers with toxic/very toxic or corrosive materials open.
- When pouring toxic/very toxic substances from a container (e.g. into another container), secure the containers against overturning or breaking.
- Use a tilting basket to pour a corrosive liquid out of a balloon flask.
- Use a blade, laboratory spoon or spatula made of a material that does not react with the substance when scooping up a solid toxic/very toxic or corrosive material.
- Never use your mouth to draw a toxic/very toxic or corrosive fluid into a pipette. Use a safety pipette or aspirate the liquid by applying a vacuum.
- When diluting/dissolving a material that releases heat during the process, add the material portionwise and stir and cool the system constantly.
- Rinse any spilled acid with water immediately; neutralization with sodium carbonate powder followed by a next rinsing with water may also be applied where appropriate.
- Rinse any spilled alkali with water immediately.
- Never use sawdust, textiles or any other organic material to remove spilled nitric acid or any strong oxidant mixture (such as chromosulfuric acid).
- The use of mercury is governed by ČSN 42 3898. A bench with elevated edges and with a smooth working area free from gaps is recommended for handling mercury; alternatively,



use a collecting dish as the base. Stationary instruments with mercury should also be fitted with collecting dishes. Do not drain spilled mercury into the drain system. Collect the mercury thoroughly and make the residues harmless.

Additional requirements for handling hazardous chemical materials are described in one of the annexes hereto.

4.2 HANDLING FLAMMABLE LIQUIDS

- The maximum total volume of flammable liquids which is allowed to be stored within a fire segment is 250 litres. In this, the maximum volumes of flammability class 1 liquids and low-boiling liquids are 50 and 20 litres, respectively.
- Avoid formation of static charge when handling nonpolar solvents.
- When planning to heat flammable liquids, take into account the specific properties of the system to be heated and make provisions to prevent fire. Ether and carbon disulfide require special attention.
- Avoid bumping when heating flammable liquids. As the simplest provision, use an anti-bumping chip or glass tube. When working with a vacuum, use a distillation capillary reaching nearly to the distillation flask bottom to prevent bumping.
- Use a heating medium which is miscible with the flammable liquid when heating a flammable liquid in a heating bath. This provision need not be applied when heating small volumes of low-boiling flammable liquids or when evaporating a liquid in a desktop rotary evaporator under a vacuum; water may be used as the heating liquid in such cases.
- Do not leave a running distillation apparatus with a flammable liquid unattended. Check the water inlet into the cooler when using a water cooling system.
- Prevent the formation of explosive mixtures and eliminate any fire initiation source when applying separation processes such as filtration, extraction, sublimation, adsorption, evaporation and centrifugation to systems involving flammable liquids.
- Apply similar provisions as above during operations such as mixing, milling and mixing of systems involving flammable liquids or low flash point materials. Prevent local overheating during the milling or mixing of solids. Make provisions to prevent dust or vapours of flammable liquids from exploding and/or initiating fire.
- If a flammable liquid has spilled, shut off all gas appliances in the room, switch off electricity by means of the ON/OFF switch located beyond the room, prevent unauthorized persons from entering the room and provide good ventilation (not to the corridor). Absorb the flammable liquid into a suitable porous material, put the latter in a metallic container fitted with a lid, and dispose off in accordance with the applicable act on wastes.
- Do not sweep spilled nonpolar solvents over a plastic floor or pad (static charge hazard!).



- Personnel performing the disposal must protect themselves against the harmful effects of the spilled liquid. No non-emergency personnel should be present in the room.

4.3 HANDLING SOLVENTS HAVING THE TENDENCY TO FORM PEROXIDES

- Solvents such as the following ones form peroxides on extended contact with oxygen in air: dialkyl ethers, dioxin, furan, tetrahydrofuran, cellosolve, glycol ethers, 2-propanol and unsaturated hydrocarbons.
- Those solvents must be handled in a fume hood with the protective glass slid down. Where this is impractical, use a face shield or protective goggles.
- If planning an operation which may bring about concentration of peroxides present in a solvent (serious explosion hazard), remove the peroxides from the solvents prior to use/distillation. Check the efficiency of this step.
- Do not use heating mantles or direct flame to heat vessels containing any of the above solvents (local overheating hazard). Use a bath with a suitable liquid (e.g. a paraffin, silicone or mineral oil) heated by an electric heater with an insulated coil.
- The use of an inert atmosphere (e.g. nitrogen) is recommended for distillations in columns. When distilling, leave an adequately large distillation residue, 10% as a minimum, in the distillation flask.
- An addition of a phenolic antioxidant is recommended when storing the distilled solvents.
- The distillation waste disposal procedure must be specified prior to starting the process.

4.4 HANDLING ALKALI METALS, HYDRIDES, ORGANOMETALLIC COMPOUNDS AND STRONG OXIDANTS

- Make ready appropriate extinguishing equipment in case of accident prior to starting work with alkali metals, hydrides or solutions of organometallic compounds.
- Wear eye and face protecting equipment when performing any operation involving alkali metals, hydrides, solutions of organometallic compounds or strong oxidants.
- Prior to handling such materials, inspect the apparatus for any damage or defect.
- Do not use water or alcohol to cool reaction vessels containing alkali metals, hydrides, or organometallic compounds.
- Be very careful when opening tins with hydrides. Hydrogen under pressure may be present. Best open the containers put into a polyethylene bag filled with nitrogen.
- Do not heat strong oxidants with open flame or in an oil bath.



4.5 HANDLING TECHNICAL GASES

- Comply with the applicable technical standards listed in the Introduction when transporting, handling and/or storing steel cylinders containing pressurized liquefied technical gases or gases dissolved under pressure.
- Do not store directly in the laboratory any cylinders with technical gases that are not required for the operations. Remove any cylinders that are permanently out of use or are empty.
- The cylinders must be secured in the upright position with a belt or chain above the midpoint or they must be accommodated in stable or mobile stands.
- The doors of the rooms in which cylinders with pressurized and/or other gases are present must be fitted with plates with the names of the gases.
- Prior to starting work with technical gases, the possibility to ventilate the area must be provided, appropriate protective, fire extinguishing and sanitation means must be made ready, and the sealing and performance of the reduction valves and apparatus seals must be inspected.
- When using cylinders with technological gases, do not:
 - use cylinders whose periodic retesting has expired or which are damaged
 - use unsuitable or damaged pressure regulators
 - use excessive force or unsuitable tools (extension pipes) to open or close valves
 - use the cylinders for any other purpose or for any other gas than as designated for
 - repair the cylinders or valves or change their labelling
 - speed up the gas discharging process by heating the cylinder
 - release the gases freely into a confined area unless this is a step of the operating procedure (e.g. in gas chromatography)
- Metal cylinders with technical gases must be provided with the prescribed colour coding.
- Wear personal protective equipment when handling liquefied gases (air, nitrogen, ammonia).
- Be sure not to exceed the maximum permitted weight of the contents when taking samples of liquefied gases into pressure cylinders.
- **WARNING:** The hazard of explosion arising from confusion of liquid nitrogen with liquid oxygen or air exists when handling flammable materials. Glass Dewar flasks must be provided with protective metallic jackets. Metallic Dewar flasks, when transported or moved, must be fitted with a neck cover such that the gasified fractions can escape while the liquid cannot splash out.
- Appropriate technical standards apply to the installation of gas pipes and branches, propane-butane distribution systems and the design, construction, testing and use of gas appliances.



- If gas fuel (e.g. natural gas) has escaped, shut off the inlet valve and switch off power by means of the ON/OFF switch located beyond the endangered area. Ventilate the contaminated room(s)/area. No smoking. No access by unauthorized persons.
- Never leave any burning burners unattended. In the event of flashback or flame flash, shut off gas supply immediately and adjust the burner.
- The cylinders must be separated from any heating sources/surfaces by a distance ensuring that the cylinder surface temperature will not exceed 25°C for methyl chloride and 50°C for other gases. The distance between the cylinders and any open flame source must not be shorter than 3 metres.

4.6 HANDLING ELECTRICAL EQUIPMENT

- Electrical equipment must be maintained in a condition complying with applicable standards and regulations.
- Such equipment must be periodically subjected to inspection and testing within the scope and in intervals stipulated by applicable standards and manufacturers' directions.
- Operation of and work on electrical equipment are governed by the following standards:
 - ČSN EN 50110-1 ed. 2 Operation of electrical installations
 - ČSN EN 50110-2 Operation of electrical installations. National annexes

4.7 HANDLING EXPLOSIVES

- Work associated with the use of explosives is governed by guidelines for the operation of laboratories specializing in explosives.

4.8 HANDLING RADIOACTIVE MATERIALS

- Activities involving radioactive materials and the ionizing radiation hazard are governed by special regulations.

4.9 WASTE REMOVAL

- Toxic/very toxic materials and packaging materials must be disposed of in accordance with the act on wastes.
- Only sufficiently diluted (1:10 or more) solvents which are fully miscible with water (as a single portion of no more than 0.5 litres) and aqueous solutions of acids and hydroxides diluted 1:30 or more may be disposed of by draining in laboratory sinks and other laboratory drains.



- Do not drain in the drain system solvents that are not fully miscible with water; toxic/very toxic materials, acids and hydroxides above the specified concentrations; explosive materials or materials producing toxic or irritating gases when in contact with water; acids or hydroxides.
- Do not pour chemicals or reaction waste into sanitary facilities such as toilets, sinks and wash-basins.
- Following removal of residues of self-igniting materials and neutralization, collect waste solvents in conspicuously labelled containers. Do not use plastic containers to collect waste solvents. At the workplaces, containers with waste must be stored at sites which are reserved for them and are subject to special supervision, and they must be emptied periodically (removed by a specialized company).
- Residues of alkali metals, alkali metal hydrides and solutions of organometallic compounds after reactions or solvent evaporation must be disposed of immediately. Use 96% ethanol in a fume hood for alkali metals, and ethanol under an inert gas for potassium. Alkali metal hydrides are removed based on their reactivity with ethyl acetate or acetone.
- Do not put into containers for waste such materials as may induce fire or self-ignition. Do not put any flammable material into a container for waste glass located near a glass-blowing burner. Containers for waste must be made of a metal and must be fitted with a lid.
- A dedicated container must be used for glass fragments and for waste with sharp edges.
- Waste (rags, sawdust) contaminated with oils or with flammable materials must be collected in closed tin containers. Containers with base feet are recommended for this purpose. The container contents must be periodically handed over for disposal in compliance with the act on wastes.

5 PERSONAL PROTECTIVE EQUIPMENT

- The method, conditions and time of use of personal protective equipment are specified in the organizational guideline for the provision of PPE based on identified risks and also in the appropriate sections hereof.
- The employees must be familiar with the personal protective equipment assigned to them and with use of the equipment. This familiarization shall be performed by the workplace manager. When obtaining the PPE, the employee shall sign the PPE card to acknowledge that he/she has been made familiar with the PPE and its use.
- Every employee is obliged to appropriately use the PPE which he/she has obtained.
- Personnel must have available and use protective ointment (such as Indulona) when working with materials that irritate or degrease skin, such as corrosive materials and organic solvents.



6 MAINTENANCE AND REPAIR

- Periodic maintenance and adjustment of the laboratory equipment, instruments and tool as described in the manufacturers' instructions for use are the responsibility of the person who has been assigned to this task.
- Routine maintenance and adjustment of the equipment shall be performed on an ongoing basis by the person who is responsible for the laboratory. Routine maintenance is confined to the cleaning of the parts of the equipment, grinding of sharp edges, removal of chips and, where appropriate, lubrication.
- Equipment cleaning from impurities after each use/by the end of the day is the duty or responsibility of the staff using it.
- Equipment to be subjected to maintenance, repair and/or cleaning must be first disconnected from power (except for some specific situations).
- Movable equipment parts must be at rest for maintenance, adjustment and/or cleaning.
- Equipment, instruments, tools and laboratory glassware to be repaired must be clean and dry and free from any residues of chemicals.
- Any maintenance or repair procedure for which the equipment must be under voltage must be approved by the appropriate manager.
- Any work on an electrical facility must be performed by staff with adequate qualification in electrical engineering.
- Any work on a gas facility must be performed by staff with adequate qualification.
- Maintenance and repair of mechanical parts of equipment are the responsibility of the appropriate manager. Operators are not allowed to perform any repair without obtaining approval from the appropriate manager.
- Any sophisticated repair must be performed by a professional service organization.
- If professional qualification pursuant to a special regulation is required for performing an operation or repair, then no person who does not possess such qualification shall be allowed to perform that operation or repair.
- Comprehensive maintenance of the laboratory, its equipment, instruments and tools must be performed once a year. The scope (extent) of this maintenance shall be specified by the manager responsible for the operation of the laboratory.

7 CHECKS AND INSPECTIONS

- Prior to starting work, check the safety and performance of the laboratory equipment, instruments and tools (by visual inspection, based on the manufacturer's instructions for use). If any fault or defect which may potentially endanger human life or health or the safe



- performance of the equipment is detected, take the equipment out of use immediately (mark it visibly out of order).
- During the run of the laboratory equipment or instruments, inspect the run and the performance of the control and protective systems constantly.
- The requirements for the checks and inspections are also specified in the appropriate sections hereof.
- The school top management must be informed immediately about defects and shortcomings identified.
- A total or partial check of the equipment must be performed whenever failure or a fault occurs on a safety-related part of the equipment.
- Once a month as a minimum, the manager responsible for the operation of the laboratory shall perform inspection focused on:
 - housekeeping
 - technical condition of the laboratory equipment, instruments and tools
 - performance of the protective (guard) system
 - use of personal protective equipment
- It is the responsibility of the manager responsible for the operation of the laboratory that the periodic professional inspections are performed in intervals and within a scope conforming to applicable regulations and standards. (This applies, in particular, to electrical and gas appliances and pressure systems).
- The professional inspections shall be conducted in compliance with applicable standards and regulations. (This applies, in particular, to electrical and gas appliances and pressure systems). They shall be performed by a professional company – person adequately licensed for this job.
- Any other periodic inspections shall be performed based on the manufacturer's instructions for use of the particular equipment and/or other general regulations.
- The inspection certificate shall be stored by the appropriate manager (manager responsible for the operation of the laboratory) at least until obtaining a next inspection certificate. This inspection certificate must be accessible to bodies of the national professional supervisory authority.
- Deficiencies identified within a professional inspection must be eliminated. This is the responsibility of the appropriate manager (manager responsible for the operation of the laboratory).
- The employer is obliged, once a year as a minimum to organize inspection of safety and health at work on the equipment and at the workplace where the equipment is located.



8 WORK RISKS AND PROVISIONS TO ELIMINATE THEM

The employer is obliged to ensure occupational safety and health protection of employees with respect to the risks which may endanger their life and/or health. To this end the employer must identify, in particular, the following:

- The specific risk existing at the workplace and in the school building (which follow from the hazards arising from the use of the specific machines and equipment and from the area in which the persons operate)
- The nature of the identified risks:
 - as regards the action of the risk with respect to time, i.e. how frequently the risk occurs in the specific case (e.g. permanently, during handling/activity, extraordinarily, ...)
 - as regards the action of the risk with respect to the activity performed (e.g. during operation, during maintenance/repair, ...)
- The source of the risk, specified as closely as possible (e.g. mechanical parts, tools, electricity, uneven floor, ...)
- The cause of the risk as regards, e.g., the emerging hazardous condition or hazardous action of the source of the risk (e.g. removal of a protective device)
- The hazard that threatens the lives/health of the persons who are exposed to the danger (e.g. electric shock, tripping, slipping, cutting, scalding, burning, ...)

The most frequent risks include:

- Unprofessional, careless operation
- Disregarding prohibitions
- Electric shock
- Injury from a tool
- Fall of a load
- Poor visibility, poor housekeeping at the workplace
- Failure to perform prescribed inspections, maintenance, repairs
- Use of a damaged machine/instrument/facility
- Use of a machine/instrument/facility with a missing guard
- Tripping, slipping, falling
- Failure to use prescribed PPE
- Fire, explosion

Analysis of the risks and specification of provisions to reduce the hazards are included in a separate document – Risk management and prevention system.



9 RESPONSIBILITIES

Responsibility for compliance with the provisions of this Guideline and for supervision thereof lies with every employee within the scope of their job duties.

The manager responsible for operation of the laboratory shall be responsible, in particular, for the following:

- Employees working in the laboratory meet the prescribed qualification requirements
- Employees have been provided with the prescribed personal protective equipment; the laboratory is equipped with the prescribed PPE; and the employees have been made familiar with the use of the PPE
- For a safe condition of the laboratory including its prescribed equipment
- For the technical condition of the laboratory equipment
- For a safe storage of materials, chemicals, pressure cylinders, etc.
- For adherence to prescribed working procedures
- Respect existing prohibitions
- For putting a facility out of use if defects immediately endangering employees' life or health have been detected on/in it
- For implementation of prescribed inspections and maintenance of the laboratory equipment
- For prompt elimination of deficiencies identified by inspections
- For identification of the specific risks of injury or harm that exist in the laboratory during work

An employee who performs an activity in the laboratory shall in particular:

- Comply with the provisions of this Guideline and applicable safety rules, shall be disciplined and keep order at the workplace
- Check the safety and performance of the laboratory equipment, instruments and tools (prior to starting work); if a defect threatening human life or health is detected, they shall immediately put the device out of use and shall inform the manager responsible for operation of the laboratory
- Store materials, chemicals, pressure cylinders, etc. safely
- Comply with the prescribed working procedures
- Proceed in accordance with the instructions for use of the equipment
- Respect existing prohibitions
- Use prescribed personal protective equipment

10 CONCLUSION

All employees whose job is related to the operation, inspections, repair and/or maintenance of the laboratory, laboratory equipment, instruments and tools must be made familiar with this Organizational Guideline within their training. Responsibility for compliance with that requirement lies with the employer.



The employer shall also be responsible for a due development, maintenance and storage of all documents attesting to the fulfilment of duties in the domain of SHE and fire protection, including records from training and inspections and instructions for use, and for those documents being kept up to date. Where updating is appropriate, the employer shall be responsible for this being performed by an authorized manager.

This Dean's decision comes into effect on the 1th September 2013
Any exceptions are decided by the Dean.

Prof. Dipl. - Ing. Otomar Linhart, D.Sc.
Dean of the FFPW USB

Appendices:

1. AUTHORIZATION
2. EXAMPLES OF INCOMPATIBLE CHEMICALS WHICH MUST NOT BE STORED TOGETHER
3. HAZARD SYMBOLS USED IN LABORATORIES
4. MARKING OF PIPE SYSTEMS
5. LABELLING OF CHEMICAL SUBSTANCES
6. HANDLING OF DANGEROUS CHEMICALS



11 ANNEXES

11.1 ANNEX 1: AUTHORIZATION

Authorization

To ensure safety in the laboratory and related areas,
carrying out statutory inspections and regular maintenance
are authorized the below stated employees responsible for the operation of the laboratory

Workplace (Laboratory, cabinet, storage of chemicals)	Name, surname	Signature

The above mentioned were trained in the regulations on safety and health for the performance of the work and are familiar with the directive - Ensuring safety at work in the laboratory and with manuals of manufacturers of various equipment. Their knowledge was tested with the result "passed".

Failure to comply with the obligations laid down in response to organizational directive will be considered a breach of duty by an employee in accordance with the § 106 of the Labor Code.

Training and verification of knowledge performed:

.....
Name, surname, function

.....
signature

In date



11.2 ANNEX 2: EXAMPLES OF INCOMPATIBLE CHEMICALS WHICH MUST NOT BE STORED TOGETHER (INFORMATIVE)

Source: ČSN 01 8003 Principles of safe work in chemical laboratories (October 2002)

Substances listed in the left column should not come in contact with substances/materials listed in the right column and *vice versa*.

Acetic acid	chromic acid, nitric acid, hydroxy group-containing compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetone	concentrated sulphuric and nitric acid mixtures
Acetylene	chlorine, bromine, copper, fluorine, silver, mercury and compounds thereof
Activated coal	calcium hypochlorite, all oxidants
Alkali and alkaline earth metals, e.g. sodium, potassium, lithium, cesium, magnesium, calcium, aluminium	carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons
Alkali metals	epichlorohydrin, ethylenchlorohydrin, water, aqueous solutions
Ammonia	chlorine, bromine, iodine, mercury, calcium hypochlorite, hydrogen fluoride, chlorates
Ammonium (potassium) peroxosulfate	chlorates, perchloric acid, sulfur, metal (aluminium) powders
Ammonium nitrate	acids, metal powders, flammable liquids, nitrites, sulfur, finely dispersed organics, flammable materials
Aniline	nitric acid, hydrogen peroxide
Barium perchlorate	stearate salts
Barium peroxide	reducing and flammable materials, e.g. aniline, alcohols, organic acids, fats, oils, phosphorus, antimony, activated carbon
Bromine	ammonia, ethylene, acetylene, butadiene, butane and other petroleum gases, sodium carbide, turpentine oil, benzene, finely dispersed metals, hydrogen, sulfur, arsenic, antimony, phosphorus, sodium, potassium
Calcium oxide	water
Calcium perchlorate	acids (see also perchloric acid)
Carbides, burnt lime	organics, acids of all types, water, aqueous solutions
Carbon disulfide	oxidants, flammable liquids, explosives
Coal, carbon black (soot)	fats, oils, metal sulfides, oxidants
Copper	acetylene, hydrogen peroxide
Crotonaldehyde	alkalis, ammonia, amines
Dust generating materials	fats, oils, oxidants, metal powders
Ethyl nitrite	hydrazine, ammonium salts, ammonium halides, sulfocyanides, hexacyanoferrates
Fats, oils	oxygen, organics, fibres, wool, coal, carbon black, metal sulfides, pyrites, oxidants, dust producing materials, explosives
Flammable liquids (especially hazard class I and II)	oils, oxidants, explosives
Fluorine	isolated from all materials, particularly from hydrogen and amorphous silicon oxide
Hydrocarbons (benzene, butane, propane, petrol)	fluorine, chlorine, bromine, chromic acid, sodium peroxide







Hydrogen cyanide	nitric acid , alkalis
Hydrogen fluoride (anhydrous)	ammonia (gas and aqueous solution)
Hydrogen peroxide	copper, chromium, iron, most metals and metal salts, all flammable liquids, flammable materials, aniline, nitromethane, glycerine, oils, resins, cotton, wool, wood dust, coal
Hydrogen sulfide	fuming nitric acid, oxidizing gases
Hydroxylamine	zinc powder, calcium, dichromates, oxidants
Chlorates	ammonium salts, acids, metal powders, sulfur, carbon disulfide, finely dispersed organics or readily flammable materials, red phosphorus, ammonium sulfocyanide, hydrazine, hydroxylamine, amines
Chlorine	hydrogen, ammonia, acetylene, butadiene, butane and other petroleum-based gases, sodium carbide, turpentine oil, benzene, finely dispersed metals, ether
Chlorine dioxide	ammonia, methane, phosphine, hydrogen sulfide
Chromic acid	acetic acid, naphthalene, camphor, glycerine, turpentine oil, ethyl alcohol and other flammable liquids
Iodine	acetylene, ammonia (gas and aqueous solutions), hydrogen
Potassium permanganate	glycerine, ethylene glycol, benzaldehyde, sulfuric acid, ethanol, ether, turpentine, mixtures of sulfur, tin, organics and ammonium nitrate
Mercury	acetylene, fulminic acid, ammonia, ethanol/nitric acid mixture
Mercury chloride	phosphorus, salts of arsenic, antimony, silver, alkali metals, alkali sulfides, acetylene, ammonia, oxalic acid, metal oxalates, metal sulfides
Metal powders, bronze	fats, oils, metal sulfides, oxidants
Nitrates and materials containing absorbed nitric acid	sulfur, potash, concentrated sulfuric acid, organics, carbides, phosphorus, explosives
Nitric acid, concentrated	acetic acid, aniline, chromium(VI) oxide, hydrogen cyanide, hydrogen sulfide, flammable liquids and nitrable materials, oils, metal powders, explosives, phosphorus, hydrogen phosphide, organics
Nitromethane	amines, strong acids and alkalis
Nitroparaffins	inorganic alkalis
Organics	fats, oils, oxidants (e.g. liquid air, nitric acid, chlorates, peroxyacids), explosives (e.g. picric acid and picrates, fulminates), burnt lime, carbides
Oxalic acid	silver, mercury
Oxidants	sulfur, phosphorus, nitric acid, metal powders, coal, carbon black, explosives, flammable liquids, nitro compounds, alkali metals, alkaline earth metals, magnesium, elektron, calcium carbide, resins, dust producing materials, hydrogen sulfide
Oxygen	oils, lubricants, hydrogen, flammable liquids, flammable solids and gases, activated carbon, metal powders
Perchloric acid	acetic anhydride, bismuth and its alloys, ethyl alcohol, paper, wood, lubricants and mineral oils, strong dehydrating agents and a oxidants
Peroxides, organic	acids (both organic and mineral) – avoid friction
Peroxyacids	sulfur, metal powders, coal, organics, flammable liquids (especially hazard class I and II)
Phosphorus	oxidants, explosive, sulfur, metal sulfides, alkali metals, alkaline earth metals, flammable liquids
Potassium chlorate	acids (see also Chlorates)
Resins, oils	oxidants, flammable liquids, mineral acids, chlorine, iodine,








	bromine
Silver	acetylene, oxalic acid, tartaric acid, fulminic acid , ammonium compounds
Sodium nitrate	ammonium nitrate and other ammonium salts
Sodium/potassium peroxide	any oxidizable material, e.g. ethyl alcohol, methyl alcohol, acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerine, ethylene glycol, ethyl and methyl acetates, furfural, water, sodium hydroxide, potassium hydroxide, sulfur, metal (aluminium) powders, cotton
Sulfur, metal sulfides	coal, carbon black, oils, oxidants, metal powders, explosives, alkali metals, alkaline earth metals
Sulfuric acid, concentrated	oxidants (e.g. nitric acid, nitrates, chlorates, ...), explosives, metal powders
Urea	chlorine, bromine, iodine








11.3 ANNEX 3: HAZARD SYMBOLS USED IN LABORATORIES

Symbol	Meaning and location	Note
	Health hazard due to potential contact with dangerous substances. At the entrance to the area or at the workplace.	Examples of use: - Storage facilities accommodating dangerous substances that can cause poisoning, e.g. when inhaled or swallowed or in contact with skin - At sites where dangerous substances are manufactured/handled
	Hazard of burning from contact with fire or hot surfaces. At the entrance to the area or at the workplace.	Examples of use: - At sites where hot surfaces are present - At sites where hot materials or objects are used - At sites where fire is used/present
	Hazard of burns from corrosive materials. At the entrance to the area or at the workplace.	Examples of use: - Storage facilities accommodating corrosive materials that can cause burns - At sites where dangerous substances are manufactured/handled
	Health hazard due to potential contact with toxic materials. At the entrance to the area or at the workplace.	Examples of use: - Storage facilities accommodating toxic substances that can cause poisoning, e.g. when inhaled or swallowed or in contact with skin - At sites where dangerous substances are manufactured/handled



 <p>BIOLOGICKÉ RIZIKO</p>	<p>Health hazard due to potential contact with hazardous biological material.</p> <p>At the entrance to the area or at the workplace.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- Storage facilities for hazardous biological material- At sites where hazardous biological material is processed or handled in any other way
 <p>LASEROVÉ ZÁŘENÍ</p>	<p>Presence of laser radiation and health hazard.</p> <p>At the entrance to the area and at sites where the hazard of exposure to radiation exists</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where laser radiation is used
 <p>POZOR NEIONIZUJÍCÍ ZÁŘENÍ</p>	<p>Presence of non-ionizing radiation posing health hazard.</p> <p>At the entrance to the area and at sites where the hazard of exposure to radiation exists</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where non-ionizing radiation is used
 <p>OXIDUJÍCÍ LÁTKY</p>	<p>Presence of oxidants</p> <p>At the entrance to the area/storage facility or at the site of storage at the workplace.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- Storage facilities accommodating pressure cylinders with oxygen, areas with other oxidants
 <p>NEBEZPEČÍ POŽÁRU</p>	<p>Fire hazard</p> <p>At the entrance to the area. This symbol may also be displayed for a limited period of time, i.e. while the risk exists.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At workplaces where flammable liquids and/or flammable/easily ignitable materials are handled- At storage facilities accommodating flammable liquids, pressure cylinders, chemicals, and the like








	<p>Presence of hazard class I flammable liquids. A similar plate for flammable liquids in hazard classes II to IV.</p> <p>At the entrance to the area/storage facility or at the site of storage at the workplace.</p>	<p>Categorization with respect to the flash point (see the Safety Data Sheet)</p> <p>Class I: up to 21°C Class II: from >21°C to 55°C Class III: from >55°C to 100°C Class IV: from >100°C to 250°C</p>
	<p>Presence of pressure cylinders.</p> <p>At the entrance to the area/storage facility or at the site of storage or handling at the workplace.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- In pressure cylinder storage facilities- At sites where pressure cylinders are present
	<p>Presence of pressure cylinders with oxygen Similar plates for other gases.</p> <p>At the entrance to the area and at a visible site in the area of storage or handling.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- In pressure cylinder storage facilities- At sites where pressure cylinders with the specific gas are present
	<p>Specification of the maximum number of cylinders stored, with the possibility of completing the precise number.</p> <p>At the entrance to the area and at a visible site in the area of storage.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- In pressure cylinder storage facilities- At sites where pressure cylinders are present
	<p>No entry to unauthorized personnel for safety reasons.</p> <p>At the entrance to the area.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where the hazard of injury exists,- such as storage facilities accommodating chemicals, flammable liquids and the like








	<p>No smoking or using flame in the area where this might initiate fire or explosion.</p> <p>At the entrance to the area/storage facility or at a visible site at the workplace.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where flammable liquids, pressure cylinders and/or flammable materials are handled- In areas with an explosive atmosphere- In storage facilities accommodating chemicals, flammable liquids, pressure cylinders, and the like
	<p>No smoking, eating or drinking area for safety reasons</p> <p>At the entrance to the area/storage facility or at a visible site at the workplace.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where not only smoking but also eating foods or drinking beverages is not permitted for safety reasons, for instance due to the possibility of contamination or confusion of liquids
	<p>Do not touch the dangerous site, surface, material or part of machine for safety reasons.</p> <p>At a visible site near the hazardous area. The possibility exists of displaying this sign for a limited period of time while the hazard exists.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites with the hazard of injury or harm such as burning from hot objects, cutting or burns from corrosive liquids due to contact with a hazardous area, surface or material- such as sharp objects or chemicals
	<p>Use protective goggles or face shield during work in order to eliminate or reduce the hazard of face injury or eye damage.</p> <p>At a visible site at the workplace, at a machine or facility or at the entrance to the area.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where the hazard of damage to the eyes or face injury due to the presence of chemical materials exists, e.g. in laboratories or in areas where acids, alkalis, disinfectants or corrosive liquids are handled



	<p>Use protective gloves during work in order to eliminate or reduce the hazard of body or hand injury.</p> <p>At a visible site at the workplace, at a machine or facility or at the entrance to the area.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where the hazard of hand injury from chemicals and/or biological agents exists- At sites where the hazard of hand skin damage due to a wet, damp or strongly contaminating environment exists
	<p>This machine/facility must be operated by authorized personnel.</p> <p>At a visible site near the machine/facility.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At machines/facilities whose operation is associated with an elevated hazard endangering the life or health of the operator or persons nearby
	<p>First aid station/point.</p> <p>At the entrance to the area or at another visible site.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- Area designed for providing first aid, first aid box
	<p>Site designed for eye rinsing</p> <p>At the entrance to the area or at another visible site.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- Area where eyes can be rinsed- Facility serving to rinse eyes
	<p>Main water shut-off valve</p> <p>At a visible site near the main water shut-off valve or at the route to it.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At the entrance to the area where the main water shut-off valve is located- At the valve or control element serving as the main water shut-off valve
	<p>Main gas shut-off valve</p> <p>At a visible site near the main gas shut-off valve or at the route to it.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At the entrance to the area where the main gas shut-off valve is located- At the valve or control element serving as the main gas shut-off valve



	<p>ON/OFF switch of a machine, facility of system (the type of the facility may be specified).</p> <p>At a visible site near the main ON/OFF switch or at the route to it.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At the entrance to the area where the ON/OFF switch is located, such as a materials storage facility- At the control element serving as the ON/OFF switch of the facility.
	<p>Electric facility; do not use water, a water or foam extinguisher or a fire hydrant to extinguish fire while the facility is under voltage.</p> <p>At a visible site near the electric facility.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- At sites where an electric facility is present or on the guard of the facility- At sites/facilities where the hazard of electric shock exists during a fire-fighting action while the facility is under voltage- e.g. distribution boxes, fuse boxes
	<p>Electric facility with the ON/OFF switch. Switch off in the event of danger. Do not use water, a water or foam extinguisher or a fire hydrant to extinguish fire while the facility is under voltage.</p> <p>At a visible site at the electric facility with the ON/OFF switch.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- On doors or main distribution boxes, at switchboards and the like
	<p>Fire extinguisher(s) is/are located here.</p> <p>At the entrance to the area or at a visible site near the fire extinguisher site.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- Always where the location/distribution of fire extinguishers is not straightforward, e.g. in complex, extensive or hidden areas, such as fire cabinets
	<p>A fire hose or fire hydrant is located here.</p> <p>At the entrance to the area or at a visible site where the fire hose is located.</p>	<p>Examples of use:</p> <ul style="list-style-type: none">- On the door of the box/cabinet where the fire hose/hydrant is stored/located.



11.4 ANNEX 4: MARKING OF PIPE SYSTEMS

Service liquid piping marking pursuant to ČSN 13 0072:

Piping for service fluids is colour coded:

- by a paint coat along the whole piping length or
- by paint strips.










Paint strips are located on the piping as follows:

- At a distance of 150 to 500 mm from machines, pipe crossings, pipe bridges and valves and in front of barriers or walls through which the pipe passes
- On straight pipes, in points where they are necessary or at a constant spacing of 5 to 10 metres.

The colour coding is completed with text, labels and hazard symbols consisting in:

- Name of the fluid, e.g. feedwater
- Text consisting of letters and numbers, e.g. NaOH 30%
- Chemical formula of the fluid, e.g. H₂O
- Other information as may be required

Indication showing the fluid flow direction is recommended.

Symbol	Meaning and location	Note
 	<p>Identification of water piping with indication of the flow direction.</p> <p>Strip and label colour: green = water</p>	<p>Marking variants:</p> 
 	<p>Identification of steam piping with indication of the flow direction.</p> <p>Strip and label colour: grey = steam</p>	<p>Marking variants:</p> 
 	<p>Identification of air piping with indication of the flow direction.</p> <p>Strip and label colour: blue = air</p>	<p>Marking variants:</p> 



	<p>Identification of gas piping with indication of the flow direction.</p> <p>Strip and label colour: yellow = flammable and nonflammable gases</p>	<p>Marking variants: - gas, heating gas, oxygen</p>
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11.5 ANNEX 5: LABELLING OF CHEMICAL SUBSTANCES



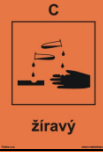





Any dangerous chemical substance or mixture must be marked with a hazard symbol.

This symbol must be present on the packaging, e.g. container, transport vessel or tank, bottle or tin. This marking is the responsibility of the manufacturer or importer marketing the dangerous substance or mixture. Where chemical materials are transferred into smaller containers, labelling of the containers shall be the responsibility of the manager responsible for operation of the laboratory.

	SUBSTANCES	MIXTURES
	<p>till 30 November 2010</p> <p>according to Directive 67/548/EEC</p>	<p>till 31 May 2015</p> <p>according to Directive 1999/45/EC</p>
	<p>from 1 December 2010</p> <p>according to Regulation (EC) No 1272/2008</p>	<p>from 1 June 2015</p> <p>according to Regulation (EC) No 1272/2008</p>

Old labelling		New labelling	
	<p>E: Explosive</p>		<p>Explosive</p>
	<p>O: Oxidizing</p>		<p>Oxidizing</p>
	<p>F+: Extremely flammable</p> <p>F: Highly flammable</p>		<p>Flammable</p>
	<p>T+: Very toxic</p> <p>T: Toxic</p>		<p>Toxic</p>



	Xn: Harmful		Harmful
	C: Corrosive		Corrosive
	Xi: Irritant		Irritant
	N: Dangerous for the environment		Dangerous for the environment

11.6 ANNEX 6: HANDLING OF DANGEROUS CHEMICALS

Act No. 258/2000 on public health protection and on the amendment of some related Acts, as amended (extract)

Article 44a: Handling of dangerous chemical substances and chemical preparations

Article 44a(6): Persons who are older than 15 years and younger than 18 years shall handle dangerous chemical substances or chemical preparations classed as toxic or corrosive only within training in preparation for their profession and under direct supervision of a responsible person. Chemical substances or chemical preparations classed as very toxic shall be handled by those persons only within training in preparation for their profession and under direct supervision of a person meeting the qualification requirement for professional competence pursuant to Article 44b(1).





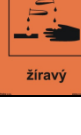

Article 44a(8): Legal entities and individuals authorized to perform business pursuant to specific legislation shall handle chemical substances and chemical preparations classed as **very toxic** only if the handling of the chemical substances or chemical preparations is performed by/is the responsibility of a person meeting the qualification requirement of professional competence pursuant to Article 44b paragraph 1, 2 or 7. The various operations within the handling of such chemical substances or chemical preparations may be performed by an employee who has demonstrably been instructed/trained by a professionally competent person. Repeated training shall be organized once a year as a minimum. A written record of the training/instruction shall be developed. This record shall be stored by the legal entity or individual authorized to perform business for 3 years. The provision of this paragraph does not apply to special protective disinfection, disinfestation and rodent control (Article 58).

Article 44a(9): Individuals who, within their occupation or preparation for their profession, handle dangerous chemical substances or chemical preparations classed as **very toxic, toxic, corrosive, carcinogenic characterized by R phrase 45 or 49, mutagenic characterized by R phrase 46 or toxic for reproduction characterized by R phrase 60 or 61** shall demonstrably have been made familiar with the hazardous properties of the chemical



substances or chemical preparations they handle, with provisions of health and environmental protection against their harmful effects, and with first aid principles.

Article 44a(10): A legal entity or individual authorized to perform business and running a workplace where dangerous chemical substances or chemical preparations classed as **very toxic, toxic, corrosive, carcinogenic characterized by R phrase 45 or 49, mutagenic characterized by R phrase 46 or toxic for reproduction characterized by R phrase 60 or 61** are handled shall issue written guidelines on safety, health and environmental protection when handling such chemical substances or chemical preparations. The guidelines shall be freely accessible to employees at the workplace and shall include, in particular, information on the hazardous properties of chemical substances and chemical preparations that are handled by the employees, instructions on safety, health and environmental protection, first aid principles, and steps to be taken in the event of accident. The text of the guidelines shall be discussed by the legal entity or individual authorized to perform business with the body of the public health authority under whose jurisdiction the site of activity falls.

List of dangerous materials to which the above requirements apply		
Classification	Symbol	R phrases
Very toxic	 	R26 Very toxic by inhalation R27 Very toxic in contact with skin R28 Very toxic if swallowed
Toxic	 	R23 Toxic if inhaled R24 Toxic in contact with skin R25 Toxic if swallowed.
Corrosive	 	R34 Causes burns R35 Causes severe burns.
Carcinogenic		R45 May cause cancer R49 May cause cancer by inhalation
Mutagenic		R46 May cause heritable genetic damage
Toxic for reproduction		R60 May impair fertility R61 May cause harm to the unborn child