HSE
Occupational Health & Safety
and Environmental Protection Unit

aunch Safety Agreement

[Type name of experiment/ equipment]

From: HSE Unit – *HSE correspondent name*

To:

CC:

Date: Click here to enter a date.

EDMS: [type EDMS number]

PURPOSE & SCOPE

This document entitled Launch Safety Agreement provides an overview of the Safety requirements applicable to experimental facilities/apparatus and equipment. It is the 2nd Step of the editorial process after the launch Safety discussion as outlined in the Safety Documentation Management procedure (EDMS 1177755).

This document is an integral part of the Safety folder for the experimental apparatus/equipment. The Safety folder is a set of documents that the Project Leader, GLIMOS, PSO shall:

- maintain and keep it updated during the life cycle of the experimental apparatus/equipment in order to demonstrate compliance with the Safety requirements stated in this document;
- make available to the HSE Unit upon request and before any periodic inspection.

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1 INTRODUCTION

The Launch Safety Agreement is established following the Launch Safety Discussion/Meeting, on Click here to enter a date.

The definition of the Safety requirements is based on the CERN Safety Rules which are available on the HSE Unit web page (http://cern.ch/safety-rules). Whenever CERN Safety Rules do not exist the Safety requirements are based on European Directives, International standards, Host States regulations and best practices.

The standards referred to in this document are available in the CERN Library (search on CERN document server, CDS (http://cdsweb.cern.ch/).

The Safety requirements defined by the HSE Unit are based on the information provided in this document (§ 2 and 3) and by the following documents:

- [List reference documents, if applicable];
- [List reference documents, if applicable];

The life cycle of the [Type name of experiment/ equipment] is defined in Safety Documentation Management procedure (EDMS 1177755) and has the following major phases:

- Study Phase;
- Project Phase:
  - Design and engineering phases;
  - Manufacture and assembly phases;
  - Construction and/or installation phases;
  - Commissioning phase;
- Operations Phase;
- Dismantling Phase

2 DESCRIPTION OF [TYPE NAME OF EXPERIMENT/ EQUIPMENT]

2.1 General Description

to be completed…

[insert picture]

Figure 1- Layout of [type location of experiment/ equipment].

2.2 Description of the installation

to be completed…

[insert picture]

Figure 2- View of the [type location of experiment/ equipment].

[Type name of experiment/ equipment] is mainly composed of:

Equipment	Availability	Design and manufacturing
[Part 1 of experiment/ equipment]	☐ Existing	☐ To be used without any modification ☐ To be modified
	☐ New	☐ Standard equipment supplied by a manufacturer ☐ CERN/collaboration responsible for the design and/or manufacturing
[Part 2 of experiment/ equipment]	☐ Existing	☐ To be used without any modification ☐ To be modified
	☐ New	☐ Standard equipment supplied by a manufacturer ☐ CERN/collaboration responsible for the design and/or manufacturing
[Part 3 experiment/ equipment]	☐ Existing	☐ To be used without any modification ☐ To be modified
	☐ New	☐ Standard equipment supplied by a manufacturer ☐ CERN/collaboration responsible for the design and/or manufacturing
[insert lines if needed]		

2.1 List of components of the [Type name of experiment/ equipment]

2.3 Schedule and location

Start date:	Click here to enter a date.
Completion date:	Click here to enter a date.
Building/experimental area	[type building/experimental area name]
Accelerator Complex	[type PS, SPS, LHC]

2.2 Schedule and location

[insert picture]

Figure 3- Map view of the location of [type location of experiment/ equipment].

2.4 Organization

Role	Name	Dep/Gr
GLIMOS	[type name]	
DSO	[type name]	
HSE correspondent	[type name]	
PSO	[type name]	
Technical coordinator	[type name]	
[type role]	[type name]	
[type role]	[type name]	

2.3 Organization

3 PRELIMINARY HAZARD IDENTIFICATION

Domain	Hazards/Hazardous Activities		Description
Mechanical Safety	Pressure	☐	[pressure][bar]; [volume][l]
	Vacuum	☐	
	Lifting equipment	☐	
	Machinery / Machine Tools	☐	
	Mechanical energy (moving parts)	☐	
	Mechanical properties (sharp, rough, slippery)	☐	
	Industrial Vehicles	☐	
	Hot Work (e.g. welding, grinding)	☐	
	Hot/cold surfaces	☐	
	Vibration	☐	
Cryogenic Safety	Cryogenic fluid	☐	[fluid] [phase]
Structural Safety	Shielding Walls	☐	
	Specific actions/conditions	☐	
Electrical and Electro-magnetic Safety	Electrical equipment and installations	☐	[voltage] [V], [current][A]
	High Voltage Equipment	☐	
	Magnetic field	☐	[magnetic field] [T]
	Equipment in potentially explosive atmospheres	☐	
Chemical Safety	Hazardous chemical agent (HCA)	☐	[chemical agent], [quantity]
	CMR (carcinogens, mutagens and substances toxic to reproduction)	☐	
	Toxic/Harmful	☐	[fluid], [quantity]
	Corrosive	☐	[fluid], [quantity]
	Oxidizing	☐	[fluid], [quantity]
	Flammable	☐	[fluid], [quantity]
	Potentially explosive atmospheres	☐	[fluid], [quantity]
	Irritant	☐	[fluid], [quantity]
	Asphyxiant	☐	[fluid], [quantity]
	Nanomaterials	☐	
	Dangerous for the Environment	☐	
	Asbestos	☐	

Biological Safety	Legionella	☐	
	Biological Agents	☐	
Non-ionizing radiation Safety	Laser	☐	
	Radiofrequency	☐	
	Microwaves	☐	
	UV light	☐	
Workplace	Excessive Noise	☐	
	Temperature constraints (non-comfortable)	☐	
	Insufficient Lighting	☐	
	Indoor Air quality (e.g. clean rooms)	☐	
	Confined space	☐	
	Work at height	☐	
	Obstructions in passageways	☐	
	Lone working	☐	
	Falling objects	☐	
	Internal Traffic (e.g workshops, experiments)	☐	
	Slippery/unstable ground	☐	
Environment	Usage/storage of potentially polluting substances (gases, liquids, solids)	☐	
	Emissions of substances into the atmosphere	☐	
	Discharge of effluents to the site drainage (i.e. infiltration water, rain water, cooling water…)	☐	
	Discharge of effluents to sewage (i.e. sanitary water…)	☐	
	Activated or radioactive soil	☐	
	Polluted or contaminated soil	☐	
	Emission of noise harmful for the environment	☐	
	Vibrations harmful for the environment	☐	
	Odors	☐	
	Waste generation	☐	
	Significant consumption of resources (e.g. water, electricity gas, fuels, ...)	☐	
Worksite	Construction & dismantling activities	☐	

	Co-activity	☐	
Fire Safety	Non-standard layout	☐	
	Combustible Materials	☐	

3.1 Preliminary Hazard Identification

4 SAFETY CLEARANCE

If [type name of the experiment/equipment] is deemed **not** to be of Major Safety Implications (MSI), the contents of this chapter are **not applicable**.

According to the HSE Unit Mandate, the HSE Unit grants Safety clearance on behalf of the Director-General for special equipment, installations, experiments and projects with major Safety implications.

Due to the information stated in § 2 and § 3 [type name of the experiment/equipment] present(s) a significant potential threat to Safety represented by [type name of the experiment/equipment] and their activity. Such consequences include primarily the loss of a human life and/or severe damage to the environment, secondarily, damage to the equipment/facility and operation.

With the above mentioned, [type name of the experiment/equipment] is classified as a project with Major Safety Implications and shall be submitted to a compulsory Safety Verification from the HSE Unit and/or DSO.

In order to provide Safety Clearance for [type name of the experiment/equipment], the following Procedure shall be applicable:

- Safety Clearance for Experiments, EDMS N. 1277960

5 SAFETY REQUIREMENTS

The following chapters list the minima requirements and documentation in matters of Safety per each Safety domain covered by the project.

Radiation protection risks are not addressed in this document, except for what concerns to the protection of the public and the environment against ionizing radiation (refer to 5.12.1.1). For the details on Safety requirements concerning radiation protection, DGS/RP group provides references that are out of the scope of the present document.

The required documentation per domain is assembled in a Safety Folder containing n-Safety Files by the technical project leader. A copy has to be provided to the Safety correspondent for the project, member of the HSE Unit.

5.1 Risk Assessment

In order to ensure the safety and health of workers in every aspect related to the work, CERN activities shall comply with the following European legislation:

- Council Directive 89/391/EEC of June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.

The Council Directive 89/391/EEC lays down the following obligations:

- To evaluate all the risks to the safety and health of workers;
- To implement measures which assure an improvement in the level of protection of workers;
- To ensure that each worker receives adequate safety and health training;
- To provide health surveillance for workers when necessary.

Prior to start-up of any activity, and in order to comply with the requirements set by the Council Directive 89/391/EEC, the activity risk assessment shall be performed.

The importance of Risk Assessments is to aid in the implementation of the risk management process laid down in the framework of the Council Directive 89/391/EEC.

The Risk Assessments shall take into account all the activities performed in the vicinity where the equipment or experiment is installed.

All the necessary Risk Assessments shall be documented and stored in the Safety Folder/File along with the documentation related to the compensatory safety measures implemented.

5.2 Products purchased on the market

Products purchased on the market must comply with CERN Safety rules and as such are legally required to bear the CE marking, whenever applicable.

The list below is not exhaustive and provides general guidance for European Directives and Regulations which apply to the majority of products used at CERN.

New Approach directives and regulations (directives and regulations providing CE marking)			
Directive / Regulation	**Reference (link to directive & harmonized standards)**	**Harmonized standards[1]**	**E.g. of products**
Low voltage equipment (LVD) **Electromagnetic compatibility (EMC)**	2006/95/EC 2004/108/EC	EN 61010 (LVD standards) EN 61326 (EMC standards)	Electrical systems, power supply systems
Machinery (MD)	2006/42/EC	EN 13155 (Lifting accessories) Other MD standards	Lifting accessories, cranes, any machine
Pressure equipment (PED)	97/23/EC	EN 13445 (Pressure vessels) EN 13458 (Cryogenic vessels) EN 13480 (Metallic piping) Other PED standards	Pressure vessels, cryogenic vessels, metallic piping, pressure relief equipment...
Potentially explosive atmospheres (ATEX)	94/9/EC	ATEX standards	Equipment to be used in explosive atmospheres
Construction products (CPR)	305/2011/EU	Eurocodes (structures) Other CPR standards	Products integrated in a permanent manner in construction works e.g.: structures, HVAC...
Lifts	95/16/EC	Lifts standards	Appliance serving specific levels
[1] **Harmonized standards are technical specifications of products meeting essential requirements set out by European Directives and Regulations. These standards are usually used as means to demonstrate compliance with European Directives and Regulations.**			

Table 2 - New approach directives and regulations

Products purchased on the marked to be used at CERN shall comply with the applicable European Directives, Regulations and CERN Safety rules. Thus, procurement documents shall refer to the European Directives and Regulations applicable to the product as well as the relevant CERN requirements, e.g. material requirements with respect to fire safety and radiation resistance.

5.2.1 Safety file of products purchased on the market

European Directives and Regulations oblige the manufacturer to draw up technical documentation (covering the design, manufacture and operation of the product) containing information to demonstrate the conformity of the product to the applicable requirements. Legally this technical documentation is not required to be delivered with the product unless required in the tendering specification.

Products purchased on the market are CE marked and, when applicable, delivered with the following documents:

- EC declaration of conformity;
- instruction manual.

5.3 Mechanical Safety

5.3.1 Pressure equipment

Pressure equipment shall comply with the following CERN Safety rules:

- Safety Regulation on mechanical equipment (SR-M),
- General Safety Instruction on standard pressure equipment (GSI-M2);
- General Safety Instruction on special mechanical equipment (GSI-M3).

According to the CERN Safety rules, pressure equipment shall meet the essential requirements set by the following European Directives:

- Directive 97/23/EC on pressure equipment - Pressure Equipment Directive (PED);
- Directive 2009/105/EC on simple pressure vessels – Simple Pressure Vessels Directive (SPVD) ;
- Directive 2010/35/EU on transportable pressure equipment – Transportable Pressure Equipment Directive (TPED).

Pressure equipment shall be designed for loadings appropriate to its intended use and other foreseeable operating conditions (the technical requirements of the **European Directive 97/23/EC** are given in Annex I).

5.3.1.1 Control measures

Where, under foreseeable conditions, the allowable limits could be exceeded, the installation must be fitted with, or provision made for the fitting of, suitable protective devices.

The capacity of the protection system shall be established considering all of the probable conditions contributing towards internal excess pressure. The safety system shall follow the rules according to **EN ISO 4126**.

The pressure relief devices shall be:

- installed, commissioned, and periodically tested according to General Safety Instruction on standard pressure equipment (GSI-M2) ;
- CE marked category IV and compliant with the harmonized standard ISO 4126 on safety devices for protection against excessive pressure.

A guideline document (EDMS 1209900) provides additional information for the purchase of pressure relief devices.

The **initial inspection of the pressure relief devices** shall be carried out by the HSE Unit inspection services).

The **proof test** shall take the form of a hydrostatic pressure test. Where a hydrostatic pressure test is harmful or impractical other tests, with appropriate safety compensatory measures, may be carried out. Other tests of a recognized value or method may be carried out subject to the prior approval of the HSE Unit

The **proof test** shall be carried out under the supervision and validation of the HSE Unit inspection service.

5.3.1.2 Safety file for pressure equipment

The Safety file for pressure equipment shall include the documents necessary to demonstrate its compliance with the above mentioned rules. In general cases, the content of the safety file shall be the following:

Study Phase	
CDR / Study Report	x
Preliminary drawings and diagrams of components, circuits…	x
Preliminary integration drawings	x
Project Phase	
DESIGN & ENGINEERING FILE	
Risk assessment	x
Result of design calculations	x
Design drawings and diagrams of components, circuits…	x
Description and explanations necessary to understand the drawings and diagrams	x
MANUFACTURING FILE	
Manufacturing drawings	x
Material certificates for base materials and welding consumables	x
Welders certificate	x
Welding procedure approval certificate	x
Non-destructive testing (NDT) personnel certificate	x [a]
Records of welding inspections	x
Pressure report test	x
RECEPTION	
EC declaration of conformity	x
EC certification of conformity of pressure relief devices	x
Instructions manual	X
COMMISSIONING FILE	
HSE pressure test report	X
Operation Phase	
OPERATION & MAINTENANCE FILE	
Records of inspections, maintenance and non-conformities	x
HSE periodic inspection report	x
Dismantling Phase	
Dismantle Report	x
Tractability Procedure for Radioactive Equipment	x [a]
[a] **if applicable**	

5.3.1.3 Nuclear pressure equipment

Nuclear pressure equipment (i.e.: pressure equipment operating with a maximum allowable pressure (PS) greater than 0.5barg, designed for a nuclear application, and which mat emit radioactivity greater than 370 MBq in the event of failure) shall comply with the requirements provided in the:

- « Arrêté du 12 Décembre 2005 relatif aux équipements sous pression nucléaires ».

The HSE Unit shall grant safety clearance priori to design and operation. The conditions to grant Safety clearance and identification of the applicable Safety requirements are defined by the HSE Unit at the conceptual phase of the equipment.

5.3.2 Refrigerating systems and heat pumps

Refrigerating systems and heat pumps, meeting the requirements of the standards listed below, are presumed to be compliant with the Safety requirements laid down in the applicable CERN Safety rules.

Scope	Harmonized Standards
Refrigerating systems and heat pumps	• EN 378-1: Refrigerating systems and heat pumps: safety and environmental requirements : Part 1: basic requirements, definitions, classification and selection criteria; • EN 378-2: Refrigerating systems and heat pumps: safety and environmental requirements : Part 2: design, construction, testing, marking and documentation ; • EN 378-3: Refrigerating systems and heat pumps: safety and environmental requirements : Part 3: installation site and personal protection ; • EN 378-4: Refrigerating systems and heat pumps - safety and environmental requirements : part 4: operation, maintenance, repair and recovery.

Table 3 – Harmonized standards

5.3.2.1.1 Safety file for refrigerating systems and heat pumps

As defined in the chapter 5.3.1.2

5.3.3 Machinery

Machinery (including lifting equipment) shall comply with the following CERN Safety rules:

- Safety Regulation on mechanical equipment (SR-M);
- General Safety Instruction on standard lifting equipment (GSI-M1).

In general, all new machinery shall be designed in accordance with Directive 2006/42/EC and shall conform directly to the Essential Health and Safety Requirements (ESHR) as defined in **Annex 1** of the **Machinery Directive 2006/42/EC**.

Machinery shall be designed and manufactured, so that it is fitted for its function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof.

Remark: The HSE Unit advises on harmonized standards that can be used for the design, manufacturing and commissioning of machinery.

5.3.3.1 Conformity of old machinery

Machinery manufactured from 1st January 1995 shall be CE-marked and comply with the requirements of the applicable Machinery Directive (Machinery Directive 2006/42/EC was published on 9th June 2006 and it is applicable from 29th December 2009, replacing the Machinery Directive 98/37/EC).

Machinery which was first used before the implementation of the Machinery Directive 98/37/EC (i.e. 1st January 1995) is excluded to be CE-marked.

Any machinery that is refurbished or upgraded so that its original specification is changed or undergoes major repair shall be considered as "new" equipment and therefore shall comply with the requirements of the Machinery Directive 2006/42/EC.

Independently of the manufacturing date, a risk assessment shall be carried out on all machines that are in use and the users shall be informed and trained for all hazards pertinent to the machine.

5.3.3.2 Conformity of workshops and machine tools

For workshop and machine tools conformity refer to the detailed Safety requirements (EDMS 1218317).

5.3.3.3 Activities involving the use of work equipment

Activities involving the use of work equipment shall comply with the requirements provided in the:

- Directive 2009/104/EC of the European Parliament and of the Council of 16 September 2009 concerning the use of work equipment by workers at work.

5.3.3.3.1 Safety file for activities involving work equipment

The Safety file for activities shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Project Phase:**
  Before starting the activity:
  - Risk assessment of the activity;

  During the activity:
  - Records of incidents.

5.3.3.4 Safety file for machinery

The Safety file for machinery shall include the documents necessary to demonstrate its compliance with the above mentioned rules.

	Machinery
Study Phase	
CDR / Study Report	x
Preliminary drawings and diagrams of components, circuits…	x
Preliminary integration drawings	x
Project Phase	
DESIGN & ENGINEERING FILE	
General description of the machinery	x
Risk assessment	x
Engineering design calculations including: description of equipment, conditions of use, actions considered in the design and design calculations	x
Design drawings (overall and detailed drawings, and whenever existing electrical, control circuits, hydraulic and pneumatic drawings)	x
Standards and technical specifications used (indicating safety requirements covered by these standards)	x
MANUFACTURING FILE	
Manufacturing drawings	x

Material certificates	x
Welders' certificate	x
Welding procedure approval certificate and/or welding procedure specification	x
Records of welding inspection	x
Results of test carried out	x
RECEPTION	
EC declaration of conformity	x
Instructions manual	x
COMMISSIONING FILE	
HSE reception test report	
Operation Phase	
OPERATION & MAINTENANCE FILE	
Records of inspections, maintenance and non-conformities	x
HSE periodic inspection report	x [a]
Dismantling Phase	
Dismantle Report	x
Tractability Procedure for Radioactive Equipment	x [a]
[a] **if applicable**	

Table 4 - Safety file for machinery

Remark: If the machinery is purchased on the market and delivered with the EC declaration of conformity signed by the European representative of the manufacturer; the engineering and manufacturing design file may not be included in the Safety file.

The HSE Unit recommends that machinery which has: high potential hazard, or high complexity of design, or uses unconventional materials, or fabrication technologies, or operates in special conditions, or is intended to be used in a complex system is delivered with the engineering design and manufacturing file.

5.3.4 Lifting Equipment

5.3.4.1 Overhead and gantry cranes

Overhead and gantry cranes designed and manufactured according to the harmonized standards benefit from presumption of compliance with the machinery directive.

Scope	**Harmonized Standards**
Bridge and gantry cranes	• EN 15011 – Cranes – Bridge and gantry cranes.
Overhead and gantry cranes	• EN 12644 – Cranes – Information for use and testing; • EN 12100 – Safety for machinery – Basic concepts, general principles for design – Basic terminology, methodology; • EN 13001 – Cranes – General design – General principles and requirements; • EN 13586 – Cranes – Access; • EN 12077 – Cranes safety – Requirements for health and safety; • EN 13557 – Controls and control stations.

Dimensional tolerances for crane installations	• ISO 11660-2 – Cranes- Access, guards and restraints – Part 2: mobile cranes.

Table 5 – Harmonized standards

5.3.4.1.1 Control measures

According to the General Safety Instruction on standard lifting equipment (GSI-M1), overhead and gantry cranes assembled at CERN shall be subject to an examination of adequacy, an examination of assembly, a functional test, a static test (test load of 1.5 times the load capacity if human strength, and 1.25 times for the others), and a dynamic test (test load of 1.1 times the load capacity).

These **tests** shall be carried out under the supervision of the HSE Unit inspection service.

The HSE Unit recommends that a minimum of two qualified people are present at all lifting operations.

5.3.4.2 Non-fixed load lifting attachments, slings and chains

Lifting equipment, meeting the requirements of the standards listed below, are presumed to be compliant with the Safety requirements laid down in the applicable rules.

Scope	Harmonized Standards
Non-fixed load lifting attachments	• EN 13155: Cranes- Safety – Non-fixed load lifting attachments
Textile slings	• EN 1492 series (Part 1, 2 & 4) - Textile slings - Safety
Steel wire rope slings	• EN 13414 series (Part 1 to 3) - Steel wire rope slings - Safety
Short link chain	• EN 818 series (Part 1 to 7) - Short link chain for lifting purposes - safety

Table 6 – Harmonized standards

The **resistance of the lifting points**, e.g. lifting lugs, built in the equipment shall be verified as follows:

- the attachment shall be designed to withstand a static load of three times the working load limit without releasing the load even if permanent deformation occurs;
- the attachment shall be designed to withstand a static load of two times the working load limit without permanent deformation;
- if the lifting beam is intended to tilt, the manufacturer shall indicate the maximum permissible angle of tilt from the horizontal. If the lifting beam is not intended to tilt, the design shall tolerate a tilt of up to 6o from the horizontal.

The resistance of the lifting points may be determined according to the applicable harmonized, e.g. EN 13155 for the verification of lift lugs of unfired pressure vessels, EN 1993 for the verification of lifting points of steel structures.

The Safety file of the equipment shall contain details on the design and manufacturing of the lifting points.

5.3.4.2.1 Control measures

According to the General Safety Instruction on standard lifting equipment (GSI-M1), the lifting equipment shall be subject to an initial **load test** and **examination test**.

The load test shall be carried out under the supervision of the HSE Unit inspections service.

The load test consists of:

- a static load test in which a load of 1.5 times the load capacity of the lifting accessory (CMU) is applied for 15 minutes,
- a dynamic load test in which a load 1.1 times the load capacity of the lifting accessory is applied and the accessory is handled as for its conditions of use.

After successful testing, the HSE Unit inspection service authorizes the use of the lifting accessories at CERN.

Remark: It is forbidden to use lifting equipment not CE marked and not inspected by the HSE Unit inspection service.

5.3.4.3 Safety file for Lifting Equipment

	Machinery		
	Cranes	Lifting accessories	Slings, chains
ENGINEERING DESIGN FILE			To be purchased on the market
General description of the machinery	x	x	
Risk assessment	x	x	
Engineering design calculations including: description of equipment, conditions of use, actions considered in the design and design calculations	x	x	
Design drawings (overall and detailed drawings, and whenever existing electrical, control circuits, hydraulic and pneumatic drawings)	x	x	
Standards and technical specifications used (indicating safety requirements covered by these standards)	x	x	
MANUFACTURING FILE			
Manufacturing drawings	x	x	
Material certificates	x	x	
Welders' certificate	x	x	
Welding procedure approval certificate and/or welding procedure specification	x	x	
Records of welding inspection	x	x	
Results of test carried out	x	x	
FILE SUPPLIED WITH PRODUCT			
EC declaration of conformity	x	x	x
Instructions manual	x	x	x
COMMISSIONING FILE			
HSE reception test report	x	x	x
OPERATION & MAINTENANCE FILE			
Records of inspections, maintenance and non-conformities	x	x	x
HSE periodic inspection report	x	x	x

5.3.5 Welding activities

All welding and related activities shall comply with the requirements of ISO 3834.

In addition the following safety recommendations shall be respected for all welding activities:

- Personal Protective equipment: Appropriate protective clothing required for any welding operation shall be adopted based on the size, nature and location of the work to be performed.

  Goggles or other suitable eye protection shall be used during all gas welding

  Helmets and hand shields shall be made of a material which is an insulator for heat and electricity, and shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.
- Fire hazards. If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.
- Guards. If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.
- Consumables: All welding consumables should conform to the requirements specified in EN 1090-2.

5.3.5.1 Welding Procedures

The Project leader shall establish a WPS (welding procedure specification) for welding activities related to equipment with high Safety relevance, which shall contain the following information (list non-exhaustive):

- Verification of the welding method by detailing the derivation and testing requirements of weld procedures
- The qualifications of welders
- The control of welding operations during preparation, actual welding and post-weld treatment
- The level of inspection and non-destructive testing techniques to be applied
- The acceptance criteria for the permitted level of weld defects

5.3.5.2 Welders

Welders shall be qualified and certified by a notified body and registered in the official database by the CERN Welding Group.

Following the elaboration of the WPS (welding procedure specification), all welders shall be submitted to the following examinations:

- Examination of qualifications:

  The welder shall be in possession of a valid qualification given by an Official Body, according to the applicable European Norms, relevant to foreseen welding tasks to be carried out.

External welders shall be certified by a Notified Body. The CERN welding group shall validate this certification and may demand internal testing if deemed necessary.

5.3.5.3 Non-destructive examination (NDT)

The NDT techniques and acceptance level is defined in the applicable Specific Safety Instruction or in the absence, according to the applicable European Harmonized standard:

- Visual Inspection - ISO 5817
- Radiographic Test - EN 12517
- Ultrasonic Test - ISO 11666

The NDT shall be carried out by a competent external body, with the expert assistance of the CERN Welding Group.

All personnel performing the NDT shall be qualified according to EN ISO 9712.

5.3.5.4 Safety file for welding activities

The Safety file for welding activities shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Project Phase:**
  Before starting the activity:
    - Welder approval test certificate;
    - Non-destructive testing personnel certificate;
    - CERN attestation to carry out welding activities;
    - Welding procedure approval certificate;

  During the activity:
    - Records of welding inspections.

5.4 Structural Safety

Metallic structures shall comply with the requirements provided in the following CERN Safety rule:

- Safety Regulation on mechanical equipment (SR-M).

As required in the SR-M for metallic structures, for analogy, all kind of structures shall be designed and manufactured according to the **structural Eurocodes.**

Remark: For reasons of building construction permit, granted by the Swiss authorities, building structures constructed in the Swiss territory may be required to comply with the SIA standards.

5.4.1 Basis of structural design

The basis and general principles for safety and serviceability of structures and structural reliability are set by the following Eurocodes and related national annexes:

- NF EN 1990: Eurocode 0 - Basis of structural design.

5.4.2 Actions on structures

The actions on structures shall be defined according to the

- NF EN 1991: Eurocode 1 - provides guidance on action for structural design (e.g. density of materials, imposed loads on structures, actions induced by cranes and machinery, accidental actions from impacts and explosions, etc);

Remark: For reasons of building construction permit, granted by the Swiss authorities, building structures constructed in the Swiss territory are required to comply with the SIA standards. In this case the actions on structures are defined according to the standard SIA 261 - Actions on structures.

5.4.2.1 Seismic action

The seismic action on structures built at CERN, **independently of the location**, is defined as stipulated by the French law.

According to the '*Décret n°2000-892 du 13 septembre 2000 relatif à la prévention du risque sismique*' new constructions or constructions submitted to important modifications in seismic regions shall comply with the applicable seismic design requirements.

According to the '*Décret n° 2010-1255 du 22 octobre 2010 portant délimitation des zones de sismicité du territoire français*' **CERN is classified as seismic zone 3**, '*sismicité modérée'*.

In order to meet the provisions of the applicable French regulations, the design of structures for earthquake resistance shall comply with the following standards:

- NF EN 1998-1 September 2005 - Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings;
- NF EN 1998-1/NA December 2007 (National annex).

The EDMS document "seismic action at CERN" provides the parameters describing the seismic hazard at CERN and defines the seismic action at CERN, in particular the:

- reference peak ground acceleration on type A ground, agR equal to 1.1 m/s2;
- design ground acceleration ag is equal to agR times the importance factor γI;
- the shape of the horizontal and vertical elastic response spectrum are defined in the NF EN 1998-1 September 2005 and shall take into account the ground type.

5.4.3 Design of steel structures

The design of steel structures shall comply with the Eurocode 3:

- NF EN 1993: Design of steel structures.

The Eurocode 3 shall be used in conjunction with the reference documents listed in the standard.

Remark: For reasons of building construction permit, granted by the Swiss authorities, the steel structures built in the Swiss territory may be required to comply with the SIA 263 –Design of steel structures.

5.4.3.1 Execution of steel structures

The execution of steel structures shall comply with the requirements of the:

- EN 1090-2:2008 Execution of steel structures and aluminium structures. Technical requirements for the execution of steel structures.

Welding and frequency of inspection of welds shall be as specified in the EN 1090-2.

The quality level of the welds shall be chosen according to the EN 25817 (Arc-welded joints in steel. Guidance on quality levels for imperfections). The quality level C according to EN 25817 is required.

5.4.3.2 Safety file for steel structures

The Safety file of the steel structure shall include the following documents:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Design & Engineering file:**
    - Engineering drawings;
    - Engineering design report including: description of the structure, conditions of use, actions considered in the design, design calculations;
    - Technical specifications.
  - **Construction / Manufacturing file:**
    - Manufacturing drawings;
    - Welding plan (§ 7.2 of EN 1090-2:2008);
    - Qualification of welding procedures (§ 7.4.1 of EN 1090-2:2008) and welding personnel (§ 7.4.2 of EN 1090-2:2008);
    - Records of inspection of welds;
    - Material certificates.
  - **Commissioning file:**
    - As-built drawings
- **Operations Phase:**
  - In case of structures modification, design & engineering file
- **Dismantling Phase:**
  - Refer to § **Error! Reference source not found.**

5.4.4 Design of concrete structures

The design of concrete structures shall comply with the Eurocode 2:

- NF EN 1992: Design of concrete structures.

The Eurocode 2 shall be used in conjunction with the reference documents listed in the standard.

Remark: For reasons of building construction permit, granted by the Swiss authorities, the concrete structures built in the Swiss territory are required to comply with the SIA 262 –Design of concrete structures.

5.4.4.1 Concrete requirements

Concrete for structures shall comply with the requirements set by the:

- NF EN 206-1 Concrete – Part 1: Specification, performance, production and conformity.

5.4.4.2 Safety file for concrete structures

The Safety file for concrete structures shall include the following documents:

- **Study Phase:**
  - CDR
  - Study Report
  - Geotechnical Report (if applicable)
  - Preliminary integration drawings
- **Project Phase:**
  - **Design & Engineering file:**
    - Engineering drawings
    - Engineering design report including: description of the structure, conditions of use, actions considered in the design, design calculations
    - Technical specifications
    - For concrete and mixed structures and for modifications of all kinds of structures, a prior validation of the design report by GS-SE group is required.
  - **Construction / Manufacturing file:**
    - Execution drawings
    - Reinforcing steels list
    - Material certificates: reinforcing steel and concrete
  - **Commissioning file:**
    - As-built drawings
    - Results of resistance tests on samples.
- **Operations Phase:**
    - In case of structures modification, design & engineering file

- **Dismantling Phase:**
  - Refer to § **Error! Reference source not found.**

5.4.5 Permanent means of access to machinery and buildings

Permanent means of access to machinery shall comply with the standards ISO 14122 concerning permanent means of access to machinery:

- ISO 14122-1: Choice of fixed means of access between two level – this standard gives advice on the adequate access means to equipment which cannot be accessed from a floor level;
- ISO 14122-2: Working platforms and walkways – this standard specifies the requirements applicable to platforms and walkways; e.g.: dimensions, distances to hazardous areas, design loads, etc;
- ISO 14122-3: Stairs, stepladders and guard-rails – this standard specifies the requirements applicable to stairs, step ladders and guard rails; e.g.: dimensions, design loads, etc;
- ISO 14122-4: Fixed ladders – this standard specifies requirements applicable to fixed ladders; e.g.: dimensions, design loads, testing, etc.

Permanent means of access to buildings shall comply with the French standards:

- NF E 85 013 : Choix du moyen d'accès fixes entre deux niveaux ;
- NF E 85 014 : Plates-formes de travail et passerelles ;
- NF E 85 015 : Escaliers, échelles a marches et garde-corps ;
- NF E 85 016 : Echelles fixes.

5.4.5.1 Control measures

According to the applicable standards, parts of the permanent means of access may need to be tested before use; e.g.: safety cage and anchor points.

The document "Safety requirements and Safety file contents for permanent means of access to machinery" – EDMS N. 1159125 - provides a list of Safety checks required to verify the compliance of access means to machinery.

5.4.5.2 Safety file for permanent means of access

The Safety file for permanent means of access shall include Safety documents necessary to demonstrate conformity with the applicable standards:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Design & Engineering file:**
    - Engineering drawings;
    - Design calculations.
  - **Construction / Manufacturing file:**
    - Manufacturing drawings;
    - Material certificates;

- Welding documents: welders' certificate, and records of welding inspections.

- **Commissioning file:**
  - Records of tests.

- **Operations Phase:**
  - In case of structures modification, design & engineering file

- **Dismantling Phase:**
  - Refer to § **Error! Reference source not found.**

5.5 Cryogenic Safety

5.5.1 Cryogenic equipment

This equipment shall comply with the following CERN Safety rules:

- Safety Regulation on mechanical equipment (SR-M),
- General Safety Instruction on standard pressure equipment (GSI-M2);
- General Safety Instruction on special mechanical equipment (GSI-M3).

Whenever falling under the scope of GSI-M2, the cryogenic equipment shall meet the essential safety requirements set by the following European Directives:

- Directive 97/23/EC on pressure equipment - Pressure Equipment Directive (PED);
- Directive 2010/35/EU on transportable pressure equipment – Transportable Pressure Equipment Directive (TPED).

Transportable cryogenic equipment whenever intended to be incorporated in a permanent cryogenic installation shall also comply with the PED (in addition to compliance with TPED).

For the remaining cases, GSI-M3 is applicable.

Cryogenic equipment and cryogenic systems shall be subjected to a cryogenic safety assessment before the start of the corresponding cryogenic activities. This assessment contains a summary of the safety requirements applicable to cryogenic equipment and its corresponding activities as well as the documents that are required to demonstrate compliance with these requirements and which constitute the safety file.

5.5.1.1 Static cryogenic storage vessels

The hazard category of the cryogenic pressure vessel and related conformity assessment procedures shall be determined as indicated in the Directive 97/23/EC on pressure equipment.

Depending on the hazard category of the cryogenic pressure vessel, it may be required that:

- the equipment complies with the Directive 97/23/EC on pressure equipment;
- the equipment is delivered with EC declaration of conformity;
- a notified body participates in the conformity assessment.

5.5.1.2 Transportable cryogenic storage vessels

Transportable cryogenic storage vessels shall comply with the requirements set by the Directive 2010/35/EU of the European Parliament and of the Council of 16 June 2010 on transportable pressure equipment. This directive requires compliance with the requirements of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) for affixing the pi-marking. The pi-marking is made by an external notified body.

The ADR requires compliance with a reference standard for construction and operation of transportable cryogenic pressure vessels:

- EN 1251-1: Cryogenic vessels: Transportable vacuum insulated vessels of not more than 100 litres volume – Part 1: Fundamental requirements
- EN 1251-2: Cryogenic vessels: Transportable vacuum insulated vessels of not more than 100 litres volume – Part 2: Design, fabrication, inspection and testing
- EN 1251-3: Cryogenic vessels: Transportable vacuum insulated vessels of not more than 100 litres volume – Part 3: Operational requirements

For the case of transportable cryogenic pressure vessels with a storage capacity higher than 1 m^3, the following reference standard shall be used:

- EN 13530-1: Cryogenic vessels: Large transportable vacuum insulated vessels – Part 1: Fundamental requirements
- EN 13530-2: Cryogenic vessels: Large transportable vacuum insulated vessels – Part 2: Design, fabrication, inspection and testing
- EN 13530-3: Cryogenic vessels: Large transportable vacuum insulated vessels – Part 3: Operational requirements

The certification of conformity with Directive 2010/35/EU as well as the periodic inspections of transportable cryogenic vessels shall be performed by a recognized notified body.

Transportable cryogenic vessels shall be delivered with a Pi-marking and the corresponding attestation and a conformity certificate with respect to the applicable reference construction standard.

5.5.1.3 Cryogenic piping made of metallic materials

The hazard category of the cryogenic pressure vessel and related conformity assessment procedures shall be determined as indicated in the Directive 97/23/EC on pressure equipment.

Depending on the hazard category of the cryogenic piping, it may be required that:

- the equipment complies with the Directive 97/23/EC on pressure equipment;
- the equipment is delivered with EC declaration of conformity;
- a notified body participates in the conformity assessment.

5.5.2 Control measures

According to the General Safety Instruction on standard pressure equipment (GSI-M2), cryogenic storage vessels and cryogenic piping with a maximum allowable pressure PS greater than 0.5 barg shall be subjected to a **proof test**.

The **proof test** shall be carried out as indicated in the § 5.3.1.1 .

Cryogenic pressure vessels shall be equipped with **pressure relief devices** to ensure the safe release of the working fluid in case of overpressure. Piping sections that may become isolated with cryogenic liquid or cold gas shall be also equipped with **pressure relief devices** to ensure the safe release of the working fluid in case of overpressure.

A calculation tool (EDMS 1209576) is available to determine the minimum relief area for safety relief devices.

The pressure relief devices shall:

- be installed, commissioned, and periodically tested according to General Safety Instruction on standard pressure equipment (GSI-M2);
- be CE marked and delivered with EC declaration of conformity and EC certificate of conformity with respect to Category IV of 97/23/EC. .They shall be additionally Pi-marked whenever installed in transportable cryogenic storage vessels.
- bear an identification plate (safety valves according to EN ISO 4126-1 and EN 13648 -1 and burst discs according to EN 4126-2 and EN 13648-2);
- be initially and periodically tested by the HSE Unit inspection service.

A guidance document (EDMS 1209900) provides additional information for the purchase of pressure relief devices.

For cryogenic vessels, the liquid container (the inner vessel in the case of a vacuum insulated vessel) shall be protected against overpressure by a minimum of two relief devices in parallel, preferably of different types such as, for example, a bursting disk and a relief valve, installed so as to remain at ambient temperature during normal operation.

The outer jacket of vacuum insulated cryogenic vessels shall be designed in a way to maintain its structural stability in the event of failure of the inner vessel. The outer jacket shall be equipped either with a pressure relief plate/plug or a bursting disc. The plate or plug shall be designed and installed such that it cannot harm personnel when ejected.

The different systems for protection against overpressure shall be combined with fail-safe mode provisions in terms of the cryogenic process and with alarm and/or detection systems which will deploy emergency procedures whenever risks for safety of personnel have been identified in case of a discharge of cryogenic fluids.

The **initial inspection of the pressure relief devices** (more specifically, of the safety valves) shall be carried out by the HSE Unit inspection services.

5.5.3 Safety file for Cryogenic Equipment

Study Phase	
CDR / Study Report	x
Preliminary drawings and diagrams of components, circuits…	x
Preliminary integration drawings	x
Project Phase	
DESIGN & ENGINEERING FILE	
Risk assessment	x
Result of design calculations	x
Design drawings and diagrams of components, circuits…	x
Description and explanations necessary to understand the drawings and diagrams	x
Cryogenic conformity assessment	x
MANUFACTURING FILE	
Manufacturing drawings	x
Material certificates for base materials and welding consumables	x
Welders certificate	x
Welding procedure approval certificate	x
Non-destructive testing (NDT) personnel certificate	x [a]
Records of welding inspections	x
Pressure report test	x
RECEPTION	
EC declaration of conformity	x
EC certification of conformity of pressure relief devices	x
Instructions manual	X

COMMISSIONING FILE	
HSE pressure test reports	X
Operation Phase	
OPERATION & MAINTENANCE FILE	
Records of inspections, maintenance and non-conformities	x
HSE periodic inspection report	x
Dismantling Phase	
Dismantle Report	x
Tractability Procedure for Radioactive Equipment	x [a]
[a] **if applicable**	

5.6 Electrical Safety

5.6.1 General requirements for electrical equipment and installations

Electrical installations and **equipment** shall comply with the Safety requirements provided in the following CERN Safety rules:

- Safety Code C1 - Electrical safety code.

5.6.2 Electrical equipment

Whenever possible **electrical equipment** used in electrical installations shall be purchased on the market and must be delivered to CERN together with the documents required by the applicable European directives.

Compliance with these directives is usually demonstrated by design, manufacturing and testing according to the harmonized standards.

5.6.2.1 Potentially explosive atmospheres

Equipment to be installed or used in the potentially explosive atmospheres shall comply with the following European Directive:

- Council Directive 94/9/EC of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

5.6.3 Electrical installations

Low voltage and high voltage **electrical installations** shall comply with the standards which are referred to in the CERN Safety rules:

- Safety Instruction IS 24 - Regulations applicable to electrical installations.

Low voltage installations (up to 1 KV AC or 1.5 kV DC) shall comply with the French standard:

- NF C 15-100 – Installations électriques à basse tension.

High voltage installations (from 1 kV AC to 63 kV AC) shall comply with the French standard

- NF C 13-200 – Installations électriques a haute tension.

5.6.3.1 Initial electrical inspection

According to Safety Code C1 the electrical installations shall be submitted to a compulsory **initial electrical inspection to** be carried out by the HSE Unit inspection service.

5.6.4 Electrical materials

Electrical materials shall comply with the Safety requirements provided in the following CERN Safety rules:

- Safety Instruction IS 23 - Criteria and standard test methods for the selection of electric cables and wires with respect to fire safety and radiation resistance
- Safety Instruction IS 41 - The use of plastic and other non-metallic materials at CERN with respect to fire safety and radiation resistance.

5.6.5 Earthing and bonding

Earthing and bonding are critical elements in providing safety to the majority of electrical installations at CERN. Their main function is to reduce to a minimum the risks of fire and shock hazard.

5.6.6 As a conductor of electricity, any metal part may become live (energized), should an electrical fault develop. By ensuring that metal parts are adequately earthed, a reliable circuit route is provided. This will allow an easy path for currents to flow through, which should allow protective devicesto detect the fault current, and automatically disconnect the supply. Therefore, all metallic parts should be earthed ensuring equipotenciality in case of electrical hazard. Emergency stops

Electrical installations and equipment in experimental and accelerator areas shall be equipped with **emergency stop systems**. The emergency stop systems shall be installed according to Safety Instruction IS 5 – Emergency stops.

5.6.7 Training

Non-electrical activities can be carried out in an electrical environment only by personnel in possession of a H0B0 work permit (non-electricians training course required).

Electrical interventions must be performed only by qualified and professional personnel, in possession of the appropriate and mandatory electrical certification as stipulated in the Code C1

The CERN training catalogue provides some of the training courses for the electrical. The HSE Safety training and awareness service provides advice on electrical safety training.

5.6.8 Safety file for electrical installations and equipment

The Safety file for electrical installations and equipment shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Design & Engineering file:**
    - Results of design calculations made;
    - Drawing identifying areas which may pose any risks to the electrical equipment, e.g. areas where fire and explosion risks exist;
    - Drawing of the building/area with earthing systems and electrical underground network;
    - Diagrams, block diagrams, interconnection diagrams of electrical and safety installations.
    - List of cables;
    - List of safety installations and maximum occupancy of the building areas;
    - Technical specifications including power supplies;
    - Technical requirements for overcurrent/overvoltage protection for load and mains;
  - **Reception:**
    - EC declaration of conformity for electrical equipment (e.g.:protective devices);

- Documents, notices or instructions required by the applicable Directives;

- **Commissioning file:**
  - Acceptance test report of the general and local emergency stop systems;
  - HSE initial inspection report;
  - Records of electrical inspections;

- **Operation Phase:**
  - **Operation and maintenance file:**
    - Records of inspections, maintenance and non-conformities;
    - Operation and maintenance procedures.

- **Dismantling Phase:**
  - Dismantle Report;
  - Tractability Procedure for Radioactive Equipment (if applicable).

5.7 Non-ionizing radiation Safety

5.7.1 Equipment emitting non-ionizing radiation

Equipment emitting non-ionizing radiation shall comply with the following standards:

(1) CISPR 11 - Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement;

(2) EN 55011 - Industrial, scientific and medical (ISM) radio-frequency Equipment. Electromagnetic disturbance characteristics. Limits and methods of measurement;

(3) EN 61000-6-1: Electromagnetic compatibility. Generic immunity standard. Residential, commercial and light industry;

(4) EN 61000-6-2: Electromagnetic compatibility. Generic immunity standard. Industrial environment;

(5) IEC 61000 series - Electromagnetic compatibility (EMC).

5.7.1.1 Safety file for equipment emitting non-ionizing radiation

The non-ionizing radiation Safety file shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Reception:**
    - EC declaration of conformity for electrical equipment (e.g.: power supplies, protective devices);
    - Documents, notices or instructions required by the applicable Directives;
  - **Commissioning file:**
    - Records of measurements of electromagnetic fields;
    - Records of the assessment of the risk of electromagnetic leakage.
- **Operation Phase:**
  - **Operation and maintenance file:**
    - Records of inspections, maintenance and non-conformities;
    - Operation and maintenance procedures.
- **Dismantling Phase:**
    - Dismantle Report;
    - Tractability Procedure for Radioactive Equipment (if applicable).

For equipment designed, manufactured and test under the responsibility of CERN or a Collaboration; the Safety file shall integrate documentation necessary to demonstrate that these phase comply with the applicable standards. Upon request the HSE Unit defines the contents of the Safety file.

5.7.2 Lasers

Laser installations shall comply and be classified and labelled according to the standard:

- IEC 60825-1: Safety of laser products - Part 1: Equipment classification and requirements.

Optical fibres integrated in the laser installations shall comply with the following standard:

- IEC 60825-2: Safety of laser products - Part 2: Safety of optical fibre communication systems;
- IEC/TR 60825-14: Safety of laser products – Part 14: A user's guide.

5.7.2.1 Control measures for lasers

Laser installations classified, according to IEC 60825-1, as class 3R, 3B or 4 shall be registered (ISI Laser form).

The laser register form shall be filled in and sent to the Laser Safety Officer.

Laser installations housing lasers that are classified, according to IEC 60825-1, as class 3 B or 4 shall:

- have assigned a laser installation supervisor (laser expert training course required);
- be only used by trained people (laser user training course required);
- be subject to a laser safety inspection.

The laser installation supervisor shall fill in the Laser Safety Inspection report (Laser Safety visit template) and then organize the laser safety inspection with the Laser Safety Officer. Laser installations shall be operated after being submitted to a successful safety inspection.

5.7.2.2 Activities where people are exposed to artificial optical radiation

Activities where workers are exposed to artificial optical radiation shall comply with:

- Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation).

5.7.2.3 Safety file for lasers

The Safety file for laser installations shall include Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Design & Engineering file:**
    - Results of design calculations made;
    - Drawing identifying areas which may pose any risks to the electrical equipment, e.g. areas where fire and explosion risks exist;
    - Drawing of the building/area with earthing systems and electrical underground network;
    - Diagrams, block diagrams, interconnection diagrams of electrical and safety installations.
    - List of cables;
    - List of safety installations and maximum occupancy of the building areas;
    - Technical specifications including power supplies;

- Technical requirements for overcurrent/overvoltage protection for load and mains;

- **Reception:**
  - EC declaration of conformity for electrical equipment (e.g.: power supplies, protective devices);
  - Documents, notices or instructions required by the applicable Directives;
- **Commissioning file:**
  - Laser register form;
  - Laser Safety Inspection report;

- **Operation Phase:**
  - **Operation and maintenance file:**
    - Training records of users and laser supervisor;
    - Operation and maintenance procedures.
- **Dismantling Phase:**
  - Dismantle Report;
  - Tractability Procedure for Radioactive Equipment (if applicable).

5.7.3 Activities in magnetic fields

Activities where workers are exposed to magnetic fields shall comply with the following CERN Safety rule:

- Safety Instruction IS 36 – Safety rules for the use of static magnetic fields at CERN.

5.7.3.1 Control measures

According to IS 36, the following control measures shall be put in place:

- workers' exposure shall be limited to the occupational exposure limit , i.e. occupational exposure during a working day shall be limited to a magnetic flux density not greater than **200 mT**;
- areas with magnetic fields above **0.5 mT** shall be marked with warning;
- any person exposed to levels above **10 mT** shall follow appropriate health surveillance.

In addition, people accessing magnetic fields are informed about hazards and safety rules.

5.7.3.2 Safety file for activities in magnetic fields

The Safety file of activities involving magnetic fields shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Before starting the activity**
    - Magnetic field map;
    - Operating procedures;

- **During the activity**
    - Records of magnetic field measurements;
    - List of people exposed to magnetic fields exceeding 10 mT.

5.7.4 Activities in electromagnetic fields

Activities where workers may be exposed to electromagnetic fields shall comply with the following rules:

- Directive 2004/40/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)).

5.7.4.1 Control measures

In order to ensure that workers exposed to electromagnetic fields are protected against all known adverse health effects, exposure shall comply with the limits listed in the table below.

Frequency range	Current density for head and trunk J (mA/m²) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density S (W/m²)
Up to 1 Hz	40	—	—	—	—
1 — 4 Hz	40/f	—	—	—	—
4 — 1 000 Hz	10	—	—	—	—
1 000 Hz — 100 kHz	f/100	—	—	—	—
100 kHz — 10 MHz	f/100	0,4	10	20	—
10 MHz — 10 GHz	—	0,4	10	20	—
10 — 300 GHz	—	—	—	—	50

Table 7 - Exposure limit values [source: directive 2004/40/EC]

If the exposure limit values are exceeded, immediate action shall be taken to reduce the exposure below the exposure limit values. The reasons why overexposure has occurred shall be identified, and the protection and prevention measure shall be amended in order to avoid any recurrence.

Where exposure above the limit values is detected, a medical examination shall be made available to the worker(s) concerned.

Frequency range	Electric field strength, E (V/m)	Magnetic field strength, H (A/m)	Magnetic flux density, B (μT)	Equivalent plane wave power density, S_{eq} (W/m^2)	Contact current, I_C(mA)	Limb induced current, I_L(mA)
0 — 1Hz	—	$1,63x10^5$	$2x10^5$	—	1,0	—
1 — 8 Hz	20 000	$1,63x10^5/f^2$	$2x10^5/f^2$	—	1,0	—
8 — 25 Hz	20 000	$2x10^4/f$	$2,5x10^4/f$	—	1,0	—
0,025 — 0,82kHz	500/f	20/f	25/f	—	1,0	—
0,82 — 2,5 kHz	610	24,4	30,7	—	1,0	—
2,5 — 65 kHz	610	24,4	30,7	—	0,4 f	—
65 — 100 kHz	610	1 600/f	2 000/f	—	0,4 f	—
0,1 — 1 MHz	610	1,6/f	2/f	—	40	—
1 — 10 MHz	610/f	1,6/f	2/f	—	40	—
10 — 110 MHz	61	0,16	0,2	10	40	100
110 — 400 MHz	61	0,16	0,2	10	—	—
400 — 2 000 MHz	$3f^{½}$	$0,008f^{½}$	$0,01f^{½}$	f/40	—	—
2 — 300 GHz	137	0,36	0,45	50	—	—

Table 8 - Action values [Source: Directive 2004/40/EC]

If the action values are exceeded, an action plan comprising technical and/or organizational measures shall be devised and implemented in order to prevent exposure exceeding the exposure limit values.

Workplaces where workers could be exposed to electromagnetic fields exceeding the action values shall be indicated by appropriate signs. The areas shall also be delimited and access to them restricted.

5.7.4.2 Safety file for activities in electromagnetic fields

The Safety file of activities in electromagnetic fields shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Before starting the activity**
    - Risk assessment of the activity;
  - **During the activity**
    - Electromagnetic field measurements.

5.8 Chemical Safety

5.8.1 Activities involving hazardous chemical agents

Activities involving hazardous chemical agents at CERN shall comply with the following CERN Safety rule:

- Safety Regulation on chemical agents (SR-C);
- General Safety Instruction (GSI-C1) on prevention and protection measures;
- General Safety Instruction (GSI-C3) on monitoring of exposure to hazardous chemical agents in workplace atmospheres.

Prior to the use of the hazardous chemical agents, and in order to comply with the requirements of the applicable CERN Safety rule, a Chemical risk assessment shall be carried out (refer Safety Form C-0-0-1, Chemical Risk Assessment). In addition the following Safety forms shall be completed, when required, for the use of hazardous chemical agents:

- Safety Form C-1-0-2 – Chemical Inventory (example);
- Safety Form C-1-0-3 – Tests of safety showers/eye washes;
- Safety Form C-1-0-4 – Respirator use (example);
- Safety Form C-3-0-1 – Exposure Form for hazardous chemicals and CMR;
- Safety Form C-0-0-2 - Nanomaterial Risk Assessment

The following Guideline documents are available for consultation, when completing the Safety forms:

- Safety Guideline C-1-0-1 – Storage of Hazardous Chemical Agents;
- Safety Guideline C-1-0-2 – Chemical Protective Gloves;
- Safety Guideline C-1-0-3 – Practical Guide for users of Local Exhaust Ventilation (LEV) systems;
- Safety Guideline C-0-0-1 – Identification of Hazardous Chemical Agents;
- Safety Guideline C-0-0-2 – Chemical Risk Assessment (Inhalation);
- Safety Guideline C-0-0-3 – Lead;
- Safety Guideline C-0-0-4 – REACH;
- Safety Guideline C-0-0-5 - Safe handling and disposal of nanomaterials

5.8.1.1 Safety file for hazardous chemical agents

The Safety file for activities involving hazardous chemical agents shall include all the Safety documents necessary to demonstrate compliance with the applicable CERN rules (SR-C and GSI-C1).

It should be compiled using the following layout:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Record of the risk assessment (completed Safety Form C-0-0-1) including:**
    - description of the workplace and working areas (e.g. type of installation, building/room);

- description of the activities concerned;
- identification of the hazardous chemical agents concerned;
- details of the selected control measures;
- who is responsible for carrying out particular actions and when the measures have to be taken;
- the name of the person (the Assessor) who completes the assessment (Safety Form C-0-0-1) and the name of the person (HSE Unit) who authorizes the start of an activity (if required).

- **Records of control measures taken:**
  - Design reports, if applicable;
  - Programmes and records of performance checks for all prevention and protection measures;
  - Executed maintenance and inspections;
  - Training records (trained persons and content of the training).
- **Commissioning File:**
  - Documents, certificates, technical specifications relating to the procurement and commissioning of equipment (e.g. EC-type examination certificates, EC certificates of conformity for work equipment);
  - safety data sheets and exposure scenarios for the hazardous chemical agents concerned;
  - storage plans and inventories for hazardous chemical agents;
  - applicable standard operating procedures for safe handling, transport and storage of hazardous chemical agents;
  - emergency procedures and programmes and reports of safety drills;

- **Operation Phase:**
  - **Exposure monitoring for hazardous chemicals (if required).**
    - report detailing the monitoring strategy and the results of exposure monitoring relating to the initial evaluation and periodic monitoring;
    - record of work stoppages due to an exposure limit being exceeded and corrective actions taken;
    - a completed exposure form for each person concerned.

5.8.2 Activities involving asphyxiant chemical agents

Activities involving asphyxiant chemical agents shall comply with the following CERN Safety rule:

- Safety Regulation on chemical agents (SR-C);
- General Safety Instruction (GSI-C1) on prevention and protection measures.

5.8.2.1 Control measures

The control measures are determined according to the results of the chemical risk assessment (refer to the Safety form C-0-0-1, Chemical risk assessment) and/or to a specific assessment of the risks of asphyxiation due to oxygen depletion.

The risk of exposure shall be reduced to a minimum by applying the relevant control measures in order of priority:

- general and/or local exhaust ventilation, and if not sufficient;
- oxygen detection deficiency systems in any areas where asphyxiant gases can become trapped and which pose a risk to persons;
- adequate Safety procedure in case the detection of oxygen deficiency is triggered.

Oxygen deficiency detection systems shall be installed, commissioned, disabled, maintained, and periodically inspected according to the Safety Instruction IS 37 - Alarms and alarm systems.

The CERN Service for installation, maintenance and calibration of detection of oxygen deficiency systems is GS/ASE .

5.8.2.2 Safety file for the asphyxiant chemical agent

The Safety file for activities involving asphyxiant chemical agents shall be compiled according to the same format as that given for hazardous chemical agents.

5.8.3 Flammable gas

The use of flammable gas shall comply with the following CERN Rule:

- GSI-C2 - Explosive atmospheres

5.8.3.1 Control measures

Prior to the use of flammable gases, and in order to comply with the requirements of this rule, an explosion risk assessment shall be carried out and the hazardous areas shall be classified when required.

The following Safety forms shall be completed for the use of flammable gas:

- Safety Form C-2-0-1 - Explosion risk assessment;
- Safety Form C-2-0-2 - Classification of hazardous areas en (when required);
- Safety Form C-2-0-3 - Declaration/Cancellation of the use of flammable gas in an experiment area (when required).

The following Guideline documents shall be consulted, when completing the Safety forms:

- Safety Guideline C-2-0-1 - Explosion protection measures;
- Safety Guideline C-2-0-2 - Identification and prevention of explosion hazards;
- Safety Guideline C-2-0-3 **-** Practical Guide for Classification of Hazardous Areas
- Safety Guideline C-1-0-1 - Storage of hazardous chemical agents.

Any purchase of flammable gases shall be authorized by the FGSO (Flammable Gas Safety Officer) of the relevant Department – purchase to be done via EDH.

The first use or use following a change in the risk of a workplace containing hazardous areas shall be subject to authorization by the HSE Unit. Authorization shall be granted if the overall explosion

safety has been verified by the HSE Unit or by an external person whose competence in the field of explosion protection is recognized by the HSE Unit.

5.8.3.2 Safety file for activities involving flammable gases

The Safety file for activities involving flammable gases shall include the Safety documents necessary to demonstrate compliance with the applicable CERN rules (GSI-C3):

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Record of the risk assessment (completed Safety Form C-2-0-1)) including:**
    - Description of the workplace and working areas (e.g. type of installation, building/room, site and layout plans attached including plans of escape routes);
    - description of the activities concerned;
    - description of the substances used/safety parameters;
    - reference to the classification of hazardous areas (completed Safety Form C-2-0-2) if applicable;
    - the applicable explosion protection measures and work equipment to be selected;
    - who is responsible for carrying out particular actions and when the measures have to be taken
    - the name of the person (the Assessor) who completes the assessment (Safety Form C-2-0-1) and the name of the person (HSE Unit) who authorizes the start of activities.
    - The risk assessment shall take account of start-up and shutdown, cleaning and malfunctions as well as normal operation.
  - **Commissioning File:**
    - Documents, certificates, technical specifications relating to the procurement and commissioning of equipment (e.g. EC-type examination certificates, EC certificates of conformity for work equipment);
    - safety data sheets and exposure scenarios for the hazardous chemical agents concerned;
    - applicable standard operating procedures for safe handling, transport and storage;
    - emergency procedures and programmes and reports of safety drills;
- **Operation Phase:**
  - **Explosion protection measures taken:**
    - Technical (prevention and mitigation)
      - performance checks for all prevention and protection measures;
    - Organizational
      - the classification of hazardous areas (completed Safety Form C-2-0-2) if applicable, including a description of their location and extent by means of text and also represented graphically;

- qualification of person assessing explosion safety (if from an outside company);
- executed maintenance and inspections;
- training records (trained persons, content and frequency of the training).

5.9 Fire Safety

Buildings, experimental facilities, equipment and experiments shall comply with the following CERN Safety rule:

- Safety Code E - Fire protection;
- Safety Note NS3 – Fire prevention for enclosed spaces in large halls.

The Safety code E sets out the fire prevention and protection rules and procedures in order to:

- ensure the protection of the people on CERN's premises;
- protect the property of CERN's premises.

In view of the very special nature of the use of certain areas, especially those underground, which involve increased fire risk, the HSE Unit is the authority for approving and, where necessary, stipulating special provisions. It reserves the right to require the additional more stringent measures which it deems fit.

5.9.1 General requirements

According to the Safety Code E buildings shall comply with the fire Safety requirements defined by the Host State law where they are located. Typically the fire Safety requirements are based on the Host State regulations.

Location	Regulations
France	• French code du travail; • Arrêté du 25 juin 1980 portant approbation des dispositions générales du règlement de sécurité contre les risques d'incendie et de panique dans les établissements recevant du public (ERP);
Switzerland	• Ordonnances 3 et 4 relatives à la loi sur le travail (OLT 3 et OLT 4) and the accompanying guidance notes of SECO ; • Standards issued by the Association of Cantonal Fire Insurance Establishments (AEAI);

Table 9 - Host State regulations

For experimental and accelerator facilities the fire Safety measures are verified by a fire risk assessment of the facility. The fire risk assessment is performed by the PSO/GLIMOS/PL with the help of fire safety specialists.

The following documents can assist the user in the process of elaborating a risk assessment:

- ISO/TS 16732: Fire safety engineering - Guidance on fire risk assessment;
- ISO/TS 16733: Fire safety engineering - Selection of design fire scenarios and design fires.

5.9.2 Fire prevention and protection measures

The guidance document "summary of fire Safety requirements applicable to office buildings" provides a summary of the requirements, also applicable to experimental facilities, set by the French and Swiss regulations respectively.

5.9.3 Fire permit

According to the Safety code E, activities (e.g.: welding and plasma cutting) that can cause a fire and are performed outside authorized areas (workshops) shall start after being authorized. The authorization shall be requested by the filling in the fire permit form available in EDH.

5.9.4 Fire Safety inspection

According to the Safety code E the HSE Unit shall be informed of the installation or modification of a building, facility and experimental apparatus.

The HSE Unit shall inspect the building, facility or experimental area before commissioning in order to check whether all the prevention and protection measures are put in place.

5.9.5 Evacuation

According to the code E evacuation diagrams shall be displayed at suitable points and clearly identify the evacuation paths. They shall also show the emergency systems; i.e. fire extinguishers, emergency stops, etc.

The HSE Unit (A. Russo) provides advice on evacuation diagrams.

Fire drills are held regularly according to the procedures set out in Appendix VII of the Safety Code E - Fire protection.

5.9.6 Fire Safety file

The fire Safety file shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR
  - Study Report
- **Project Phase:**
  - **Design & Engineering file:**
    - Report indicating the sources of fire hazard, giving the following information:
      - Foreseen destination of use, manufacturing process or activity
      - Estimated maximum number of occupants in the area
      - Technical installations (ventilation, power, machinery, etc.)
      - Rough estimate of type and quantities of combustible materials (as part of construction elements and equipment, used in the process or for maintenance, stored etc.)
      - Fire resistance requirements of the structural elements and or products (fire dampers, penetration seals, etc.)
      - Fire compartments and their fire resistance class
      - Calculation details of the fire protection systems, i.e. water extinguishing systems, hose reels, smoke extraction systems etc.
    - General drawings (scale 1:50, 1:100 or 1:200) of the different rooms and areas with indication of their destination including the stairs and emergency issues. They shall also include the position of the working places, of the machines, of the fire extinguishers and

of other extinguishing systems (if present), of the evacuation plans and of the following technical installations (not exhaustive list) :

- Steam boilers, steam and under pressure vessels
- Heating and ventilation installations, fuel or oil tanks, gas installations
- Lifts
- Installations dedicated to transformation or storage of materials particularly inflammable, explosive or harmful
- Fire compartments layout also including penetration of services
- Evacuations paths (also showing the path's length) and emergency issues. The type, opening direction and width of escape doors should be reported. The conformity to all the applicable safety requirement should be demonstrated also taking into account the foreseen number of occupants.
- Relevant fire protection systems (water extinguishing systems, hose reels, fire detection, smoke extraction, etc.).

- Elevation and cross sections drawings with indications concerning materials, windows and staircases construction
- For transformation projects, drawings of the old layout or installations.

- **Manufacturing / Reception file:**
  - Execution drawings approved by the competent external authorities (in case of Construction Permit request)
  - Reaction to fire certification of the materials to be installed and their arrangement in the construction work
  - Fire resistance justification of the building elements / products to be installed (i.e. CE marking, classification report, certificate of correct installation, calculation report for analytical assessment, etc.)
  - Definition documents and drawings of technical systems (ventilation, smoke extraction, water extinguishing systems, etc.)
  - Declaration or certification of CE conformity[1] of products and components (if applicable)
- **Commissioning file:**
  - Acceptance test report of the fire detection system, if applicable;
  - Evacuation diagrams;
  - Fire Safety inspection report;

- **<u>Operation Phase:</u>**
  - **Operation and maintenance file:**
    - Records of evacuation drills;
    - Emergency procedures;
    - Annual test report of fire detection system;

[1] From the 1st July 2013 these documents are replaced by the "Declaration of Performance", as defined in the Construction Products Regulation

- **<u>Dismantling Phase:</u>**
    - Dismantle Report;
    - Tractability Procedure for Radioactive Equipment (if applicable).

5.10 Heating, Ventilation and Air Conditioning (HVAC) Systems

For experimental and accelerator facilities the ventilation systems are designed after performing a risk assessment of the facility. The risk assessment is performed by the PSO/GLIMOS/PL with the help of mechanical safety specialists.

5.10.1 HVAC requirements

The general requirements applicable to HVAC systems are defined on the basis of the French and Swiss legislation. The requirements are available in EDMS: 1157155.

5.10.2 HVAC equipment

Equipment purchased on the marked (e.g.: Air Handling Units, chillers, boilers, fan coils) shall comply with the applicable European Directives and shall bear the CE marking. For products purchased on the market refer to 5.2.

Ductwork (supply or exhaust air) and piping systems incorporated in a permanent manner in a building, shall comply with the following European Regulation:

- European Regulation 305/2011 - Construction Products Regulation.

Ductwork designed according to the harmonized standards:

- EN 1505 - Ventilation for buildings. Sheet metal air ducts and fittings with rectangular cross-section. Dimensions;
- EN 1506 - Ventilation for buildings. Sheet metal air ducts and fittings with circular cross-section. Dimensions;
- EN 12097 - Ventilation for buildings. Requirements for ductwork components to facilitate maintenance of ductwork systems.

These standards provide presumption of conformity to the Safety requirements regarding the design laid down in the applicable European Regulation.

Metallic piping shall be designed and manufactured as defined in EN 13480.

5.10.3 Pressurized areas

Buildings and facilities may be fitted compartments that are pressurized in order to prevent the contamination of airborne particles or smoke (e.g.: with pressurized areas in escape routes such as the shaft of underground facilities).

Typically at CERN pressurized areas meet the fire safety requirements set by:

- French "instruction technique 246" – overpressure in stairwells of buildings with public access of 20 Pa to 80 Pa;

and the safety requirements set by:

- ISO 17873: Nuclear facilities - Criteria for the design and operation of ventilation systems for nuclear installations other than nuclear reactors – minimum overpressure between critical radioprotection areas and other areas of 40 Pa.

5.10.4 Safety file for HVAC systems

The Safety file for HVAC systems shall include the following documents:

- **Study Phase:**

- CDR;
- Study Report;
- Preliminary Risk Assessment (if applicable);

- **<u>Project Phase:</u>**
  - **Design & Engineering file:**
    - Risk Assessments (if applicable);
    - Engineering drawings (P&I D(s));
    - Engineering design report including: description of the HVAC system, conditions of use, actions considered in the design (ventilation rates), design calculations;
    - Technical specifications;
  - **Reception:**
    - EC declaration(s) of conformity of equipment purchased on the marked (e.g.: Air Handling Units, chillers, boilers, fan coils);
    - Instruction(s) manual of the referred equipment;
    - Material certificates of ductwork and piping;
  - **Commissioning file:**
    - HSE reception test report;
    - Records of tests and inspections made;
- **<u>Operation Phase:</u>**
  - **Operation and maintenance file:**
    - Instruction manual for the operation and maintenance of the installation;
    - Records of inspections, maintenance and non-conformities.
- **<u>Dismantling Phase:</u>**
    - Dismantle Report;
    - Tractability Procedure for Radioactive Equipment (if applicable).

5.11 Workplace Safety

Workplaces shall meet the health, safety and wellbeing needs of the workers, including people with disabilities. The workplace shall be adapted in order to be accessible to people with disabilities, e.g.: passageways, washrooms and workstations.

Workplaces shall comply with the requirements set by the:

- Council Directive 89/654/EEC concerning the minimum safety and health requirements for the workplace;
- Council Directive 92/58/EEC relating to the provision of safety and/or health signs at work.

Additionally workplaces shall comply with the requirements set by the Host State regulation where the workplace is located.

Location	Regulations
France	• Code du Travail ; • Arrêté du 27 Juin 1994 relatif aux dispositions destinées à rendre accessibles les lieux de travail aux personnes handicapées ; • Décret n"2009-1272 du 21 octobre 2009 relatif à l 'accessibilité des lieux de travail aux travailleurs handicapés ;
Switzerland	• Ordonnances 3 et 4 relatives à la loi sur le travail (OLT 3 et OLT 4) and the accompanying guidance notes of SECO ; • Loi fédérale sur l'élimination des inégalités frappant les personnes handicapées (LHand);

Table 10 - Workplace reference regulations

The chapters below provide a summary of the workplace requirements set by the Host State regulations.

5.11.1 Activities in confined spaces

Activities in confined spaces shall comply with the following CERN Safety Rule:

- Safety code A4 - Confined spaces.

5.11.1.1 Control measures

Before accessing a confined space, it shall be ensured that:

- A supervisor, person responsible for any activity in the confined space, is assigned to the confined space;
- Any person who may enter the confined space as well as the supervisor shall follow a CERN training course on confined spaces;
- Any person who may enter the confined space shall follow appropriate health surveillance in order to check whether the person is suitable to work in such a working environment;
- There is at least one person maintaining a watch outside the confined space at all times.

CERN members of personnel and users are subject to specific health surveillance defined by the CERN Medical Service. Contractor's personnel shall be subject to the health surveillance defined by the law of the Host State in which the activity will be carried out.

Only CERN members of personnel and users are examined by the CERN Medical Service.

The training courses on confined spaces are held at CERN and registration for the course can be made via EDH.

5.11.1.2 Safety file for activities in confined spaces

The Safety file for activities in confined spaces shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Project Phase:**
  - **Before starting the activity**
    - Entry permit;
    - Training records of the personnel;
    - Operating procedures.

5.11.2 Lone working

Activities involving significant hazards during lone working shall comply with the following applicable CERN Safety Rules:

- Safety code A6: Two-person rule of working;
- Safety note NS8: Two-person rule of working.

5.11.2.1 Control measures

According to the Safety code A6 workers shall not work alone where significant hazard exists. A second person is required in order to provide appropriate assistance in the event of an emergency.

The two-person rule applies to activities where workers are or may be exposed to more risks than those encountered in low-risk activities such as bureaucratic activities, library or secretarial work, painting (not on a ladder), manual operations in a workshop or gardening by hand.

Some one-person activities are allowed if adequate control measures are implemented.

5.11.3 Ergonomics and Working places

The “Summary of the safety requirements for workplaces” document available in EDMS: 1134034 a summary of the requirements and recommendations of the French and Swiss workplace regulations for:

- Disabled Access
- Room dimensions and spaces
- Lighting
- Sanitary conveniences and washing facilities
- Facilities to eat meals
- Noise
- Vibration

5.11.3.1 Safety file for activities in which workers are or may be exposed to noise

The Safety file shall include:

- **Project Phase:**

- **Before starting the activity**
    - Record of measures taken (defined by the HSE Unit) in order to eliminate or reduce to a minimum the risks from noise;
    - Sound power level and one-third octave spectrum of the machine (not compulsory);
- **During the activity**
    - Report of the noise measurements (carried out by the HSE Unit);

5.11.4 Workplaces with hazardous areas

Workplaces where there are areas in which several hazards are present and have the potential to cause harm to people who may access it shall have controlled access in order to prevent the entry of unauthorized people and people who are not aware about the hazards present (these areas shall be accessible at all times to the CERN Fire Brigade).

The access control system and procedures shall be identified based on the risk assessment of the area.

People who may access such areas shall be informed about the hazards that they may encounter, and the rules to follow in case of emergency.

5.12 Protection of the environment

With regard to protection of the environment CERN Safety Policy states that Organization is committed to ensure the best possible protection of the environment. This can be achieved by ensuring that the Environmental requirements and guidelines set by the Host State regulations, European Directives, international standards and best practices are implemented in all CERN's activities susceptible to harm the environment.

5.12.1 General requirements

5.12.1.1 Protection of the public and the environment against ionizing radiation

The Safety requirements on the protection of the public and the environment against ionizing radiation are set by the following CERN Safety rule:

- Safety Code F – radiation protection.

The Safety Requirements for the design of stacks emitting radioactive substances to the atmosphere from the experiments shall comply with the following document:

- Requirements on the design of stacks emitting Radioactive Substances to the Atmosphere.

5.12.1.2 Conventional protection of the environment

In order to meet the CERN Safety Policy, CERN activities shall comply with the technical provisions set by the following European Directives:

- Directive 2008/1/EC on Integrated Pollution Prevention and Control – IPPC Directive;
- Directive 2004/35/CE on environmental liability with regard to the prevention and remedying of environmental damage;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste.

According to the IPPC Directive, all activities susceptible to harm the environment shall use adequate pollution-prevention measures (notably best available techniques), use energy efficiently, ensure accident prevention and damage limitation in order to achieve a high level of protection of the environment.

5.12.1.3 Air

Atmospheric potentially polluting emissions shall be limited at the source and shall respect the requirements and related technical prescriptions of the following rules:

- Code de l'environnement – Partie réglementaire – Livre II – Titre II (France) ;
- Arrêté du 02/02/98 relatif aux prélèvements et à la consommation d'eau ainsi qu'aux émissions de toute nature des installations classées pour la protection de l'environnement soumises à autorisation (France) ;
- Loi fédérale sur la protection de l'environnement (Loi sur la protection de l'environnement, LPE) (Switzerland) ;
- Ordonnance sur la protection de l'air (Switzerland).

Whenever greenhouse gases or substances that deplete the ozone layer are emitted into atmosphere by experiments or equipment, emissions shall respect the requirements and related technical prescriptions of the following legislation:

- Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer ;

- Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol;
- Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases.

The technical project leader shall ensure that prescriptions related to energetic efficiency of the experiments or equipment are taken into account and are in line with the following requirements:

- La Réglementation Thermique 2012 (RT2012) (France)
- SIA 380/1 – L'énergie thermique dans le bâtiment (Switzerland)
- SIA 380/3 – Isolation thermiques des conduites, canalisations et réservoirs du bâtiment (Switzerland)
- SIA 380/4 – L'énergie électrique dans le bâtiment (Switzerland)

5.12.1.3.1 Control measures

CERN activities discharging pollutants into the air shall be controlled by implementing as a general rule, and in order of priority, the following measures:

- To reduce at the minimum the discharge of pollutants in the air;
- To collect the air at the source;
- To release air above roof level;
- To ensure that the emission of air effluents comply with emission limit values set by the Host State regulations:
  - Articles 26, 27, 28, 29, 30 of the Arrêté du 02/02/98 relatif aux prélèvements et à la consommation d'eau ainsi qu'aux émissions de toute nature des installations classées pour la protection de l'environnement soumises à autorisation (France) ;
  - Annexes 1 to 4 of Ordonnance sur la protection de l'air (Switzerland) ;
- To implement air monitoring programme for:
  - polluting substances (annex III of Decision No 2008/1/EC);
  - greenhouse gases (Decision No 280/2004/EC);
  - fluorinated greenhouse gases (Regulation (EC) No 842/2006);
  - and substances that deplete the ozone layer (Regulation (EC) No 1005/2009);
- To implement corrective actions (e.g.: filters, gas washers, scrubbers) after exceeding emission limit values;
- To assess annually emission levels of greenhouse gases and ozone depletion gases according to their annual consumption within equipments;
- To ensure effectiveness of remedial measures.

5.12.1.4 Water

According to the location of the project on the CERN site, the discharge of effluent water into the CERN clean and sewage water networks shall be designed and set-up in conformity with the following rules and their related technical prescriptions:

- Loi sur l'eau et les milieux aquatiques (France) ;

- Arrêté du 02/02/98 relatif aux prélèvements et à la consommation d'eau ainsi qu'aux émissions de toute nature des installations classées pour la protection de l'environnement soumises à autorisation, Chapitre V: Valeurs limites d' émissions, Section III : Pollution des eaux superficielles, Articles Article 31 and 32 (point 1 to 3) (France) ;
- Loi fédérale sur la protection des eaux (Switzerland) ;
- Ordonnance sur la protection des eaux (OEaux) (Switzerland).

The direct or indirect introduction of potentially polluting substances into water, including their infiltration into ground is prohibited.

5.12.1.4.1 Control measures

CERN activities discharging pollutants into the surface water shall be controlled by implementing as a general rule, and in order of priority, the following measures:

- To reduce at the minimum the discharge of pollutants in the water;
- To comply with emission limit values for effluent water. The discharge of effluent water into the CERN clean and sewage water networks shall be done in conformity with the Host State regulations in force according to the location of the receiving watercourses:
  - Art. 31, 32 & 34 of Arrêté du 02/02/98 relatif aux prélèvements et à la consommation d'eau ainsi qu'aux émissions de toute nature des installations classées pour la protection de l'environnement soumises à autorisation (France) ;
  - Annex 3.2 of Ordonnance sur la protection des eaux (Oeaux) (Switzerland) ;
- To implement a water monitoring programme for any activity using substances given in the Annex VIII of the Directive 2000/60/EC;
- In the event of exceeding the emission limit values for effluent water, to study the possibility of a different elimination pathway, either incorporating water treatment equipment or treating the effluents as dangerous waste. In the event of the use of water treatment equipment, ensure the maintenance and document the maintenance procedure. Keep all decantation units / oil separators / filters / septic tanks or any other water treatment unit fitted and maintained. Carry out cleaning operations on a regular basis. Describe in a procedure how to carry out the maintenance and how to control their state periodically;
- To control the amount of water released and quantify whenever possible;
- To keep storage facilities in good shape, ensure retention means complying with: SR-C; Safety Guideline C-1-0-1 - Storage of hazardous chemical agents and other relevant prescriptions;
- Implement corrective actions after exceeding emission limit values;
- Ensure effectiveness of remedial measures following a significant environmental event.

The HSE Unit (Environmental Section) provides advice on measurements of effluent water, water monitoring and risk control measures.

5.12.1.5 Soil

CERN activities that may damage the soil shall meet the requirements set by the Host States regulations mentioned in the section 5.12.1.4., and take into account the following legislation:

- Code de l'environnement, Livre V, Titre Ier: Installations classées pour la protection de l'environnement, Chapitre Ier et Chapitre II (France) ;
- Circulaire du 08/02/07 relative à la prévention de la pollution des sols - Modalités de gestion et de réaménagement des sites pollués (France) ;

- Ordonnance du 19 octobre 1988 relative à l'étude de l'impact sur l'environnement (OEIE). (Switzerland);
- Ordonnance sur les atteintes portées aux sols (Osol) (Switzerland) ;
- Ordonnance sur les sites contaminés, (OSites) (Switzerland) ;
- Directive OFEV pour la valorisation, le traitement et le stockage des matériaux d'excavation et déblais: Directive sur les matériaux d'excavation (Switzerland) ;
- Directives CCE (Conférence des chefs des services et offices de protection de l'environnement de Suisse): Mesures de protection pour installations d'entreposage et places de transvasement Remplissage des réservoirs (Switzerland).

Whenever excavation works are required, the HSE Unit (Environmental section) shall be contacted in order to check whether the site is polluted or contaminated and, if needed, to define remedial measures. The identification of polluted and contaminated sites is done accordingly to the limit values defined in the following legislation:

- Ordonnance sur les sites contaminés, (OSites) (Switzerland) ;
- Directive OFEV pour la valorisation, le traitement et le stockage des matériaux d'excavation et déblais: Directive sur les matériaux d'excavation (Switzerland) ;
- Circulaire du 08/02/07 relative à la prévention de la pollution des sols - Modalités de gestion et de réaménagement des sites pollués (France) ;

5.12.1.5.1 Control measures

In order to prevent the soil pollution and contamination the following measures shall be implemented as a general rule, and in order of priority:

- To keep storage facilities in good shape, ensure retention means complying with the CERN Safety rules and Host State practices:
  - SR-C; Safety Guideline C-1-0-1 - Storage of hazardous chemical agents;
  - French practices "Stockage et transfert des produits chimiques dangereux, INRS 2009" ;
  - Swiss practices "Guide Pratique: Entreposage des matières dangereuses, 2011" and Directives CCE: Mesures de protection pour installations d'entreposage et places de transvasement Remplissage des réservoirs.
- The infiltration of polluted water into the ground is prohibited.

5.12.1.6 Hazardous substances for the environment

The introduction of such substances at CERN shall follow:

- Safety Regulation Chemical Agents (SR-C);
- Directive 2011/65/EC of the European parliament and of the council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, (RoHS);
- Code de l'environnement Livre V : Titre II – Article RS21-3 to R.S21-54 and Titre IV (France);
- Arrêté du 30 juin 2009 relatif à la procédure d'enregistrement et de déclaration au registre national pour les équipements électriques et électroniques prévu à l'article R. 543-202 du code de l'environnement, et abrogeant l'arrêté du 13 mars 2006 relatif à la procédure d'inscription et aux informations figurant au registre national des producteurs prévu à l'article 23 du décret n°

2005-829 du 20 juillet 2005 relatif à la composition des équipements électriques et électroniques et à l'élimination des déchets issus de ces équipements (France) ;

- Ordonnance sur la réduction des risques liés aux produits chimiques (ORRChim) (Switzerland)

Activities involving the use of greenhouse gases and ozone depleting gases shall comply with specific Host State regulations:

- Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases ;
- Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer;
- Code de l'environnement Livre V: Titre IV, Chapitre III, Fluides frigorigènes – Article RS21-3 to R.S21-54 (France) ;
- Ordonnance sur la réduction des risques liés aux produits chimiques (ORRChim) (Switzerland).

5.12.1.6.1 Control measures

The storage of chemicals shall be made according to the following regulations:

- Stockage et transfert des produits chimiques dangereux, INRS 2009 (France) ;
- Guide Pratique: Entreposage des matières dangereuses, Institut de sécurité 2008 (Switzerland) ;
- Control measures for activities involving the use of greenhouse gases and ozone depleting gases shall comply with the requirements mentioned in the § 5.12.1.6.

Working procedures shall be established and implemented for activities involving the use of greenhouse gases including the storage, handling, transport, recovery and disposal. Additionally such activities shall be performed by trained personnel.

5.12.1.7 Waste

The generation of waste shall be limited at the source. Furthermore, the technical project leader shall ensure that the waste will be handled from its collection to its recovery or disposal according to the Host States Regulations:

- Directive 2008/98/EC on waste on waste and repealing certain Directives ;
- Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste ;
- Directive 2012/19/EC of the European Parliament on waste electrical and electronic equipment (WEEE).

Additionally, waste management shall comply with the applicable Host State regulations:

- Code de l'Environnement Livre V: Titre IV -Déchets (France) ;
- Gestion de déchets : Guide pour les établissements publics d'enseignements supérieur ou recherche (France) ;
- Loi fédérale sur la protection de l'environnement (LPE): Titre II, Chapitre IV (Switzerland) ;
- Ordonnance sur le traitement des déchets (OTD) (Switzerland) ;
- Ordonnance sur les mouvements de déchets (OMoD) (Switzerland) ;

- Ordonnance sur la restitution, la reprise et l'élimination des appareils électriques et électroniques (OREA) (Switzerland).

Waste shall be handled in accordance with the Host State regulations, including the traceability of waste at any time and shall respect the internal waste sorting procedures in force within the Organization and maintained by the GS Department (except the radioactive waste, which is managed by the HSE Unit) to ensure the adequate management of waste.

The following CERN services can be contacted for waste management:

- Conventional Waste Collection and Classification;
- Dangerous Waste Collection and Classification;
- Radioactive Waste.

5.12.1.7.1 Control measures

Waste production is avoided and limited at the source in accordance with Directive 2008/98/EC; where waste is produced, it is recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment.

The following measures can be put in place in order to meet this requirement:

- Sort waste properly. If needed ask for waste bins. Contact the relevant CERN service: Conventional Waste Collection and Classification
- Even if your waste doesn't follow the standard CERN collection procedure, characterize waste and sort it accordingly (e.g.: electrical waste, hazardous waste).
- Ensure appropriate waste collection, recovering and/or disposal.
- For elimination of conventional waste, contact relevant CERN service: Conventional Waste Collection and Classification;
- For elimination of the hazardous waste, contact relevant CERN service: Dangerous Waste Collection and Classification;
- For management of the radioactive waste, contact relevant CERN service: Radioactive Waste.
- Transport the waste as dangerous good according to the directive ADR (Directive 94/55/EC on the approximation of the laws of the Member States with regard to the transport of dangerous goods by road. EDH Internal Transport request (option Internal) for common chemical waste
- Ensure traceability: Inventory of waste categories, amounts and collection points.
- Store hazardous waste properly as indicated in the Safety Guideline C-1-0-1 – Storage of Hazardous Chemical Agents

5.12.1.8 Preservation of the natural environment

The technical project leader should ensure the preservation of the natural environment (e.g. landscaping, biotopes, floral reserve, etc.) shall be protected according to the following regulation:

- Loi fédérale sur la protection de la nature et du paysage.

5.12.1.9 Prevention of noise pollution

Emissions and immissions of environmental noise related to neighbourhoods shall respect the thresholds indicated in:

- Arrêté du 23/01/97 relatif à la limitation des bruits émis dans l'environnement par les installations classées pour la protection de l'environnement (France) ;

- Ordonnance sur la protection contre le bruit (OPB) du 15 décembre 1986, article 6 (Switzerland).

The Plan d' attribution du degrés de sensibilité OPB, shall also be taken in account when designing new installations on the Suisse territory.

5.12.1.9.1 Control measures

The HSE Unit performs environmental noise measurements in order to check the compliance of with the applicable regulations.

5.12.2 Environment Safety file

The environment Safety file shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- **Study Phase:**
  - CDR;
  - Study Report;
  - Preliminary Risk Assessment (if applicable);
- **Project Phase:**
  - **Design & Engineering file:**
    - Documentation on environmental impact assessment, if applicable;
    - Water network drawings, showing clean and sewage water networks of the new or existing building concerned by the project, internal and external to the construction, from the origin up to the connection to the public network;
    - Description of the measures to be taken in case of civil engineering works on a site which is part of the CERN inventory of polluted sites and a plan for the elimination of the excavated material ;
  - **Construction / Manufacturing file:**
    - Procedures and maintenance plans of the new water networks, including the related infrastructure if applicable (ex. oil-separators, decantation pits, water regulation basins etc.);
    - Ventilation network drawings with extraction points, documentation on air treatment units, if applicable;
  - **Commissioning file:**
    - Inventory of waste categories and collection points
- **Dismantling Phase:**
    - Dismantle Report;
    - Tractability Procedure for Radioactive Equipment (if applicable).

In the event of an accident or a near miss during activities related to the installation, maintenance, operation or dismantling the procedure described in Code A2 shall be followed:

- Immediately inform the CERN Fire Brigade;
- Draw up the accident report available in EDH.

To contact the CERN Fire Brigade use a red phone or dial 74444 from a CERN phone or dial +41 22 767 4444 from other phones.

5.13 Worksite Safety

5.13.1 Safety Coordination

The applicable regulation concerning work of contractor on CERN site is defined on the document "Working on CERN site" (EDMS 1155899).

According to the CERN rules, the work for [type name of the experiment/equipment] is chose the correct option:

- Classified as a “Category 1” worksite;
- Classified as a “Category 2” worksite or activity;
- Classified as a “Category 2” activity, but it will be part of an existing worksite classified as a “Category 1” worksite (‘Shutdown’ case for example).

5.13.1.1 “Category 1” worksite (or activity part of a “category 1” existing worksite)

The project leader shall enlist the services of a Safety Coordinator.

In case of activity part of a “category 1” existing worksite, the project leader has to contact the appointed Safety coordinator.

The Safety Coordinator role is to help the project leader to coordinate work activities in the area in order to guarantee safe working conditions.

A Work and Safety coordination Plan (WSCP or PCTS) shall be established by the CERN’s Safety Coordinator, summarizing the main general issues to be followed for and during the worksite.

In case of invitation to tender, the WSCP shall be sent as soon as possible, ideally to the bidders. If not possible, this plan must be sent to the “designated” contractor, together with the template of a Special Safety and Health Protection Plan (SSHPP or PPSPS).

In accordance with the CERN Safety Regulations and the WSCP for this worksite, before the start of work:

- The SSHPP (or PPSPS) shall be completed by the/each contractor and sent to CERN; this plan will include, in particular, workers involved in those activities, risk assessment, a description of the activities and prevention measures to be implemented;
- One (or more) Joint Inspection(s) of the areas where the work will take place will be organized by the CERN’s Safety Coordinator; the contractor(s), and any subcontractors, will take part.

Some activities are subject to a notice of starting work issued by CERN (AOC or Impact).

5.13.1.2 “Category 2” worksite or activity

The project leader shall manage Safety during the work/activity, and coordinate, in collaboration with the various CERN work supervisors, activities in the area to ensure safe working conditions (including coactivity).

In addition to the document PSO/2011-001/Rev4, the project leader shall prepare, with the collaboration of the contractor, a Prevention Plan (PdP), summarizing the main general issues to be followed before and during the works (including a risk assessment from the contractor and subcontractors).

Before the beginning of the work, the contractor (and subcontractors) shall:

- Take part to the joint inspections;
- Collaborate with the project leader to establish the PdP, including a work description with presentation of the activities to be carried out, workers involved in those activities,

assessment on risks inherent to the worksite and risks generated by activity, preventive and protection measures to be taken for each risk;

- Inform and train his personnel about the specific risks which they are exposed to and the existing individual and collective protective measures to prevent those risks;
- Provide CERN with detailed evidence that his personnel have received health and Safety training and information.

During the performance of the contract, the PdP shall be updated as risks evolve and at least annually.

The contractor shall inform CERN of changes in the potential risks as and when they arise and vice versa.

Some activities are subject to a notice of starting work issued by CERN (AOC or Impact)

5.13.2 Training

Depending on the type of activity related to the worksite, safety training courses shall be followed by the working personnel.

More details on c**ompulsory Safety training** may be found at the web page for Safety Training.

5.13.3 Electricity

In case electrical power is needed on the site, personnel performing the activity shall bring their own electrical distribution panel, with appropriate over-current protection as prescribed in NF C 15 100 standard. Only CERN qualified persons are allowed to plug it in.

Temporary electrical installation required in the worksite, shall be verified by a certified body under the responsibility of the company realizing the works.

5.13.4 Fire protection

For all activities related to execution works, the respect of the following Swiss directive in matters of fire protection is recommended:

- Prévention incendie – Sécurité dans les exploitations et sur les chantiers, AEAI 11-03

5.13.5 Hot work and welding

Welding activities may be needed in installation phase. The description of this activity shall be included in the safety documents.

The hot work activity shall comply with the Safety requirements provided in the Safety Code E on fire protection.

Before starting the hot work activity the project leader shall ensure that:

- Fire permit form, which is available in EDH, is filled up and approved
- IS 37 form, which is available in EDH, is filled up and approved
- Any necessary compensatory measures are put in place.

5.13.6 Handling and lifting activities

The personnel performing the installation works is not allowed to use machines or handling equipment which are not CE marked and approved by the HSE Unit.

Handling personnel (excluding members of CERN personnel), shall be trained and in possession of the documents demonstrating their competence to use lifting equipment as the provisions of the Host Sate where the activity is carried out:

- CACES for activities in France;
- Machinist permit for activities in Switzerland.

The use by other personnel of handling and lifting equipment belonging to CERN is subject to:

- The attendance to the specific training designed for personnel using forklift, crane and for cherry-picker
- A special 'access request' to be formulated on EDH as it follows:

AC-CE, for fork-lift trucks up to 6 t capacity, except lateral forklift trucks

AC-CT, for tractors, in particular for the transport of equipment in the tunnel

AC-N3, for working platforms

AC-PE, for overhead travelling cranes to lift loads up to 10 t.

The obtained authorization is valid for 5 years.

Following the manufacturer recommendations, the staff working on personnel lifting equipments could be asked to be trained in 'working in heights'.

Handling and lifting equipment operating in the worksites shall be accompanied by the documentation concerning the periodical maintenance.

5.13.7 Use of scaffolding

- Any scaffolding used in the area shall be assembled, dismantled and modified by trained workers.
- Any scaffolding can only be accessed after being checked by a trained person (a third party in France, the DCTI in Switzerland). The person who performs the Safety check shall display and sign a form containing the following:
- Name of companies/members of personnel authorized to use the scaffolding
- Maximum authorized load.
- For CERN personnel, users and collaborators, training courses on assembling and Safety checking of scaffoldings are offered in the CERN Training Catalogue (Scaffolding). The registration for the course can be made via EDH.

5.13.8 Temporary work at height

Temporary work activities at height shall comply with the requirements provided in the applicable legislation.

Location	Regulations
France	• Article R. 4323-58 of the French Code du Travail ;
Switzerland	• Ordonnance sur la sécurité et la protection de la santé des travailleurs dans les travaux de construction (OTConst) ;

Table 11 - Law applicable for activities involving scaffoldings

5.13.9 Asbestos

Activities in which workers are or may be exposed in the course of their work to dust arising from asbestos or materials containing asbestos, shall comply with the following CERN Safety rule:

- Safety Instruction IS 43 – Asbestos, dangers and precautions.

5.13.9.1 Control measures

Before starting the work, the precaution principle in matter of asbestos presence must be applied. For buildings, equipment or experimental facilities built before 1997, the project leader shall ask a survey before work, to be carried out by HSE unit.

In case the presence of asbestos is ascertained, necessary protective measures have to be put in place following the applicable CERN Safety rule:

- Safety Instruction IS 43 – Asbestos : Dangers and precautions

5.13.10 Protection of the environment

In relation to prevention of atmospheric pollution, the worksite activities, including the usage of mechanical engines, shall comply with the requirements and related technical prescriptions of the rules mentioned in ch. 5.12.1.3.

For CERN worksite activities located on the Swiss territory, the measures to be taken for prevention of atmospheric pollution shall be defined with support of the following instruction:

- Protection de l'air sur les chantiers – Directive Air Chantiers (Directive concernant les mesures d'exploitation et les mesures techniques visant à limiter les émissions de polluants atmosphériques des chantiers).

The discharge of water from the worksite into the CERN clean and sewage water networks shall be designed and set-up in conformity with the rules and related technical prescriptions mentioned in ch. 5.12.1.4. The technical project leader shall in particular ensure that the discharge of water from a CERN worksite located on the Swiss territory follows the instructions given by:

- Directive relative au traitement et à l'évacuation des eaux de chantier (d'après la recommandation SIA/VSA 431Dir).

The technical project leader shall ensure that the storage and usage of dangerous substances or potentially polluting substances comply with the requirements and related technical prescriptions of the rules mentioned in ch. 5.12.1.6.

In case the experiment is located on a site which is part of the CERN inventory of polluted sites, the technical project leader shall ensure that all necessary measures are taken to handle excavated material adequately and prevent further site contamination. The inventory is available at the HSE Unit upon request.

The generation of waste shall be limited at the source. Waste shall be handled in accordance with the Host State regulations, and in the event of generation of waste, which is under the responsibility of CERN, the contractor shall respect the waste sorting procedures mentioned in ch.5.12.1.7, including the traceability of waste at any time. The technical project leader shall in particular ensure that the waste generated from a CERN worksite follows the instruction given by:

- Art L541-2 du Code de l'environnement (France) ;
- Loi n° 2010-788 du 12 juillet 2010 portant engagement national pour l'environnement (France) ;
- Directive SIA 430 Gestion des déchets de chantier lors de travaux de construction, de transformation et de démolition (Switzerland) ;

The natural environment surrounding the worksite shall be preserved in its initial state. The project leader shall ensure that remedial measures are implemented whenever this requirement cannot be fulfilled.

5.13.11 Accidents and near misses

In the event of an accident or a near miss including pollution during the activities related to the installation work, maintenance, operation or dismantling of the project, the procedure described in the Code A2 shall be applied. An internal report of accidents, available in EDH (https://edh.cern.ch/Document/General/Accident) shall be filled in.

5.13.12 Worksite Safety file

- The worksite Safety file shall include the following documents:
  - Notice of start of work (AOC, following the IS 39) or equivalent (Impact);
  - Worksite safety documents (Prevention Plan [PdP] or Work and Safety coordination Plan [WSCP or PCTS] and Special Safety and Health Protection Plans [SSHPP or PPSPS]) depending on the category of the works);
  - Specific maintenance Safety procedures and inspection proofs;
  - Effluent water management plan (Formulaire Traitement des eaux de chantier (Switzerland) ;
  - Waste management plan (Schéma d'Organisation et de suivi de l'élimination des déchets (SOSED) (France) or Formulaire de déclaration de gestion des déchets de chantier (Switzerland);
  - Description of storage conditions of chemical substances during civil-engineering work (e.g. retention).

Where necessary:

- Fire permit form
- IS37 form
- Permit to dig
- Training records on confined spaces
- Training records on assembling and safety checking of scaffoldings
- Certification on 'working in heights'
- Noise, air or water measurements

6 SAFETY FILE

The Safety file shall include the Safety documents necessary to demonstrate compliance with the applicable rules:

- Safety file of products purchased on the market (5.2.1);
- Mechanical Safety file:
  - Safety file for pressure equipment (5.3.1.2);
  - Safety file for refrigerating systems and heat pumps (5.3.2.1.1);
  - Safety file for machinery (5.3.3.4);
  - Safety file for activities involving work equipment (5.3.3.3.1);
  - Safety file for welding activities (5.3.5.4);
- Structural Safety file:
  - Safety file for steel structures (5.4.3.2);
  - Safety file for concrete structures (5.4.4.2);
  - Safety file for permanent means of access (5.4.5.2);
- Cryogenic Safety file;
- Electrical Safety file:
  - Safety file for electrical installations and equipment (5.6.8);
- Non-ionizing radiation Safety file:
  - Safety file for equipment emitting non-ionizing radiation (5.7.1.1);
  - Safety file for lasers (5.7.2.3);
  - Safety file for activities in magnetic fields (5.7.3.2);
  - Safety file for activities in electromagnetic fields (5.7.4.2);
- Chemical Safety file:
  - Safety file for hazardous chemical agents (5.8.1.1);
  - Safety file for the asphyxiant chemical agent (5.8.2.2);
  - Safety file for activities involving flammable gases (5.8.3.2);
- Fire Safety file:
  - Fire Safety file (5.9.6) ;
- Workplace Safety file:
  - Safety file for HVAC systems (5.10.3);
  - Safety file for activities in confined spaces (5.11.1.2);
  - Safety file for activities in which workers are or may be exposed to noise (5.11.3.1);
- Protection of the environment:
  - Environment Safety file (5.12.2)
- Worksite Safety file:
  - Worksite Safety file (5.13.12)