LHC PROJECT

INSTALLATION OF THE LHC AND LHC EXPERIMENTS (ALICE, ATLAS, CMS, LHC B)
CONSTRUCTION AND ADAPTATION OF INFRASTRUCTURE AND EQUIPMENT

Overall Safety and Health Protection

Plan

P.G.C.S.P.S.

(Plan Général de Coordination en matière de Sécurité et de Protection de la Santé)

This document must be read in conjunction with:

ORGANISATION OF THE WORK FOR THE INSTALLATION OF THE LHC AND THE LHC EXPERIMENTS

Reference: CERN/TIS-GS/IR/98-04-A
Index: 05
Amended on: 25/09/2001
Original: French

Note: The updated version of this document can be found on the following web site http://www.LHCinstallation.cern.ch

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<td>18/01/1999</td>
<td>Creation of the PGCSPS</td>
<td>D. PALVADEAU</td>
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<tr>
<td>01</td>
<td>08/02/1999</td>
<td>Appendices of the annexes 5 à 11 of version 00</td>
<td>D. PALVADEAU</td>
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<td>02</td>
<td>22/03/1999</td>
<td>Update articles d 1.9.1.4, 1.9.1.8 et 1.10.1.2</td>
<td>D. PALVADEAU</td>
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<td>03</td>
<td>19/04/1999</td>
<td>Articles 1.9.1 and 1.10 completes (co-ordination de la security)</td>
<td>D. PALVADEAU</td>
</tr>
<tr>
<td>04</td>
<td>04/02/2000</td>
<td>Updated chapter 1.9 (People working at CERN)</td>
<td>D. PALVADEAU</td>
</tr>
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<td>05</td>
<td>25/09/2001</td>
<td>The document was re-written (All information relating to the dismantling operation has been removed and updated information relating to the installation phase added.)</td>
<td>J. WEBER, J. ETHERIDGE</td>
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GLOSSARY OF ABBREVIATIONS

CISSCT : Collège Interentreprises de Sécurité, de Santé et des Conditions de Travail (Inter-Firms Safety, Health, and Working Conditions Committee)

Coordonnateur de Sécurité : Coordonnateur en matière de Sécurité et de Protection de la Santé (Safety Co-ordinator)

CRAM : Caisse Régionale d’Assurance Maladie (FRANCE) (Regional health insurance authority – France)

DAEL : Département de l’Aménagement, de l’Environnement et du Logement (SUISSE) (Department of Town and Country Planning, Environment and Housing - Switzerland)

DIUO : Dossier d’Intervention Ulterière sur l’Ouvrage (Dossier for later intervention on work)

GLIMOS : Chef de groupe pour les questions de sécurité des expériences

IT : Inspection du Travail (FRANCE) (Work inspectorate - France)

LHC : Large Hadron Collider

LEP : Large Electron–Positron collider

OCIRT : Office Cantonal de l’Inspection et des Relations de Travail (SUISSE) (Works Inspectorate and Labour Relations Office for the Canton of Geneva - Switzerland)

OPPBTP : Organisme Professionnel de Prévention du Bâtiment et des Travaux Publics (FRANCE) (Office of Health and Safety in the Building and Public Works Trades - France)

PGCSPS : Plan Général de Coordination en matière de Sécurité et de Protection de la Santé (Overall Safety and Health Protection Plan)

PPSPS : Plan Particulier de Sécurité et de Protection de la Santé (Special Safety and Health Protection Plan)

R J : Registre Journal (Log-book)

RSO : Délégué à la sécurité radiations Radiation Safety Officer

SUVA : Caisse Nationale d’Assurance (SUISSE) (Swiss national health insurance authority)

TIS/RP : Groupe de RADIOPROTECTION de la division TIS TIS Radio Protection Group

TSO : Délégué à la Sécurité Territoriale Territorial Safety Officer
PREAMBLE

This Overall Safety and Health Protection Plan (PGCSPS) has been drawn up in the framework of the LHC project for the dismantling of LEP and the LEP experiments, the installation of the LHC and the LHC experiments. This will included the construction and adaptation of the infrastructure and equipment, in accordance with CERN regulations.

It takes into account the spirit of French and EU legislation and Swiss trends with regard to health and safety co-ordination, and aims to harmonise the measures relating to health, safety and conditions in the workplace and thus limit risks and prevent occupational accidents and illnesses.

In agreement with the Host States and without prejudice to its international status, CERN complies with the fundamental standards enshrined in the various national regulations. However, as an intergovernmental organisation with international status, CERN cannot be subject to any national provisions, such as administrative and penal provisions, which would contradict its international status.

The content of this PGCSPS shall in no way alter the nature or scope of the responsibilities incumbent upon the contractors, project managers and specialised bodies, pursuant to the legal and statutory provisions concerning health, safety and conditions in the workplace to which they are subject. This document is part of the call for tenders file sent to all contractors, including subcontractors and independent traders, since the provisions contained herein may have an impact in particular upon the amounts to be invested for the performance of the work.

The contents of the PGCSPS shall constitute basic data for the contractors, who shall use it to draw up their Special Safety and Health Protection Plan (PPSPS). The PGCSPS is a contractual document for the contractors and their subcontractors.

The PGCSPS will be completed and updated by the safety Co-ordinator as the design studies and work progress; it will also include addenda relating to specific operations for the LHC project (see Chapter 10 below). Furthermore, the PGCSPS will gradually incorporate and harmonise the PPSPS drawn up by the contractors and sub-contractor.
1. General information

1.1 The CERN its purposes and the LHC project

CERN (European Organisation for Nuclear Research) is an intergovernmental laboratory, founded by a number of European States on 29 September 1954. The Organisation has its seat in Geneva and sites totalling 550 hectares on either side of the border between France and Switzerland. CERN hosts and provides technical support for around 6,000 scientists who come to work on the instruments placed at their disposal.

The LHC project (Large Hadron Collider) is a large particle accelerator approximately 27Km in circumference that will allow physicists to approach ever close the beginning of the universe. The LHC recherche program is basted on four large detectors. The two largest being, ATLAS and CMS they are conceived primarily to observe the collision between protons. These experiments require the construction of two new experimental zones located respectively at points 1 and 5 in Meyrin and Cessy.

The two other experiments, ALICE and LHC-b will be installed in existing experimental caverns dating from the LEP at point 2 and 8, Sergy and Ferney-Voltaire. ALICE will observe the collisions between heavy ions and LHC-b will study the particles containing the fifth quark, the quark “Beauty”

1.2 Summary of the work

As a whole, the work for the LHC project comprises of:
- The installation of the infrastructure and equipment in the surface buildings concerned (Points 1, 1.8, 2, 3, 4, 5, 6, 7, and 8)
- The installation and adaptation of the infrastructure and equipment associated with the underground facilities
- The assembly of the ATLAS, CMS, LHC-b and ALICE experiments
- The installation of the LHC in all sectors.

This work was started in the last quarter of 1999 and included the installation of general services/ fluids/ventilation of buildings on the surface at point 1.8 and will continue through to the beginning of 2006 when the first tests will be carried out (see attached project schedule).

1.3 Technical Co-ordination

1.3.1 Technical Co-ordination for the machine LHC

The strategical aspects of the installation of the machine and associated infrastructure, which come under the responsibility of a technical co-ordination committee the LHC (LHC-TCC). The tactical aspects and the general co-ordination are under the responsibility of a working group LHC (InstWG). The operational aspects come under the responsibility of the CERN technical groups involved. The decisional and organisational bodies, which are mentioned in this document, can be found by consulting the Web page: http://www.LHCinstallation.cern.ch
1.3.2 Technical Co-ordination for the experiments

The installation of the infrastructure and the equipment in the new experimental caverns will be co-ordinated by the group EST/LEA, and the various other groups and the division EP and ST. The group EST/LEA and various groups from the division EP will assure the co-ordination for the assembly of the experiments.

1.4 Names of structures

1.4.1 Surface buildings:
- SA: accelerator cavity conditioning building
- SD: unloading building on top of PM shaft
- SDH: helium unloading building
- SE: electrical substation
- SEE: EDF auxiliary post (20 kV)
- SEG: generator shelter
- SHE: high-voltage enclosure
- SEQ: room for compensating magnets
- SEM-SES: electrical substation
- SM: magnets assembly hall
- SF: pumping substation / cooling towers
- SG: gas building
- SGX: gas building
- SCX: control room and offices
- SDX: shaft-head building
- SH: helium compressor building
- SHE: helium tank platform
- SHM: helium compressor building
- SMI: assembly hall
- SR: rectifier building
- SRK: klystron shelter
- SU: ventilation / air conditioning building
- SUH: helium compressor building
- SUX: ventilation annex
- SX: experiment building on top of PX shaft
- SXL: experiment assembly hall
- SY: reception building
- SZ: personnel access building

1.4.2 Shafts:
- PM: machine access shafts (access for staff, handling of machine components, passage of cables, pipe-work and ventilation ducts)
- PX: experiment equipment shafts (for experiment equipment handling)
- PZ: shafts providing personnel access to UX experiment halls
- PMI 2: access shaft to TI 2 tunnel
- PGC8: access shaft to TI 8 tunnel (during construction phase).

1.4.3 Underground areas:
- RA: high-frequency tunnel
- RE: electricity cavity
- RM: reference magnet cavern
- RR:
1.5 Applicable regulations

The regulations applicable in the framework of the LHC project are set out in document CERN/TIS-GS 98-10 of May 1998, entitled “SAFETY REGULATIONS APPLICABLE TO THE WORK OF CONTRACTORS AT CERN”. This document is included at each call for tender and contractors can consult this document on web page:


It will hereafter be referred to as” the Safety Regulations”.

With respect to safety co-ordination, CERN undertakes, as Principal, to follow a policy of prevention throughout all the phases of the project, from design through to construction; to this end, it will comply, in particular, with:


This document also takes into account all regulations relating to safety in the workplace currently in force in the Host States, which must be fully adhered to.

1.6 Aim and role of the Safety Co-ordinator

The essential aim of the safety co-ordinator is to perform the following tasks:
– to provide all necessary assistance with respect to health and safety to all the partners involved in the LHC project and to ensure that the general principles of prevention and other regulations are observed at all times throughout the project;
– to draw up the PGCSPS, defining the measures specifically relating to the prevention of risks, in particular those deriving from interference between the activities of different contractors on the work sites. This document, drafted during the design, design study and preparation phase of the project, will be included with the call for tender documents sent to potential bidders and will serve as the basis for the preparation of the PPSPS by successful bidders;
– to draw up the DIUO, which sets out the measures chosen to facilitate later work on each structure (safety of repair and maintenance teams);
– to open and keep the RJ;
– to chair the CISSCT that will be set up by CERN.

In particular, the co-ordinator will:
– update the PGCSPS and ensure that it is observed;
– make a joint inspection of the site with all the contractors, sub-contractors and independent workers, in the presence of the project manager, before any work is done and before the PPSPS is submitted; during this inspection, information will be given on the various instructions to be complied with or to be passed on to the workforce, according to the work to be performed, as well as any specific remarks relating to health and safety for the whole operation;
– take account of the interference and constraints inherent in the performance of the work and inform the firms of the measures to be taken;
– ensure compliance with the decisions taken on safety problems at the various meetings and inspections, in particular those taken at the CISSCT and during joint inspections;
– inspect the work site and report any instances of non-compliance with the safety measures specified by the regulations in force or imposed on the contractors by the Principal, project manager and the safety co-ordinator;
– examine with the contractors the measures and provisions to be taken to implement the general principles of prevention;
– advise all appropriate measures to promote workers’ health and especially those aimed at preventing occupational illnesses;
– receive the PPSPS from the firms, examine their contents, communicate any observations he or the project manager wish to make and ensure these are brought to the attention of everyone concerned;
– co-ordinate safety measures taken or to be taken by contractors working in succession or concurrently on the work site, including subcontractors;
– keep the RJ up-to-date;
– receive personal accident reports and conduct investigations in the event of serious accidents;
– compile, update and analyse accident statistics;
– ensure that the DIUO is updated.

1.7 CERN staff with specific responsibilities

1.7.1 Project Leaders and project managers
- See web page: www.instLHC-CNGS.cern.ch

1.7.2 Technical Inspection and Safety Division: TIS
The Technical Inspection and Safety Division (TIS) is responsible for the essential safety aspects at CERN (safety of CERN personnel and monitoring the application of CERN regulations by outside f
The director of the TIS division who is directly responsible to the Director-General heads the division. The division works in close liaison with the technical and research divisions and with the Directorate. The diagram relating to TIS internal structure can be found on the web by consulting the following address:


The organisational chart of the TIS Commission may be consulted in the Safety Regulations.

1.8 Outside bodies

1.8.1 Safety co-ordination

- Holder of the contract
  
  GTD/APAVE  
  TechnoparcGessien  
  55, rue Auguste Piccard  
  01360 SAINT GENIS POUILLY

- Safety co-ordinators office
  
  CERN  
  Building 57.2.034  
  Ch – 1211 GENEVE 23

1.8.2 Official health and safety bodies in the Host States

1.8.2.1 In Switzerland:
  – OCIRT: Work Inspection
  – SUVA: Swiss accident insurance fund
  – DAEL: Department of work site inspection

1.8.2.2 In France
  – Inspection du Travail (IT - Work Inspection)
  – CRAM: French regional health insurance authority
  – OPPBTP: Office of health and safety in the building and public works trades (France)

1.8.3 Industrial health

1.8.3.1 In France
  – Industrial health in the Ain Department  
    Association Médico-sociale du Bâtiment et des Travaux Publics  
    BP 52  
    Site de PREVESSIN. 01631 CERN Cedex  
    Dr Roger STROBEL  
    Tel: 022 767 53 56  
    Fax: 022 767 76 10

1.8.3.2 In Switzerland
  – Industrial health medical officer of the OCIRT
23, rue Ferdinand HOLDER  
C.P. 3974  
1211 GENEVA 3  
Tel: 022 319 28 50  
Fax: 022 735 45 18  
Dr Elisabeth CONNE-PERREARD

1.9 Useful addresses

1.9.1 French administration

- PREFECTURE DE L’AIN  
  Direction départementale de l’action sanitaire et sociale  
  45, rue d’Alsace-Lorraine  
  01012 BOURG en BRESSE Cedex  
  Tel. 04 74 32 30 00

- SOUS PREFECTURE  
  56, rue Charles Harent  
  01170 GEX  
  Tel. 04 50 41 51 51

- ADMINISTRATION DE L’EQUIPEMENT, DES TRANSPORTS ET DE L’ENVIRONNEMENT  
  23, rue Bourgmayer  
  01012 BOURG en BRESSE Cedex  
  Tel. 04 74 45 62 37

- ELECTRICITE DE FRANCE  
  Services d’urgence et d’assistance  
  Subdivision de Bellegarde  
  5, rue Joseph Viala  
  B P 248  
  01202 BELLEGARDE Cedex  
  Tel. 04 50 56 63 63  
  District de GEX  
  72 ,rue Aiglette sud  
  01170 GEX  
  Tel 04 50 41 77 22

- FRANCE TELECOM  
  Bellegarde branch  
  Tel. 10 14 or 10 16 ou 0 800 10 14 74 (toll-free number)

- WATER COMPANIES  
  St Genis and Chevry supply networks (ZI St Genis, P4, P2)  
  Société fermière SOBEA  
  Zone artisanale  
  01630 ST GENIS POUILLY  
  Toll-free number: 0 800 24 26 76

- Ferney-Voltaire, Versonnex, Echenevex supply networks (p8, p7, p6, p5)  
  Société fermière SDEI  
  190 route de Divonne  
  01170 GEX  
  Tel. 04 50 99 04 13
1.9.2 Swiss Administration

– DEPARTEMENT DE L’INTERIEUR, DE L’ENVIRONNEMENT ET DES AFFAIRES REGIONALES.
  ECOTOXICOLOGIE
  23, Avenue Ste Clotilde
  1205 GENEVE
  Tel. 022 781 01 03

– DIRECTION DE L’AEROPORT
  Service technique de Cointrin
  Case postale 319
  1215 GENEVE 15
  Tel. 022 798 11 22

– The airport’s weather service provides local weather details on request (Tel: *162).

– DIRECTION DES SERVICES INDUSTRIELS DE GENEVE (water, electricity)
  2, chemin du Château
  Le Lignon
  1211 GENEVE 02
  Tel. 022 420 88 11

2. Specific features of the working areas

2.1 Surface buildings and areas

The following special features are to be taken into account:

2.1.1 Shafts

The primary risk is of falling objects or people from heights. The collective protective measures must therefore be kept in place. If for any reason the collective protection must be removed the only person with the necessary authorisation to do so is the site manager. Collective protection may only be removed if the contractor concerned properly marks out the hazardous area. Any staff entering the hazardous area shall be equipped with the individual protection adequate to do so for example safety harness to prevent them from falling, after the operation is complete the original collective protection shall be re-installed.

Opening the lower part of the well/aperture used for material handling operations in the existing SD buildings, at the even-numbered points, will be authorised if it is absolutely necessary for the purpose of handling exceptional loads. The aperture must be opened according to the following procedure:

1 - The member of ST/HM group in charge of the material handling operation, who is in possession of the key that opens the first pad lock, shall contact the site manager and they shall proceed together to the shaft-head.
2 - The site manager shall unlock the second pad lock.
3 - The member of the ST/HM group in charge of the operation shall open the lower panel only to let the load through, check that the indicator light is working and lock the panel again immediately afterwards.
– 4 - When the operation has been completed, the member of the transport group in charge shall ask the site manager to secure the second lock and shall remain at the shaft-head until this has been done. This procedure shall be applied each and ever time this type of material handling operation is to be carried out, even if the same operation is scheduled to resume the following day.

If the warning light does not function, please inform without deal the following number 72201: the operation may continue, but only with extreme vigilance. Furthermore it is an obligation that the crane operator must be equipped with a safety harness anchored to a fixed point adapted for this type of operation, from the moment the site manager opens the look until such time as the lock is finally closed.

2.1.2 New shafts
Pending the installation of permanent protection at the head of the shaft, the barriers installed by the civil-engineering contractors shall remain in place, for a transitional phase, after the completion and the hand over visit. The protection at the top of the shaft shall be at least 2 m in height fixed to the floor slab and be strong enough to ensure the safe passage of all personnel in the vicinity. Furthermore, the contractors shall make specific arrangements to allow safe access for mobile elevated working platforms inside the shaft itself.

2.1.3 Storage areas
The main risks in the storage areas are that of tripping over objects and the risk of personnel falling over at ground level. Storage areas and plant manoeuvring areas shall therefore be clearly marked on the ground by CERN. No equipment shall be stored in the storage areas without the agreement of the site manager, with whom the contractor shall liaise before any delivery.

2.1.3 Material Handling areas
The main risks associated with material handling areas are that of falling loads and moving plant. It is therefore forbidden for loads to be transported over the heads of staff and for vehicles to park or pass underneath loads. Moreover, when material handling machines are being used, their area of manoeuvre shall be clearly marked and, if necessary, all manoeuvres shall by supervised by someone appointed by the person in charge of the operation.

2.1.4 Fire and Rescue Service access areas
To facilitate the arrival of the Fire and Rescue Service, each shaft has an area designated by CERN (marked out on the ground) to allow access for emergency vehicles without the need to evacuate the storage areas. There has also been designated at each point a landing area for a helicopter.

2.2 Shafts and shaft bottoms
The specific risks associated with these areas are essentially:

2.2.1 The risk of falls
The shafts are provided with infrastructure to enable safe access. In the special case of new shafts, where there is no permanent infrastructure allowing staff accesses, temporary lifts shall be used. Safety installations at shaft bottoms shall remain in existing shafts and installed in new ones.

2.2.2 Risk of Fire
Due to the strong updraft in the shafts, even small fires can quickly take on major proportions. Contractors are therefore required to keep their workplaces clean at all times. Rubbish skips are provided for this purpose and are emptied by ST/HM.
2.3 Underground facilities

The specific risks associated with work in underground facilities are:

2.3.1 Fire risks and the risk of intoxication from smoke and fumes

Given the size of the facility and the great distances to be covered to evacuate a hazardous area, fire is a major risk in the tunnels, especially due to the fact that it can produce large amounts of smoke and fumes.

The important points are as follows:

2.3.1.1 Preventing fires from breaking out

The same principles of cleanliness shall apply for the shaft heads as well as the shaft bottoms, with the following additional requirements:

- **Smoking is strictly forbidden** in underground facilities.
- **Hot work permit**: Any contractor undertaking hot work shall apply for a hot-work permit by contacting the project manager CERN. In this document will be defined the nature of the work, the hazards, the preventive measures and the planned means of protection. The hot-work permit may be issued for one day or one week depending on the environment of the site concerned. The site manager, as well as the safety co-ordinator can stop any work if a hot-work permit has not been issued or is out of date. The person carrying this operation must have a copy of the hot-work permit in his possession, and must insure that the instruction are not being followed if this is not the case the work will be stopped.
- **Equipment prohibited in tunnels**: In view of fire and smoke hazards, all gas-heated devices and internal combustion engines are prohibited in the tunnels. Propane preheating torches for welding and gas heaters, etc., are also prohibited.
- **Compressed air**: Should compressed air be required, only electrical compressors shall be allowed in the tunnels or caverns.
- **Gas bottles**: Authorisation shall be required from the CERN supervisor for compressed gas bottles to be taken into underground facilities. The contents shall be clearly marked on each bottle. Bottle trolleys shall be used at all times.
- **Material Storage**: For the reason of fire safety and the risk of intoxication, the storage of chemical products and inflammable gases is strictly forbidden in underground areas, as well as all other materials likely to catch fire.

2.3.1.2 Prevention against smoke and fumes:

In order to cope with accidental smoke emissions, CERN will make available, breathing apparatus, which will provide 30 minutes of oxygen supply at the shaft bottoms and in the transport vehicles used in the tunnels. At the CERN’s request (as stated in the technical specifications) the companies will themselves have to acquire and maintain this equipment.

The procedure for handling these devices will be explained at the safety briefing organised by CERN. Personnel working in tunnels or caverns shall keep this equipment close to hand.

It is up to the contractors to organise their work site in such away as to comply with these instructions.

Access to underground facilities shall not be granted to those equipped with faulty safety gear or no safety gear at all. The contractors site representative, the site manager, the members of the TIS Division and the Safety Co-ordinator shall ensure that this rule is observed.

2.3.2 The risk of anoxia

Anoxia is caused by the reduction of the oxygen level in the air. The general principle of prevention against such a hazard is to maintain constant ventilation inside the underground facilities. CERN will endeavour to ensure that the correct ventilation is available at all times in the underground area.
The risk of anoxia will arise in special circumstances where a ventilation system shutdown coincides with the emission of an inert gas. In this particular case, staff will use their breathing apparatus they have with them and will proceed directly to the pressurised chamber at the shaft bottom.

2.3.3 Transport hazards

2.3.3.1 Transportation by monorail:
The monorail can only be driven by a person qualified to do so and also must be part of the company holding the contract for transport at CERN. It is also an obligation that the qualification complies with the CERN Code D1.

2.3.3.2 Transport by self-propelled electrical vehicles
Equipment storage areas: whatever the circumstances, each contractor must leave a passage of at least 90 cm at ground level at all times his work site and equipment storage areas must allow access for the self-propelled vehicles needed for the work sites and emergencies. For this purpose he shall:
– Marked out, equipment storage areas,
– Install, warning signs on both sides of these storage areas,

2.3.4 The risk of Irradiation (exposure to ionising radiations)
After the LEP has been dismantled and all measurements have been taken, there will remain no residual radiation. Consequently, it will not be necessary to wear a film badge or have special medical supervision. If for any reason work exposing the personnel to radiation ionisants (non destructive testing) is to be carried out specific instruction will be given. The procedure to be followed is contained in safety bulletin ref TIS 93-01

3. Organisation and co-ordination measures

3.1 Working hours and official holidays
See § 2 of this document:
«ORGANISATION OF INSTALLATION WORKS FOR THE LHC AND THE EXPERIMENTS ».

3.2 Site Services
Underground ventilation, management of the breathing apparatus, water, electricity, lighting, communication, compressed air and electromagnetic compatibility: See § 4 of this document «ORGANISATION OF INSTALLATION WORKS FOR THE LHC AND THE EXPERIMENTS ».

3.3 Storage, transport and material handling
See § 3 of this document:
«ORGANISATION OF INSTALLATION WORKS FOR THE LHC AND THE EXPERIMENTS ».

3.4 General safety measures
All the provisions set out in the “Safety Regulations” documents are applicable and in particular with respect to the following points:
3.4.1 Collective protection and work stations
Measures shall be taken to protect workers from falling objects, and all necessary measures will be taken to ensure that this does not happen. The existing safety measures shall be maintained and, should this prove impossible, compensatory measures shall be taken. General safety installations already in place or set up temporarily may only be dismantled with the agreement of the works supervisor and the safety co-ordinator. It is particularly important to maintain collective safety measure in “sensitive areas” such as shaft heads and bottoms, working platforms, mobile scaffolding and mobile elevated working platforms, and all other work carried out at height, etc.

3.4.2 Scaffolds (fixed, mobile, flying) and telescopic boom lifts
Prior authorisation is required from the Safety Co-ordinator to install scaffolds or telescopic booms and lifts. On the French part of the site, scaffolding must comply with the Decree of 8 January 1965, as amended by the Decree of 6 May 1995, and on the Swiss part of the site with Cantonal Work Site Regulation L 5 05 03. In the particular case of fixed scaffolds with cantilevered or overhanging sections, a scaffold assembly drawing with design calculation showing the stability of the structure shall be provided. Floors shall be made of jointed material that is incombustible or very difficult to ignite. CERN reserves the right (through its safety officers) to have any structure that does not comply with the safety requirements specified above dismantled, re-erected or modified. The type and capacity of telescopic boom lifts and mobile elevated working platforms will depend on the work to be carried out. The choice will take into account the number of workers, the weight of the material to be raised, the elevation, etc. They shall preferably be of the electrical type and must have been checked by a qualified body before being used on each work site. The result from these inspections along with any remedial action taken must be clearly noted in a register along with the name and qualifications of the personnel carrying out the work.

3.4.3 Ladders
A ladder is a means of access from one level to another; it is not under any circumstance a working platform. It must be fixed at the top and the bottom to ensure that it can not slip and at the top it must be 1m higher than the working platform in order to ensure safe access.

3.4.4 Compulsory individual safety equipment
It must be noted that, independently of the general safety measures in force, the wearing of a safety helmet is compulsory on all the work sites thought out the LHC project. The following safety measures are also compulsory:
- The wearing of safety shoes,
- The wearing of a safety harness for all short-term (≤ 1 day) work at a height where there are no collectives protections to prevent falls,
- The wearing of a mask (for filtering aerosols, gases or dust, as appropriate) and safety goggles for all work involving grinding, painting or the use of dangerous substances,
- The wearing of gloves for work involving the handling or use of dangerous substances,
- The breathing apparatus must always be within easy reach.

3.4.5 Isolated workers
It is strictly forbidden to work alone; in certain situations however workers may be required to work in isolated zones, if this eventuality arises the following recommendations must be followed.
• The person in question
• Must be able to call for help by Tel. (GMS or all other adapted means)
• Must be equipped with an automatic device (for example a dead mans handle)
• Must be in the field of vision of another person who has the responsibility to supervise him/her.

For further information refer to CERN code A6 chapter § 2.1 and 2.2. In case of any ambiguity about the application of these rules, please do not hesitate to contact the division TIS.

### 3.4.6. Welding and grinding work

For welding, grinding and sawing, etc., a hot-work permit issued. (See §2.3.1.1) by the supervisor is required.

In addition to taking fire precautions, the contractor shall install the necessary safety devices to protect passers-by against stray flashes, flying particles, drips, etc. The preferred method for the evacuation of smoke and fumes is by capture at source and evacuation to the ventilation system or to the exterior, or else by means of extractor hoods fitted with active carbon filters.

The earth connection during welding must be taken directly from the piece being welded. It is forbidden to use another framework, hand-railing etc

### 3.4.7 Compressed gas bottles

The safety rules concerning the supply and use of flammable gases and the design and use of flammable gases systems are set out in safety code G (CERN Safety Manual, Flammable Gases). In particular, in Safety Instruction 42, which deals with the rules, governing the use of (flammable or non-flammable) compressed gas bottles.

These documents are available from the TIS/GS Group.

### 3.4.8 Electrical portable tools

The hand tools used shall be suitably insulated and shall have the appropriate protection rating and electricity supply. They shall comply with the standards in force in the Host States.

### 3.4.9 Machines

Machines other than manually operated machines and portable electrical or pneumatic equipment are not allowed in the underground areas.

Should the use of such machines inside the LHC premises prove absolutely necessary, only the TIS division and the safety co-ordinator may grant exceptions to this rule together.

The personnel using this equipment must have the necessary authorisation and the user must present a statement of compliance with the documents in force.

### 3.4.10 Working environment and conditions

Noise, dust, smoke and fumes are significant pollution agents in the underground areas.

Wherever possible, noise reduction at source (soundproofed equipment) shall be a priority. Where the noise is caused by the activity itself, the work shall be done outside wherever possible (hammering, sheet metal work, etc.). Failing this, the area concerned shall be delimited and the personnel concerned given the appropriate equipment.

Activities involving the production of dust, smoke or fumes shall preferably be dealt with by measures such as capture and extraction of dust and/or smoke and fumes at source or the use of dust and smoke-filtering equipment.

These preventive measures are also applicable in the surface buildings.
3.4.11 Work site inspection visits

All visits by persons not involved in the project LHC shall require prior authorisation by the project manager CERN and the group in charge of the technical co-ordination.

3.4.12 Information and training of the personnel concerned

3.4.12.1 Information

Prior to performing any activity on the work site, the personnel must be informed by their hierarchical supervisors of the specific conditions relating to work on the site, namely:

- Conditions of access to the various work sites applying to the personnel
- Conditions of supply
- Staging and procedures applying to the various items of work
- Hazards specific to the working environment and preventive measures
- Emergency plan.

These items shall be discussed with the company's senior representatives during the joint inspection visit organised by the safety co-ordinator.

3.4.12.2 Training

The director of each company must insure that the personnel working for him are medically apt to do so further more they must have the necessary competence to carry out the task they have been entrusted. In particular, any work that has to be carried out on electrical installations for this type of intervention the person concerned must obtain a certificate of competency equivalent to the French publication UTE C 18-510 [26]. In the same way for certain other tasks, the personnel concerned must obtain an authorisation to drive certain vehicles. This authorisation will only be given after a specific training has taken place. Listed below are a number of examples of vehicles, which require a formation period.

- Forklift trucks
- Cranes
- Mobile elevated working platforms
- Overhead travelling Cranes

The underground mono rail (if it is kept in operation, it will how ever be exclusively used by the company with the responsibility for the transport and material handling operations at the CERN)

3.4.12.3 Site cleanliness.

All sites must be kept clean and tidy at all times and at no time in the underground must any rubbish be allowed to accumulate in the gully.

3.5 Contractors' responsibility

Contractors working on the site are responsible concerning their employees, and others working in the same area, for ensuring that their employees comply with the safety rules in force.

In the event of any deficiencies in the safety field observed by the safety co-ordinator with respect to risks generated by the interference of activities, comments or observations shall be placed in the RJ. In the event of repeated failure by the contractor to comply with these comments or observation, the protect manager will send an official written warning to the company concerned, requesting that the company complies with the recommendation with in a given time limit. Furthermore, as specified in Article 12 of Annex 5 of the Safety Regulations, the company's failure to comply with the safety regulations may result in the imposition of penalties by the official Host State bodies. Moreover, such a development may lead to the contractor being denied access to the CERN site and to the termination of the contract.
In agreement with the project manager and the safety co-ordinator and in compliance with the applicable labour legislation, the contractors must also install the necessary equipment to ensure the health and safety of their personnel.

3.6 Site installations

3.6.1 Facilities installed by the outside contractors

See § 2.3 of this document:
«ORGANISATION OF INSTALLATION WORKS FOR THE LHC AND THE EXPERIMENTS ».

3.6.2 Electrical work site installations

For the installation on the surface, and the underground CERN's electrical group will provide the necessary power via a general work site switchboards to which the contractors may connect their own electrical installations.

All the electrical work site installations shall comply with the legislation in force in the Host States, in particular that relating to health and safety. For both installation and maintenance activities, the authorisation procedure for electricians shall be applied.

3.6.2.1 Rules and regulations applying to electrical installations

Final and provisional electrical installations at CERN must be done in accordance with Safety Instruction No 24.

3.6.2.2 Checking of electrical installations:

All electrical installation must be checked

• At the start of the each site or the first time they are used
• Once per year following the first check,
• Every time there is a structural change.

These checks are generally entrusted to an authorised body. Each check must be the object of a report. Any reservations following the report must be followed up by the corresponding work.

3.6.2.3 Specific electrical equipment:

Safety lamps: must be of a professional type with a protected bulb, must be impossible to dismantle without special equipment and must have a minimum protection rating of IP 45.

Extension leads: The use of type H 07 RNF cables is compulsory for work site. In the case of Class 1 materials, they must comprise a protection lead.

Electricity cubicles: shall be installed by the contractors and must allow power points to be connected without having to open the door of the cubicle, which must remain locked. The cubicles must be fitted with a highly sensitive differential device (30 mA) on the inside.

Safety transformers: in the case of work inside a narrow conductive casing, electrical equipment powered by very low safety voltages (25 volts) must be used, which shall be provided by a 230V/25V safety transformer located outside the conductive casing.

3.6.2.4 Design principle of the electrical site installations

The CERN will provide electrical supply points from a distribution board, for the use of the contractors; these will be fitted with circuit breakers linked to differentials calibrated at 300mA. The circuit breakers may be reset from outside the switchboard.

The contractors shall be required to install their switchboards or switch boxes from the outputs provided by CERN and to protect them using suitably calibrated 30mA differential circuit breakers. Requests for emergency repairs must be made to the persons whose names are shown on the notice on the distribution board.
The contractors shall be required to protect their power cables, which must not restrict the movement of personnel and plant in any way. At the end of the day each contractor must disconnect his equipment. Any equipment left switched on outside the contractor's working hours without authorisation will be turned off and the contractor shall not be entitled to take any action against CERN as a result. Should apparatus need to remain switched on for imperative technical reasons, written authorisation obtainable solely from the person in charge of the area concerned is required. The equipment concerned shall be labelled with a notice indicating that it is switched on. Disconnection of items of equipment belonging to another contractor (other than for safety reasons) shall be prohibited.

4. Special requirements arising from the risks due to interference between different activities

Bearing in mind possible interactions with civil-engineering work in particular, the boundaries between areas where civil-engineering work is being carried out and those of other work areas must be clearly marked by suitable fencing, markers and signs. Those in charge of the civil engineering contracts, and the safety co-ordinator will define the rules relating to the movement of contractors and their personnel.

During the installation work on LHC and its experiments, the various activities shall be carried out in accordance with the planning there by avoiding any risks related to co-activity or simultaneous activities. The contractors' attention is drawn to the fact that there may be a major risk of co-activity involved in the installation work that must be carried out in the shafts.

However, it should be noted that delays in the work to be done might sometimes give rise to hazardous situations, which must be taken into account in the changing and adjustment of the work schedules. Descriptive cards will be drawn up by the technical coordination, and will take into account any possible interference or co-activity.

5. Fire: emergency plan

5.1 Preventive measures

The prevention of fire is particularly important in underground areas. Access to underground areas is subject to regulations and personnel entering them shall be equipped with an escape breathing apparatus.

The essential measures comprise of fire and smoke detection systems and the provision of fire-fighting equipment (fire extinguishers, fire hose stations). To provide the necessary means to combat the risk of fire, CERN will make available in the tunnel, at approximately 100m intervals, fire extinguishers to deal with the risks in that area.

In addition, the UX and US are each equipped with 3 mobile extinguishers on wheels with a capacity of 50 kg of Halon 1211.

There are established procedures concerning hot-work permits, the deposit of toxic substances or packing materials, which could present a fire hazard, and the evacuation of personnel.

5.2 Emergency organisation

CERN Telephones:
Red Telephones: By using a red telephone this will put you in immediate contact with the CERN Fire and Rescue Service

Internal Telephones (connected to the CERN network) The personnel can use them within the frame work of their daily activities to contact the people responsible for the contract, the safety co-ordinaters, responsible for the experimental areas within the confines of the CERN. The CERN ensures that this services will be maintained, but can not be held responsible for dangers due to accidents or wanten vadilisem.

The site manager will endever to ensure that the installation are maintained by contacting the CERN’s maintance service.

In the case of an accident or fire

- Red Telephone
- Or dial 74444 or temporarily 112 from any CERN telephone
- Or 767.4848 or 00 41 22 782 9118 from any other telephone

Specify the place where you are (the number of the building and the room are clearly marked on a label on each telephone) and the reason for your call only when you are instructed by the fire service at the other end of the line do you hang up.

5.3 Hospitals

5.3.1 In France
- Centre hospitalier de St Julien
  S.M.U.R
  Rue de l’Hôpital
  74160 ST JULIEN EN GENEVOIS
  Tel: 04 50 49 11 33 (switchboard)
  Tel: 04 50 49 01 00 (emergency)

5.3.2 In Switzerland
- Hôpital Cantonal Universitaire
  24, rue Micheli du Crest
  CH - 1211 GENEVE 4
  Tel: (022) 372 33 11
  Tel: (022) 382 33 11

- Hôpital de la Tour
  Service d’urgence
  3, Avenue J. Daniel Maillard
  CH. 1217 MEYRIN (GENEVA)
  Tel: (022) 780 01 11

6. Accidents in the work place

6.1 Preventive measures

The head of the company is required to organise and provide information to all the personnel he deploys to work on the site about the inherent hazards and the preventive measures taken as well as on what to do in the event of an accident in the work place.
6.1.1 Occupational first-aiders
The permanent presence of one occupational first- aider per contractor and for every 10 persons shall be required throughout the site. Each first-aider shall be identified by a special badge (preferably worn on his/her helmet). Every first-aider shall follow the appropriate initial training, to be supplemented by annual refresher courses.

6.1.2 First-aid equipment
First-aid equipment shall be made available in a specially designated place. All first-aid equipment and medicines shall be easily accessible. The medicines kept in stock shall be selected according to the specific hazards of the site concerned. Each site shall have the statutory emergency facilities to allow the evacuation of any injured persons.

6.2 What to do in the event of an accident
CERN's permanently manned Fire and Rescue Service are available 24 hours a day 7 days a week and are responsible for the emergency interventions for the LHC sites. Where necessary, this service will call in the help of outside emergency services. Emergency calls must be directed to the CERN Fire and Rescue Service in all cases:

6.2.1 Non-serious accidents
• The injured person shall be treated by one of the first-aiders present on the site,
• The injured person and the first-aider shall decide whether it is necessary to alert the CERN Fire and Rescue Service.

6.2.2 Serious accidents
• Inform the first-aider(s) on the site who will give the CERN Fire and Rescue Service the necessary information on the injured person's condition (plus the exact location of the site),
• Alert the CERN Fire and Rescue Service,
• Follow the instructions given on the emergency card (appended to this PGC),
• Arrange for a guide if access to the site is difficult,
• Give the injured person treatment compatible with his/her condition.

6.2.3 Fatal accidents
• Alert the CERN Fire and Rescue Service,
• Ensure that the accident site is left intact,
• Inform the services and bodies shown on the emergency card (appended to this PGC) immediately,
• Assemble as many witnesses as possible.

6.2.4 Documents to be provided in the event of an accident
In the case of all non-serious accidents, an occupational accident report shall be sent to the co-ordinator within 24 hours.
In the case of serious or fatal accidents or incidents, which could have had serious consequences, a very detailed accident report shall be drawn up by the contractor and sent to the Principal, the project manager, the safety co-ordinator and the preventive bodies concerned within 24 hours.
At the end of every month, each contractor shall send the safety co-ordinator a monthly accident record by completing the form attached to this document.

7. Special Health and Safety Protection Plan (PPSPS)
Following the joint inspection visit with the safety co-ordinator, all contractors working on the site, including independent tradesmen must draw up a PPSPS (special safety and health protection plan) within the following deadlines (and in any case before the start of the work):
• Contractors holding a contract signed by the Principal: within 30 days of receipt of the signed contract.
• Sub-contractors for work involving particular hazards: within 30 days of receipt of the contract signed with the contractor.
• Sub-contractors for work that does not involving particular hazards: deadline reduced to 8 days.

The PPSPS shall be drawn up in accordance with:
• The specific constraints associated with the work concerned,
• General safety obligations applicable to all contractors,
• Specific requirements of this PGC, risks associated with the performance of more than one activity simultaneously and with successive phases of activities.

A PPSPS, (see attached guide) must provide a detailed analysis of the chosen working processes and operating procedures wherever they have consequences for the health and safety of those working on the site.

It must define the inherent hazards associated with the operating procedures, the equipment used, the facilities and installations used, the use of dangerous substances or preparations, the movement of personnel and the layout of the site, and must describe the safety measures implemented in order to mitigate these hazards.

The PPSPS shall list the information, which the company must provide, as well as the measures the latter intends to implement to ensure the safety of its personnel and that of the other companies working on the site.

A PPSPS may, of course, be amended or supplemented as often as necessary.
Prior to starting any work, each contractor shall take part in a joint inspection, which will be carried out, on site. This inspection will be carried out by the safety co-ordinator and in the presence of the project manager, with a view to making clear the safety measures to be complied with, according to the specific characteristics of the work to be done and the constraints of the site. This joint inspection shall take place before finalisation of the PPSPS in order to incorporate any additional instructions arising from the visit in the document. The company concerned should issue a copy of this document all safety organisations both French and Swiss.

8. **Inter-Firm Safety, Health and Working Conditions Committee (CISSCT)**

8.1 **Setting-up of the CISSCT**

In accordance with Annex 4 of the Safety Regulations, an Inter-Firm Committee for Matters of Safety, Health and Working Conditions shall be set up on the Project leaders.

This committee shall be set up whenever there are two or more companies present on the site.

8.2 **Role and composition**

The Inter-Firm Committee may, notably at the safety co-ordinator's proposal, define certain common rules with the aim of ensuring compliance with the health and safety measures applicable on the site. It checks that all the rules defined by it or the safety co-ordinator are actually implemented.

The activities of the CISSCT shall not change the nature and scope of the responsibilities of the parties taking part in the work. As laid down in the other provisions of the safety regulations, nor the powers of the bodies representing the personnel in matters of health, safety and working conditions.
The composition of the Inter-Firm Committee is set out in Article 4 of the CISSCT's draft regulations attached to this document. Throughout the duration of the work on the site, each contractor shall be represented on the committee by:

- the head of the company or his officially designated representative,
- a salaried employee actually working on the site, selected by the members of the team working on the site.

Each contractor shall forward the names of his two representatives to the chairman of the committee (safety co-ordinator) during the joint inspection visit which shall take place before the work starts and before each scheduled meeting at the latest.

The list of the names of the contractors' representatives and the other members of the CISSCT, together with persons who may be called upon to take part in the committee's meetings in an advisory capacity, will be kept updated and posted up at the site by the safety co-ordinator.

### 8.3 Statutory rules of the CISSCT

The CISSCT's draft regulations are attached to this document and has been submitted to the committee members for approval at the CISSCT's inaugural meeting and accepted.

### 9. Addenda to the PGCSPS

The following addenda will supplement this PGCSPS for each of the activities concerned; they will be forwarded to the contractors depending on the contracts.

1. Transformation of LEP in sectors 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-1
2. Dismantling of ALEPH
3. Dismantling of OPAL
4. Dismantling of DELPHI
5. Dismantling of L3
6. Installation of the infrastructure and equipment of the surface buildings
7. Installation of the infrastructure and equipment of the underground areas
8. Assembly of the ATLAS experiment
9. Assembly of the CMS experiment
10. Assembly of the LHC-b experiment
11. Assembly of the ALICE experiment
12. Installation of the LHC and the injection tunnels.

### 10. Annexes

1. Statutory rules of the CISSCT (Inter-Firms Safety, Health and Working Conditions Committee)
2. Guide for drawing up an PPSPS (Special Safety and Health Protection Plan)
3. Site plan of the CERN installations
4. General layout plan of PA1, PM18, PA2, PM32, PZ33, PA4, PA5, PA6, PA7 and PA8
5. Authorisation for work outside normal working hours and days
6. Hot-work permit
7. Monthly accident report
8. Instructions for emergency calls in the event of an accident