



CODE DE SÉCURITÉ SAFETY CODE

E Rev.

Date of revision: July 1995

Issued by: Director-General

Original: French *
(except Appendix IV)

FIRE PROTECTION

Contents

- 1 LEGAL BASIS
- 2 SUBJECT
- 3 COVERAGE
- 4 GENERAL DEFINITIONS AND REFERENCE DOCUMENTS
- 5 STRUCTURES AND EQUIPMENT
- 6 FIRE PREVENTION AND PROTECTION
 - 6.1 General
 - 6.2 Buildings and modifications
 - 6.2.1 New buildings
 - 6.2.2 Existing structures
 - 6.2.3 Buildings open to the general public
 - 6.2.4 Special cases
 - 6.3 Contents of premises
 - 6.4 Special hazards
 - 6.5 Fire permit requirements
 - 6.6 Fire-fighting
 - 6.6.1 Equipment to be provided
 - 6.6.2 Staff information
 - 6.6.3 Staff training
 - 6.6.4 Fire instructions
- 7 FIRE DRILLS
- 8 MONITORING THE APPLICATION OF THIS CODE
- 9 ENTRY INTO FORCE
- 10 LIST OF APPENDICES

- tourner le document pour version française

1 LEGAL BASIS

This code is based on the document that lays down safety policy at CERN (SAPOCO/42, Safety Policy at CERN, see "The Safety Codes and their Appendices. Authority for issuing safety rules").

It is issued under the provisions of the Staff Rules and Regulations.

2 SUBJECT

The purpose of this code is to set out the fire prevention and protection rules and procedures to be followed in order to

- ensure primarily the safety and well-being of anyone on CERN's premises;
- protect the property on CERN's premises as far as possible.

3 COVERAGE

This code applies to :

- all persons on CERN's premises;
- all CERN premises, the surface and underground structures, and the installations and equipment for which CERN is responsible.

4 GENERAL DEFINITIONS AND REFERENCE DOCUMENTS

CERN uses the definitions in the ISO standards, especially ISO 3261 and 8421-1 to 6, for the terms commonly used in fire prevention and protection (see Appendix I).

5 STRUCTURES AND EQUIPMENT

The approval of the TIS Commission, following the procedures set out in Appendix II, is required for the following:

- 5.1 Any project for the construction of or alterations to buildings.
- 5.2 Any project for an installation, or for a change in the way of using the equipment or in the contents of the premises.

6 FIRE PREVENTION AND PROTECTION

6.1 General

Every structure shall meet the standards, regulations, and normal trade practice concerning fire prevention and protection.

6.2 Buildings and modifications

6.2.1 New buildings

In the absence of any specific CERN regulations on the subject as laid down by SAPOCO/42, the designer of new buildings shall observe the principles of the provisions concerning structures and equipment covered by the regulations of the Host Countries^{*)} on their respective territories. These provisions are included in the documents listed in Appendix III.

6.2.2 Existing buildings

Any altered building shall be regarded as a new structure. Therefore the provisions of subsection 6.2.1 shall apply.

6.2.3 Buildings open to the general public

The regulations governing "buildings accessible to the general public" in force in the Host Countries shall be applied on their respective territories.

6.2.4 Special cases

In view of the very special nature of the use of certain areas, especially those underground, which involve increased fire hazards, the TIS Commission is the authority for approving and, where necessary, stipulating special provisions, as listed in Appendix III.

6.3 Contents of premises

The TIS Commission may, on the basis of the standards and regulations in force or being drawn up in the Member States, permit, forbid, or stipulate any special measures or arrangements concerning the equipment and materials used in

- the service installations;
- the installations for experiments;
- the fitting-out of the premises

and, more generally everything on the premises, including furniture.

These measures or special arrangements are set out in Appendix IV.

^{*)} The observation of these regulations shall be controlled by the TIS Commission.

6.4 Special hazards

The designer of a project involving special hazards (such as chemical, toxic, radioactive, or flammable products, etc.) shall point them out clearly when submitting his project to the TIS Commission, which will give its opinion of the proposed safety measures.

6.5 "Fire permit" requirements

An assessment shall be made of welding and other "hot" work to determine the necessity or otherwise of the issue of a "fire permit" if such work is performed outside normally authorized areas (workshops etc.).

The criteria for this assessment, the people competent to draw it up, and the procedures for making it are described in Appendix V.

6.6 Fire-fighting

6.6.1 Equipment to be provided

Warning and fire-fighting equipment, which is suitable for the type of structure, its occupation, and its content, shall be set up in all structures under the responsibility of the user Divisions. This equipment and the procedures for its installation are described in Appendix VI.

6.6.2 Staff information

Under the responsibility of the Division Leaders and with the assistance of the TIS Commission, the Group Leaders shall provide all the members of their staff with information about fire hazards and the procedure to be followed in the event of a fire, according to the instructions set out in Appendix VII.

6.6.3 Staff training

Each Division Leader shall appoint an adequate number of members of his staff to be instructed in the use of the available fire-fighting equipment. The procedures for this training are set out in Appendix VII.

6.6.4 Fire instructions

The users in charge of premises shall ensure that fire instructions are displayed, as specified in Appendix VII.

7 FIRE DRILLS

Division Leaders shall ensure that fire drills are held regularly according to the procedures set out in Appendix VII.

8 MONITORING THE APPLICATION OF THIS CODE

- 8.1 Independently of the safety inspections provided for in Safety Instruction N° 4, the TIS Commission is entitled to check, in any manner it deems fit, that the rules of this present code are observed.
- 8.2 The TIS Commission may call upon outside bodies for help with these controls.
- 8.3 National or international standards that are not quoted in this code and its appendices may be applied, subject to the prior agreement of the TIS Commission.

9 ENTRY INTO FORCE

This code shall enter into force on the date of its publication and replace Code E, published in 1966 and revised in 1978.

10 LIST OF APPENDICES

- Appendix I : General definitions and reference documents.
- Appendix II : Buildings and equipment. Procedures to be applied.
- Appendix III : Construction of or alterations to buildings. Special-purpose structures. Structural provisions. Fire-protection equipment.
- Appendix IV : Fire safety standards for furniture and other contents of rooms and buildings
- Appendix V : Fire permit.
- Appendix VI : Fire-detection and extinguishing appliances.
- Appendix VII : Staff information and training. Diagrams and instructions to be complied with in the event of fire. Evacuation exercises.

GENERAL DEFINITIONS AND REFERENCE DOCUMENTS

1 INTRODUCTION

The purpose of this appendix is to define the current terms used in fire prevention and detection, and to list the reference documents that are recognized internationally and nationally in certain Member States of the Organization.

Section 2 is an easy guide to the international, European, and national reference documents: published standards, those being prepared or revised, and other documents recognized in the field of fire prevention and protection, e.g. the NFPA^{*)} codes in the USA, the APSAIRD^{*)} rules in France, and the documents drawn up by SIA^{*)} in Switzerland. The CERN documents are also indicated.

This list is not comprehensive and will be periodically updated.

The International ISO standards are revised every five years. The reader is therefore advised to always consult the latest edition shown in the catalogue (Library or TIS Commission).

Section 3 of this Appendix gives definitions. They are taken from the ISO (International Standardization Organization) standards Nos. 3261 and 8421, Part 1.

**2. INTERNATIONAL, EUROPEAN, AND NATIONAL
REFERENCE DOCUMENTS**

2.1. List of documents

The following table lists some existing reference works (published or draft standards, or other documents), their country of origin, and publisher. Tests, structural components, etc., are indicated under subheadings. The full list of the documents themselves is obtainable from the Fire Prevention Section of the TIS Commission.

^{*)} See glossary of abbreviations.

2.2. Glossary of the abbreviations in the table

AEAI :	Association des Établissements Cantonaux d'Assurance contre l'Incendie (CH).
AFNOR :	Association Française de Normalisation (F).
AMS :	Aerospace Material Specification (USA).
APSAIRD :	Assemblée Plénière des Sociétés d'Assurances contre l'Incendie et les Risques Divers (F).
BSI :	British Standards Institute (UK).
CEI :	Commission Électrotechnique Internationale.
CEN :	Comité Européen de Normalisation.
CENELEC :	Comité Européen de Normalisation Électrotechnique.
DIN :	Deutsches Institut für Normung (IRG).
EN :	Euronorm.
IBN :	Institut Belge de Normalisation (B).
ISO :	International Organization for Standardization.
NFPA :	National Fire Protection Association (USA)
NT :	Nordtest (Scandinavian countries).
PS :	Scandinavian countries.
SIA :	Société Suisse des Ingénieurs et des Architectes (CH).
SNV :	Schweizerische Normen Vereinigung (CH).

3. GENERAL DEFINITIONS

The documents concerning these definitions taken from ISO can be obtained from the Fire Prevention Section of the TIS Commission.

REFERENCE DOCUMENTS FOR FIRE PROTECTION

Country and Publishing body														
D		E		F			I		PS		UK		USA	CERN
N	Others	CEN	AFNOR	APSAIRD	Others	CEI	ISO	NT	Others	BS	Others	NFPA		
							X			X				
		X	X				X	X		X				
	X													
		X	X			X	X	X		X				
		X					X			X				
	X										X			
		X	X				X	X		X				
		X												
	X	X		X			X	X						
			X				X			X				

* 1 = Published standards; 2 = Draft standards; 3 = Other documents.

**BUILDINGS AND EQUIPMENT
PROCEDURES TO BE APPLIED**

1 CONSTRUCTION, ALTERATION, OCCUPATION AND USE OF BUILDINGS

- 1.1 All plans for the erection of a building structure must be submitted to the TIS Commission *for its opinion, before implementation.*

The project designer is strongly advised to consult the TIS Commission at the drafting stage.

- 1.2 The TIS Commission will decide which measures are advisable or essential to take.
- 1.3 During construction or alteration work, at the request of the official in charge of the work, or at its own discretion, the TIS Commission shall perform *in situ* inspections to ensure that the recommended fire prevention and protection measures have indeed been applied.
- 1.4 When the work has been completed, the TIS Commission must be involved in any acceptance procedures in order to ensure that all the recommended fire prevention and protection measures have actually been applied. It will also notify any defect or omission in the construction which could not be foreseen when the file was first examined and which might prejudice the safety of people and property.
- 1.5 Once a structure or a part thereof has been subjected to the acceptance procedure, the acceptance report, if satisfactory, shall be regarded as approval for use.

2. INSTALLATION OR MODIFICATION OF EXPERIMENTS AND TECHNICAL EQUIPMENT

- 2.1 As soon as it is intended to install or modify experiments or equipment in an existing building, the project designer shall consult the TIS Commission regarding any safety measures to be taken, taking into account the hazards inherent in the project and its environment.
- 2.2 At the request of the person in charge of the project, or at its own discretion, the TIS Commission shall make safety inspections during the fitting of the installations concerned. It shall ensure that the measures recommended when the project was examined have indeed been applied.
- 2.3. Before the installation is commissioned, the project designer shall organize a general safety inspection (see Safety Instruction N° 4).

**CONSTRUCTION OF OR ALTERATIONS TO BUILDINGS,
STRUCTURAL PROVISIONS. FIRE-PROTECTION EQUIPMENT.**

1 SWISS LEGISLATION

1.1 Cantonal legislation of Geneva

Document A-2-2 : Act concerning the effects and application of the law.

Document F-4-0,3 : Fire and natural disaster defences Act.

Document F-4-0,5 : Agreement concerning the intervention of the permanent station outside the confines of the City of Geneva and its co-operation with the airport emergency services.

Document F-4-1 : Ordinance for the implementation of the fire and natural disaster defences act.

Document F-4-2 : Ordinance concerning major firms and public or private establishments, or those presenting special fire defence hazards.

Document F-4-4 : Ordinance concerning operations, emergency assistance, and information in the event of an accident.

Document I-4-2 : Ordinance concerning premises for public entertainment or meetings and, in general, all large public establishments.

Document L-5-1 : Act concerning miscellaneous constructions and installations.

Document L-5-4 : Ordinance for the implementation of the Act concerning miscellaneous constructions and installations.

Document L-5-4,2 : Ordinance concerning hydrocarbons and similar liquids.

Document L-5-5 : Ordinance concerning lifts and goods elevators.

Document L-5-8 : Ordinance concerning measures for fire protection and fire fighting, and the use of certain items.

Document L-5-10 : Act concerning chimney-sweeping and specific smoke emanation monitoring

Document L-5-10,5 : Ordinance for the implementation of the Act concerning chimney-sweeping and specific smoke emanation monitoring.

Document L-5-12 : Ordinance concerning explosive or easily flammable substances.

Cantonal Fire Inspectorate Instruction:

- Fire instructions,
- Extinguishers,

*) The documents quoted here are regularly revised or amended. The reader is advised to consult the latest editions ['Feuille d'Avis Officielle' (Switzerland), 'Journal Officiel' (France), ISO and EN catalogues, etc.] which are of course available only in French. The above translations of titles are unofficial and are only intended as a guide to those available.

- Emergency teams,
- Signs and notices,
- Access,
- Safety, alarm system—Evacuation,
- Instructions for hotels, boarding houses, and the like,
- School and similar buildings.

Federal law relating to workers' protection—Articles concerning industrial fire prevention:

- Ordinance 3 of the Act concerning employment, health, and accident prevention on industrial premises.
- Ordinance concerning the prevention of occupational accidents and diseases (OPA).

1.2 Association of Cantonal Fire Insurance Establishments (AEAI)

Fire authority regulations.

Instructions for applying the Fire Authority regulations.

2 FRENCH LEGISLATION

Buildings open to the general public (ERP). Decree dated 25.6.80, as amended.

Installations involving risks to the environment. Act dated 19.07.76.

Dwellings.

Building code.

Gas and liquefied-hydrocarbon installations.

Storage and use of petroleum products.

High-rise buildings (IGH).

3. SPECIAL PROVISIONS

Where there are special hazards, the TIS Commission reserves the right to require the additional or more stringent measures which it deems fit.

**FIRE SAFETY STANDARDS FOR FURNITURE AND
OTHER CONTENTS OF ROOMS AND BUILDINGS**

1 INTRODUCTION

Recent fires, such as those in the aeroplane at Manchester Airport, the Woolworths fire at Manchester, and the fire in the Petit-Saconnex Commercial Centre, have shown that the inhalation of thick toxic smoke produced from easily ignitable furniture and fittings is the most common cause of death and disability.

The 1975 fire at the PS showed that combustion of plastics containing halogens or sulphur can result in serious corrosion of electrical and electronic equipment. At CERN, the installation of experiments in underground areas where household-type furniture fittings are used, and where escape routes are long and less accessible than those on the surface, calls for improved safety standards in the choice of such articles.

2 SCOPE

These standards apply to furniture and fittings for use in underground and other areas where there is restricted egress and thus less chance of escape in case of fire.

Where TIS considers that escape is less difficult, but where nevertheless the consequences of a fire should not be ignored, less stringent standards may be applied.

The furniture referred to includes chairs (especially upholstered), tables, desks, cupboards, curtains, carpets and other floor coverings, etc.

Other items include panels, cable channels, light fittings, blackboards or whiteboards, free-standing partitions, etc.

3 OBJECT

The object of this appendix is to define standard test methods and criteria for acceptability with respect to:

- fire performance (e.g. ignitability, combustibility, surface spread of flame, etc.);
- the specific optical density and rate of production of smoke;
- the toxicity of the smoke;
- the corrosivity of the smoke.

It is also necessary that the furniture fulfils its functions with respect to comfort, wear resistance, and ease of use.

4 CRITERIA

Furniture and fittings may be the major contributing factor to a fire, as, for instance, when a small fire-source, such as a cigarette or match, lands on an upholstered chair or touches curtains; or they can increase the danger when caught in a fire from other sources, particularly when thick, toxic, and corrosive smoke is produced. Tests of ignitability, combustibility, and the surface spread of flame apply to the first case, whilst tests of smoke density, toxicity, and corrosivity apply to the second one.

Wherever possible, internationally accepted standards should be used; national standards should be resorted to only when these are demonstrably more advanced or when international standards are non-existent.

Tests of the smoke density, toxicity, and corrosivity are common to all items, but other tests have been devised for the following groups:

- upholstered furniture,
- floor coverings,
- partitions and textile curtains,
- miscellaneous furniture and fittings.

Whenever possible, the ignitability and combustibility tests should be carried out on the finished items, particularly for upholstered furniture. The tests should be realized in an independent, recognized laboratory, and witnessed by CERN. Other tests may be carried out on small samples of component items, but attention must be paid to the choice of representative samples especially where composite materials are concerned (e.g. foam upholstery and fabric covers). A full report of the test procedure and results should be obtained, and not just a simple statement of compliance.

The regulations do not apply to small parts (such as knobs, handles, rollers, gaskets, fasteners, clips, grommets, rubstrips, pulleys, or small electrical parts), which would not contribute significantly to smoke density, toxicity, or corrosivity.

5 REGULATIONS

The use of halogenated or sulphur-containing plastics, fillers, and fire-retarding agents, etc., is to be avoided.

The TIS Commission can arrange to have analyses carried out and is competent to interpret the results and judge the suitability of materials.

Tables IV.1 to IV.4 give the standards to be applied for each of the groups mentioned in Section 4 of this appendix, but where other standards are quoted, only TIS is competent to judge the suitability of the items in question.

N.B. : Performance requirements are not quoted in all the standards cited in the tables, and it is left to the user to decide, in conjunction with TIS, what is best for the application foreseen. In other cases, suitable standards exist in certain countries only, but this should not prevent them from being applied by CERN in its specifications. Safety Note No. 11 'Recommendations on the use of plastic and synthetic materials in areas where the products of combustion in a fire may cause material damage or threaten the life or health of affected persons', should be consulted for indications on the suitability of materials. TIS should be consulted where any doubt exists. All orders for furniture must be approved by the TIS Commission.

Table IV.1: Upholstered furniture

Test parameter	Standard	Performance requirements
Ignitability	ISO 8191-1 (smouldering cigarette)	Pass
	ISO 8191-2 (match-flame equivalent)	Pass
	BS 5852 Part 1 (similar to above)	Pass
	BS 5852 Part 2 (wood crib)	Pass P5
		Articles for use in surface buildings must pass ISO 8191 1 & 2 and preferably BS 5852 Part 2 P3
Smoke density	ASTM E662	$D_S < 250$ for flaming and non-flaming mode
Toxicity of fire gases	ATS 1000.001	HF < 50/50 ppm HCl < 50/500 ppm HCN < 100/150 ppm $SO_2 + H_2S < 50/100$ CO < 3000/3500 NO + NO ₂ < 50/100 For other details, see standard
Corrosivity of fire gases	DIN 57 472-813	pH 3.5 Conductivity < 100 μ S/cm (Test temperature: 750 °C to 800 °C)

Table IV.2: Floor coverings

Test parameter	Standard	Performance requirements
Combustibility	NBSIR 75-950 + DIN 54332 NF P92-501 BS 476 Part 6 SNV 198897	B1 M1 Class 0 (i 6 and I 12) V
Smoke density, toxicity, and corrosivity	See Table IV.1	See Table IV.1

Table IV.3: Textile curtains and flexible partitions

Test parameter	Standard	Performance requirements ^{*)}
Flammability	DIN 66082 NF G07-113 BS 5867 Part 2	Brennklasse V-b Class B Duration of flaming: < 20 s Duration of afterglow: < 60 s
Smoke density, toxicity, and corrosivity	See Table IV.1	See Table IV.1

^{*)} These requirements should be discussed with the supplier and the testing laboratory, as they will have experience in the testing of these materials.

Table IV.4: Miscellaneous furniture and fittings

Test parameter	Standard	Performance requirements
Ignitability (furniture other than upholstered)	ISO 8191-1 ISO 8191-2	Pass Pass
Flammability of plastic fittings	UL 94V	94V-0
Smoke density, toxicity, and corrosivity	See Table IV.1	See Table IV.1

FIRE PERMIT

1 INTRODUCTION

Many fires are caused by work done with tools which create "hot points", for example: electric or oxyacetylene welding, electric, oxyacetylene or plasma cutting, grinding, sectioning or the use of blow torches or propane lances.

Fire can break out in a number of different ways:

- by conduction:
where heat is transferred along a hot component and can ignite materials with which it comes into contact;
- by convection:
where hot gases rise and can cause the fire to spread;
- by radiation:
where unprotected materials near the flame are ignited;
- by sparks:
sparks, which reach temperatures of 1000 à 2000°C, are scattered and can fly several metres.

The person in charge of the work and the operator working with "hot" tools must, therefore, be aware of the hazards involved in the action of the flames or the sparks on the materials around the work site.

There is a considerable difference between "hot" work carried out as a manufacturing process in a place designed for the purpose (such as a welding shop) and that done in an arbitrary location (such as a work site). In the former, protective measures are permanently implemented and the "Fire Permit" is not required.

In all other cases, the procedure outlined in paragraph 2.4 below applies.

2 THE FIRE PERMIT

2.1 Definition

The Fire Permit is a document drawn up to prevent the fire and explosion hazards involved in "hot" work.

2.2 Scope of the Fire Permit

Welding of other "hot" work carried out outside permanent CERN work-stations must always be covered by a Fire Permit. For every item of work of this kind the person who executes it must be an authorized operator and must be in possession of a properly completed and signed Fire Permit.

2.3 Presentation of the document (attached document)

The front side of the Fire Permit must show detailed information about the work as well as the signatures of the people involved:

- the person who ordered the work (the applicant),
- the Territorial Safety Officer (TSO),
- the operator performing the work.

The reverse side describes the safety measures to be observed before, during and after the work.

2.4 Application procedure for a Fire Permit (see attached document)

- 1 The **applicant** completes boxes 1, 2 and 3. He signs and dates in box 1. He forwards the document to the relevant TSO.
- 2 The **TSO** (or the applicant himself) inspects the premises and completes boxes 4 to 8. He returns the document to the applicant.
- 3 The **applicant**:
 - . **before the work is started**, forwards a copy of the document signed by the TSO and by himself to TIS-FB,
 - . forwards the document to the contractor responsible for the work or to the operator himself.

4 The **operator**:

- . inserts his name and the date in box 9,
- . must observe the instructions shown on the reverse of the form under "during..." and "after the work",
- . keeps the document until the work has been completed, to show it, if requested, to a TIS inspector or any other qualified person,
- . returns the document to the applicant or the TSO after the work has been completed.

5 When the work is completed, **the applicant or the TSO** inspects the premises to ensure that everything is in order and he completes box 10.

The document is then filed by the applicant for a week, after which it can be destroyed.

FIRE DETECTION AND EXTINGUISHING APPLIANCES

1 INTRODUCTION

The purpose of this appendix is to inform the reader about the existing fire-detection and extinguishing appliances.

There are many of them; some are designed for specific hazards, while others are general-purpose equipment.

It is difficult to establish the precise criteria to decide on the "ideal" type of detector to be installed. It essentially depends on the contents of the premises, which may well vary from day to day.

Regarding the choice of fire extinguisher, it is first of all necessary to select the most suitable extinguishing agent and then the method of using it. It may be movable (requiring human operation) or fixed (automatic or remotely-controlled semi-automatic system).

Project engineers will find detailed information on each system mentioned in the reference documents listed in Appendix I. They may also consult the specialised staff of the TIS Commission.

2 DETECTION

2.1 Fire-detection equipment

2.1.1 Thermal detectors

- Individual detector with fusible element;
- Linear detector (air-intake type or *alarm-line*-type fusible wire);
- Individual infra-red detector;
- Individual ultra-violet detector.

2.1.2 Smoke detectors

- Individual ionic detector;
- Individual optical detector;
- Linear light-beam detector;
- Linear detector with air aspiration and using optical or ionic air analysis (conventional or VESDA type).

2.2 Criteria for deciding whether or not to install a fire-detection system

The criteria below follow the rules in force in the Host-States, especially the Swiss AEIA standard (fire-protection standard issued by the Association of Cantonal Fire Insurers) and the Fire Safety Rules (E.R.P., France).

2.2.1 Principle

The Technical Inspection and Safety Commission (TIS) decides whether a fire-detection installation is needed to protect people on the basis of the criteria below.

The units responsible for property and installations must decide themselves concerning the additional fire-detection requirements, depending on the property to be protected or the risks that the installations are closed down in case of destruction by the fire.

2.2.2 Criteria

Premises	Detection
UNDERGROUND	<u>Yes</u> in general (except in areas with no combustible items)
IN SINGLE STOREY BUILDINGS	<u>No</u> (for barracks in experimental areas: see Safety Note N° 3 Rev)
ERP (premises with public access)	Night-time occupation: <u>Yes</u> generalized. Day-time occupation: <u>Yes</u> on the floors below those with public access (Main Building, etc.).
<p style="text-align: center;">IN MULTI-STOREY BUILDINGS</p> <p>a) <i>two-storey buildings with an unenclosed staircase:</i></p> <p><u>basement:</u> premises not continuously occupied and with some combustible items</p> <p><u>ground floor:</u> premises with a considerable combustible content</p> <p>other premises in the corridors shared by these premises</p> <p><u>1st floor:</u> closed premises corridors shared by these premises</p>	<p><u>Yes</u>, generalized</p> <p><u>Yes</u></p> <p><u>No</u></p> <p><u>Yes</u>, unless there are always people in the corridor</p> <p><u>No</u></p> <p><u>Yes</u></p>

Premises	Detection
<p><i>b) buildings of more than two floors:</i></p> <p>The staircases in these buildings must be enclosed</p> <p>basement premises not continuously occupied and with a high combustible content or containing hazardous substances (flammable liquids, etc.)</p> <p>offices, meeting rooms without public access</p> <p>meeting rooms, auditoria with public access</p> <p>workshops, laboratories, service rooms with a high combustible content</p> <p>service rooms, stores, opening directly towards a stairwell</p>	<p><u>Yes</u></p> <p><u>No</u></p> <p><u>Yes</u> in the corridors of the floors below these premises, depending on the number of occupants</p> <p><u>Yes</u></p> <p><u>Yes</u></p>
<p>Premises containing flammable gases or liquids or hazardous materials</p>	<p><u>Yes</u></p>
<p>COMMENTS:</p> <p>1) TIS may require a fire-detection system to be fitted as a compensatory measure in an existing building with no adequate safeguards for people, e.g. multi-storey buildings without emergency stairs, with unenclosed stairwells and/or corridors, premises accessible by means of a code, etc.</p> <p>2) Multi-storey buildings and those in which there are special hazards where a fire-detection system is considered essential for personal safety must be fitted with alarm/evacuation sirens automatically triggered by the fire-detection system supplemented with suitably distributed manual push-button controls (mainly in the escape passages and near the exit doors).</p>	

3 FIRE-FIGHTING

3.1 Extinguishing agents and their use

- **WATER** pure or with A3F (AFFF = Agent Forming a Floating Film)

- Fixed installations:
traditional sprinklers
larged-drop sprinklers
fast-acting sprinklers
"deluge"
"mist" sprinklers
"micronised" water sprinklers
- Semi-fixed installations:
fire hydrants + flexible hoses
fire points + flexible hoses
hose reels
 - with flexible hoses on half-unions
 - with rigid pipes (axially-fed reels)
- Mobile appliances:
portable extinguishers
trolley extinguishers

- **EXTINGUISHING POWDERS**

sodium bicarbonate
monoammonium phosphate

Fixed installations (kitchen, oil heating plants)

Mobile appliances:
portable extinguishers
trolley extinguishers.

- **EXTINGUISHING GASES**

derivatives of CFC or HCFC used in fixed installations:

HALONS 1211 and 1301 (*following the signing of the Montreal Protocol by the Host Countries, these halons will be used in future at CERN only to recharge existing fixed installations*)

NAF S-III

Fe-13

FM-200

PFC 410 (CEA 410)

Halotron II.

All these agents are used in fixed installations. HALON 1211, and very rarely HALON 1301, are used in portable extinguishers.

Inert

CO₂ (in fixed installations or portable extinguishers)

INERGEN)

ARGONITE) used in fixed installations

CEREXEN)

• **EXTINGUISHING FOAMS**

chemical

physical: protein, synthetic

low-foaming: 1-20 (mobile appliances)

medium-foaming: 20-200 (mobile appliances or fixed installations)

high-foaming: > 200 (fixed installations).

3.2 Fitting buildings with extinguishing systems

3.2.1 Extinguishing appliances usable by the Fire Brigade

Whatever the type of building and its contents, the equipment below constitutes the minimum needed for fire-fighting:

- Fire hydrants:
At least one pressurised fire hydrant connected to the fire-fighting system must be installed at less than 100 m of any side of a building accessible by a roadway for the Fire Brigade. These hydrants are intended for use by the Fire Brigade only.
- Axial-feed flexible hose reels:
Depending on the contents of the buildings, the TIS Commission may require the installation of hose reels intended for use either by the Fire Brigade or by specially trained staff (auxiliary firemen, for example).

3.2.2 Extinguishing appliances usable by those on the spot

- Axial-feed hose reels with rigid hoses:
At least one axial-feed hose reel must be fitted in any building with a wall 40 m or more long. If several hose reels are found necessary, their number must be determined on the basis of the criteria below:
 - . it must be possible to reach every point in the building with the jet from a nozzle
 - . a nozzle jet will carry about 5 m,
 - . the standard acceptable length of a hose from a hose reel is 20, 25 or 30 m,
 - . the hose must be long enough to reach around any obstacles.

These reels are initial-action appliances for use essentially by the people on the spot.

- Portable or trolley extinguishers
The TIS Commission is competent to determine the type of extinguisher to be fitted (capacity, extinguishing agent). The extinguishers will be installed inside or

outside the premises to be protected at points such that the user does not have to cover more than 10 metres in order to find one.

3.2.3 Additional extinguishing appliances

In certain special high-hazard cases, and with the TIS Commission's agreement, project designers and the Divisions responsible for existing buildings must make provision for the installation of automatic or semi-automatic (with a time delay) or manually controlled extinguishing systems using water (sprinklers, deluge), gas (CO₂, Inergen, etc.), powder or foam.

PERMIS DE FEU

12.07.1995

Le PERMIS DE FEU est établi dans un but de prévention contre les dangers d'incendie et d'explosion occasionnés par les travaux par point chaud (chalumeau et arc électrique notamment). Pour chaque intervention de ce genre la personne qui l'exécute doit être habilitée pour ce travail et doit être en possession d'un PERMIS DE FEU dûment rempli et signé. Le visa CERN ne dégage en aucun cas la responsabilité de l'opérateur.
Il ne concerne pas les travaux effectués à des postes de travail permanents du CERN.

DONNEUR D'ORDRE du travail par point chaud* 1 NOM : DIVISION : Tél. : < > Date : Signature :	CONSIGNES PARTICULIÈRES 6
TRAVAIL A EXECUTER 2 (Date, heure et durée de validité du permis) : le.....de.....à..... lieu Installation à traiter : Travail à effectuer par : <ul style="list-style-type: none">- soudure électrique- soudure au chalumeau- découpage électrique- découpage au chalumeau- lance à propane- découpage plasma- meulage, tronçonnage- lampe à souder	MOYENS DE PROTECTION 7 CONTRE LES PROJECTIONS
ENTREPRISE CHARGÉE DU TRAVAIL 3 - Raison sociale - Représentant qualifié	PROXIMITÉ DU LIEU DE TRAVAIL 8 Local protégé par détection feu : - oui <input type="checkbox"/> - non <input type="checkbox"/> Détection incendie mise hors service temporairement : **- oui <input type="checkbox"/> - non <input type="checkbox"/> Moyens d'alerte..... Moyens d'intervention En cas d'accident, tél : ...112.....
PERSONNE CHARGÉE DE LA SÉCURITÉ 4 Délégué territorial à la sécurité (TSO)*Tél. :<.....> Date : Signature :	RÉALISATION DU TRAVAIL 9 - Opérateur : Nom : Signature :
RISQUES SIGNALÉS 5 - gaz : <input type="checkbox"/> - hydrocarbures : <input type="checkbox"/> - stockage : <input type="checkbox"/> - autres :	VISITE DES LIEUX APRÈS RÉALISATION DU TRAVAIL PAR :* 10 Nom : Date : Heure : Signature :

* A remplir en caractères d'imprimerie SVP

Distribution: TIS/FB

** Si oui, prière de remplir le formulaire "Procédure de mise hors service de tout ou partie de système générant une alarme de niveau 3"
(Rév. 12.07.1995)
disponible auprès des secrétariats de division.

avant transmission à l'exécutant

Chefs de chantiers, contremaîtres, chefs d'équipe : outre les risques d'incendie, N'OUBLIEZ PAS la protection des personnes, non seulement soudeurs ou meuleurs mais aussi les aides et les passants. Pensez aux risques de brûlures, aux coups d'arc, aux pailles dans les yeux, aux risques d'électrocution... VOTRE RESPONSABILITÉ PEUT ETRE ENGAGÉE EN CAS D'ACCIDENT.

Ne manquez pas de contresigner le PERMIS DE FEU et d'en respecter scrupuleusement les consignes, ainsi que les instructions permanentes.

FIRE DETECTION AND EXTINGUISHING APPLIANCES

1 INTRODUCTION

The purpose of this appendix is to inform the reader about the existing fire-detection and extinguishing appliances.

There are many of them; some are designed for specific hazards, while others are general-purpose equipment.

It is difficult to establish the precise criteria to decide on the "ideal" type of detector to be installed. It essentially depends on the contents of the premises, which may well vary from day to day.

Regarding the choice of fire extinguisher, it is first of all necessary to select the most suitable extinguishing agent and then the method of using it. It may be movable (requiring human operation) or fixed (automatic or remotely-controlled semi-automatic system).

Project engineers will find detailed information on each system mentioned in the reference documents listed in Appendix I. They may also consult the specialised staff of the TIS Commission.

2 DETECTION

2.1 Fire-detection equipment

2.1.1 Thermal detectors

- Individual detector with fusible element;
- Linear detector (air-intake type or *alarm-line*-type fusible wire);
- Individual infra-red detector;
- Individual ultra-violet detector.

2.1.2 Smoke detectors

- Individual ionic detector;
- Individual optical detector;
- Linear light-beam detector;
- Linear detector with air aspiration and using optical or ionic air analysis (conventional or VESDA type).

2.2 Criteria for deciding whether or not to install a fire-detection system

The criteria below follow the rules in force in the Host-States, especially the Swiss AEIA standard (fire-protection standard issued by the Association of Cantonal Fire Insurers) and the Fire Safety Rules (E.R.P., France).

2.2.1 Principle

The Technical Inspection and Safety Commission (TIS) decides whether a fire-detection installation is needed to protect people on the basis of the criteria below.

The units responsible for property and installations must decide themselves concerning the additional fire-detection requirements, depending on the property to be protected or the risks that the installations are closed down in case of destruction by the fire.

2.2.2 Criteria

Premises	Detection
UNDERGROUND	<u>Yes</u> in general (except in areas with no combustible items)
IN SINGLE STOREY BUILDINGS	<u>No</u> (for barracks in experimental areas: see Safety Note N° 3 Rev)
ERP (premises with public access)	Night-time occupation: <u>Yes</u> generalized. Day-time occupation: <u>Yes</u> on the floors below those with public access (Main Building, etc.).
<p style="text-align: center;">IN MULTI-STOREY BUILDINGS</p> <p>a) <i>two-storey buildings with an unenclosed staircase:</i></p> <p><u>basement:</u> premises not continuously occupied and with some combustible items</p> <p><u>ground floor:</u> premises with a considerable combustible content</p> <p>other premises in the corridors shared by these premises</p> <p><u>1st floor:</u> closed premises corridors shared by these premises</p>	<p><u>Yes</u>, generalized</p> <p><u>Yes</u></p> <p><u>No</u></p> <p><u>Yes</u>, unless there are always people in the corridor</p> <p><u>No</u></p> <p><u>Yes</u></p>

Premises	Detection
<p><i>b) buildings of more than two floors:</i></p> <p>The staircases in these buildings must be enclosed</p> <p>basement premises not continuously occupied and with a high combustible content or containing hazardous substances (flammable liquids, etc.)</p> <p>offices, meeting rooms without public access</p> <p>meeting rooms, auditoria with public access</p> <p>workshops, laboratories, service rooms with a high combustible content</p> <p>service rooms, stores, opening directly towards a stairwell</p>	<p><u>Yes</u></p> <p><u>No</u></p> <p><u>Yes</u> in the corridors of the floors below these premises, depending on the number of occupants</p> <p><u>Yes</u></p> <p><u>Yes</u></p>
<p>Premises containing flammable gases or liquids or hazardous materials</p>	<p><u>Yes</u></p>
<p>COMMENTS:</p> <p>1) TIS may require a fire-detection system to be fitted as a compensatory measure in an existing building with no adequate safeguards for people, e.g. multi-storey buildings without emergency stairs, with unenclosed stairwells and/or corridors, premises accessible by means of a code, etc.</p> <p>2) Multi-storey buildings and those in which there are special hazards where a fire-detection system is considered essential for personal safety must be fitted with alarm/evacuation sirens automatically triggered by the fire-detection system supplemented with suitably distributed manual push-button controls (mainly in the escape passages and near the exit doors).</p>	

3 FIRE-FIGHTING

3.1 Extinguishing agents and their use

- **WATER** pure or with A3F (AFFF = Agent Forming a Floating Film)

- Fixed installations:
traditional sprinklers
larged-drop sprinklers
fast-acting sprinklers
"deluge"
"mist" sprinklers
"micronised" water sprinklers
- Semi-fixed installations:
fire hydrants + flexible hoses
fire points + flexible hoses
hose reels
 - with flexible hoses on half-unions
 - with rigid pipes (axially-fed reels)
- Mobile appliances:
portable extinguishers
trolley extinguishers

- **EXTINGUISHING POWDERS**

sodium bicarbonate
monoammonium phosphate

Fixed installations (kitchen, oil heating plants)

Mobile appliances:
portable extinguishers
trolley extinguishers.

- **EXTINGUISHING GASES**

derivatives of CFC or HCFC used in fixed installations:

HALONS 1211 and 1301 (*following the signing of the Montreal Protocol by the Host Countries, these halons will be used in future at CERN only to recharge existing fixed installations*)

NAF S-III

Fe-13

FM-200

PFC 410 (CEA 410)

Halotron II.

All these agents are used in fixed installations. HALON 1211, and very rarely HALON 1301, are used in portable extinguishers.

Inert

CO₂ (in fixed installations or portable extinguishers)

INERGEN)

ARGONITE) used in fixed installations

CEREXEN)

• **EXTINGUISHING FOAMS**

chemical

physical: protein, synthetic

low-foaming: 1-20 (mobile appliances)

medium-foaming: 20-200 (mobile appliances or fixed installations)

high-foaming: > 200 (fixed installations).

3.2 Fitting buildings with extinguishing systems

3.2.1 Extinguishing appliances usable by the Fire Brigade

Whatever the type of building and its contents, the equipment below constitutes the minimum needed for fire-fighting:

- Fire hydrants:
At least one pressurised fire hydrant connected to the fire-fighting system must be installed at less than 100 m of any side of a building accessible by a roadway for the Fire Brigade. These hydrants are intended for use by the Fire Brigade only.
- Axial-feed flexible hose reels:
Depending on the contents of the buildings, the TIS Commission may require the installation of hose reels intended for use either by the Fire Brigade or by specially trained staff (auxiliary firemen, for example).

3.2.2 Extinguishing appliances usable by those on the spot

- Axial-feed hose reels with rigid hoses:
At least one axial-feed hose reel must be fitted in any building with a wall 40 m or more long. If several hose reels are found necessary, their number must be determined on the basis of the criteria below:
 - . it must be possible to reach every point in the building with the jet from a nozzle
 - . a nozzle jet will carry about 5 m,
 - . the standard acceptable length of a hose from a hose reel is 20, 25 or 30 m,
 - . the hose must be long enough to reach around any obstacles.

These reels are initial-action appliances for use essentially by the people on the spot.

- Portable or trolley extinguishers
The TIS Commission is competent to determine the type of extinguisher to be fitted (capacity, extinguishing agent). The extinguishers will be installed inside or

outside the premises to be protected at points such that the user does not have to cover more than 10 metres in order to find one.

3.2.3 Additional extinguishing appliances

In certain special high-hazard cases, and with the TIS Commission's agreement, project designers and the Divisions responsible for existing buildings must make provision for the installation of automatic or semi-automatic (with a time delay) or manually controlled extinguishing systems using water (sprinklers, deluge), gas (CO₂, Inergen, etc.), powder or foam.

**PERSONNEL TRAINING.
DIAGRAMS AND INSTRUCTIONS TO BE COMPLIED WITH
IN THE EVENT OF FIRE. EVACUATION EXERCISES**

1 INTRODUCTION

This appendix concerns all persons on the CERN grounds. Its purpose is to provide them with essential information and to inform them of what action to take in the event of a fire, so that they may be evacuated from buildings in the safest possible way.

2 PERSONNEL TRAINING

All members of the personnel must attend a basic fire-prevention and fire-fighting course, organized in association with the TIS Commission.

The training shall concentrate on fire risks, methods of extinction, the use of emergency equipment, and action to be taken prior to the arrival of the Fire Brigade.

3 DIAGRAMS, EXIT ARROWS, AND FIRE INSTRUCTIONS

Evacuation diagrams must be displayed in all buildings to which members of the public have access, and in underground structures. They shall be posted at suitable points, and shall clearly indicate the normal exits and the emergency exits, as well as the main access routes to these exits. They shall also show where the emergency appliances (red telephones, fire extinguishers, and fire hydrants) are situated.

In all the buildings, the exits must be marked with the standard "EXIT" or "EMERGENCY EXIT" signs. Corridors must be marked with the accepted standard arrows indicating the way to the exits. Emergency appliances (alarm buttons, emergency stops, red telephones, extinguishers, fire hydrants) must be marked with standard signs mounted on accepted standard signboards.

The fire instructions must be adapted to each type of building and structure. They shall include the general instructions and, wherever necessary, specific instructions relating to increased hazards. These instructions must be displayed on the standard signboards and posted at appropriate points.

4 EVACUATION EXERCISES

Evacuation exercises must be arranged on the initiative of Division Leaders, in consultation with the TIS Commission, at regular intervals depending on the level of hazard and in the light of previous evacuation exercises carried out in the structure concerned or in similar structures.

Evacuation exercises must be well prepared so as to obtain the maximum information while causing the minimum disruption to current activities. A report will be drawn up on each exercise in order to identify any shortcomings in the application of the instructions set out in Section 3 above and, where appropriate, to recommend further work in order to improve the safety of the occupants and of CERN property.