	<p style="text-align: center;"><b>INSTRUCTION DE SÉCURITÉ</b> <b>SAFETY INSTRUCTION</b> Ayant force d'obligation selon SAPOCO/42</p>	<p style="text-align: center;"><b>TIS</b> <b>IS 5 Rev</b></p>
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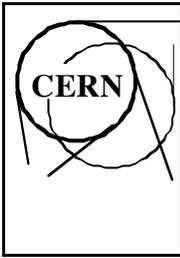
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## **ARRETS D'URGENCE**

## **EMERGENCY STOPS**

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# INSTRUCTION DE SÉCURITÉ SAFETY INSTRUCTION

Mandatory as defined in SAPOCO/42

**TIS**  
**IS 5 Rev**

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## EMERGENCY STOPS

### 1 INTRODUCTION

This Safety Instruction provides a detailed description of rules applying to the two types of Emergency Stops at CERN:

- a) **Local Emergency Stop (AUL) (cut-offs to premises without issuing a Level 3 Alarm)**
- b) **General emergency stops (AUG) (general cut-offs issuing a Level 3 Alarm)**

The AULs or AUGs act as cut-offs to systems supplementing Code C1 and taking account of CERN's specific features, with a view to increasing the degree of safety.

#### 1.1 Basic rule

*Any person shall be authorised and required to activate an emergency stop whenever he or she considers that a dangerous situation is in imminent danger of happening, actually exists, or is in the process of occurring.*

#### 1.2 General requirements

AUGs set off Level 3 Alarms, which must be treated as such, in accordance with Safety Instruction IS 37.

The provisions of AULs or AUGs must be such that setting them off does not cause other danger. This means that any new installation of an AUL or AUG system must first have a risk analysis undertaken.

#### 1.3 Exceptions to cut-off by AUL or AUG

AULs or AUGs **must not cut off safety installations** allowing for evacuation of premises and access by the emergency services or other action, nor may they reduce the degree of safety in the premises concerned. (Safety installations are lifts, certain types of lighting, smoke extraction, alarm systems, detection devices, emergency pumps, hose stations, un-interruptible power supplies (UPS) that supply power to computer and network installations transmitting alarms, etc.)

Equipment remaining live and other sources of energy still operating must be so designed and installed that it shall not create any additional risks during an intervention by emergency services.

Equipment and installations using higher than extra low safety (SELV) or protection voltages (PELV), and that are not cut off by AULs or AUGs, must have special distinctive markings and/or be fluorescent orange in colour.

## 2 GENERAL EMERGENCY STOP SYSTEMS (AUG) AND EMERGENCY STOP SYSTEMS FOR PREMISES (AUL)

### 2.1 Purpose

The purpose of an AUL or AUG is to cut off power sources liable to present a danger.

<p><b><u>AUL - specific features:</u></b></p> <p>* cut off power sources situated inside or serving a geographically circumscribed position or installation.</p>	<p><b><u>AUG - additional special features:</u></b></p> <p>* where relevant, shut down the particle beams and accelerators. * alert the emergency services by issuing a Level3 Alarm.</p>
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### 2.2 Areas to be equipped

<p><b><u>AUL:</u></b></p> <p>AULs must be installed in restricted premises or areas that are clearly demarcated such as workshops, laboratories, barracks and similar areas and/or other types of plants with risks greater than those of ordinary domestic appliances or office equipment.</p>	<p><b><u>AUG:</u></b></p> <p>AUGs must be installed in accelerator tunnels and buildings, experimental halls and areas, assembly halls, and any other buildings where a risk analysis by the person in technical charge, in conjunction with TIS Division, calls for an AUG.</p>
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### 2.3 Areas without an AUG

AUGs shall not be installed in buildings of the tertiary type<sup>1</sup>, or in premises belonging to the electricity distribution services with access reserved for the sole use of persons authorised to work in them.

In the event of fire, the fire brigade must not enter until the premises in question have been declared safe by the person responsible for the installation.

When a workshop, laboratory, barrack or similar premise is fitted with AULs, AUGs may not be installed therein.

### 2.4 Effect of an AUL or AUG

AULs or AUGs must cut off all electrical installations using higher voltages than extra low safety or protection voltages (SELV and PELV), except for safety circuits. Residual energy must be

<sup>1</sup> Risk comparable with the one of electric domestic appliances or offices of standard type.

discharged. After power has been cut off, the remaining dangers, in particular, electrical, mechanical, chemical, thermal, or from radioactive sources, must be taken into account for any emergency intervention.

All AUL actuators at a given point or those of an AUG in a building or hall must have the same effect.

<p><b><u>AUL:</u></b></p> <ul style="list-style-type: none"> <li>* Such systems must act only within the area to be protected.</li> <li>* Circuits passing through any such area without being used there must be installed and protected in conformity with § 482.2.6<sup>2</sup> of NF C 15-100 if they are not cut off by an AUL.</li> <li>* AUL triggering is not transmitted to the Safety Control Room (SCR).</li> </ul>	<p><b><u>AUG:</u></b></p> <ul style="list-style-type: none"> <li>* An AUG shall affect the entire area of the building, hall, area or installation concerned.</li> <li>* The setting-off of an AUG must be automatically transmitted to the SCR.</li> <li>* The system must include devices that will enable the exact position of an incident to be ascertained in all circumstances.</li> </ul>
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## 2.5 Positioning of alarm triggers for AULs and AUGs

The alarm triggers must be located at points where they can be clearly seen and are always accessible:

<p><b><u>AUL:</u></b></p> <ul style="list-style-type: none"> <li>* inside and at all points of entry to the area concerned.</li> <li>* barracks and areas considered as particularly exposed shall also have alarm triggers outside.</li> <li>* at any point dictated by local conditions.</li> </ul>	<p><b><u>AUG:</u></b></p> <ul style="list-style-type: none"> <li>* close to every entrance to buildings or areas.</li> <li>* at access gates to areas where beams operate.</li> <li>* elsewhere, at positions dictated by local conditions (e.g., on each floor).</li> </ul>
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It is desirable to group together near a hose station the AUG, evacuation alarm, telephone, red telephone, first-aid box, and fire extinguishers for a given area.

## 2.6 Types of alarm actuators and marking

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<sup>2</sup> NF C 15-100 § 482.2.6: separate conduit inside the premises crossed, with same degree of fire resistance as the other installations inside the premises crossed, and fusing situated upstream of the premises crossed.

<p><b><u>AUL:</u></b></p> <p>* The actuators of the AUL must be of the open mushroom type and painted in red, when they are remote control devices. In restricted premises, the AUL may be replaced by the circuit breaker that directly cuts off the power supply. This applies only if it is situated inside the premises and identified as such. The actuator shall be of the lockable type. After the actuator is deactivated, power can be restored to the installation only through a deliberate act.</p> <p>* The AUL systems must be marked with the relevant rectangular sign from the Safety Code A3. The name of the area in question must be given on the sign.</p>	<p><b><u>AUG:</u></b></p> <p>* The actuators of the AUG, which will be in red, must be protected from being set off inadvertently.</p> <p>* The AUG actuators must be marked with large round signs of the type shown in Safety Code A3.</p> <p>* Signs of this kind shall not be used for any other purpose.</p>
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## 2.7 Acceptance and commissioning

The competent electricity service at CERN is the one that carries out the installation, maintenance and full commissioning of the AUL or AUG system, and in particular its acceptance test (prior to commissioning). It arranges for a full test of the AUG or AUL system under actual conditions, which the TSO or GLIMOS and TIS Division take part in.

<p><b><u>AUL:</u></b></p> <p>No additional conditions.</p>	<p><b><u>AUG:</u></b></p> <p>TIS Division shall be given adequate advance notice, monitor its performance and make out a report, copies of which shall be given to the participants, and to the TCR and SCR. The AUG cannot be considered operational until TIS Division has formally declared it as such.</p>
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## 2.8 Reliability and testing

The AUL and AUG systems shall be fail-safe. In particular, any power failure or interruption of one of their circuits must have the same effect as activating them.

The command circuits for AULs or AUGs must be connected to un-interruptible power supplies.

The AULs and AUGs must be designed in such a way that if an Emergency Stop is activated during a power failure the stop condition will persist after power has been restored.

<p><b><u>AUL:</u></b></p> <p>The AULs shall be tested at least once a year by the TSO responsible for the premises where they are installed.</p>	<p><b><u>AUG:</u></b></p> <ul style="list-style-type: none"> <li>* The competent electrical service at CERN must make arrangements for their regular maintenance and must carry out operational inspections of the alarm systems at least once a year, in line with procedures to be drawn up with TIS Division (IS37).</li> <li>* These inspections will be the subject of a summary report, a copy of which must be sent to the TIS-GS Group.</li> <li>* Work on the AUGs must be traceable.</li> <li>* The AUGs must come under the responsibility of a single service with an adequate knowledge of the electrical power distribution network.</li> </ul>
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### 3. LEGAL BASIS AND FINAL REMARKS

#### 3.1 Reference rules

The most recent European Directives and the IEC and CENELEC (European Electrotechnical Standardisation Committee) recommendations shall be the legal bases applicable to CERN installations and equipment. This Safety Instruction is based on French standard NF C 15-100 that corresponds to European standard EN/IEC 60364 series, harmonised CENELEC documents in the HD 384 series, and standards from the EN/IEC series 60204 and 60292.

#### 3.2 Internal Procedures

This Safety Instruction is published by the TIS Division under the procedure set out in the CERN Safety Policy document SAPOCO/42 and pursuant to the Organization's regulations. It will come into force on the date of publication.

#### 3.3 Glossary

A3	CERN Safety Code A3 (Safety Colours and Safety Signs) N.B: This code contains colour images of all alarm signs and actuators
AUG	General Emergency Stop
AUL	Emergency Stop for certain premises, rooms, workshops
C1	Electrical Safety Code
CENELEC	European Committee for Electrical Standardisation
EN	European Standard
GLIMOS	Group Leader in Matters of Safety
HD	Harmonised document
IEC	International Electrotechnical Commission
IS37	Safety Instruction No 37 (Alarms and Alarm Systems)
NF C 15-100	French standard: Low voltage electrical installations
Actuator:	Manual control (Actuator) in accordance with EN 60292-2

Device of the control equipment components which, when activated, bring the control equipment into action and is designed to be activated by an individual.

RIA	Hose station
SAPOCO	CERN Safety Policy Committee
SCR	Safety Control Room, Fire Brigade
SELV	Safe extra low voltage ( $U < 50 \text{ VAC}$ , $U < 120 \text{ VDC}$ , not earthed) except in damp premises and confined areas
PELV	Protection extra low voltage ( $U < 50 \text{ VAC}$ , $U < 120 \text{ VDC}$ , earthed) except in damp premises and confined areas
TCR	Technical Control Room
TIS	Technical Inspection and Safety Division
TIS/GS	General Safety Group of TIS Division
TSO	Territorial Safety Officer
UPS	Uninterruptible Power Supply