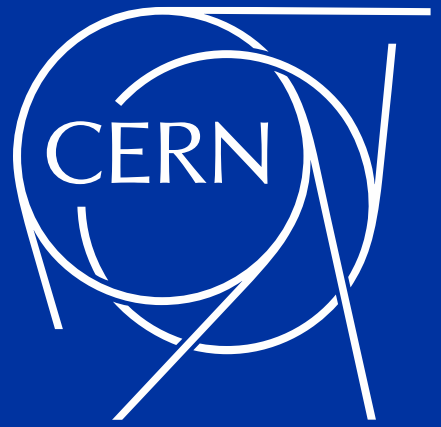
TECHNICAL GALLERIES CONSOLIDATION

ENGINEERING DEPARTMENT

Technical Galleries Consolidation Program

Emergency lighting

Request for integration study; location guidelines



EMERGENCY LIGHTING TG-CONS

(SUMMARY OF THE CONCEPT)

Georgi GEORGIEV, EN-EL

12/04/2024

EDMS 3077752

INTRODUCTION

CERN
Esplanade des Particules 1
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TECHNICAL GALLERIES CONSOLIDATION

EDMS NO.	REV.	VALIDITY
2811267	1.0	Released

REFERENCE
TGC-S-EN-0003

Date: 2023-04-03

TECHNICAL NOTE

TG-CONS PROJECT RESPONSE TO SRF 2794867 IN THE WEST AREA

ABSTRACT:

Answer to the SRF EDMS 2794867 issued by HSE after the request of the TG-CONS Project.

DOCUMENT PREPARED BY:	DOCUMENT CHECKED BY:	DOCUMENT APPROVED BY:
A. Filinis [EN/CV]	O. Prouteau [HSE-OHS] O. Rios [HSE-OHS] J. Audrain [HSE-FRS] O. Deschamps [HSE-FRS]	S. Evrard [EN/CV] As Project Leader

2.6 Is emergency lighting required?

During the meetings held with the HSE experts to clarify certain points, the issue of emergency lighting was raised. Currently, it is not present in all galleries but only on a case-by-case basis. The HSE unit gave some recommendations on this subject.

In summary, emergency lighting is required in order to properly guide workers.

Distances between such lightings, power supply mode and their autonomy should still be defined. In any case, there should be no ambiguity in direction changes and the lighting must ensure a minimal brightness of 1 to 2 lux.

Taking into consideration the above-mentioned points, TG-CONS Project will install an emergency lighting system based on the technical specifications followed for the HL-LHC technical galleries.

REFERENCES

[1] HSE-OHS, "SRF: Answer to TG-CONS questions on fire safety and emergency preparedness," [Online]. Available: https://edms.cern.ch/document/2794867/.

TECHNICAL DESIGN REPORT HL-LHC

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ENGINEERING DEPARTMENT

EDMS NO. 2686790 | REV. 2.0 | VALIDITY RELEASED
REFERENCE ELG-GENNET-PR-0050
Date: 2022-02-24

TECHNICAL DESIGN REPORT

Electrical Infrastructure
SL171-172-173-174

ABSTRACT:
This document contains all the drawings and studies concerning the new technical galleries SL171-172-173-174 of LHC1 in the frame of the project HL-LHC.

DOCUMENT PREPARED BY:	DOCUMENT CHECKED BY:	DOCUMENT APPROVED BY:
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DOCUMENT SENT FOR INFORMATION AFTER APPROVAL TO:
Group leader EN-EL, section leaders EN-EL, section EL-EWS, section EL-MT
HL-LHC WPL17 – L. Tavian

Example P1

5. Equipment related to personnel safety and GS equipment

5.1 Introduction

The distribution principle and the location of the safety equipment planned to be installed in the technical galleries have been validated by the WPL17 (Work Package Leader) and by the PSO (Project Safety Officer) of the HL-LHC project [5]. A general presentation of all the safety equipment under WP17.2 has been made and is available in reference [6].

In addition, a formal approval (by EDMS process) was also requested and accepted by the PSO and the WPL17. This approval mainly concerns the validation of the number and position of the safety lights [7].

5.2 Emergency Stop - AUG

There will not be any AUG buttons in the Technical Galleries.

5.3 Secured lighting

The type of secured lighting provided in the Technical Galleries will be of the evacuation path lighting type. The location and number of lights have been defined considering the escape routes defined by the PSO [5].

The luminaires will be of the autonomous block type (BAES), of the brand and model standardized in the S213 installation contract.

The operation of the luminaires will not be permanent. Their operation will be triggered by lack of voltage in the building-controlled lighting circuit.

Following discussions between HSE and the EL-MT section about lighting in the Technical Galleries and the inherent risks, it was recommended not to order controlled lighting circuits.

5.4 Normal lighting (non-controlled)

Normal lighting will not be controlled (for more details refer to § 4.3) and will be supplied from the sub-distribution switchboards of adjacent buildings. The chosen luminaires will be of the LED strip type, PHILIPS brand and installed on the ceiling.

5.5 General Services

Several circuits dedicated to low power will supply socket boxes equipped with IEC type sockets 16A (three-phase + N + PE) and 16A (1 phase + N + PE). The socket boxes will be protected by 30 mA differential protection, intended to supply the mobile lifting pumps used by the firefighters, according to known needs.

5.6 Earthing system and main equipotential network

The cable ladders will be earthed in accordance with the EN-EL standard in force (GENEB___0054). A 120 mm2 bare copper cable will be installed in the EB ladder (General Services) and will connect the equipotential earth of the adjacent buildings,

[5] T. Otto, «Evacuation Paths - SF 17 and SF 57Cooling Towers,» EDMS 2509104 , 2021.

TECHNICAL DETAILS ON THE INSTALATIONS 1/3

This solution is already installed for HL-LHC in P1 and P5.
The same will be applied for NA-CONS.

Luminaire type:

LUMATEC
Lighting beyond technology

Fiche technique

Luminaire de secours
Straitbox 300
A8 L3 /1

DESCRIPTION

Luminaire de secours à LED IK09, boîtier métallique.

- Luminaire autonome et source centrale (faible consommation d'énergie, durée de vie d'environ 80.000 heures)
- Fonction permanent et non permanent
- Montage mural ou encastré
- Autres dimensions disponibles : Straitbox S300, Straitbox 500
- Autotest inclus
- 5 ans de garantie sur les luminaires de secours à LED Lumatec*

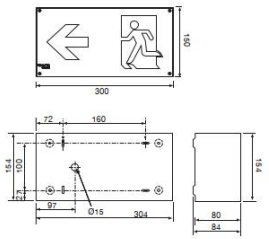
Options :
- Système de surveillance Lumabus pour les luminaires de secours autonome
- Réduction de luminosité pour les salles de spectacle (Autotest désactivé)

*Hors batterie - se reporter aux CGV

IP40 IK07 2.275 kg

Conformes aux directives : 2004/108/CE, 2006/95/CE, 2009/125/CE, 2011/65/EU

DIMENSIONS (mm)



CARACTÉRISTIQUES TECHNIQUES

Distance de visibilité :	30 m AEAI / 30 m EN
Boîtier :	Métal laqué époxy, RAL 9016
Indice de protection :	IP 40, IK 07
Classe d'isolation :	I
Source lumineuse :	LED 300 lm
Plage de fonctionnement :	0°C à + 40°C

Luminaire autonome

Tension d'entrée :	230V AC 50-60Hz ±10%
Autonomie :	1 h
Batterie :	NiMH 7,2 V / 1,25 Ah
Consommation :	5 W (Non permanent : 1 W)
EBLF :	77%
Autotest :	Oui
Poids :	2 275 g

Luminaire source centrale

Tension d'entrée :	230V AC 50-60Hz ±10%
Tension d'entrée :	176-264V DC
Consommation AC :	3 W
Consommation DC :	3,5 W
EBLF :	100%
Poids :	2 195 g

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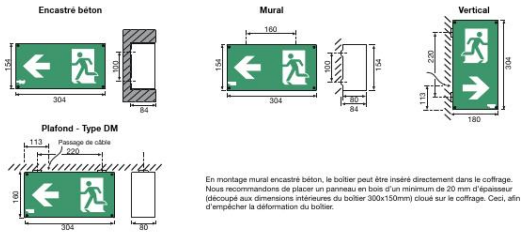
Emergency Markup Lighting

LUMATEC
Lighting beyond technology

MONTAGES



En montage mural encastré béton, le boîtier peut être inséré directement dans le coffrage. Nous recommandons de placer un panneau en bois d'un minimum de 20 mm d'épaisseur (découpé aux dimensions intérieures du boîtier 300x150mm) cloué sur le coffrage. Ceci, afin d'empêcher la déformation du boîtier.

PICTOGRAMMES

Type	Article
A8 200.22/1	191A580
A8 200.26/1	191A581
A8 200.30/1	191A582
A8 200.50/1	191-A00

Type	Article
A8 200.38D/1	191A583
A8 200.37D/1	191A584
A8 200.38G/1	191A585
A8 200.37G/1	191A586

Choix du pictogramme à préciser à la commande

RÉFÉRENCES PRODUITS

Luminaire autonome

Type	Article	Autotest	Autonomie	Télécommande	Montage
A8 L3RW1/1-TA-WM/EB	601A080	Oui	1h		Mural / Encastré béton
A8 L3RW1/1-TA-WM/EB-F	601-412	Oui	1h	Oui	Mural / Encastré béton
A8 L3RW1/1-TA-DM	601-072	Oui	1h		Plafond simple face
A8 L3RW1/1-TA-DM-F	601-0721	Oui	1h	Oui	Plafond simple face
A8 L3RW1/1-TA-DM2	601-081	Oui	1h		Plafond double face
A8 L3RW1/1-TA-DM3-F	601-0811	Oui	1h	Oui	Plafond double face
Option : Surveillance Lumabus					

Luminaire source centrale

Type	Article	Montage
A8 L3U220/1-WM/EB	601-141	Mural / Encastré béton
A8 L3U220/1-DM	601-088	Plafond simple face
A8 L3U220/1-DM2	601-089	Plafond double face

Accessoires

Type	Article	
A8 400.15/1	191A573	Plexi neutre, 300x150mm
A8 L3RW1/1-TA-E	601A104	Intérieur pour luminaire autonome
LL 7212-B00	142-270	Batterie NiMH 7,2V 1,25Ah
A8 L3U220/1-E	601-131	Intérieur pour luminaire batterie centralisée
A8 100.15/1-LED	165D063	Boîtier pour montage encastré, béton ou apparent, avec pattes de fixation
A8 100.12/1	650-0004	Grille de protection A8/1

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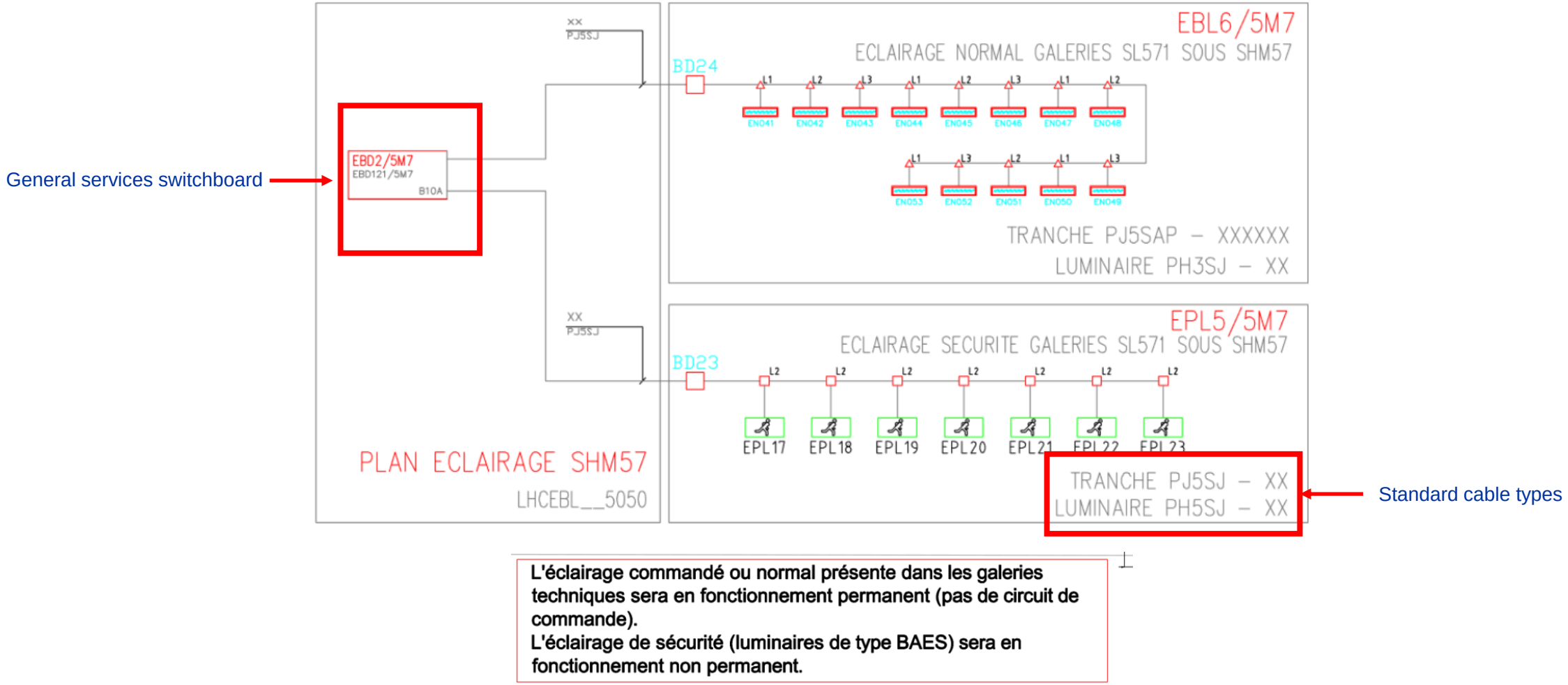
v7.10.24

Emergency Markup Lighting

TECHNICAL DETAILS ON THE INSTALATIONS 2/3

This solution is already installed for HL-LHC in P1 and P5.
The same will be applied for NA-CONS.

Power supply and cabling:



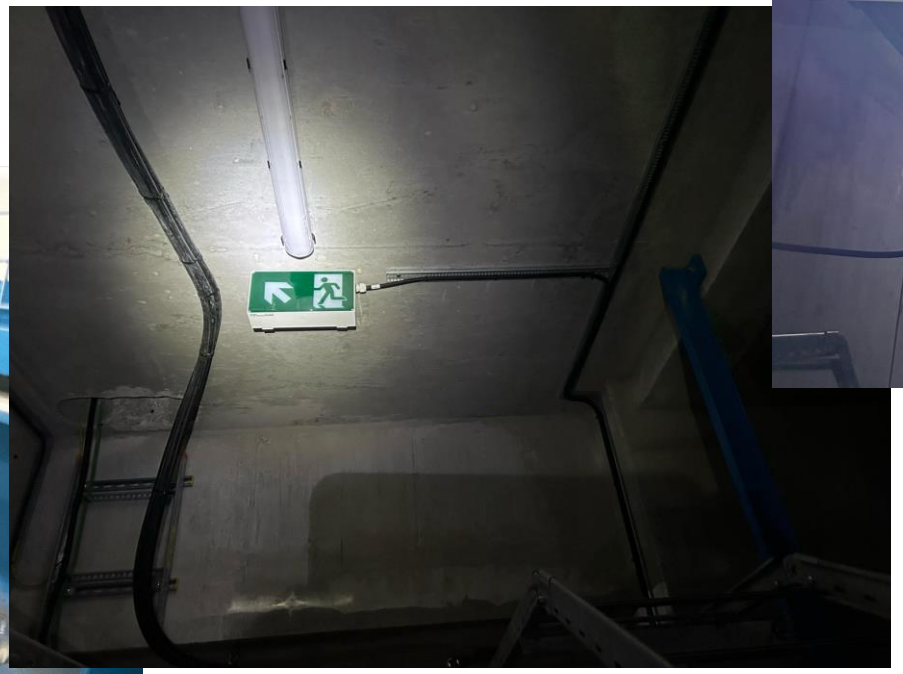
L'éclairage commandé ou normal présente dans les galeries techniques sera en fonctionnement permanent (pas de circuit de commande).
L'éclairage de sécurité (luminaires de type BAES) sera en fonctionnement non permanent.

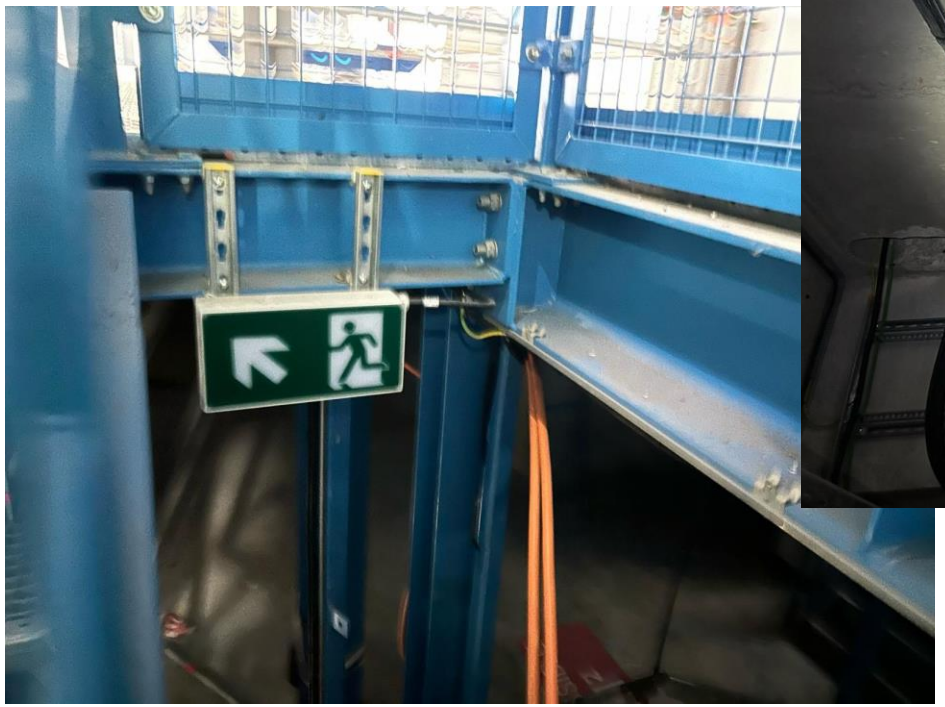
From EDMS 2600972: SL571 Tech. Gallaries (South) - EN-EL Safety lighting

TECHNICAL DETAILS ON THE INSTALATIONS 3/3

This solution is already installed for HL-LHC in P1 and P5.
The same will be applied for NA-CONS.

Pictures of HL-LHC installation





Location guidelines

Feedback received from L. Contini via email based on EDMS documents (2811267 & 2601370) was the following:

We saw in EDMS 2811267 §2.6 that the distance between the emergency lights is not defined yet. The requirements are provided in the “Arrêté du 14 décembre 2011” (reference used by notified body inspectors), as well as in the Safety Guideline EL-0-0-1 (which inspired to this particular Arrêté). As it was done for HL-LHC (EDMS 2601370), evacuation signs shall be installed:

- **every 15 m**
- **above every exit**
- **above obstacles**
- **at every change in direction.**

In addition, emergency lights location should be aligned with Emergency Call Points.

Technical Galleries Emergency Call System Progress Report

HSE TMB 5th April 2023

E. Sanchez-Corral, H. Nissen, J. Ramos
EDMS 2823833

TGs Overall Cost Estimate Framework

1. **HSE SRFs (EDMS 2219600, 2794867)**
   - Functional requirements and prescriptions for call points positioning
2. **TG-CONS master table (EDMS 2740751)**
   - Number of TGs (82), TG lengths (total 14 km) -> Call points estimate (200) applying HSE rules (1)
3. **URD ECS TGs Meyrin West Area (EDMS 2780563)**
   - Proposal for pilot installations TG835 and TG825 and general layout
4. **Technical solution proposed (evaluated in TP)**
   - Architecture components, cabling layout and assumptions on number of CPs per bus (in TGs, ~5 CPs/line) and number of TCP/IP converters.
5. **Realization Strategy and Provisional Schedule**
   - **Prior to LS3, as soon as possible to make system available during TG-CONS works to protect personnel**

TGs Meyrin West Area Layout

- Total CPs: 30. Pilot installations TG825 and 835 (10 CPs).
- Considering proposed technical solution (1) : 3 TCP/IP connection cabinets could cover the whole area

1 - Design & Test Platform System V&V → 2- Pilot Installations TG825 & 825 *(10 CPs)* → 3- I&C in all TGs *(175 CPs)*

Validation for Pilot installations — Validation for series production and I&C all TGs

3-4Q2023 — 4Q2023 — 2024-2026

Conclusions and Action Plan

- **Implementation strategy**
  - System deployment prior to LS3 proposed

-> ECS available as soon as possible to protect personnel during TG-CONS works!

  - More efficient and cheaper than deployment in each TG integrated within general TG-CONS planning over 10-15 years
  - Feasibility being studied with TG-CONS and services providers (i.e., integration offices, EN-EL, IT-CS)
  - Budget allocation according to spending profile determined by delivery schedule
- **1st overall cost estimate Emergency Call System for Technical Galleries**
  - Based on proposed technical solution and TGs Master Table: 14 km of galleries (82), 200 call points

	Scope	Cost KCHF	Resources EN-AA	Budget
Project 2S2023-2026	Supply of system equipment and technical support, cabling and TCP/IP, connections, installation and commissioning	800 KCHF + 20 % contingency -> 966 KCHF	0.5 FTE Not all covered today	TG-CONS Project
Operation & Maintenance > 2024	Annually: 2 x 0.5 FTE (FSU or S295) + 10 KCHF annual system upgrades & support to operation by Supplier	~25 KCHF/year New budget line required	0.1 FTE EN-AA-AS	TG-CONS Project

- **Feasibility Study report to be finalised**

-> TGs Emergency Call System Approval by HSE, EN Management & TG-CONS -> Budget to be allocated by TG-CONS -> Launch project

- **Price inquiry for the supply of TGs Emergency Call System equipment**

Location guidelines

The summarized HSE functional requirements are as follows:

1. **An emergency call system shall be present every 200m. If possible, recommended maximal distance is 150m.**
2. It must be suitable for operating in the wide range of environmental conditions that are present on CERN premises (underground, radioactive areas2 , etc.) and their functionality must be guaranteed under all operating conditions (humidity, temperature, noise, etc.).
3. The system shall alert the CERN Fire and Rescue Service via level 3 alarm by CSAM (according to IS37).
4. It must have the capability to deliver reliable two-way communications.
5. It must be able to operate in the event of a power failure for a given duration compatible with the premises' emergency concept.
6. It shall provide an unambiguous geo-location and tracking of the triggered device.
7. **One call point per fire compartment.**
8. **One call point should be foreseen in gallery crossings.**
9. **Particular configurations: call point should be installed near normally closed emergency exits (i.e., vertical hatches) located at dead ends (to avoid cul-desac situation).**
10. **At maximum 50m from the main entrance of the gallery.**

URD ECS TGs Meyrin West Area (EDMS 2780563)