

# TE-CRG Group Contribution to ATS Consolidation Day

Marco Pezzetti, ACC-CONS group coordinator for TE-CRG

ATS Cons Day 2024

25<sup>th</sup> October 2024

# LHC Cryo **CONS**olidations for maximum operation availability (with EoL principles)

LS1



LS2



LS3

Cryo Learning steep learning curve  
CERN standard application on **nonconformity**.  
**R2E immunity**.

CERN standard application on nonconformity.  
**EoL principles and proto (QSCA)**.

**EoL System consolidations.**

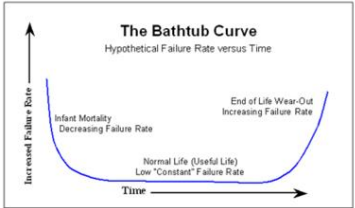
TE-CRG-IC section “Technical STANDARD” used in the consolidations are oriented to a smooth fault diagnostic and:  
-Maximum “safety” (of people)  
-Maximum “protection” (of the equipment).  
-High cryogenic availability.

And.....  
-Reduce the number of **components**,  
-Optimise the **maintenance frequency**,  
-Improve the **flexibility** during operation.

### Electrical system lifetime expectation.

By the first HL-HLC beam, most of the equipment of the ex-LEP cryo-plants would have passed EoL.

Typical lifetime	[y]
Cables	30-40
Plastic electricity	25-30
Instrumentations	20-25
Protections	20-25
Control PLC – IO	15-20



- Obsolescence – EoL replacement strategy in progress...;
- Degradation (cabling – electrical equipment);
- Safety (Local PLC, test de rotation, SIL1 push button);

- Priority :
- P4
  - P6
  - P8
  - P2\*

Consolidation upgrade is an evolving process all along the LHC accelerator lifetime ...

EDMS-1888489 “Cryo control LifeTime”  
Control PLC “EoL” = 15/20y  
Electrical cabinet “EoL” = 25y

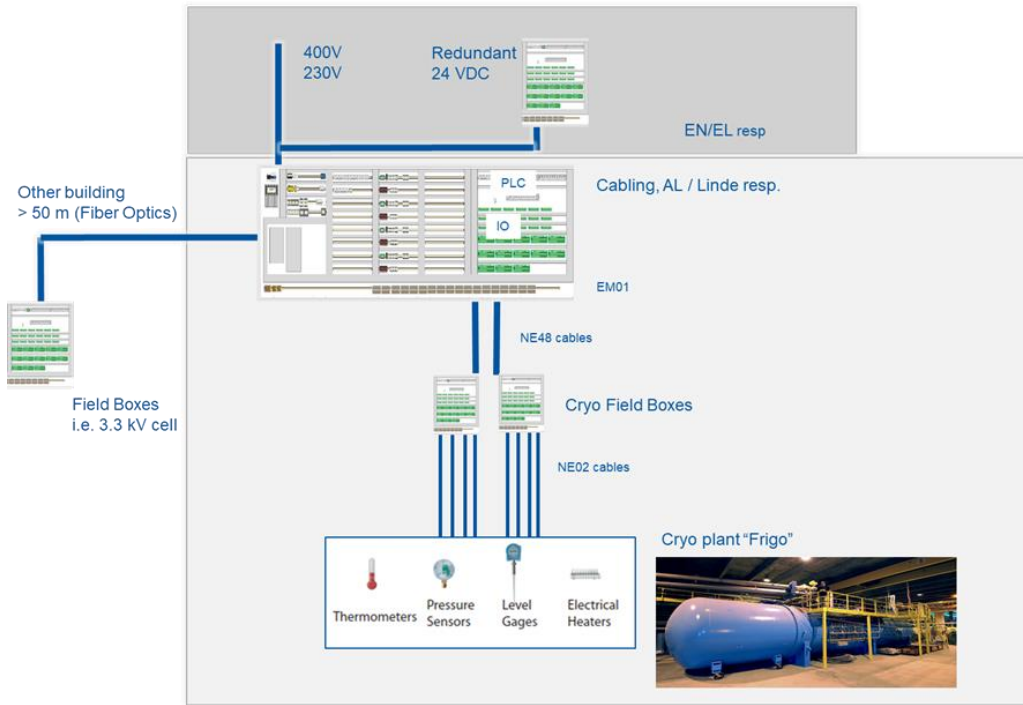
# TE-CRG Approved requests with budget allocations

Project	EDMS BC	WU description	2024 kCHF	2025 kCHF	2026 kCHF	2027 kCHF	2028 kCHF	2029 kCHF	TOTAL	Comment*
LHC CONS	99517	99517 - 3.3 kV electrical motors consolidation	56	-	-	-			56	Monitoring
LHC CONS	2447981 99518	Consolidation LHC ex-LEP cryoplants electrical cabinets	319	400	200	148			1302	In progress
LHC CONS	2767424 99522	LHC Cold Compressor AMB electronics (P18-2/6)	<del>298</del> 90	<del>150</del> 250	<del>50</del> 100	<del>0</del> 50			500	Reprofile
LHC SPARES	2749574 99521	LHC multicomponent gas analyzers	<del>120</del> 80	<del>80</del> 120	80				280	Reprofile

-Consolidation LHC ex-LEP cryoplants electrical cabinets - Detailed design prototype and material order is on-going. Electrical cabinet construction series with industry contract(2024/2025/2026). Project linked with BE-ICS PLC IO upgrade. P8 - LHCb upgrade radiation constraints considered into the underground cryoplants electrical cabinet design (possible new location).

-LHC Cold Compressor AMB electronics (P18-2/6) -“1.8K cryoplants cold compressor Active Magnetic Bearing electronics”. Technical meeting in progress identification of the prototype. First order prototype test validation in 2025 due to delay of prototype arrival. Reprofile for 2025-2026-2027.

-LHC multicomponent gas analyzers - DAI sent in May 2023 for 3 Linde Analysers 31.05.2023 (124,856.00 CHF). Linde was struggling to deliver the components, nowadays is seems resolved. End of the year arrival foreseen. In 2025 no problems announced by the firm.



Job Worksheet 215258

General Summary Notes Data Quality History

Status: "Overbudget"

WBS\* Holder\* Start Date\* Finish Date\* Comments

AC - Consolidation of the LHC ex-LEP cryoplants electrical cabinet - P1 FSR-PRJ R. Siben 01-Jan-2022 31-Dec-2027

PERSONNEL RESOURCES

ASSOCIATED PERSONNEL RESOURCES

Account*	Description*	IC	RBC	Org Unit	Amount*	Currency*	Start	Finish	Comments
00000	Consolidation of the LHC ex-LEP cryoplants electrical cabinets	99518			0	CHF	01-Jan-2022	31-Dec-2022	charged 2022
00000	Consolidation of the LHC ex-LEP cryoplants electrical cabinets	99518			185,000	CHF	01-Jan-2023	31-Dec-2023	charged 2023
00000	Consolidation of the LHC ex-LEP cryoplants electrical cabinets	99518			369,000	CHF	01-Jan-2024	31-Dec-2024	
CONTRB	Budget to 99517 (5th motor)	99518			-50,000	CHF	01-Jan-2024	31-Dec-2024	
00000	Consolidation of the LHC ex-LEP cryoplants electrical cabinets	99518			490,000	CHF	01-Jan-2025	31-Dec-2025	
00000	Consolidation of the LHC ex-LEP cryoplants electrical cabinets	99518			290,000	CHF	01-Jan-2026	31-Dec-2026	verifie 2026-2027
00000	Consolidation of the LHC ex-LEP cryoplants electrical cabinets	99518			148,000	CHF	01-Jan-2027	31-Dec-2027	28 of 2022 job of 2023

DELIVERABLES

EXTERNAL LINKS

LHC		Elec Cabinet	Cable	I/O	PLC
Refrigerator	LS2	Ex LEP warm compressors	LS2	LS3	Run2 (PLC Premium crisis)
	LS3	Ex LEP Refrigerator	LS3	LS3	
Tunnel	LS3	RE - UJ	LS3	LS3	LS3

TE-CRG Request change to "priority 1" in 2025

**Budget Code Breakdown:**

Budget Code	Charged to Budget Code (CHF)	Annual Commitment (CHF)	Annual Open Commitment (CHF)	Payment Budget (CHF)	Pipeline (CHF)	Commitments incl. Pipeline (CHF)	Balance (Including Pipeline) (CHF)	Balance (Excluding Pipeline) (CHF)	Percentage Budget Used (Including Pipeline)
99518	219,857.12	289,236.19	69,379.07	319,000.00	16,773.00	306,009.19	12,990.81	29,763.81	95.93
<b>Grand Total:</b>	<b>219,857.12</b>	<b>289,236.19</b>	<b>69,379.07</b>	<b>319,000.00</b>	<b>16,773.00</b>	<b>306,009.19</b>	<b>12,990.81</b>	<b>29,763.81</b>	<b>95.93</b>

CET on 14/10/2024 extraction

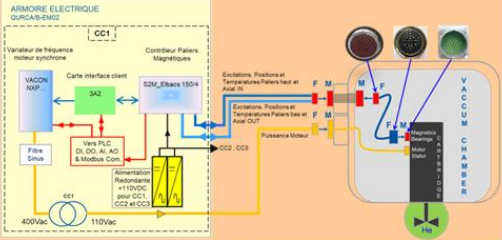
Design finished & prototype in construction at CERN.  
EN/EL blanket contract (OSMOS – Spain) will be used for series production.

**S2M AMB Electronic**  
**ACHILLE new controller identified**





**Technical Validation**

**TE-CRG-IC (B110)**  
**LABO Cold Compressor**  
**"Heavy, detailed and long test protocol"**



**(1) P6\_a (proto)**

Edit Workunit 225382

General Summary Notes Data Quality History

Status\*Description\* WBS\* Holder\* me Start Date\* Finish Date\* Comments

AC	LHC Cold Compressor AMB electronics (P18-2/6) - P1	LCI-CONS	R. Billen	01-Jan-2022	31-Dec-2026	EDMS 2767424
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PERSONNEL RESOURCES

ASSOCIATED PERSONNEL RESOURCES

MATERIAL RESOURCES

Account*	Description*	BC	RBC	Org Unit	Amount*	Currency*	Start	Finish	Comments
GOODS	LHC Cold Compressor AMB electronics (P18-2/6)	99522			2,000	CHF	01-Jan-2023	31-Dec-2023	charged
GOODS	LHC Cold Compressor AMB electronics (P18-2/6)	99522			298,000	CHF	01-Jan-2024	31-Dec-2024	-2k CF 2023
GOODS	LHC Cold Compressor AMB electronics (P18-2/6)	99522			150,000	CHF	01-Jan-2025	31-Dec-2025	
GOODS	LHC Cold Compressor AMB electronics (P18-2/6)	99522			50,000	CHF	01-Jan-2026	31-Dec-2026	

DELIVERABLES

EXTERNAL LINKS

390th Finance Committee, 20 March 2024.  
S2M contract in progress.  
Delivery of first unit prototype in November 2024. all the rest units will be delivered in 2025.

**Budget Code Breakdown:**

Budget Code	Charged to	Budget Code (CHF)	Annual Commitment (CHF)	Annual Open Commitment (CHF)	Payment Budget (CHF)	Pipeline (CHF)	Commitments incl. Pipeline (CHF)	Balance (Including Pipeline) (CHF)	Balance (Excluding Pipeline) (CHF)	Percentage Budget Used (Including Pipeline)
99522		23,295.36	87,286.66	63,991.30	298,000.00	12,458.00	99,744.66	198,255.34	210,713.34	33.47
<b>Grand Total:</b>		23,295.36	87,286.66	63,991.30	298,000.00	12,458.00	99,744.66	198,255.34	210,713.34	33.47

CET on 20/08/2024 extraction

TE-CRG drafts & new

# SITUATION & STRATEGY

## AERZEN COMPRESSORS

### In operation

- AERZEN 563aH : 12
- AERZEN 563aM : 8

### In stock

- AERZEN 563 aH : 2
- AERZEN 563 aM : 1

- High failure frequency for aH High Stage compressors
- Running time will be significantly overpassed with the extension of RUN3 (50'000 hrs of runtime will be reached instead of the designed value of 40'000 hrs)

→ Risk of extra failures

#### Purchase of one 563aH spare

- Justification
  - High failure frequency
  - Exceeding running time with the LS3 offset
  - Long repair times in the event of failure (9 months)
  - The purchase of one spare gives :
    - More flexibility for corrective maintenance
    - Rotation for major overhaul possible during YETS for High Stage compressors
- Delivery time : 9 to 12 months
- Cost : 400,000.00 CHF

## STAL S93 COMPRESSORS

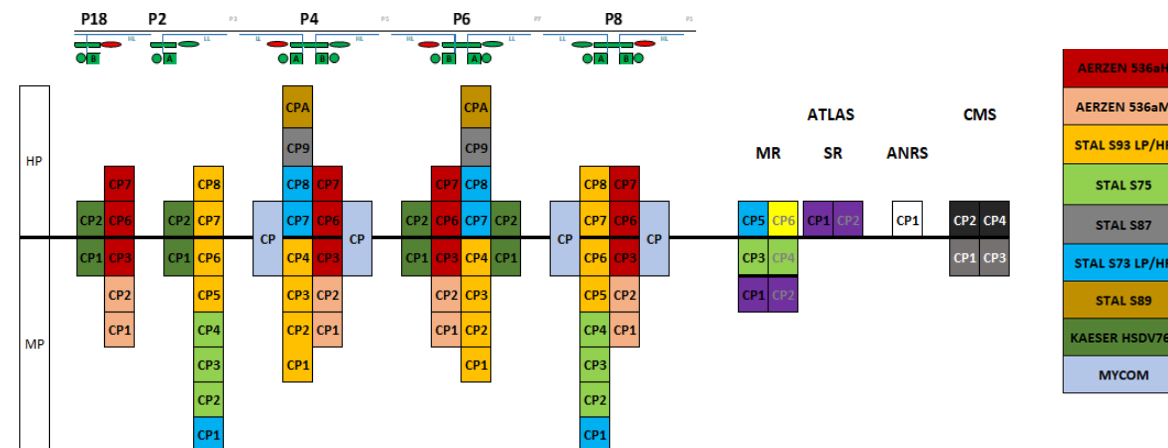
### In operation : 16

### In stock : 1

- Obsolescence of the machine, not built anymore by the supplier STAL

#### Purchase of one S93 spare

- Justification
  - Obsolescence of the machine, not built anymore by the supplier
  - Opportunity with STAL company which can provide us a second-hand refurbished compressor to obtain a new spare unit
- Delivery time : 1 month
- Cost : 250,000.00 CHF



[Criticality Vs Failure rate Vs MTTR = Nr Spares at CERN ]

## MYCOM COMPRESSORS

### In operation : 4

### In stock : 0

- No spare
- Obsolescence of the machine, not built anymore by the supplier MYCOM after 2024

#### Purchase of one spare

- Justification
  - No spare in stock
  - Obsolescence of the machine, not built anymore by the supplier after 2024
  - Opportunity to buy one spare by the end of 2024
- Delivery time : 9 to 12 months
- Cost : 500,000 CHF

LHC long MTTR impact (>6 months!)

LHC maximum capacity impact

# Purchase of warm helium compressor critical spares for LHC cryogenics 1.8K and 4.5K

**Description (EDMS No.3166640):** Considering the current cryogenic needs to operate properly the LHC at its maximum capabilities and minimize the downtime in case of major failure, the additional spare units are mandatory for the luminosity production along the LHC physics program.

**Motivation:** [Criticality Vs Failure rate Vs MTTR = Nr Spares at CERN ] With the high failure rate frequency and exceeding running time in 2026 of AERZEN 563 aH compressors and with the obsolescence STAL and MYCOM compressors (impossibility of obtaining in the future). It is necessary to purchase these spares to meet the current cryogenic needs to operate properly the LHC at its maximum capacity and minimized downtime in case of major failure.

**Priority/consequence of delay:** The addition of new spare units for the equipment will mitigate the risks of stop of operation for several months of the LHC cryogenic system. Without these spare units, some cryogenic plant reconfigurations are necessary in case of failure and the available cryogenic cooling power will be consequently reduced, not allowing the operation of the LHC with nominal beams for extended periods.

New request #	Material [kCHF]	Personnel [kCHF]	Time frame	Priority (1 to 3)
CRG-1	1550	0	2024-2030	1



# SITUATION & STRATEGY

## TURBO-EXPANDER LINDE

- In operation
  - TGL45 : 4
  - TGL32 : 4
- Spare in stock at CERN
  - TGL45 : 0
  - TGK32 : 0
- Location : Caverns UX45 and US85 of LHC

## TURBO-EXPANDER AIR-LIQUIDE C5-500

- In operation : 4
- Spare in stock at CERN : 0
- Location : Caverns US25, PM18 and UX65 of LHC

- 1) Used during the cooldown of the QURC
- 2) In operation from RUN3 (increase the cryogenic cooling power)

→ In case of failure, LHC beams would need to be reduced to lower cryogenic heat loads

**Considering the importance of these turbines on performance of Cryogenic System, the lack of spares in stock and the repair time in case of breakdown (2 to 3 months for LINDE turbines and 4 to 6 months AIR-LIQUIDE turbines), it is crucial to purchase these spares before the start of RUN4**

# Purchase of helium turbo-expander critical spares for LHC cryogenics 1.8K

**Description (EDMS No. 3166645):** Considering the current cryogenic needs to operate properly the LHC, delaying the purchasing these additional spare units could lead to a significant reduction of the luminosity production along the LHC physics program.

**Motivation:** After an analysis of the critical equipment needed to operate the LHC cryogenic system at its maximum capabilities, several cryogenic equipment have been identified to ensure a long-term operation of the LHC by procuring additional spares, including cryogenic helium turbo-expanders.

**Priority/consequence of delay:** Considered turbo-expanders allow to increase the cryogenic cooling power and in case of helium turbo-expander failure, the LHC beams would need to be reduced to lower the cryogenic heat loads.

New request #	Material [kCHF]	Personnel [kCHF]	Time frame	Priority (1 to 3)
CRG-2	500	0	2028-2029	1

# TE-CRG drafts & new

LHC		Elec Cabinet	Cable	I/O	PLC
Refrigerator	LS2	Ex LEP warm compressors	LS2	LS3	Run2 (PLC Premium crisis)
	LS3	Ex LEP Refrigerator	LS3	LS3	
Tunnel	LS3	RE - UJ	LS3	LS3	LS3

Project	EDMS DRAFT	WU description	2025 kCHF	2026 kCHF	2027 kCHF	2028 kCHF	2029 kCHF	2030 kCHF	TOTAL	Comment
LHC CONS	2767421 <b>Priority 1</b>	22084 - Cryo-tunnel PLC's	<del>300</del> 200	300	<del>200</del> 250	50			800	Linked to LHC Frigo control update
LHC CONS	2767432 <b>Priority 1</b>	22084 - LHC Cryo tunnel instrumentation & electronics	<del>200</del> 100	<del>300</del> 200	200	300			800	Cryo LHC tunnel Electronics EoL
LHC SPARES	3166640 <b>Priority 1</b>	Warm helium compressor critical spares	1150					400*	1550	Following «LMC Critical spare review»
LHC SPARES	3166645 <b>Priority 1</b>	Helium turbo-expander critical spares				500			500	Following «LMC Critical spare review»

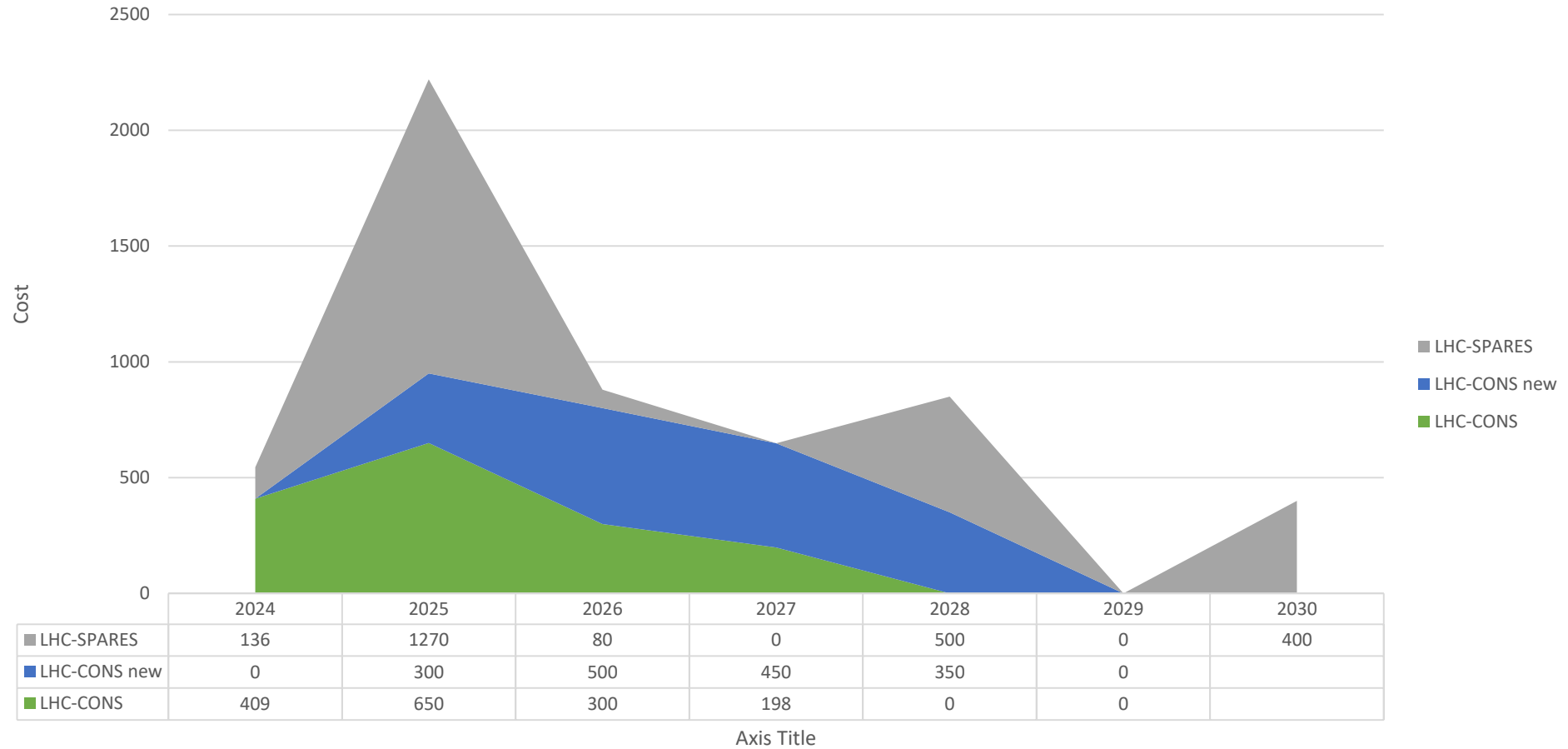
-**Cryo-tunnel PLC's** - Industrial equipment phase-out. After LS3, the cryo-tunnel PLC's and its electrical racks will be 22 years old with the failure rate probability increasing rapidly. PLC CPU & I/O cards are phasing out and will be limited spares after 2026/2027. Prototype already started. Priority change from Draft to Priority 1.

-**LHC Cryo tunnel instrumentation & electronics** - Electronics & instrumentation installed in LHC tunnel environment is closely monitored. Some events occurred but not escalation foreseen in 2024, strategy definition from 2025 forward. Priority change from Draft 2 to Priority 1.

- Following “**LMC Critical spare review**” Meeting (#492) **TE-CRG LHC Critical Spares presentation** identified the need of purchasing three units of Turbo-expanders (LHC cold compressors refrigerators) and several warm helium compressor. Priority 1.

- \*depending on 2026 extended run operation experience !

# TE-CRG proposed spending profile



Spare slides

# QURC Air Liquide AMB electronic

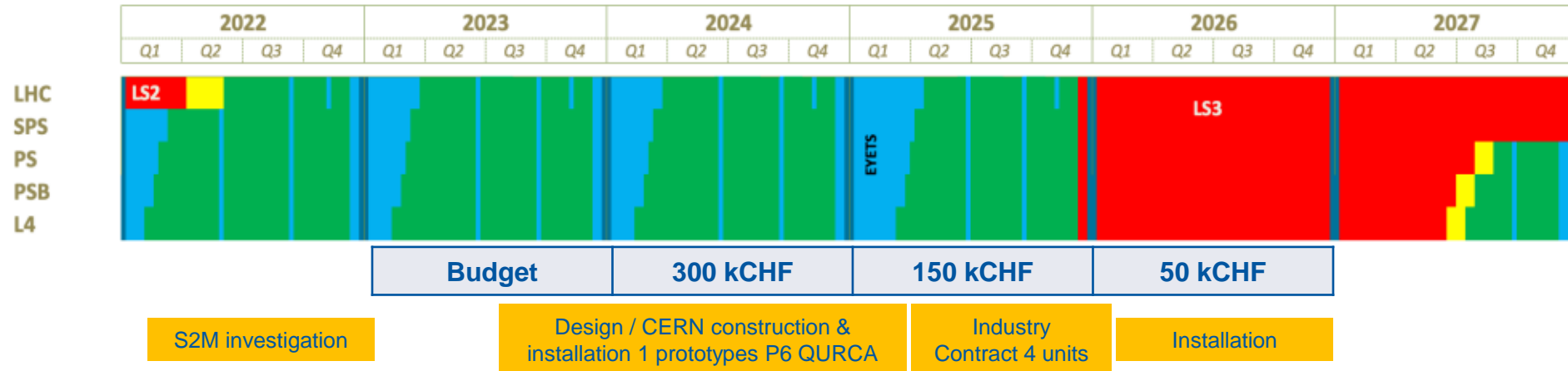
B. Ivens / S. Martin  
M. Pezzetti

**Objective:** New electrical cabinet and AMB electronics refurbishment

	Design	Proto @ CERN	Industry	Installation
Surface QSCC – P18	100%	100%	2025	2026
Surface QSCC – P2			2025	2026
Surface QSCCA – P6			Proto	YETS24/25
Surface QSCCB – P6			2025	2027
Cavern QURC – P18	90%	Readiness review mid November 2024	2025	2026
Cavern QURC – P2				2026
Cavern QURCA – P6			Proto	YETS24/25
Cavern QURCB – P6			2025	2027

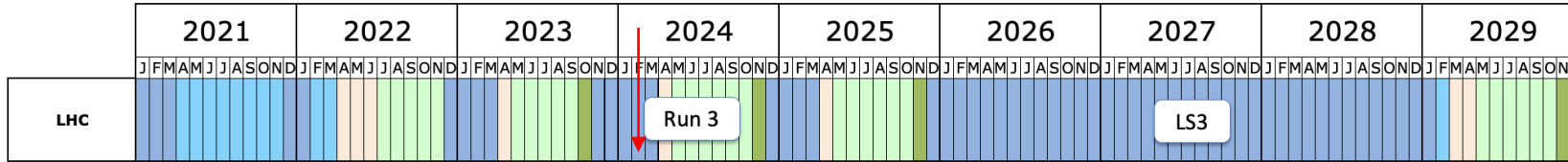
## Impact during LS

- QSCC :  
Inst. 2 weeks per unit  
Commissioning 1week per unit
- QURC  
Installation 8 weeks per unit  
Commissioning 2 weeks per unit  
with 4.5 LHC refrigerator



# QURC "AL" AMB Roadmap

## "ATS-CONS - AMB electronic upgrade QURC Air Liquide"



**S2M AMB Electronic**  
**ACHILLE new controller identified**

**Technical Validation**

**TE-CRG-IC (B110)**  
**LABO Cold Compressor**  
**"Heavy, detailed and long test protocol"**

**(1) P6\_a (proto)**

**VFD**      **AMB**

**(2) Production Elec Assembly**

P18      P2      P6\_b

**(3) Installations LS3**

(3 + 3) units (2024) – (9+3) units (2025) = 18 electronics

C. Hartley- 390th Finance Committee, 20 March 2024 – Approved!

LHC		Elec Cabinet		Cable	I/O	PLC
Refrigerator	LS2	Ex LEP warm compressors	done	LS2	LS3	Run2 (PLC Premium crisis) BE-ICS done
	LS3	Ex LEP Refrigerator	Req. CRG-2	LS3		
Tunnel	LS3	RE - UJ		LS3	LS3	TE-CRG Req. CRG-3

“The LHC cryogenic control system” several component and multi dept responsibility matrix.

### LHC Refrigerator PLC I/O Upgrade

**Objective:** Replacement of all the Schneider Premium I/O card to M580 → ~1100 cards

*S. Martin  
T. Barbé  
BE-ICS*

- Status**
  - Cards purchased by BE-ICS
  - TE-CRG-IC to manage installation + cabling to phoenix bloc → 1200+ blocs
  - Some installation planned for YETS 24/25 (as proto)
  - Requires to update / clean-up / replace / arrange the routing of cable
  - Strategy still to be define for the cable between card and phoenix bloc (new, adapt onsite ...) → **Potential outsourcing**
- Impact during LS**
  - No control system on the impacted plant → Detailed planning per installation to be defined

**Budget** 200 kCHF (from BE-ICS)

TE-CRG –IC LS3 consolidation

### Tunnel PLC + I/Os Upgrade

*B. Ivens  
A. Tovar*

**Objective:**

- Replacement of the all 18 PLCs (PS, CPU, Coupler) of the LHC tunnel
- Replacement and upgrade of the I/Os of sector S67 and S78 including:
  - Profibus Slaves ET200M and ET200S by ET200SP
  - Burket crates conditioners (conditioners and I/O)

**Impact during LS**  
I/Os upgrade : 6 weeks per sector (commissioning included)

**Budget** 800 kCHF (to be validated)

TE-CRG –IC LS3 consolidation



# Tunnel PLC + I/Os Upgrade

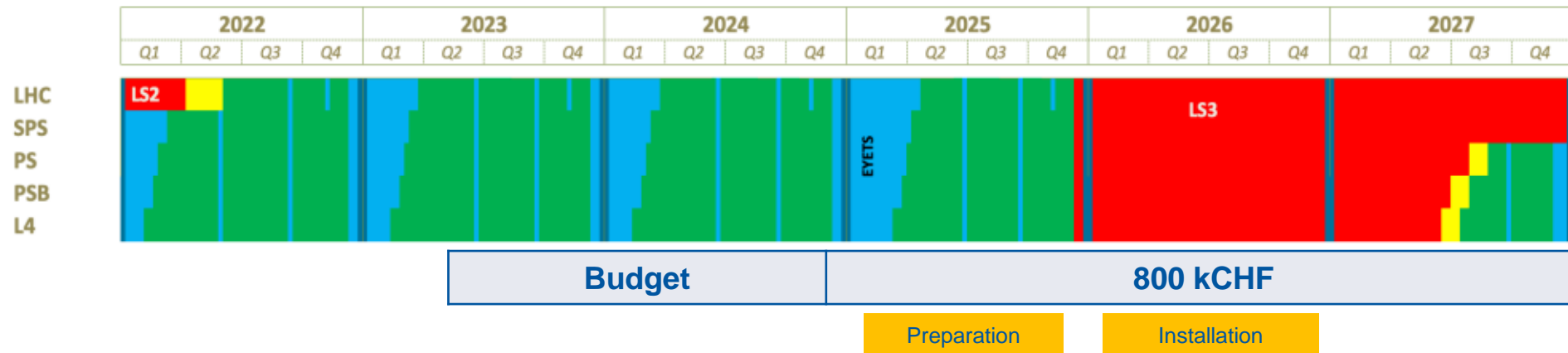
B. Ivens  
A. Tovar

## Objective:

- Replacement of the all 18 PLCs (PS, CPU, Coupler) of the LHC tunnel
- Replacement and upgrade of the I/Os of sector S67 and S78 including:
  - Profibus Slaves ET200M and ET200S by ET200SP
  - Burkert crates conditioners (conditioners and I/O)

## Impact during LS

I/Os upgrade : 6 weeks per sector  
(commissioning included)



# LHC Crate Electronics

LHC  
CONS

2767432  
Draft 2

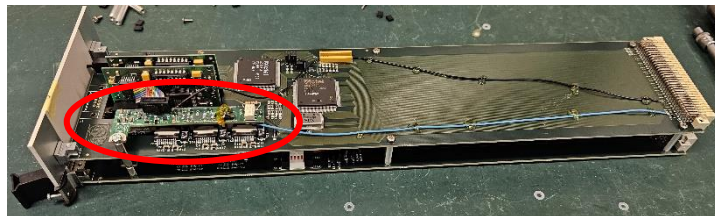
22084 - LHC Cryo tunnel instrumentation & electronics

## Various consolidation on LHC crates Electronics

- Installation of copper wire mesh to ground proximity equipment parts (DFBs, crates)
- Replace the ventilator elements of ventilators trays (EoL)
- Maintain / Upgrade Electronics cards
  - Possible action on spiky TT cards -> Replace ICs.
  - Possible action on EHBS cards (to bring ASIC control signal levels within specs).
  - Possible action on EHBS cards. Individual temperature calibration.
- Upgrade cabling and Cards for CLs type C, X
  - Replace the 298 x HCQYMCY001 with new type of electronics (CLs type C, X)..
  - Replace local cabling of CLs C, X. Preparation of cabling: outsourced.



N. Trikoupis  
B. Ivens



Budget

800 kCHF

→ Work on progress, detail / final list to be updated

Status 2024 - CET																	
Budget Code	Description	Section	Project	Charged to budget	Carry Over	Open Commitment	Payment	Pipeline	C+P	APT 2024	Balance 2024	APT balance	Payments CET %	Payments APT %	CET %	APT%	
99840	VSC Prj: Acc Cons - SPS ion pumps	IVO	SPS-CONS	20.55	0.82	379.18	376	0	379.18	376	-3.18	-3.18	5%	5%	101%	101%	Ok
99717	VSC Prj: Acc Cons - LHC beam vacuum: RF finger	BVO	LHC-CONS	499.81	17.7	559.32	901	110.82	670.14	901	230.86	230.86	55%	55%	74%	74%	Ok
99712	VSC Prj: Acc Cons - LHC Turbo mobile pumping vacuum - P1	IVO	LHC-CONS	13.59	0	24.4	68	0	24.4	68	43.6	43.6	20%	20%	36%	36%	Saving => wait until September
99810	VSC Prj: Acc Cons-Replacement BV mobile pumping groups-arcs	BVO	LHC-CONS	9.77	4.56	142.87	177	0	142.87	177	34.13	34.13	6%	6%	81%	81%	Ok
99844	VSC Prj: Acc Cons -SPS Ring and Transfer Lines Vacuum system	IVO	SPS-CONS	31.66	16.33	121.67	130	0	121.67	130	8.33	8.33	24%	24%	94%	94%	Waiting inputs
99830	VSC Prj: Acc Cons - PS fixed pumping	IVO	PS-CONS	5.26	0	8.1	50	0	8.1	50	41.9	41.9	11%	11%	16%	16%	Ok
99716	VSC Prj: Acc Cons - LHC beam vacuum	BVO	LHC-CONS	0.15	0	4.63	42	4.51	9.14	42	32.86	32.86	0%	0%	22%	22%	Ok
99727	VSC Prj: Acc Cons - LHC Insulation Vacuum	IVO	LHC-CONS	0	4.54	4.54	40	0	4.54	40	35.46	35.46	0%	0%	11%	11%	Ok
99763	VSC Prj: Acc Cons - LHC bake out	BVO	LHC-CONS	17.26	15.91	17.26	110	0.05	17.31	110	92.69	92.69	16%	16%	16%	16%	Ok
99710	VSC Prj: Acc Cons - LHC Spares - Ins. vacuum turbos	IVO	LHC-SPARES	61.55	45.32	190.49	189	0	190.49	189	-1.49	-1.49	33%	33%	101%	101%	Check and reprofile
99776	VSC Prj: Acc Cons - LHC Electron Cloud	BVO	LHC-CONS	26.05	0	26.05	50	29.78	55.83	50	-5.83	-5.83	52%	52%	112%	112%	Reprofile
62722	VSC Prj: Acc Cons - SPS & TD2	IVO	SPS-SPARES	5.24	0	10.99	60	0	10.99	60	49.01	49.01	9%	9%	18%	18%	Reprofile
99741	VSC Prj: Acc Cons - PS	IVO	PS-CONS	2.41	0	2.8	40	0	2.8	40	37.2	37.2	6%	6%	7%	7%	Ok
99824	VSC Prj: Isolde pumps & front-end consolidation	IVO	PS-CONS	0	0	0	30	0	0	30	30	30	0%	0%	0%	0%	Anthony?
99841	VSC Prj: Acc Cons - SPS spares	IVO	SPS-CONS	7.55	0	21.06	58	0.55	21.61	58	36.39	36.39	13%	13%	37%	37%	Ok
99764	VSC Prj: Acc Cons - LHC Beam Vacuum instrumentation	BVO	LHC-CONS	0	0	0	44	0	0	44	44	44	0%	0%	0%	0%	Ok
99842	VSC Prj: SPS cons - Pumping Groups cons - inj & ext zone	IVO	SPS-CONS	2.43	1.65	4.17	7	0	4.17	7	2.83	2.83	35%	35%	60%	60%	Anthony?
				703.28		1517.53	2372	145.71	1663.24		708.76	708.76	30%		70%		
											70%						

**LHC SPARES**      **2749574**  
**99521**

**LHC multicomponent gas analyzers**

idit Workunit 232291

General	Summary	Notes	Data Quality	History	
Status*Description*	WBS*	Holder* me	Start Date*	Finish Date*	Comments
AC   LHC multicomponent gas analyzers - P1	LCI-CONS	R. Billen	01-Jan-2022	31-Dec-2026	EDMS 2749574

MATERIAL RESOURCES	Account*	Description*	BC	RBC	Org Unit	Amount*	Currency* Start	Finish	Comments
+	GOODS	Replacement multicomponent gas analyzers	99521			0	CHF   01-Jan-2023	31-Dec-2023	charged 2023
+	GOODS	Replacement multicomponent gas analyzers	99521			120,000	CHF   01-Jan-2024	31-Dec-2024	40k CF 2023
+	GOODS	Replacement multicomponent gas analyzers	99521			80,000	CHF   01-Jan-2025	31-Dec-2025	
+	GOODS	Replacement multicomponent gas analyzers	99521			80,000	CHF   01-Jan-2026	31-Dec-2026	80k CF 2023

Search Criteria: Category of Accounts **Materiel** and Time Period **This Year + Carry Over** and Budget Code **99521**

Search Criteria:

**Organic Information**

Organic Unit:  ?  
 Budget Code:  ?  
 Project:  ?  
 PPA Unit:  ?  
 Program:  ?  
 Budget Control Unit:  ?  
 Time Period:  ?  
 Pipeline Transactions Only:   
 Budget Code Type:   
 Financial Class:

Category of Accounts:  ?  
 Account(s):  ?  
 Purchase Code:  ?  
 Recurrency:  ?  
 Sub-Program:  ?  
 Funding Source:  ?  
 Pipeline:  ?  
 Bank Billing Number:   
 Experiment:

**Order Criteria**

Order Code:  ?  
 Order Description:  ?  
 Order Status:  ?

Only Accrued Orders:   
 Only Open Orders:   
 Only External Orders:   
 Only Contract Expenditure:

**Transaction Criteria**

Contract:  ?  
 Supplier/Client:  ?  
 Technical Contact:  ?  
 Document Number:  ?

Parent Agreement:  ?  
 Country:  ?  
 Currency:   
 Salary Position:  ?

**Monetary Filters**

**Custom Query Input**

Output Format:  Hide form:   
 Show Borders:

Store Report Columns Ordering Reset Retrieve

Query Returned No Results

Runtime: 0

Acknowledgement receipt of order limited to 2 units by Linde not yet delivered. Disruption of electronic and instrumentation parts.. **Investigation for back up plan ongoing...**



Fig 1. Example of multi-component gas analysers for helium from Sulzer/Linde and LDetek

Description	Root	P18	P2	P4	P6	P8
Compressor station "A" (Ex-LEP)	QSCA	N/A	QT03	QT03	QT02	QT03
Cold Box "A" (Ex-LEP)	QSKA	N/A	QT02	QT02	QT02	QT02
Compressor station "B"	QSCB	N/A	QT02	QT02	QT02	QT02
Cold Box "B"	QSRB	QT02	N/A	QT02	QT02	QT02
Compressor station for 1.8K "A"	QSCCA	N/A	8QT319	QT03	QT02	QT02
Compressor station for 1.8K "B"	QSCCB	QT02	N/A	QT02	QT02	QT02

Status	Linde Type	Qty	Estimated asset replacement value
<b>Out of Order</b>	-	1	40,000 CHF
<b>Not supported, Obsolete</b>	Type I	5	200,000 CHF
<b>Supported except electronic and sensors</b>	Type II	10	400,000 CHF
<b>Fully supported</b>	Type III	8	320,000 CHF

# Ex-LEP electrical cabinet refurbishment

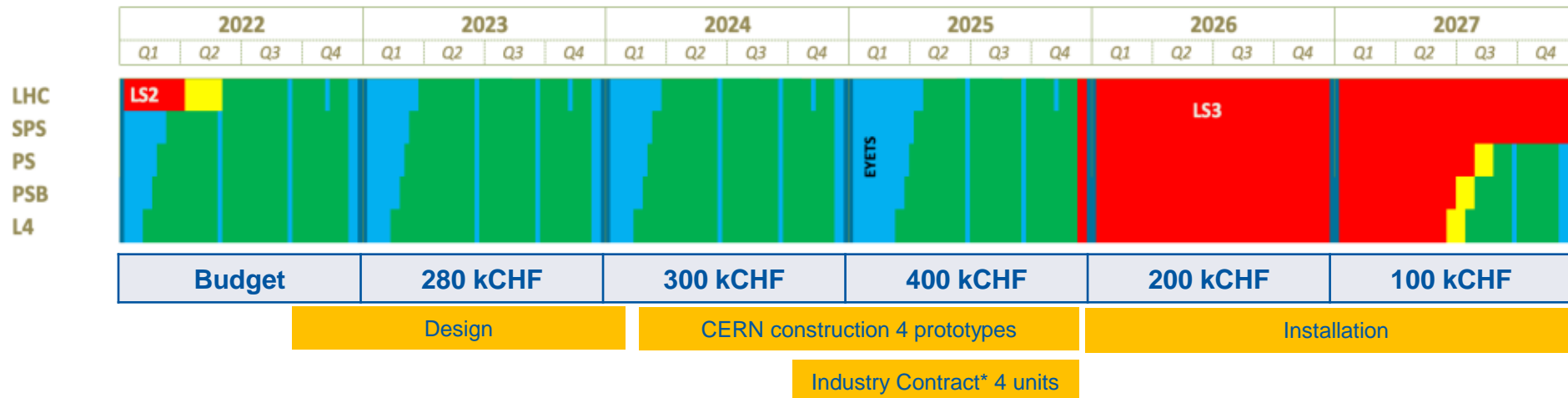
S. Martin  
T. Barbé

**Objective:** Upgrade of the electrical cabinet QSRA / QURA

	Design	Proto @ CERN	Industry	Installation
Surface QSRA AL – P2	40%	2025	2025	2026
Surface QSRA AL – P8				2026
Surface QSRA Linde – P4	90%	20%	2025	2026
Surface QSRA Linde – P6				2026
Cavern QURA AL – P2	70%	2025	2025	2027
Cavern QURA AL – P8				2027
Cavern QURA Linde – P4	85%	2024	2025	2026
Cavern QURA Linde – P6				2026

## Impact during LS

Installation 8 weeks per unit  
Commissioning 2 weeks per unit



**From:** Ronny Billen <Ronny.Billen@cern.ch>  
**Sent:** Friday, August 2, 2024 5:22 PM  
**To:** ACC-CONS (Accelerator consolidation - group representatives) <ACC-CONS@cern.ch>  
**Cc:** ACC-CONS-review-committee (Accelerators consolidation requests review committee) <ACC-CONS-review-committee@cern.ch>; Alessia Valenza <alessia.valenza@cern.ch>  
**Subject:** ACC-CONS Day 25-Oct-2024 - Preparation & Timeline

**Importance:** High

Dear colleagues,  
 While you have surely marked the ACC-CONS Accelerator Consolidation Day of **25 October 2024** in your agenda, hereby some information on the *preparation* of the Day. As usual, a brief overview of the *status and progress* of your ongoing, budgeted activities should be presented, as well as a summary of the *critical spares*. However, the *budget re-profiling* can be submitted to me at any time in *Excel format, prior to the Consolidation Day*. This allows us to have already a more accurate overall financial picture. Concerning any *new (high) priority* consolidation requests that should be realized *before or during LS3*, the following timeline is foreseen: The timeline above, with fixed periods for submission and reviewing, should facilitate a more effective interaction during the Consolidation Day, eventually permitting the final arbitration before the year end.

Start	End	Who	What
15-Aug-2024	15-Oct-2024	Group’s Representative	Submit internally checked Consolidation request as “Ready for Approval”
2-Sep-2024	15-Oct-2024	ACC-CONS Office	Start reviewing process: documents will become “Under Approval”
2-Sep-2024	23-Oct-2024	ACC-CONS Reviewers	Review, comment documents “Under Approval”

The process itself is well documented (1), having successfully gone through the 2023 round of requests. For this 2024 round, a new template should be used (2), which has mainly an improved risk assessment table layout. The detailed agenda of the Day is not fixed yet, but I will keep you posted. Do not hesitate to contact me if clarifications are required.

Kind regards,  
 Ronny

- (1) Procedure Consolidation Request: [https://edms.cern.ch/file/2937910/0.3/procedure\\_docx\\_cpdf.pdf](https://edms.cern.ch/file/2937910/0.3/procedure_docx_cpdf.pdf)
- (2) Template Consolidation Request: [https://edms.cern.ch/file/1528260/4/CONSOLIDATION\\_REQUEST\\_\(2024\).dotx](https://edms.cern.ch/file/1528260/4/CONSOLIDATION_REQUEST_(2024).dotx)

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 Ronny BILLEN <mailto:Ronny.Billen@cern.ch>  
 CERN – Beams Department tel : +41 22 767 69 04  
 Accelerator Consolidation DPL/PPO mobile : +41 75 411 44 05  
 CH-1211 Geneva 23, Switzerland <https://acc-cons.web.cern.ch/>  
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# Tunnel PLC + I/Os Upgrade

B. Ivens  
A. Tovar

