

## *Preparation of Cool-Down in Sector 78 RAT* Réunion Avancement Travaux

HARDWARE COMMISSIONING COORDINATION - WEEK 48

5 December 2006 8:30 2889-R-009

Present: B. Bellesia, D.Bozzini, P.Chambouvet, V.Chereyre, M.Coccoli, P.Cruikshank, J.Etheridge, S.Ferher, J.C.Guillaume, F.Millet, B.Perea Solano, M.Pojer, R.Rabehl, R.Saban, R.Schmidt, A.Suraci.

### **Preparation of the Cool-Down in Sector 78**

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AC cabling: -

DC cabling: -

Vacuum: -

Cryogenics: -

DFB Commissioning:

- S.Ferher informed that he and R.Rabehl should apply a coating on the DFBX current leads G10 dishes. This job should be done after an integrity check with 200V to make sure that the leads are properly isolated from ground (D.Bozzini stresses the fact that he has no manpower at this moment to do it). Also, the coating and its curing should be completed before cooling down (the curing requires 1 week, including just two times a 2 hours access to the DFBX).
  - This activity is required if the DFBX will be cooled down (a formal discussion is still in-progress).

Safety:

- D.Bozzini made a presentation (slides attached) to explain the safety measure that will be put in place during the ELQA-TP4B. He also showed the schedule of these tests. Comments not included in the presentation:
  - D.Bozzini: every circuit is grounded and this fact ensure the arc safety during the tests;
  - J.Etheridge: the safety documentation should include the names of the involved people, especially the responsables;
  - R.Saban: the HCC can lend a signalization panel for these tests;
  - J.C.Guillaume informed that the work on DFBs performed by Flohe is likely to be not finished be Wed 6<sup>th</sup> Nov evening; the cable positioning could need some further fine tuning that could be performed early next year; however, J.C.G. will report at tomorrow RAT meeting.

- D.Bozzini: the work on DFBMs need to be completed by Wed 6<sup>th</sup> night, whether work on DFBA need to be completed by Thu 7<sup>th</sup> possibly during the morning (of course, if the Flohe team will work on Thu 7<sup>th</sup> on DFBA, it has to be properly informed of the hazardous activity happening in the nearby DFBMs);
- P.Chambouvet informed that the functional tests on theDFBAO and DFBX Current Leads heating system are ongoing and that this is not compatible with the ELQA-TP4B; the solution will be discussed after the meeting and reported at tomorrow's RAT.

Preparation of Powering Procedure Test (previously called Dry Run):

- B. Bellesia informed that the 60A SCT are ongoing smoothly.

AOB:

- B.Bellesia informed that the Safety and Access cabling activity going on along the arc 78 will maybe finish already today;
- B.Bellesia informed that today the *consignation* of the monorail *guaine* was done at 8am instead that 9am, allowing the Flohe team some extra time to work. This could be done also in the following days, but need to be organized.

## Open Issues

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### AC non-conformity

- 21.11.06 Non-conformity on instrumentation cables (temperature sensors on current leads) (A.Suraci: 3 cables are in repair-Wed.29th)
- 13.11.06 Non-conformity of the crates of cryo instrumentation (inrush current) (A.Suraci: ready next year)
- 13.11.06 Non-conformity of the AC cabling of the crates under the magnets. This concerns ACR, MEL, orbit corrector power converters & VAC.

### DC cabling

- 04.12.06 Access & Safety Cable Installation (full sector) (J-C.Guillaume; end by Dec 7th)
- 30.11.06 Non conformity: 6 temperature sensor cables need repair (D.Bozzini, A.Suraci)
- 25.11.06 Functional test on the leads heaters: DFBAO, DFBMA, DFBMC, DFBXG
- 22.11.06 Pre-connection of 120A cables in LSSR7 (TS/EL)
- 20.11.06 Galvanic insulation installation on all DFBs (AT/MEL)
- 13.11.06 6 kA and 13 kA cables positioning at DFBAO, DFBMA, DFBMC, DFBAN (Flohe)

### Assembly

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### Vacuum

-

## Cryogenics

- 22.11.06 Cryo-valves remote control in CCC by AB/CO
- 22.11.06 Control of quench valve
- 17.11.06 Instrumentation cable HV tests in LSS8L (A.Suraci: 4 cables to be tested)

## DFB Commissioning

- 04.12.06 Re-positioning collars used to fix the WRL to the CLs (all DFBs) (A.Perin-D.Bozzini-F.Millet)
- 29.11.06 Pumping of insulation vacuum for DFBX

## Safety

General remark: written communication in advance to announce operations!!!

- 25.11.06 EIQA-TP4B safety procedure (1900 volts tests!).
- 23.11.06 Wooden structure for UA access restriction (that will allow transport).
- 23.11.06 Water leak on the tunnel concrete wall to be fixed (C33L8).
- 16.11.06 Cool down safety procedure & access conditions

## Preparation of powering test

- 22.11.06 Installation of flexible cables by CV (UA83)
- 16.11.06 Water circulating in UA83 for the Powering Procedure Test: filters need to be checked.

## AOB

- 13.11.06 BPM connection in Q2, Q3, Q4, Q5, Q6, Q7-wk49 (J-C.Guillaume & R.Jones)
- 13.11.06 Quench protection continuity tests and cables assignment LLS7R (DFBMH, DFBAN) and LSS8L (DFBMC, DFBMA and DFBX)

## **Closed Issues**

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EIQA-TP4-A for all DFBs between 7 and 8 (D.Bozzini: next(w48): DFBAO HC module, DFBMA, DFBMC, DFBX))	05.12.06
LHCb ODH System ready	04.12.06
Definition of owner of activity and pumping needs for current leads insulation vacuum (DFBX) (S.Feher, R.J.Rabehl)	04.12.06
DFB instrumentation cables to be connected (A.Suraci)	04.12.06
Functional test on the leads heaters DFBMA	04.12.06
Functional test on the leads heaters DFBMC	04.12.06
Non-conformity of the DC cabling of the orbit corrector power converters	04.12.06
Pretest of 60A converters in sector 78, location C16L8.	30.11.06
EIQA-TP4-A on DFBAN, DFBMH, DFBAO LC module	29.11.06

Pumping of insulation vacuum for all DFBs between 7 and 8 (except DFBX)	29.11.06
Functional test on the leads heaters DFBMH	29.11.06
Functional test on the leads heaters DFBAN	28.11.06
Pumping of current lead insulation vacuum DFBAN	25.11.06
120A and 600A positioning on DFBAN and DFBMH (INEO)	25.11.06
Missing labels on DFBAO instrumentation cables	24.11.06
Adjustment of cable length on DFBAO	24.11.06
Prototype of galvanic insulation to be tested at Point 6	23.11.06
Definition of Safety procedure for Powering Procedure Test (aka Dry Runs)	23.11.06
Leaks on DFBAO gas recovery line in repair/installation of helicoflex	22.11.06
21 leak detectors to be placed all along the arc 78	22.11.06
Connections (made by TS/MME) of 120 A cables to be verified (TS/EL)	22.11.06
600 A cable positioning on DFBAO	22.11.06
Pumping of current lead insulation vacuum DFBMH	21.11.06
Pressurized air supply to valve on WRL	21.11.06
Support on DFBAO WRL	21.11.06
Bellows in Q6-Q7 LSS8L which had been damaged, is now repaired	20.11.06
Valve on the WRL is operational	20.11.06
Leak in arc Q11-8L	20.11.06
Cryogenic valve manipulation on DFBX	20.11.06
Removal of some BLMs in conflict with the pumping groups	17.11.06
120 A Cables connection in DFBAO, DFBMC, DFBMA and DFBX LSS8L	17.11.06
DS7R and DS8L leak test finished	17.11.06
Leak in R7 repaired	17.11.06
Q6-Q7 bake-out completed	17.11.06
Current lead vacuum: man power and pumping groups availability	15.11.06
Hydraulic connection of the current leads	15.11.06
DFBX AT/MEL Transformers installation	14.11.06
WRL connection DFBMH LSS7R	14.11.06
ELQA-TP3 test of the sector 78	14.11.06
Polarity tests of the 600A and 120A cables for DFBAN and DFBMH (LSS7R)	14.11.06
QUI available	10.11.06

Pressure tests of QUI and DFBs safety valves finished	10.11.06
QRL valves available for all sector	09.11.06
QRL valve opening/cabling verification	13.11.06
Interconnections DFBAO, DFBMA and DFBMC.	13.11.06
WRL connection at DFBMC, DFBMA and DFBX	13.11.06
120A cables positioning at DFBAO, DFBMA and DFBMC	13.11.06
Q6-Q11L8 leak test envelope	13.11.06
Interconnections of DFBAN and DFBMH	13.11.06

### **Milestones: Test Schedule**

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Week 45	Interconnections
End week 46 [18.11.06]	Leak Test
End week 47 [24.11.06]	Pressure Test
Week 47-48	EE sensor tests in RR77
Week 48 & 49	Purge and filling
Week 49	Dry Run
Week 49	Short Circuit tests of 60 A
Week 49	Diesel Tests
Week 50	Flushing
Week 50 [15.12.06]	Giga PAQ
Week 51	Cool Down Sector 78



### **Next RAT meeting**

**Tuesday, December 6th 8:30 @ P8 2889-R-009**

Mirco Coccoli

## → ELQA-TP4B

- High voltage qualification at warm of all circuits powered via the DFB's (according to EDMS 90327)
- Safety requirements due to hipot tests
  - No accessibility to any part of the DFB's of the tested subsector
  - No intervention/accessibility to cabling and systems touching live parts, i.e.
    - » Circuit protection (**MP**, **EE**, R. Denz)
    - » Current lead heating system (**CHS**, A. Ballarino)
    - » Cryogenic instrumentation of the leads (**CRYO**, A. Suraci)
    - » Power converters (**PC**, H. Thiesen)
  - Galvanic insulation between current leads and warm cables in place.
  - Warm cables + PC + EE systems grounded
  - All cables and electronic acting as galvanic insulator must be connected

## → Proposal of schedule

### – Three phases

- Thursday 7 December:
  - From 14:00 till 20:00
  - All circuits of DFBMH, DFBMA, DFBMC (two teams in //)
  - Maximum voltage 600V
  - Pressure inside the cold mass: 6 bars, inside DFB: 2.2 bars
- Friday 8 December:
  - From 7:00 till 20:00
  - All circuits of DFBAO, DFBAN (two teams in //)
  - Maximum voltage 1900V
  - Pressure inside the cold mass: 6 bars, inside DFB: 2.2 bars
- Friday 15 December (after flushing)
  - From 14:00 till 20:00
  - 3 x 13 kA circuits form DFBAO (One team)
  - Maximum voltage 1900V
  - Pressure inside the cold mass: 6 bars, inside DFB: 2.2 bars

→ **Preparation of the tests (safety point of view only)**

– **Closure of areas**

- Access to the UA's restricted (in place on both extremities of the UA)
  - Chains;
  - Flashing lights;
  - Panels;
  - One fix supervisor (from ELQA team or HCC);
  
- Access to the DFB's restricted (in place on both extremities of the DFB)
  - Chains;
  - Flashing lights;
  - Panels;
  - Two engineers performing the tests will supervise the area (from ELQA team);
  
- Dcums to be defined



## → Execution of the tests

### – Preparatory works

- Green light form systems owners (all is ok. In particular HV qualification of live cables (CRYO, MP, CHS, EE, PC));
- Signalization of the area;
- Grounding of recognized systems (Warm cables, PC, EE);
- Installation of the measuring system;
- All the activities to be carried out during the preparatory phase are done by the team performing the tests without using steppers;
- No need to key lock the monorail;

## → Execution of the tests

- Conditions to start the tests
  - Pressure inside the cold mass at 6 bars
  - Pressure inside the DFB (helium enclosure) at 2.2 bars
  - Green light form cryogenic
  
- Execution of the tests
  - All circuits excepted the one under test are grounded.
  - The circuit tested will be energized up to 1.9 kV (worst case) by steps of 200V with a ramp rate of 10 V/s (slower case), followed by a steady state period of 30 s.
  - Once the test voltage has been reached the circuits will be kept at a steady state for a period 5 minutes (applicable to the longest circuit) then the circuit is de-energized.

## → Co-activities

- Any co-activity in the concerned sub-sectors can only take place if previously submitted and approved by HCC, ELQA Team and safety team.
  - Concerned groups/teams/ systems
    - Beam loss monitors
    - Warm cabling
    - Installation of control cabling
    - Vacuum pumps installation
    - Bake-out of beam lines
    - Tuning of DFB equipments
    - Alignment activities
    - Transport of systems
    - Transfer of heavy or sizeable elements/systems

## → Phase 1

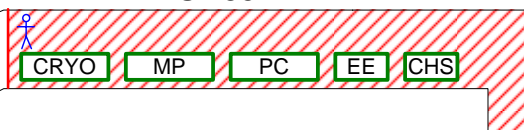
### ELQA-TP4B high Voltage electrical qualification

#### Restricted access

contact D. Bozzini (163817) or V. Chareyre (165285)

From 14:00 to 20:00 on Thursday 7 December

#### UA83



#### RA83



Concerned systems

Blocked areas (barriers, lights, panels)

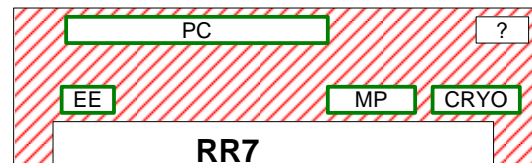
Test operators and survey (3 people)

### ELQA-TP4B high Voltage electrical qualification

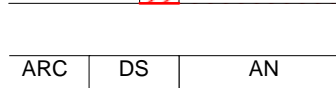
#### Restricted access

contact D. Bozzini (163817) or V. Chareyre (165285)

From 14:00 to 20:00 on Thursday 7 December



#### RR7



Concerned systems

Blocked areas (barriers, lights, panels)

Test operators and survey (3 people)

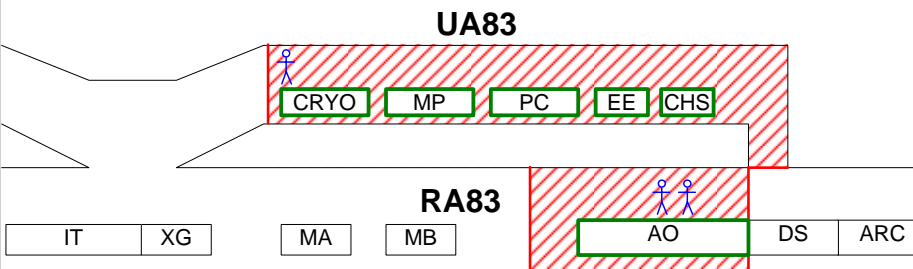
## → Phase 2

### ELQA-TP4B high Voltage electrical qualification

#### Restricted access

contact D. Bozzini (163817) or V. Chareyre (165285)

From 7:00 to 20:00 on Friday 8 December



Concerned systems

Blocked areas (barriers, lights, panels)

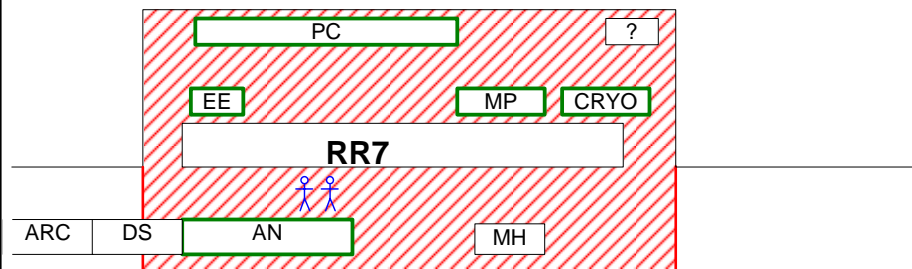
Test operators and survey (3 people)

### ELQA-TP4B high Voltage electrical qualification

#### Restricted access

contact D. Bozzini (163817) or V. Chareyre (165285)

From 7:00 to 20:00 on Friday 8 December

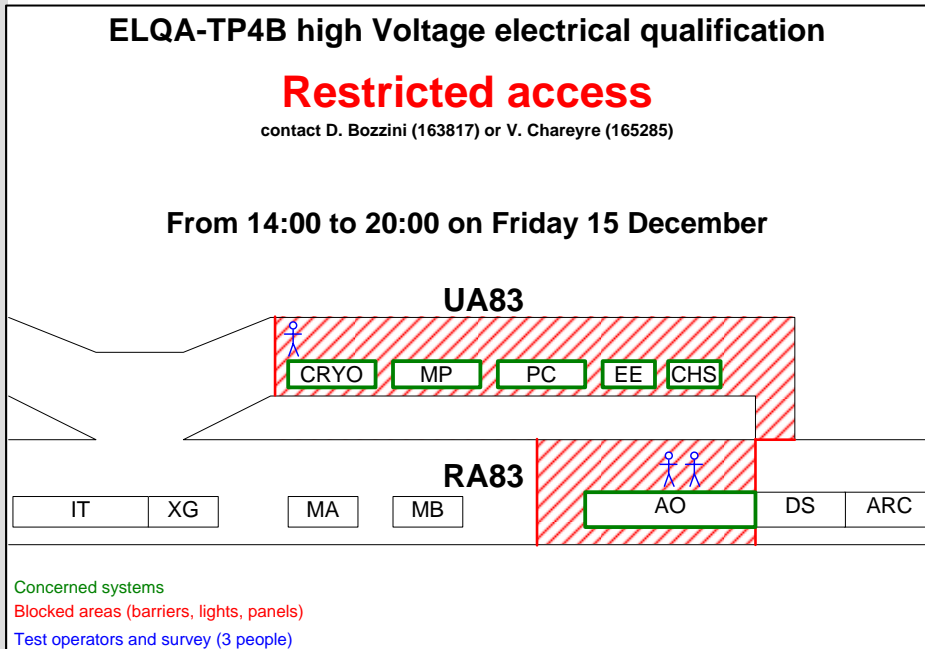


Concerned systems

Blocked areas (barriers, lights, panels)

Test operators and survey (3 people)

## → Phase 3



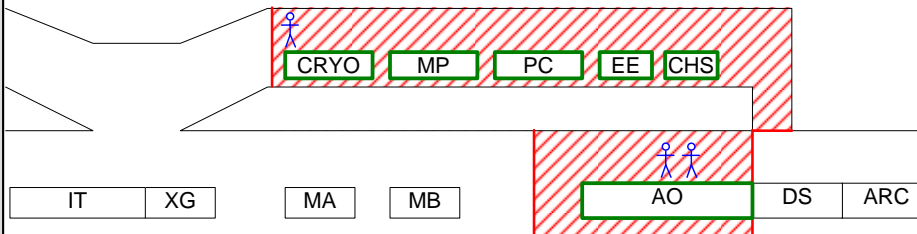
## → Phase 3

### ELQA-TP4B high Voltage electrical qualification

### Restricted access

contact D. Bozzini (163817) or V. Chareyre (165285)

From 14:00 to 20:00 on Friday 15 December



Concerned systems

Blocked areas (barriers, lights, panels)

Test operators and survey (3 people)