

## SECTOR TEST – PREPARATION LAYOUT IN LSS7

J. Uythoven, CERN, Geneva, Switzerland.

### Abstract

The sector test requires the installation of specific equipments in LHC LSS7. The layout after the continuous cryostat in LSS7, to be used during the sector test, is presented. A special emphasis will be given on the installation of the temporary equipment, like the beam dump, additional shielding, radiation monitors and beam instrumentation in this region.

### INTRODUCTION

During the LHC sector test beam will be injected in LHC point 8 and will travel through the various LHC elements up to the temporary beam dump which will be installed to the right of the IP in LHC point 7 [1]. Figure 1 shows the layout in the area of the temporary beam dump for the nominal LHC situation (a) and as it will be used for the sector test (b). The beam will travel through the continuous cryostat right of IP7 and Q6.R7 followed by a temporary vacuum chamber and finally will hit the temporary dump.

### OVERVIEW INSTALLATION LSS7

Figure 1 shows that D4 right of IP7 should not be installed. D3.R7 may be installed, but will not see any beam. It might be easier not to install D3 to avoid possible interference with the temporary shielding of the beam dump. No collimators (TCP, TCHS, TCM and TCG) will be installed right of IP7. Q6 and the DFBM should be installed. Q6 consists of 6 MQTLH magnets, it is not part of the dispersion suppressor which goes up to Q8, and their readiness for the sector test is confirmed.

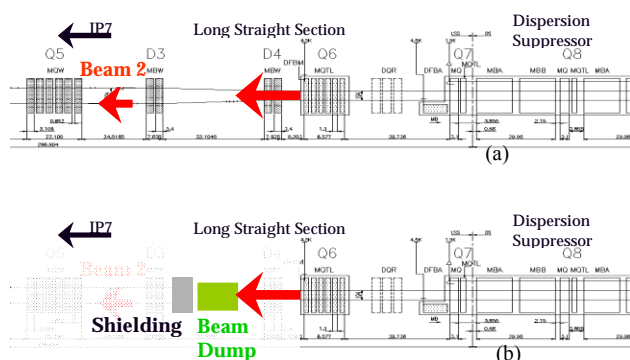


Figure 1: Layout in LSS7 as will be used for nominal LHC operation (a) and during the sector test (b).

### INSTALLATION OF THE BEAM DUMP

The temporary beam dump which will be installed for the sector test in LSS7 is 'borrowed' from TI 2, where it

will be installed at a later date. This avoids the creation of additionally radiated equipment. This beam dump is identical to the one used for the TI 8 beam tests, but will be equipped with a temporary SPS type transport system, to avoid the installation of fixings in the ceiling. Experimental data concerning activation from low intensity proton beams is available for this beam dump [2]. Additional temporary shielding will be placed behind the dump, similar to the one used during the TI 8 beam tests.

The dump will be positioned approximately 29 m to the left of Q6.R7. This position is at a sufficient distance from the QRL return module to avoid mechanical interference and to have a limited effect of induced radiation on this QRL return module, see Figure 2.

The transport and installation of the temporary beam dump and the additional shielding remains to be integrated in the LHC planning. The details of the transport path taken are presently unknown. The time required for transport and installation of the dump and its shielding is estimated to be 2 – 3 days. The details of the mechanical obstruction, once the dump and the shielding are in place, are also outstanding. A total time of about 4 weeks is estimated for installation, operation, radiation cool down and removal.

Remnant radiation will affect the access conditions after the tests [3]. Radiation monitoring will be required.

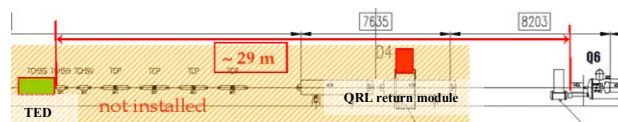


Figure 2: Approximate position of the temporary beam dump and the position of the QRL return module.

### OTHER ADDITIONAL EQUIPMENT

An additional and temporary BCT, approximately half way between the Q6.R7 and the beam dump, is required to measure the intensities dumped on the beam dump.

No additional BLMs will be required as there are already some installed on Q6.R7. Besides the standard BLMs on Q6 the presence of beam will also be indicated by the standard BPMs installed on Q6.R7.

In the nominal LHC layout a BTV is foreseen about 1 m in front of Q6. For this reason no additional BTV is required.

Between Q6 and the beam dump a temporary vacuum tube, consisting of four sections of about 7 m each, is foreseen. This tube will stop about half a meter before the temporary dump, where a standard AITi window will end the vacuum pipe. A CC protection against implosion will be mounted. The VADL installed on the left of Q6

includes an ion pump plus penning and pirani gauges for the part to the left of the sector valve. As a result it will not be necessary to install any additional vacuum equipment or instrumentation on the temporary beam tubes.

### **ACCESS AND VENTILATION**

A temporary access door will be installed in the arc towards point 6, about 800 m from IP7 [4]. Access to part of the sector 6 – 7 will not be possible at least one day before the test (for closing the zone), during the tests with beam and 2 – 3 days following the tests.

The collimation ventilation doors, foreseen to direct the radioactive air produced at the collimators, and the chicanes foreseen around the collimators should not be installed.

### **CONCLUSIONS**

The layout in LSS7 for the sector test will be identical to the nominal situation up to and including Q6.R7. The additional equipment foreseen consists of the temporary beam dump and its shielding, about 29 m away from Q6.R7, a vacuum chamber between Q6 and the beam dump and a temporary BCT in the middle of this vacuum chamber. The transport of the temporary dump, the effect of its installation and radiation issues on the general planning need to be studied in more detail. A detailed layout drawing of LSS7 with the temporary installation will be made in the coming months.

### **ACKNOWLEDGEMENTS**

The contribution of Mike Lamont and the other people involved in the preparations of the sector test are gratefully acknowledged.

### **REFERENCES**

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