

Summary of Collimator Installation and Lists V2

The collimation installation for the 2007 closure of the LHC ring has recently been reduced to a minimal system. In total there are 160 database locations in the LHC for collimators and collimator-like objects. For each location it has been specified what will be the minimum installation before 2007 closure. Reference is the LHC study database as extracted on October 4th, 2006, which has been updated since with requested changes for 12 collimators in IR7.

1 Summary Tables

Table 1 summarizes the overall numbers of various equipments that will be installed as part of the collimation system and for closure of the LHC vacuum. Replacement chambers have been defined by AT/VAC (e-mail C. Rathjen April 14th, 2006):

- Standard replacement chambers in stainless steel refer to type VCDSR of length 1480 mm (coated copper replacement chambers are available in sufficient number).
- Special replacement chambers include chambers for passive absorbers (VCELA: 1500 mm length. VCELB: 400 mm length) and scrapers (VCDSX: 680 mm length) which were ordered in April 2006.

The total need for special replacement chambers could be lower, as longer replacement chambers are used by AT/VAC in some insertions. This requires a detailed check by AT/VAC for every location.

Table 1 Number of various equipment types installed into the 160 locations for the LHC collimation system. Note that transfer line collimators are not included into the LHC ring database and hence are not included here.

	Number
Installed collimators	30
Standard replacement chambers stainless steel	52
Standard replacement chambers copper (coated)	30
Special replacement chambers	26
Collimator DB placeholders (coll. phase 3 ⁱ and 4 ⁱⁱ)	22
Total	160

ⁱ The TCLP's in LSS5L and LSS5R (including their supports) are in conflict with the TOTEM Roman Pots and will only be installed once high luminosity is reached and after de-installation of the Roman pots at these locations.

ⁱⁱ Phase 4 locations are reserved for an ultimate upgrade of the LHC collimation system, if found necessary. No installation of equipment and infrastructure is planned for the foreseeable future.

Table 2 summarizes the overall numbers of various support types to be installed. Even if no collimator is installed, in most cases supports will be installed. It is noted:

- Standard quick-plugin supports (low and high versions) are all installed during the standard LSS installation campaign. There is the exception of the TCLP collimator supports in LSS5L and LSS5R which will not be installed due to space conflict with the Roman pots in IR5. TCLP's in point 5 will only be installed once found necessary (high luminosity) and after de-installation of Roman pots.
- Standard base supports are all installed during the standard LSS installation campaign.
- In case of a missing collimator the installed standard quick-plugin and base supports will be used to support the replacement chamber, if AT/VAC does not choose to adopt a different solution.
- Special supports are NOT installed before the closure of the LHC rings. Individual supports must be provided by AT/VAC for replacement chambers. This excludes the two special supports in IR6 which will be installed together with the collimators in November 2006.
- No supports and no other infrastructure will be installed at the IR7 locations of "phase 4" collimators. It has been announced previously that these locations are only space reservations with no installation. In some locations these space reservations will be used by special vacuum sector valves in order to facilitate collimator maintenance with shorter vacuum sectors in IR7.

In total **84 holders for replacement chambers** are required for collimator supports with replacement chambers. At this time 50 holders are available. The other 34 holders plus a few spares will be procured by the collimation project.

Table 2 Number of various support types to be installed into the 160 locations for the LHC collimation system. Low supports are for IR3, IR5 and IR7. High supports are for IR1, IR2, IR6 and IR8.

	Number
Standard quick-plugin supports (low version)	66
Standard base supports (low version)	30
Standard quick-plugin supports (high version)	14
Special supports	28
No supports (coll. phase 4 ⁱⁱⁱ)	22
Total	160

ⁱⁱⁱ Phase 4 locations are reserved for an ultimate upgrade of the LHC collimation system, if found necessary. No installation of equipment and infrastructure is planned for the foreseeable future.

Collimation Installation Lists and Summary V2

2 Detailed List

FUNCTIONAL POSITION NAME	PHASE START	New Phase	Collimation phase	Plug-in Support standard low	Base support standard low	Plug-in Support standard high	Support special	No infrastructure	Replace ment chamber standard SS	Replace ment chamber standard CU	Replace ment chamber special
TCTVA.4R1.B2	2	2	1	0	0	1	0	0	1	0	0
TCTH.4R1.B2	2	2	1	0	0	1	0	0	1	0	0
TCLP.4R1.B1	2	2	3	0	0	1	0	0	1	0	0
TCL.5R1.B1	2	2	1	0	0	1	0	0	1	0	0
TCTH.4L2.B1	2	2	1	0	0	1	0	0	1	0	0
TCTVB.4L2	2	2	1	0	0	0	1	0	0	0	1
TCDD.4L2	2	2	1	0	0	0	1	0	0	0	1
TCTVB.4R2	2	2	1	0	0	0	1	0	0	0	1
TCLIA.4R2	2	2	1	0	0	0	1	0	0	0	1
TCTH.4R2.B2	2	2	1	0	0	1	0	0	1	0	0
TCLIB.6R2.B1	2	2	1	0	0	1	0	0	1	0	0
TCLIM.6R2	2	2	1	0	0	0	1	0	0	0	1
TCLA.7L3.B2	2	2	1	1	0	0	0	0	1	0	0
TCLA.6L3.B2	2	2	1	1	0	0	0	0	1	0	0
TCP.6L3.B1	1	1	1	1	0	0	0	0	0	0	0
TCHSH.6L3.B1	2	2	1	0	0	0	1	0	0	0	1
TCLAP.6L3.B1	2	2	1	0	0	0	1	0	0	0	1
TCSG.5L3.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.5L3.B1	2	2	2	0	1	0	0	0	0	1	0
TCLA.B5L3.B2	2	2	1	1	0	0	0	0	1	0	0
TCLA.A5L3.B2	2	2	1	1	0	0	0	0	1	0	0
TCSM.B5L3.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.B5L3.B2	1	1	1	1	0	0	0	0	0	0	0
TCSM.A5L3.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.A5L3.B2	1	1	1	1	0	0	0	0	0	0	0
TCSM.4L3.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.4L3.B2	1	1	1	1	0	0	0	0	0	0	0
TCSG.4R3.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.4R3.B1	2	2	2	0	1	0	0	0	0	1	0
TCSG.A5R3.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.A5R3.B1	2	2	2	0	1	0	0	0	0	1	0
TCSG.B5R3.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.B5R3.B1	2	2	2	0	1	0	0	0	0	1	0
TCLA.A5R3.B1	2	2	1	1	0	0	0	0	1	0	0
TCLA.B5R3.B1	2	2	1	1	0	0	0	0	1	0	0
TCSM.5R3.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.5R3.B2	1	1	1	1	0	0	0	0	0	0	0
TCLAP.6R3.B2	2	2	1	0	0	0	1	0	0	0	1
TCHSH.6R3.B2	2	2	1	0	0	0	1	0	0	0	1
TCP.6R3.B2	1	1	1	1	0	0	0	0	0	0	0
TCLA.6R3.B1	2	2	1	1	0	0	0	0	1	0	0
TCLA.7R3.B1	2	2	1	1	0	0	0	0	1	0	0
TCL.5L5.B2	2	2	1	1	0	0	0	0	1	0	0

Collimation Installation Lists and Summary V2

FUNCTIONAL POSITION NAME	PHASE START	New Phase	Collimation phase	Plug-in Support standard low	Base support standard low	Plug-in Support standard high	Support special	No infrastructure	Replace ment chamber standard SS	Replace ment chamber standard CU	Replace ment chamber special
TCLP.4L5.B2	2	2	3	1 ^{iv}	0	0	0	0	1	0	0
TCTH.4L5.B1	2	2	1	1	0	0	0	0	1	0	0
TCTVA.4L5.B1	2	2	1	1	0	0	0	0	1	0	0
TCTVA.4R5.B2	2	2	1	1	0	0	0	0	1	0	0
TCTH.4R5.B2	2	2	1	1	0	0	0	0	1	0	0
TCLP.4R5.B1	2	2	3	1 ^v	0	0	0	0	1	0	0
TCL.5R5.B1	2	2	1	1	0	0	0	0	1	0	0
TCSG.4L6.B2	1	1	1	0	0	0	1	0	0	0	0
TCSG.4R6.B1	1	1	1	0	0	0	1	0	0	0	0
TCLA.B7L7.B2	2	2	1	1	0	0	0	0	1	0	0
TCLA.A7L7.B2	2	2	1	1	0	0	0	0	1	0	0
TCLA.D6L7.B2	2	2	1	1	0	0	0	0	1	0	0
TCLA.C6L7.B2	2	2	1	1	0	0	0	0	1	0	0
TCP.D6L7.B1	1	1	1	1	0	0	0	0	0	0	0
TCP.C6L7.B1	1	1	1	1	0	0	0	0	0	0	0
TCP.B6L7.B1	1	1	1	1	0	0	0	0	0	0	0
TCP.A6L7.B1	2	2	4	0	0	0	0	1	0	0	0
TCHSV.6L7.B1	2	2	1	0	0	0	1	0	0	0	1
TCHSH.6L7.B1	2	2	1	0	0	0	1	0	0	0	1
TCHSS.6L7.B1	2	2	1	0	0	0	1	0	0	0	1
TCLA.B6L7.B2	2	2	1	1	0	0	0	0	1	0	0
TCLAP.6L7.B1	2	2	1	0	0	0	1	0	0	0	1
TCLAQ.6L7.B1	2	2	1	0	0	0	1	0	0	0	1
TCSG.B6L7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.B6L7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSG.A6L7.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.A6L7.B1	2	2	2	0	1	0	0	0	0	1	0
TCLA.A6L7.B2	2	2	1	1	0	0	0	0	1	0	0
TCSM.6L7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.6L7.B2	1	1	1	1	0	0	0	0	0	0	0
TCLAR.6L7.B1	2	2	1	0	0	0	1	0	0	0	1
TCSM.E5L7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.E5L7.B2	1	2	1	1	0	0	0	0	1	0	0
TCSM.D5L7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.D5L7.B2	1	2	1	1	0	0	0	0	1	0	0
TCSM.C5L7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.C5L7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.B5L7.B1	1	2	1	1	0	0	0	0	1	0	0
TCSM.B5L7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSG.A5L7.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.A5L7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSM.B5L7.B2	2	2	2	0	1	0	0	0	0	1	0

^{iv} The plug-in support for **TCLP.4L5.B2** will not be installed for closure of the rings in 2007, as it is in conflict with the TO-TEM Roman Pots. It will only be installed for high luminosity and once the Roman Pot at this location is removed.

^v The plug-in support for **TCLP.4R5.B1** will not be installed for closure of the rings in 2007, as it is in conflict with the TO-TEM Roman Pots. It will only be installed for high luminosity and once the Roman Pot at this location is removed.

Collimation Installation Lists and Summary V2

FUNCTIONAL POSITION NAME	PHASE START	New Phase	Collimation phase	Plug-in Support standard low	Base support standard low	Plug-in Support standard high	Support special	No infrastructure	Replace ment chamber standard SS	Replace ment chamber standard CU	Replace ment chamber special
TCSG.B5L7.B2	1	2	1	1	0	0	0	0	1	0	0
TCSM.A5L7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.A5L7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.D4L7.B1	1	2	1	1	0	0	0	0	1	0	0
TCSM.D4L7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSM.B4L7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.B4L7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.C4L7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.C4L7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.A4L7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.A4L7.B2	1	1	1	1	0	0	0	0	0	0	0
TCSG.B4L7.B1	1	2	1	1	0	0	0	0	1	0	0
TCSM.B4L7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSG.A4L7.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.A4L7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSG.A4R7.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.A4R7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSM.A4R7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.A4R7.B2	1	1	1	1	0	0	0	0	0	0	0
TCSM.B4R7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.B4R7.B2	1	2	1	1	0	0	0	0	1	0	0
TCSM.C4R7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.C4R7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.B4R7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.B4R7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.D4R7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.D4R7.B2	1	2	1	1	0	0	0	0	1	0	0
TCSG.A5R7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.A5R7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSG.B5R7.B1	1	2	1	1	0	0	0	0	1	0	0
TCSM.B5R7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSM.A5R7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.A5R7.B2	1	1	1	1	0	0	0	0	0	0	0
TCSM.B5R7.B2	2	2	2	0	1	0	0	0	0	1	0
TCSG.B5R7.B2	1	2	1	1	0	0	0	0	1	0	0
TCSG.C5R7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSM.C5R7.B1	2	2	4	0	0	0	0	1	0	0	0
TCSG.D5R7.B1	1	2	1	1	0	0	0	0	1	0	0
TCSM.D5R7.B1	2	2	2	0	1	0	0	0	0	1	0
TCSG.E5R7.B1	1	2	1	1	0	0	0	0	1	0	0
TCSM.E5R7.B1	2	2	2	0	1	0	0	0	0	1	0
TCLAR.6R7.B2	2	2	1	0	0	0	1	0	0	0	1
TCSG.6R7.B1	1	1	1	1	0	0	0	0	0	0	0
TCSM.6R7.B1	2	2	2	0	1	0	0	0	0	1	0
TCLA.A6R7.B1	2	2	1	1	0	0	0	0	1	0	0
TCSM.A6R7.B2	2	2	2	0	1	0	0	0	0	1	0

Collimation Installation Lists and Summary V2

FUNCTIONAL POSITION NAME	PHASE START	New Phase	Collimation phase	Plug-in Support standard low	Base support standard low	Plug-in Support standard high	Support special	No infrastructure	Replace chamber standard SS	Replace chamber standard CU	Replace chamber special
TCSG.A6R7.B2	1	1	1	1	0	0	0	0	0	0	0
TCSM.B6R7.B2	2	2	4	0	0	0	0	1	0	0	0
TCSG.B6R7.B2	2	2	4	0	0	0	0	1	0	0	0
TCLAQ.6R7.B2	2	2	1	0	0	0	1	0	0	0	1
TCLAP.6R7.B2	2	2	1	0	0	0	1	0	0	0	1
TCLA.B6R7.B1	2	2	1	1	0	0	0	0	1	0	0
TCHSS.6R7.B2	2	2	1	0	0	0	1	0	0	0	1
TCHSH.6R7.B2	2	2	1	0	0	0	1	0	0	0	1
TCHSV.6R7.B2	2	2	1	0	0	0	1	0	0	0	1
TCP.A6R7.B2	2	2	4	0	0	0	0	1	0	0	0
TCP.B6R7.B2	1	1	1	1	0	0	0	0	0	0	0
TCP.C6R7.B2	1	1	1	1	0	0	0	0	0	0	0
TCP.D6R7.B2	1	1	1	1	0	0	0	0	0	0	0
TCLA.C6R7.B1	2	2	1	1	0	0	0	0	1	0	0
TCLA.D6R7.B1	2	2	1	1	0	0	0	0	1	0	0
TCLA.A7R7.B1	2	2	1	1	0	0	0	0	1	0	0
TCLA.B7R7.B1	2	2	1	1	0	0	0	0	1	0	0
TCLIM.6L8	2	2	1	0	0	0	1	0	0	0	1
TCLIB.6L8.B2	2	2	1	0	0	1	0	0	1	0	0
TCTH.4L8.B1	1	1	1	0	0	1	0	0	0	0	0
TCLIA.4L8	2	2	1	0	0	0	1	0	0	0	1
TCTVB.4L8	2	2	1	0	0	0	1	0	0	0	1
TCDDM.4R8	2	2	1	0	0	0	1	0	0	0	1
TCTVB.4R8	2	2	1	0	0	0	1	0	0	0	1
TCTH.4R8.B2	1	1	1	0	0	1	0	0	0	0	0
TCL.5L1.B2	2	2	1	0	0	1	0	0	1	0	0
TCLP.4L1.B2	2	2	3	0	0	1	0	0	1	0	0
TCTH.4L1.B1	2	2	1	0	0	1	0	0	1	0	0
TCTVA.4L1.B1	2	2	1	0	0	1	0	0	1	0	0