



EDMS NO. 0000000	REV. 0.0	VALIDITY DRAFT
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REFERENCE : NOT REQUIRED

HL – LHC Engineering Change Request

LOW-IMPEDANCE UPGRADE OF THE CONSOLIDATED PRIMARY COLLIMATORS FOR HL-LHC

ECR DESCRIPTION

WP Originator	WP5	Process	Process concerned
Equipment	Code of the equipment concerned	Baseline affected	Cost
Drawing	Drawing/s concerned	Date of Issue	2018-04-19
Document	Document/s concerned	CI responsible	S. Redaelli
WPs Affected		Reference Document	TDR Version 1.0

Detailed Description

This document lists a baseline change for WP5 that was agreed upon at the end of 2017, which does not change the cost to completion of WP5 but only its scope. This change concerns the **contribution from HL-WP5 to the consolidation item “renewal of LHC primary collimators in LS2”**.

Four primary collimators of the betatron cleaning insertion (IR7) will be replaced in LS2 with a new design that adds in-jaw beam positions monitors. The new hardware will also improve the overall efficiency of the LHC by replacing primary collimators – which are necessary for high intensity operation and are highly exposed to radiation – with new ones.

The HL-WP5 will contribute to the acquisition of the active collimator material of the 4 collimators + 1 spare that will be built in 2018-2020 for the installation in LS2, with a total amount of **300 kCHF**. This contribution will be used to procure the molybdenum-graphite (MoGr) material that improves by about a factor 5 the electrical resistivity of the carbon-fibre composite used for the present primary collimators. This upgrade will reduce by about a factor 2 the single collimator impedance of the primary collimators.

On the technical point of view, this modification was triggered by the excellent performance of the MoGr material against beam impacts, as tested in the HiRadMat experiment “jaw”, carried out in 2015.

Financially, this change of scope became possible **without increased of cost to completion for WP5** because the industrial production of MoGr results to beam less expensive than initially foreseen on the basis of the cost in the R&D phase. The acquisition of material for the new primary collimators respects the previously allocated budget envelope for WP5 (specifically, the task “IR7 cleaning”).

This change was approved at the collimation steering meeting in Sep. 14th, 2017.

Reasons for change

The main reason for changing the baseline scope is to improve the impedance of the primary collimators which is outside the scope of the consolidation project.

Impact on Cost, Schedule & Performance

There is not impact on cost and schedule. The performance will be improve by reduce by about a factor 2 the impedance of 4 primary collimators in IR7. According to present simulations, the change of two primary collimators per beam has alone an improvement of about 10 % on the required current of Landua octupoles used to stabilize the beams.

Impact on other items within the WP

None.



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Impact on other WPs

None.

Actions to be carried out if ECR is accepted

The procurement of MoGr for the primary collimators is planned and part of the production lines for LS2. This affects primarily two contracts: one with Nanoker for the material production itself, one with CINEL for the collimator construction and assembly. For primary collimators, un-coated MoGr will be used so there should be no other significant impacts.

Comments by WPL

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Comments by other WPLs affected

Comments by Project Office

DECISION

Description of the Decision
ECRs affecting different WPs will be discussed during the TCC.

Remarks

<p align="center">Decision of the WPL/s during TCC :</p> <input type="checkbox"/> Rejected. <input type="checkbox"/> Accepted	<p align="center">Decision of the Project Leader during TCC:</p> <input type="checkbox"/> Rejected. <input type="checkbox"/> Accepted <input type="checkbox"/> Accepted with remarks.
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Date of Decision: _____ **Date of Approval:** _____

ACTIONS/FOLLOW-UP

Action Description	Who	Date completion
Verb, action to be done, by when	N. Surname	201Y-MM-DD



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