CONCEPTUAL SPECIFICATION

INJECTION ABSORBER TDIS

[HL-LHC-TDIS]

Equipment/system description

The TDIS is a movable two-sided absorber with the purpose to protect machine elements in case of LHC injection kicker (MKI) malfunctions and to intercept bunches during set-up or commissioning of the injection system with low beam intensity. The present TDI needs to be adapted to HL-LHC and LIU beam parameters, which implies a change of the absorber materials and of the total absorber length. In addition, problems with the present design have become apparent during the first years of LHC operation. Instead of having one long jaw (4.185 m) as in the present TDI, the new TDIS is foreseen to comprise up to five shorter absorbers accommodated in separate tanks, which implies an increase in the total length.

Layout Versions	LHC sectors concerned	CDD Drawings root names (drawing storage):
V 1.0	LSS2 and LSS8	LHCTDIS To be created by S. Chemli

TRACEABILITY

Project Engineer in charge of the equipment	WP Leader in charge of the equipment
Anton Lechner Antonio Perillo Marcone	J.Uythoven

Jan Uythoven, WP 14 Concept Specifications

Main Points

- TDI injection absorber used several times during run 1 following unavoidable injection kicker errors. New name TDI**S**.

- Most be able to intercept a full injection batch, up to 288 bunches, or same kicker length stored beam

- Ideally compatible with all LIU beams but this is **very challenging** (1 sigma impact, tensile stresses), **especially for the small BCMS beams**

  - Looking for new absorber materials, but not much time as **installation in LS2**

- Protect downstream superconducting magnets, D1 and triplet

  - Not against quenching but against damage

- Also new mechanical design as present 5 m tank is not ideal

  - Considering up to 5 absorbers of about 1 m length each, tapering an issue

  - Total **system length will be increase in the upstream direction**

  - Beam impedance also important, as is halo absorption

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Parameters

Table 1: HL-LHC and LIU beam parameters for BCMS filling schemes (25 nsec)

Characteristics	HL-LHC	LIU-BCMS
Number of bunches	Up to 288	Up to 288
Horizontal and vertical emittance, normalised	2.08 µm	1.37 µm
Bunch intensity	2.33×10^{11}	2.00×10^{11}

Table 2: TDIS position relative to the orbit.

Characteristics	Units	Value
Position fully closed, opening	mm	1
Typical position during injection	mm	± 3.8
Position when no injection	mm	± 55

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