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LBNF Cryostat Floor Loading

Abstract

This report describes the current understanding of the way the load of the cryostat is transferred to the concrete floor

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Distribution List

History of Changes

Date	Version	Changes/Comments	Authors
25 July 2015	1	First draft	Marzio Nessi Dimitar Mladenov

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1 Introduction

The LBNF cryostat will simply be placed on a concrete floor. No direct floor connections are foreseen. In Annexe I one can see the layout of the floor loading.

2 Weight summary

Here is the present understanding of the load of the cryostat:

- Steel Structure: 3'200 T (this includes: Steel profiles, Stainless steel plate, insulation and membrane)
  - Steel profiles : xxx T
  - SS plate: xxx T
  - Insulation and membrane: xxx T

- LAr: 17’800 T (full no gas)
- Detector wet weight: unknown
- Detector services: unknown

Total: 21'000 T (excluding a detector and services on the roof)

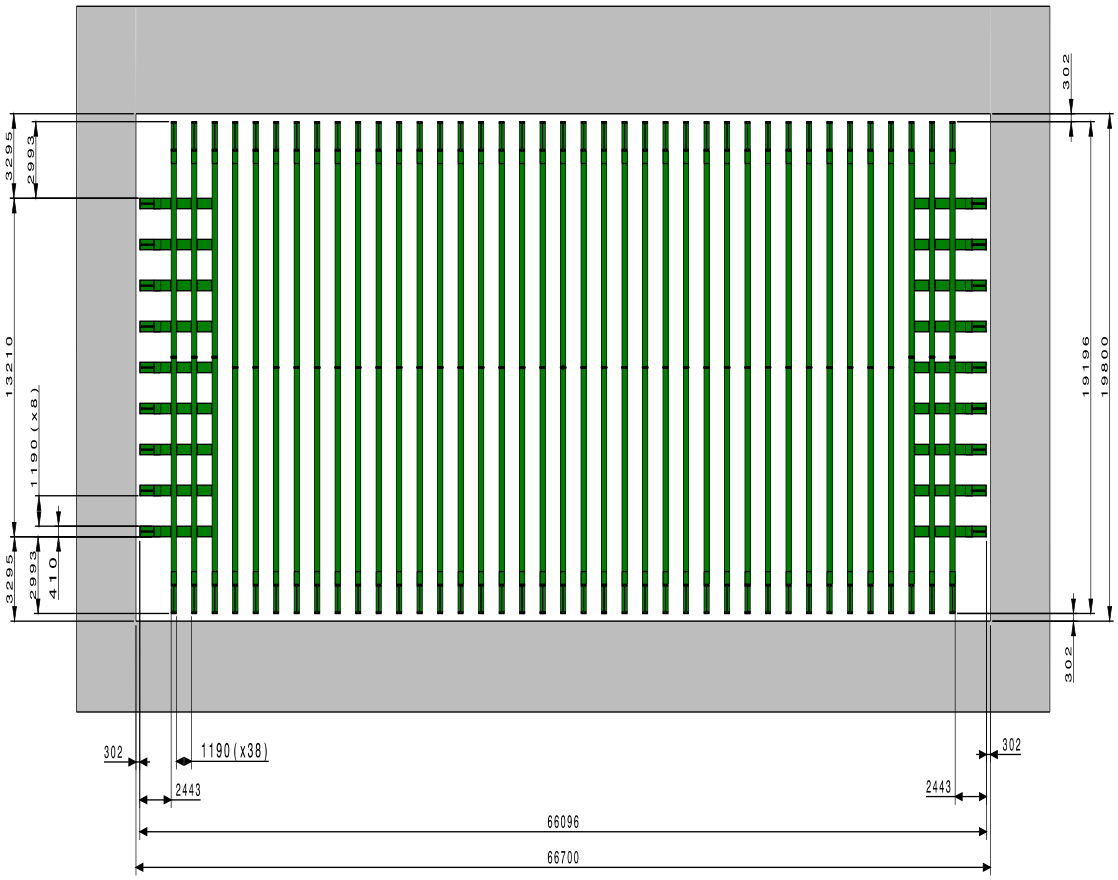
3 Floor load case

Total length of the beams in contact with the concrete: 749m (39 x 19.2m, ignoring the small pieces connecting the small walls)
The width of the beam is 410mm, therefore: Surface: 307m2

Load under the beams: 68 T/m2 (=21'000T / 307m2)

Or 28 T/m of beam, i.e. the concrete under a beam will see 28 T every meter of beam.

4 Annex I : Floor loading layout



5 Conclusions

This first load estimation put a requirement on the concrete floor structure (~70 T/m^2).

Given the fact that the cryostat main beam will have a give flatness tollerance, the plan is to shim the beams to the floor.

Next to be clarified:

- Floor flatness
- Floor stability over time
- Detector and services loads