

INFN & Zanon
S1-G Cryomodule Meeting
(20090202)

大内

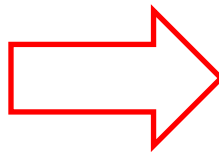
S1-Global Module-C 設計打合せ

- January 27
 - Zanon訪問
 - Vicenzaに工場がある: INFN-LASA (Milano)から鉄道で約2時間
 - 工場内見学
 - Module-Cの仕様確認
- January 28-29
 - INFN-LASA(Milano) 訪問
 - INFN側設計者を含め、Module-C仕様確認
 - 仕様同意書の製作
 - INFN-LASA 見学



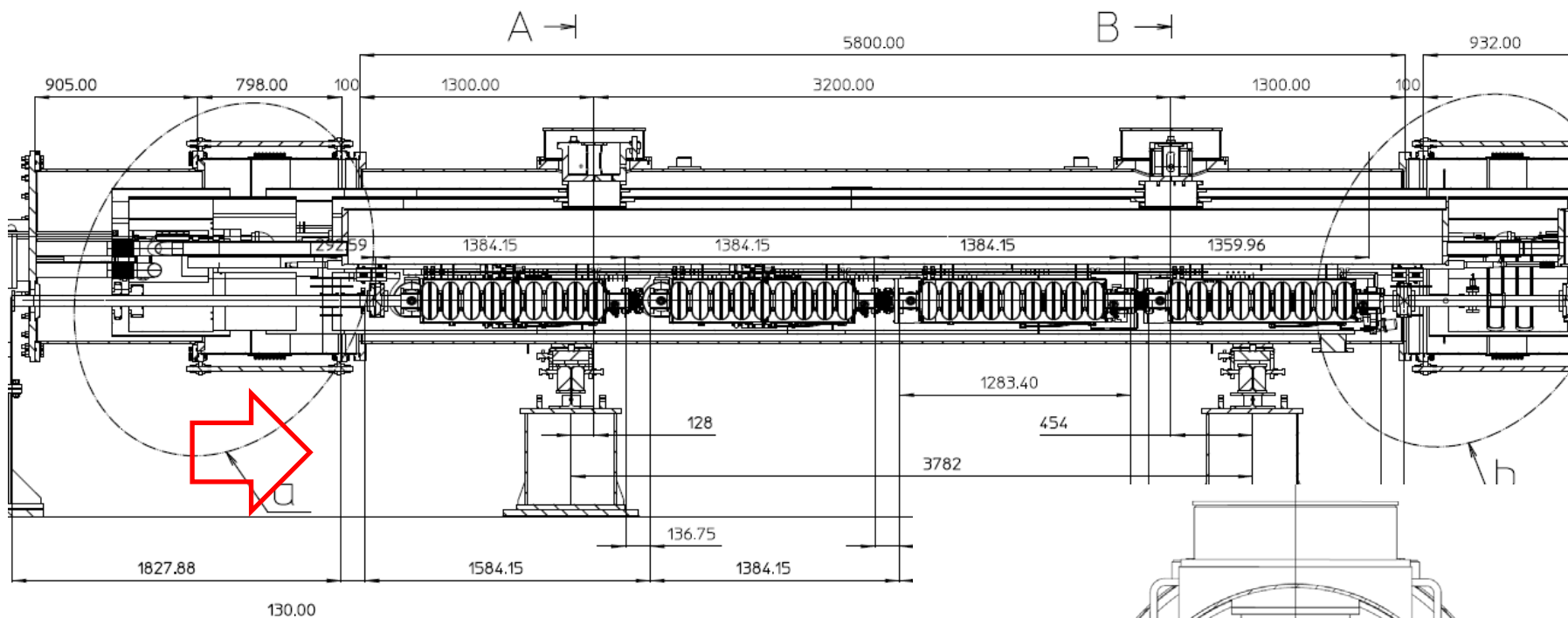
Module-C打合せ@Zanon

- Zanon側担当者
 - Project Engineer : Giorgio Corniani
 - Designer : Giovanni Basoni
- KEK提示のModule-C設計に対して、Zanon側からコメント及び仕様確認
 - ガス戻り配管 (Gas Return Pipe)
 - GRP長さ、材質、製作方法、GRP端板の厚みはKEKが後日報告
 - 接続配管材質 (schedule-10)、長さ
 - 温度計取付条件 (KEKが出張作業)
 - 真空容器 (Vacuum Vessel)
 - 長さ (5800mm)
 - 両端フランジは、固定フランジで設計寸法はTTFと同一
 - 熱輻射遮蔽板 (Thermal Radiation Shield)
 - 70K shield, 5K shield長さ
 - 接続冷却配管長、SUS/AL異材継ぎ手無
 - 接続真空フランジ
 - 接続用クロークランプの寸法確認及びKEK側フランジとの接続面寸法の確認
 - 真空引き・信号線取出しフランジ
 - 寸法取付及び位置

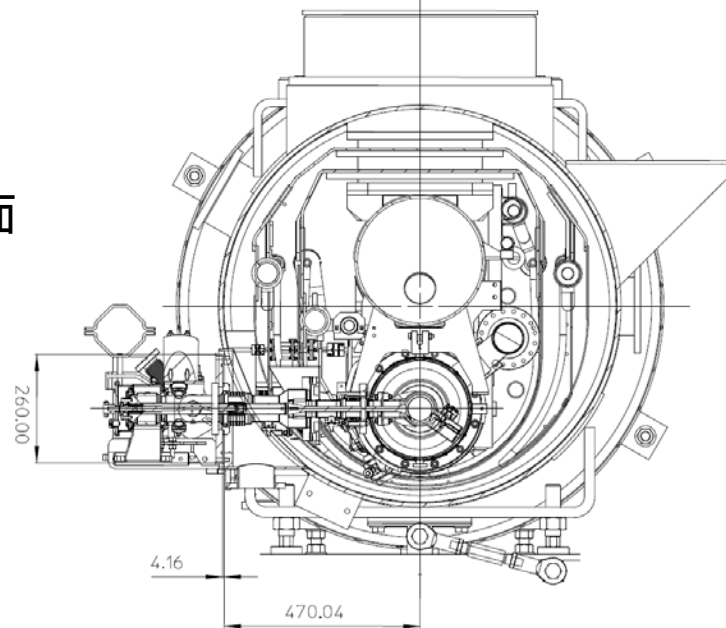


Zanon: 製作図面 (1次案) を2月中に製作

Module-C design



矢印方向から見た断面



Module-C打合せ@INFN

- INFN担当者
 - Serena Barbanotti 他
- Zanon打合せ項目の確認及び仕様確認

Spec. Document-1

- **GRP design**

- Final length of GRP including reduction to 76.3 mm pipe is 6000 mm.
- Over-length from vacuum vessel end flange is 100 mm at each side.
- KEK defines the thickness of the reduction from 312 mm pipe to 76.3 mm pipe.
- Zanon produces and installs the reduction to the 76.3 mm pipe (schedule 10 standard pipe).
- The length of the GRP plus the reduced pipe is 7000 mm (500 mm reduced pipe for each side).
- The longitudinal position of the shape on the GRP is calculated from the vacuum vessel coupler openings by INFN and provided in the attached drawing.
- Gate valve support shapes have XFEL design and are positioned at 100 mm from GRP 312 mm pipe end. The position is fixed, while the design could be slightly modified in accord with cavity groups (at FNAL and DESY).

Spec. Document-2

- **GRP design-2**

- The shape profile (mainly the area of the 5K pipe support) will be slightly modified by Zanon to adapt to the new WPM position and support.
- KEK requires additional holes on the shapes and will communicate their position and diameter at the end of week n. 6.
- **GRP has 5 layers of MLI. Any sensor needed by KEK has to be provided and installed at Zanon before the MLI installation.**

- **Thermal shields overlength**

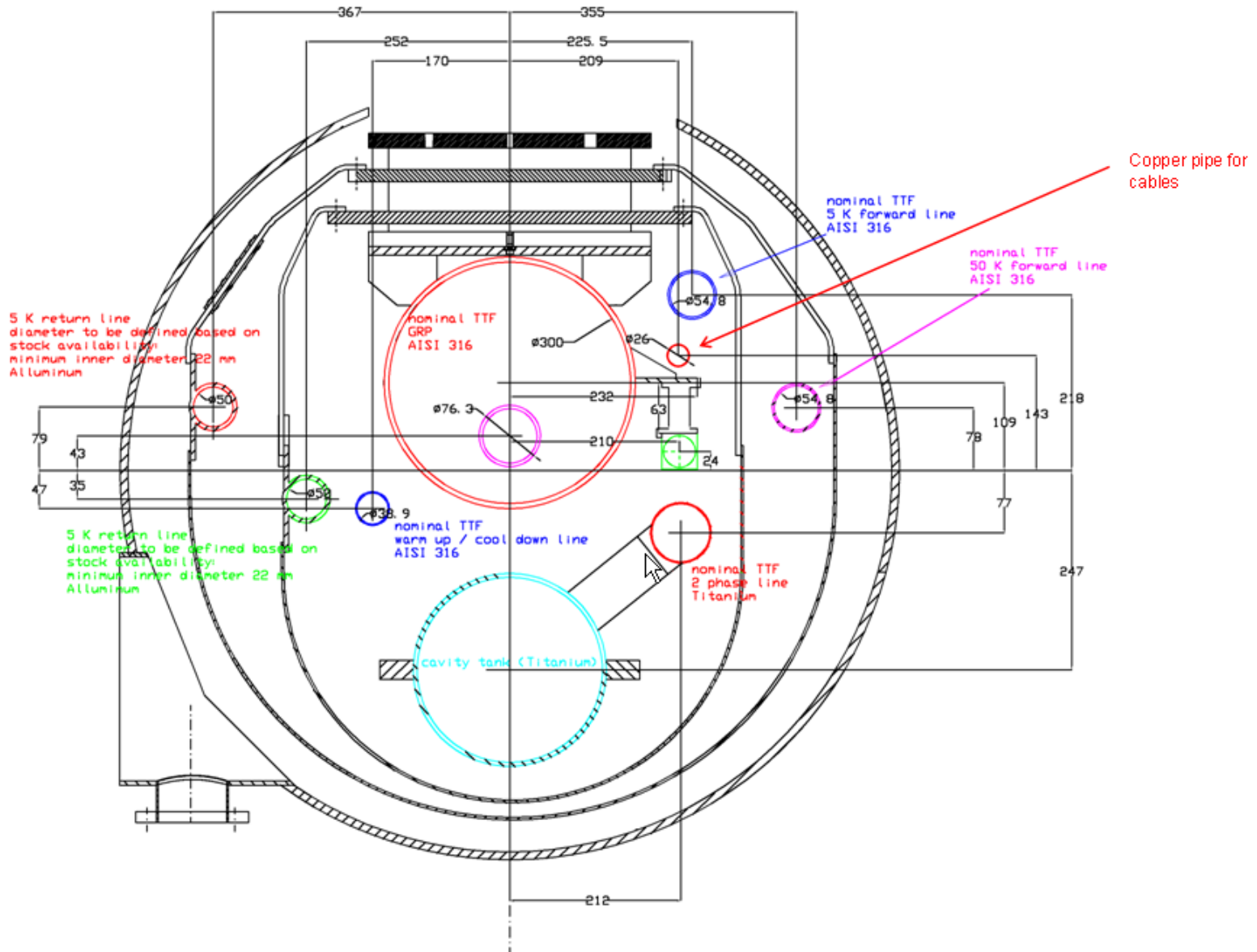
- Distance between 4.5 K shield and vacuum vessel: 100 mm at each end.
- Distance between 70 K shield and vacuum vessel: 50 mm at each end.
- The coupler openings on the shield lower parts are the same as TTF.
- The aluminum pipe overlength from each end of the two shields is 500 mm.

Spec. Document-3

- **Piping and module cross section**

- It is the same cross section as TTF cryomodule type 3+ with the following modifications:
 - WPM position
 - 5 K forward line and cable pipe position
 - 5 K and 70 K return line (extruded pipes) diameter can be reduced (up to a minimum of 22 mm), depending on stock availability.
 - 5 K and 70 K return line (extruded pipes) profile can change (slightly different fin design), depending on stock availability (available in Zanon: 2 pipes about 6 m long in total and another pipe with smaller fin).
 - 2.2 K forward line has been removed.
- If not mentioned in other parts of this document or in the attached drawing, pipes have a standard over-length of 500 mm from the vacuum vessel end flange on both sides.
- Copper pipe position in the cross section will be confirmed after communication with Kay Jensch (DESY) to clarify assembly procedure.
- All distances in the drawing are referred to the vacuum vessel center, chosen as the reference position.
- NB: given pipe diameter is internal diameter.

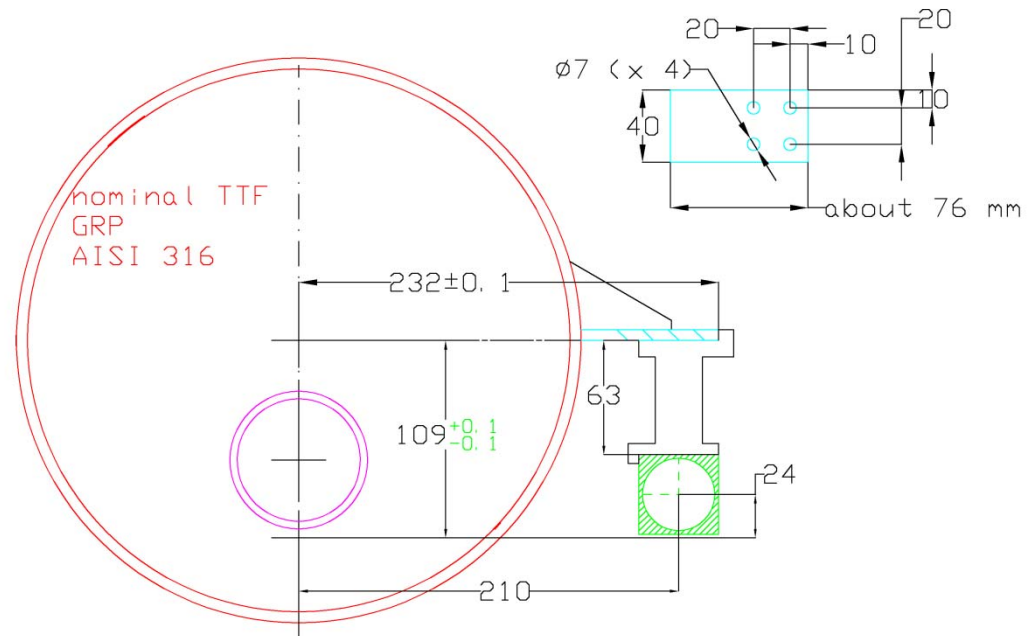
Spec. Document-4



Spec. Document-5

- **WPM position and support design**

- Positioning of WPM support is fixed:
 - Machined horizontal plane is aligned with GRP axis.
 - Machined vertical plane is at 232 mm from GRP axis.
- **WPM sensors, holders and connecting pipes are provided by KEK before final preassembly of the module in Zanon.**
 - WPM cables will be installed at KEK.
- Hole position on the support is defined in the following picture.



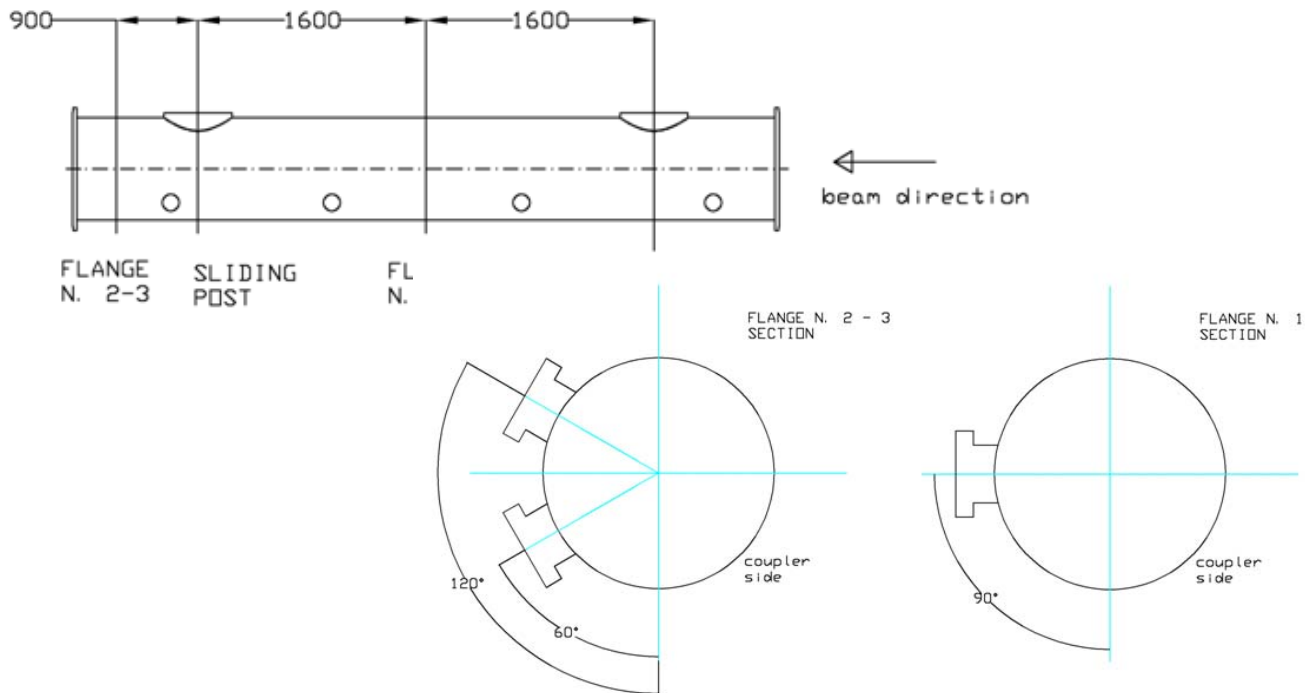
Spec. Document-6

- **Invar rod fixture**

- The invar rod will be fixed to the shape (cavity support leg) closer to the fixed post.

- **Openings**

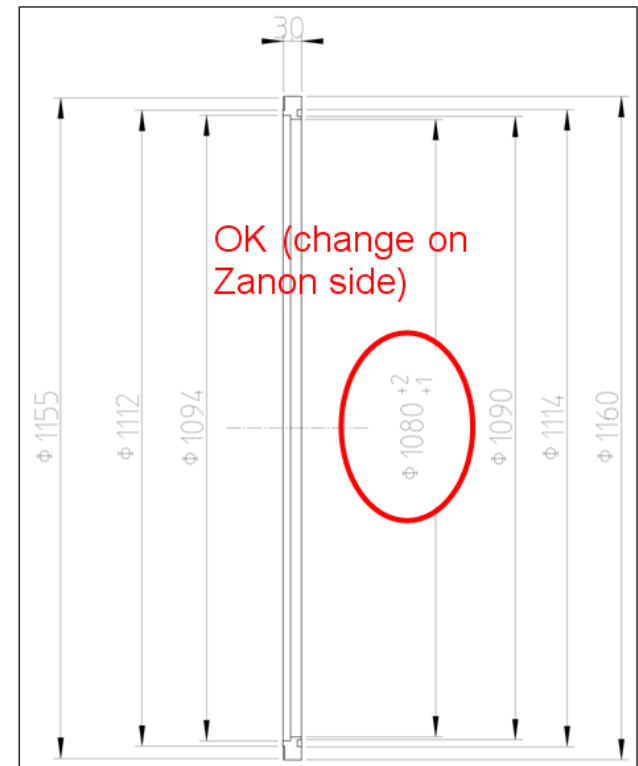
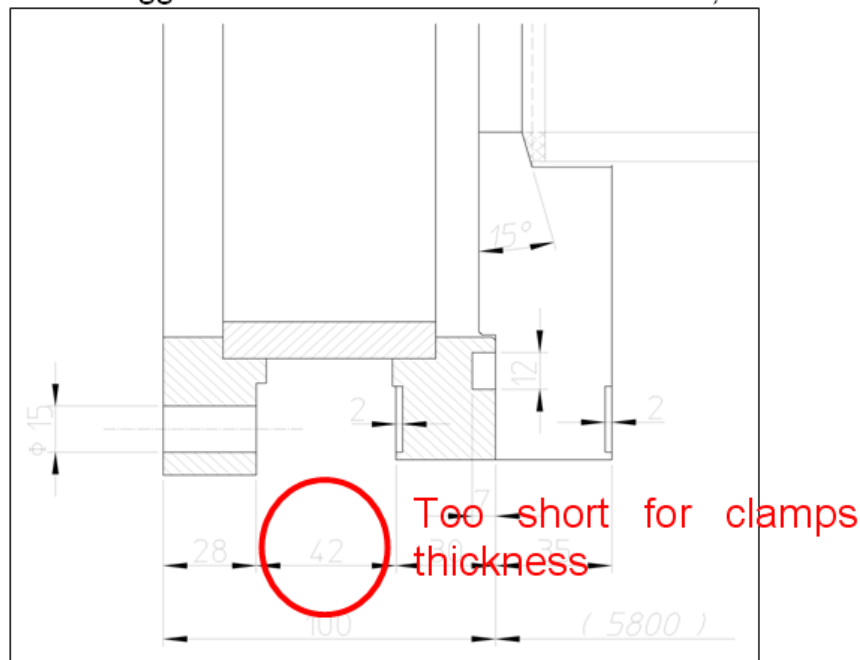
- The vacuum vessel has 3 standard flanges ISO 160F; inner diameter of the opening is 139.8 mm.
- The following drawing resumes the position of the flanges.



Spec. Document-7

- **Vacuum vessel end flange and adaptor**

- The KEK adaptor inner diameter (1080 mm) is approved; Zanon modifies the inner diameter of the machined part on the vessel end flange to 1050 – 1060 mm.
- KEK will provide clamps for the end flanges and will verify the spacing on the adaptor to host the clamps (at present Zanon suggests to move from 42 mm to 100 mm).



Spec. Document-8

- **Longitudinal positions of coupler ports on the vessel**
 - Distance between consecutive couplers at 2 K = 1383.6 mm.
 - Distance between consecutive couplers at 300 K = 1384.15 mm.
 - The cavities are suspended to the gas return pipe through the pads.
 - The distance at 2K between pads on consecutive cavities is the same as the distance between cavity coupler centers: 1383.6 mm.
 - The shapes have to hold the pads both at 300 K and 2 K. For this reason to calculate the distance between two consecutive set of shapes on the gas return pipe a mean value of the thermal contraction coefficient of invar and stainless steel (stainless steel thermal contraction coefficient: 0.003 m/m) has been used.
 - The obtained distance between two consecutive set of shapes on the gas return pipe is then 1385.6 mm.

MoUでの確認事項

- MoU内の下記の項目について、確認を行った。

- **10. Spending of budget share amount and submission of record book**

- INFN shall spend the money transferred for each fiscal year during the fiscal year to complete the operations within the relevant fiscal year based on the annual plan. And INFN shall submit the record book to KEK in twenty days after the end of the corresponding fiscal year.