

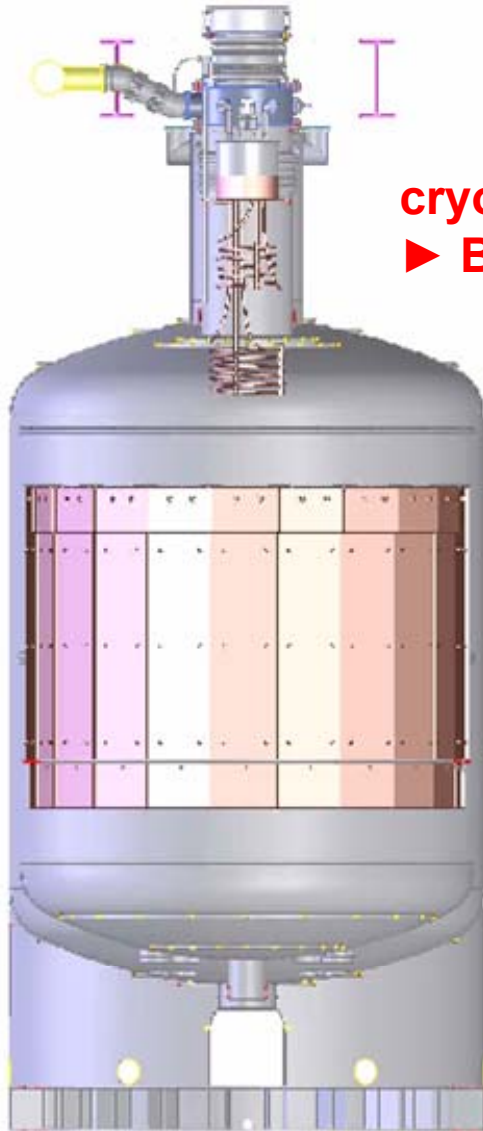


# **Cryogenic Vessel**

## **Status Report for TG04**

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GERDA Collaboration Meeting at LNGS  
9 - 11 June 2008



**cryogenic infrastructure**  
▶ **Bernhard**

- **progress**
- **photos**
- **problem(s?)**

new cleaning cycle

25 Feb : cryostat filled with Rn-free nitrogen (for Rn test)

27 Feb : pressure test of outer vessel 1.85 barg N2

03 Mar : cryostat leaving SIMIC

06 Mar : arrival & installation in Hall A of LNGS

11 Mar : Rn-222 emanation test, 2 extractions (44/40m3) 13.6±2/13.7±2 mBq

18 Mar : internal copper shield installed

04 Apr : LN2 evaporation test of completely filled cryostat <4Nm3/h (<300W)

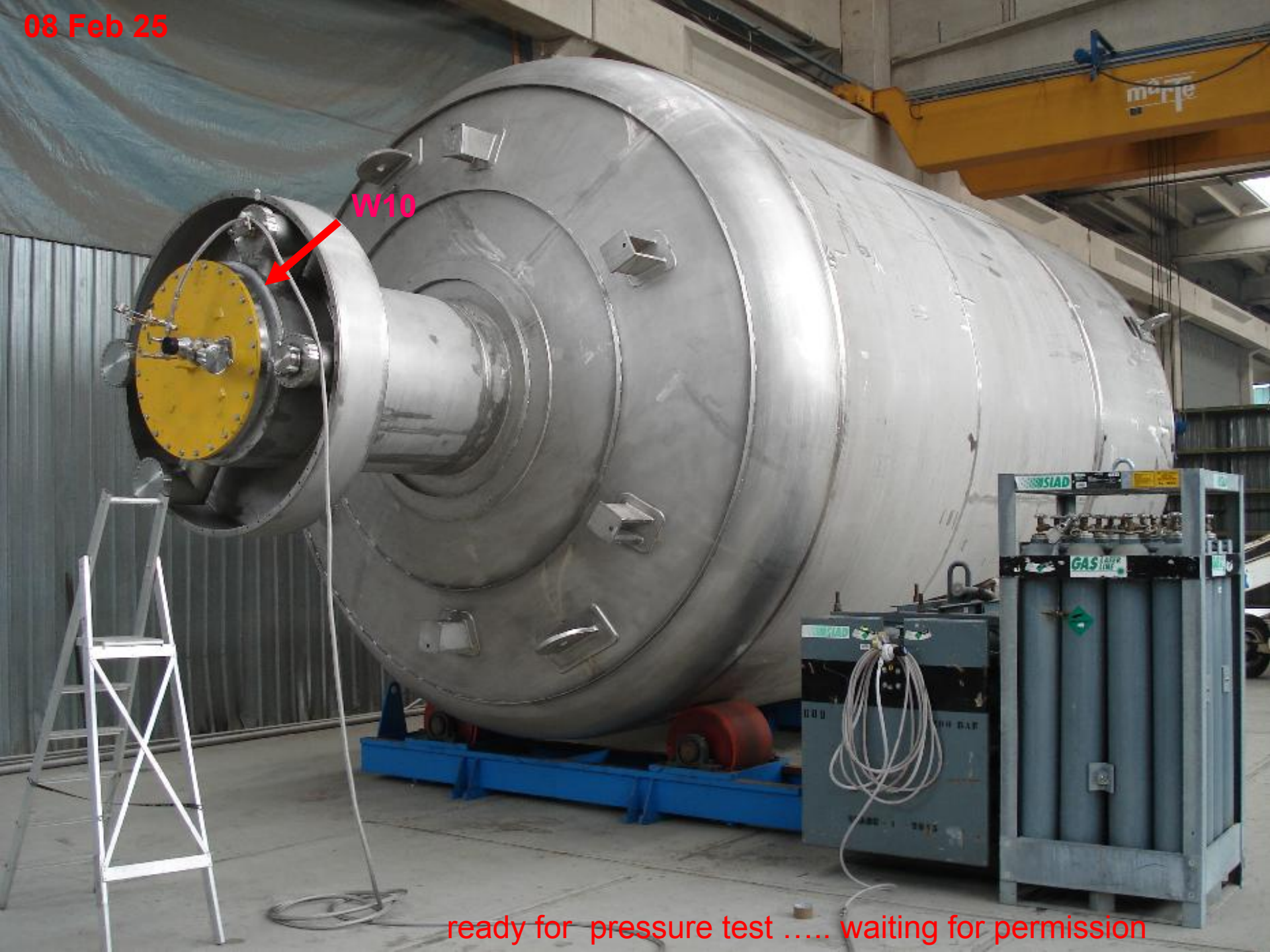
09 Apr : 21:35 cryostat again empty (3.6/3.2/2.9 @3/6/9 pm)

28 Apr : start of WT construction

03 May: Rn-222 emanation test, 2 extractions (26/20m3) 121±5/120±5 mBq

08 Feb 25

W10



ready for pressure test ..... waiting for permission

Seite 2 von 5  
 zum Bericht M.ETK. 8000183786  
 Unser Zeichen: CSch vom 22.04.2008

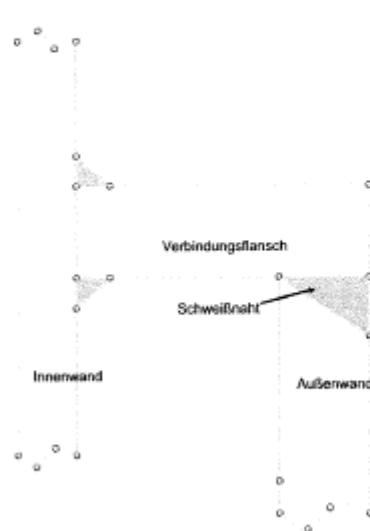
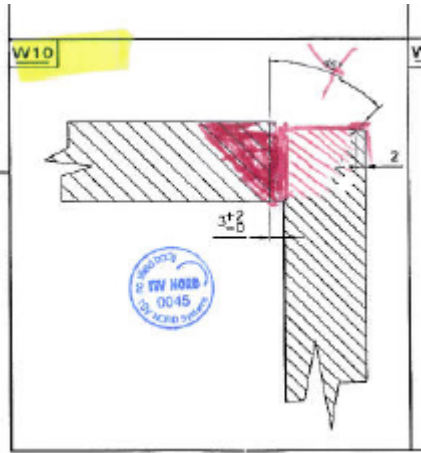


Abb. 1: Vorgesehene Ausführung

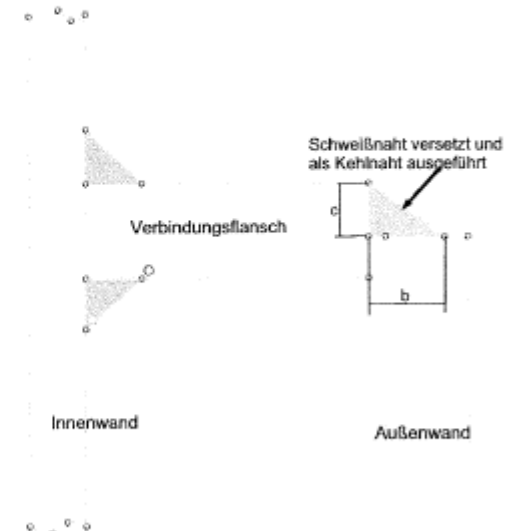


Abb. 2: vorhandene Ausführung

Zusammenfassend stellen wir fest, dass die durch die Linearisierung der Spannungskomponenten der Membran- plus Biegespannung ermittelte maximale Vergleichsspannung von  $P_m + P_b = 144 \text{ N/mm}^2$  der Schweißnaht unterhalb der zulässigen Spannung von  $\sigma_{zul} = 156 \text{ N/mm}^2$  liegt, d.h. der Innendruck wird, unter den angenommenen Maßen der hier vorliegenden Schweißnahtausführung, sicher abgetragen.

**es wird / ist alles gut .....**



08 Feb 27 14:19


08 Feb 27 13:15

1.9 barg



W10 takes it !


150



Via Vittorio Veneto - 12072 CAMERANA (CN) ITALY

**PRESSURE EQUIPMENT SUBJECT TO THE EUROPEAN  
PRESSURE EQUIPMENT DIRECTIVE 97/23/CE**

MANUFACTURED BY	SIMIC S.p.A.	
YEAR OF MANUFACTURING	2008	
SERIAL NUMBER	13P	
ITEM	-	
	VESSEL	JACKET
CONSTRUCTION CODE	AD-2000	
EQUIPMENT TYPE (PED)	JACKETED VESSEL	
CATEGORY (PED)	IV	
FLUID GROUP (PED)	2	
CORROSION ALLOWANCE	0 mm	0 mm
HEAT TREATMENT	NO	NO
TEST PRESSURE	3.6 bar (Hyd)	1.85 bar (gas)
MAX ALLOWABLE PRESS.	1.5 bar	1.0 bar
MAX ALLOW. EXT. PRESS.	1.0 bar	1.78 bar
MIN/MAX ALLOWABLE TEMP.	-196/50 °C	-196/50 °C
OPERATING FLUID	LAr/LN2	VACUUM
DESIGN TEMPERATURE	-196/+50	-196/+50
JOINT EFFICIENCY	100%	100%


0045

180

submitted for approval to TÜV





08 Mar 03 at SIMIC



08 Mar 08 08:55



*boxes with copper shield*

**08 Mar 06 17:20**

ATORI  
ASSO



25

08 Mar 06 17:26



SIMIC team leader G.Costa

08 Mar 06 19:29



SIMIC team rdy for Cu shield installation



installation done after 2:30 hrs

08 Mar 06 19:52

Rn emanation test followed by  
installation of Cu shield



08 Mar 09





08 Mar 07 17:21



Gzegorz and Luigi  
on the way up for  
the Rn test



08 Mar 17



© Cattadori jun.

Who ordered that?

set up for copper shield installation













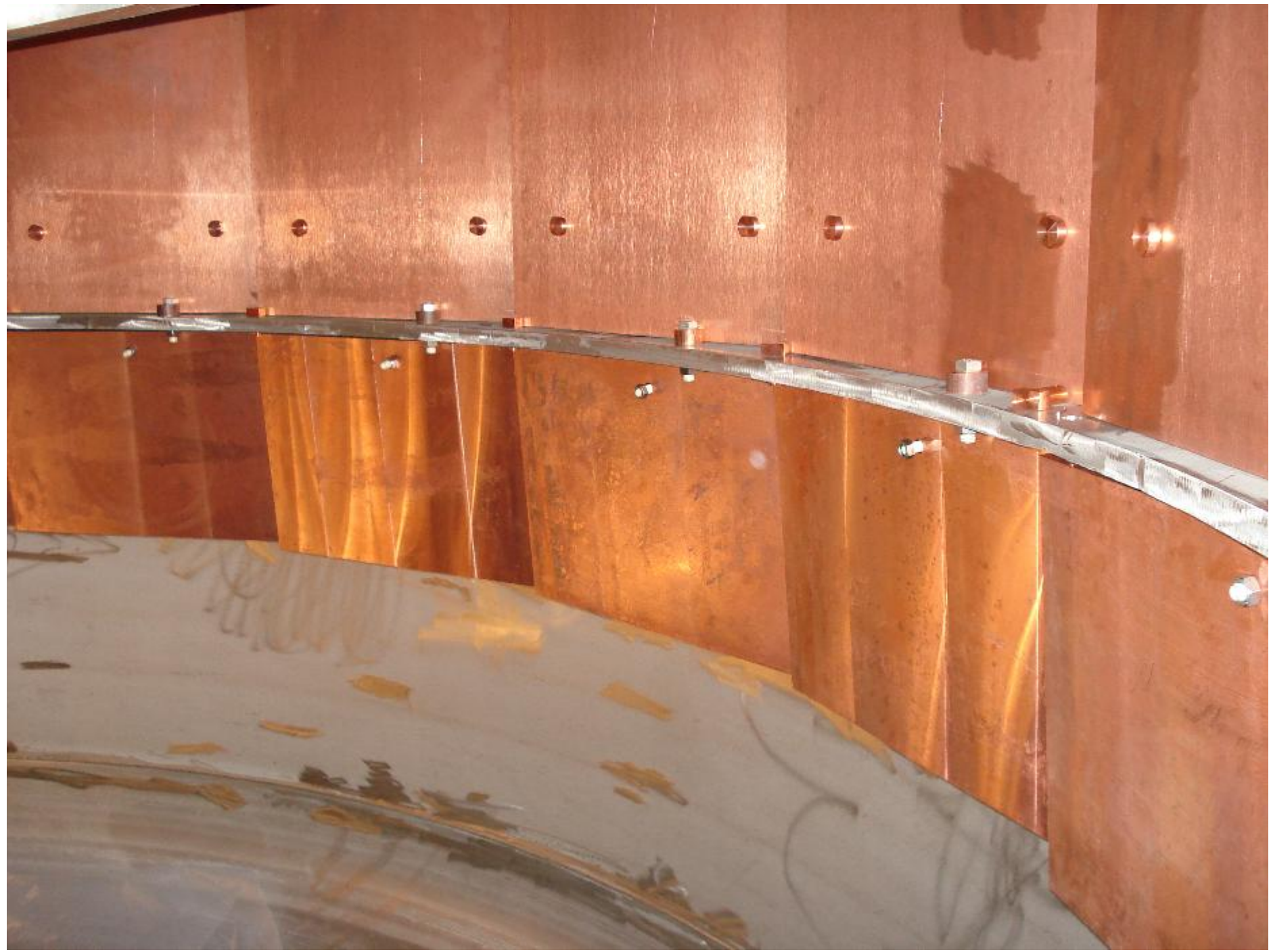








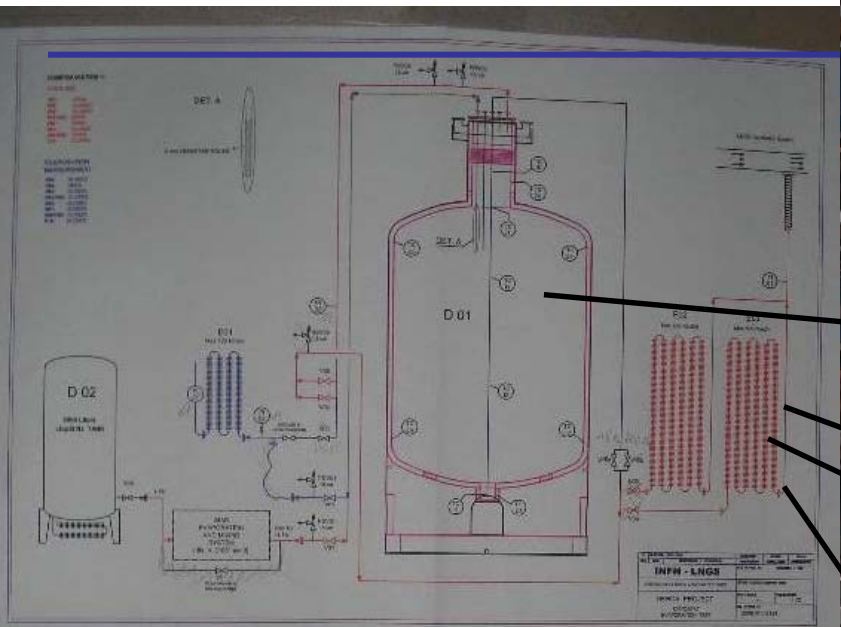




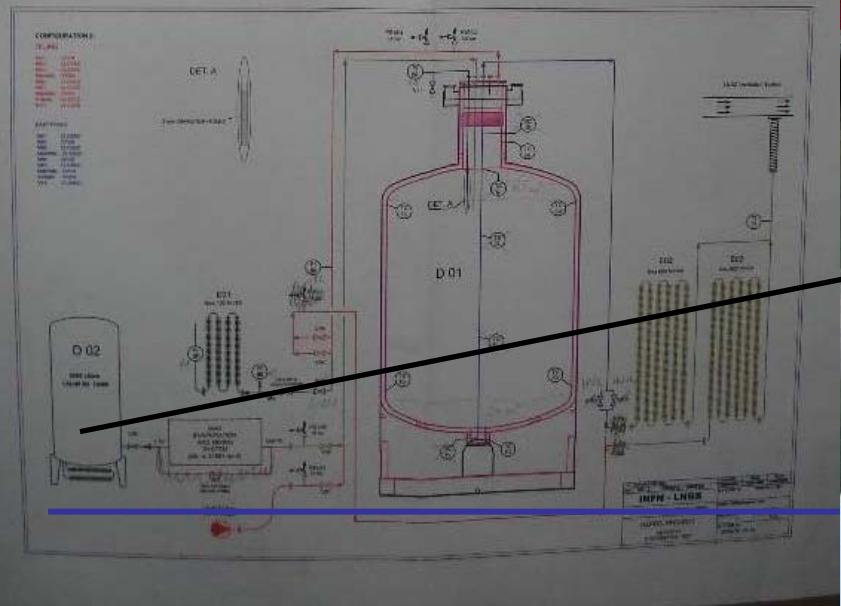
Evaporation test at LNGS followed by  
another Rn emanation test



08 Mar 18



setup for evaporation test



BIG thanx to LNGS team



Hardy preparing 3rd  
Rn emanation test  
on top of cryostat

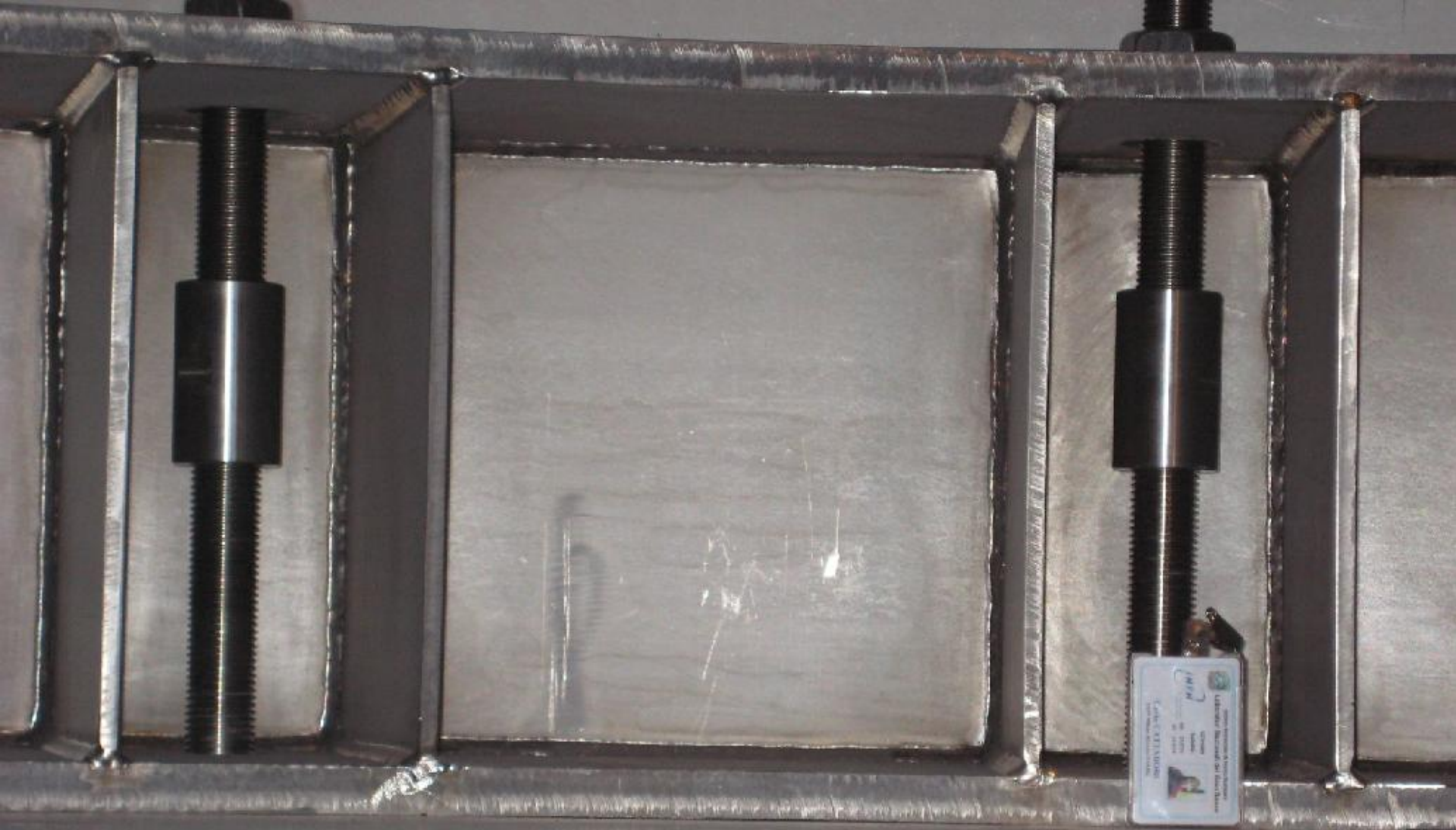


A paper craft figure made of brown paper, holding a large sheet of paper with a sketch of a face. The figure is made of two pieces of paper, one for the body and one for the head, with several pins or staples holding them together. The face sketch is drawn on a separate piece of paper and is held up by the figure. The sketch shows a face with large eyes, a wide mouth with sharp teeth, and some lines suggesting hair or a beard. The figure is standing on a white surface.

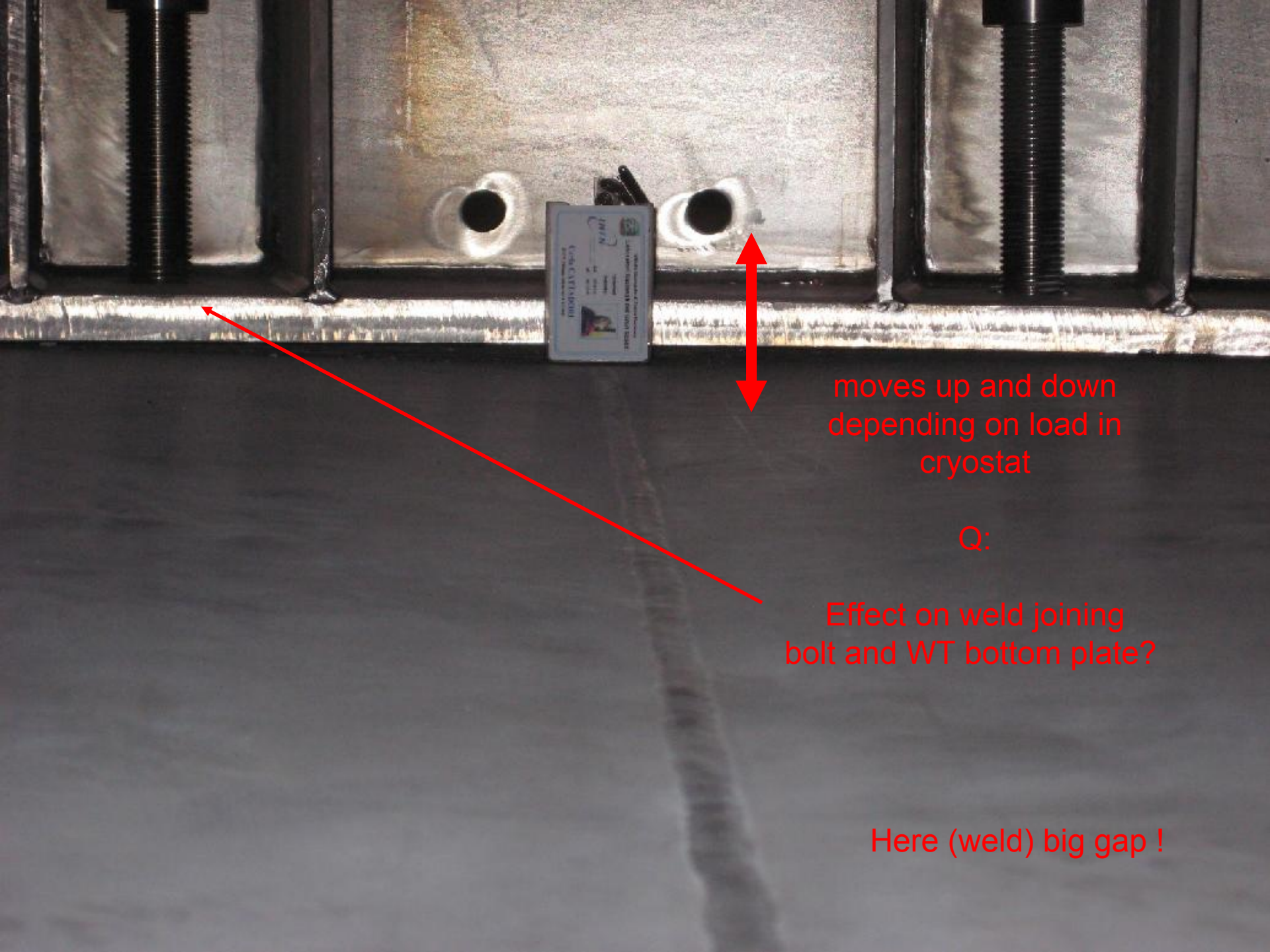
**Problem(s?)**



**Bottom plate of WT not perfectly flat !**



Here (no welds) OK !



moves up and down depending on load in cryostat

Q:

Effect on weld joining bolt and WT bottom plate?

Here (weld) big gap !



Careful inspections of welds did not reveal cracks!

Needs confirmation.  
Test with 1m water column ongoing.  
▶ See WT talk!



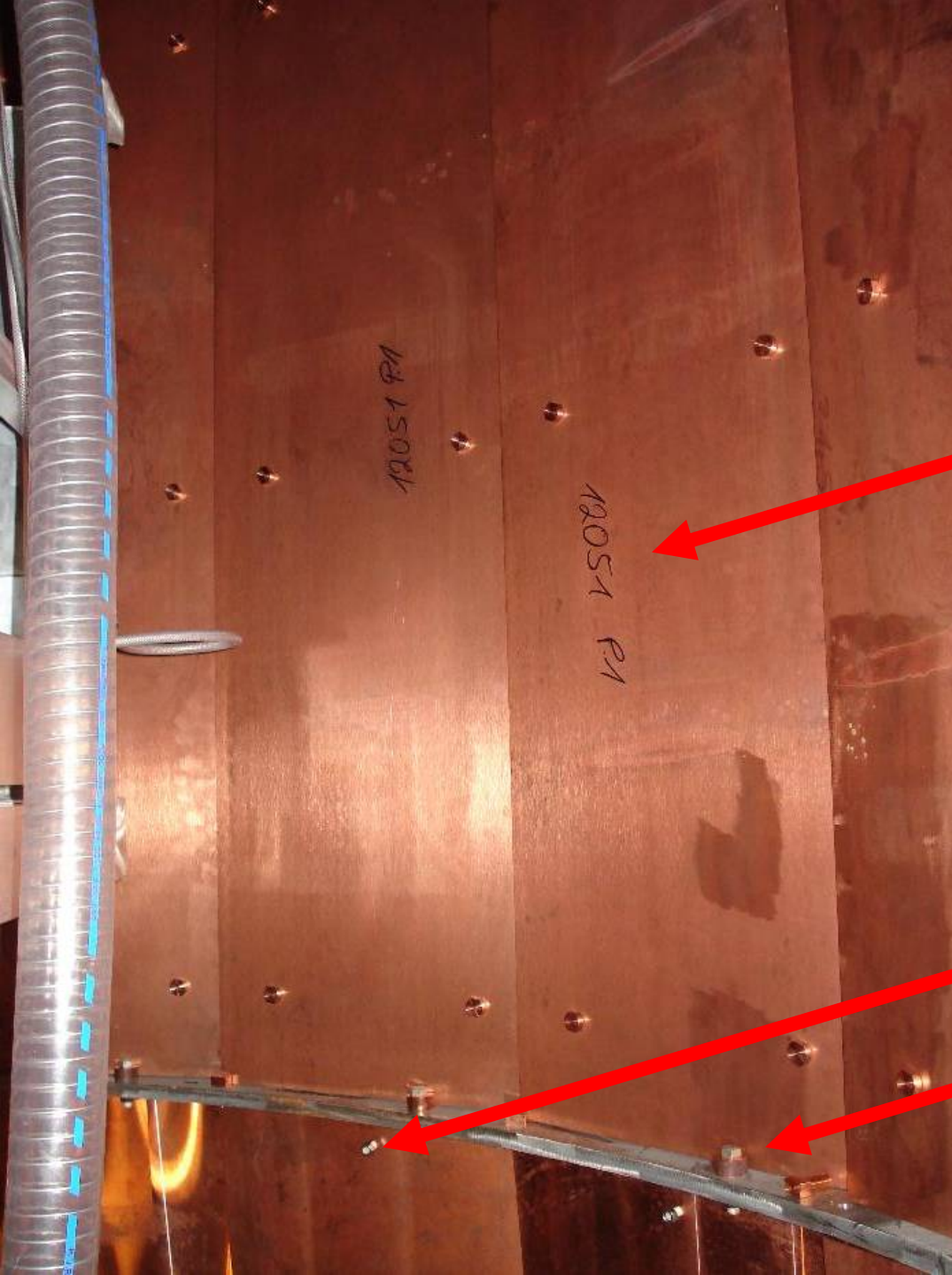
**Rn emanation 10x larger**

**14 ► 120 mBq**

**after copper installation**

**8 mBq ► bgnd index of  $10^{-4}$**

# possible sources

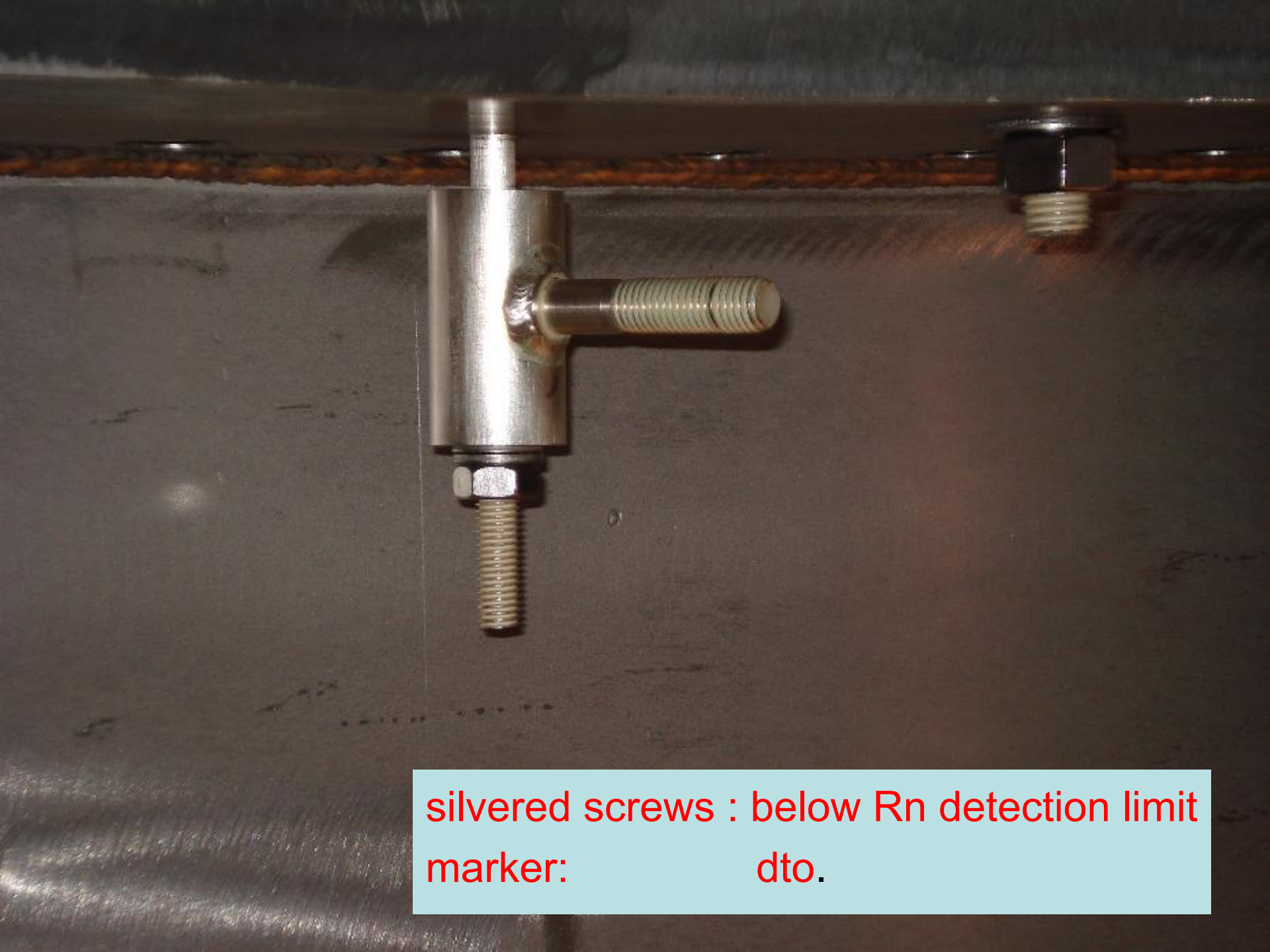


**marker writing**

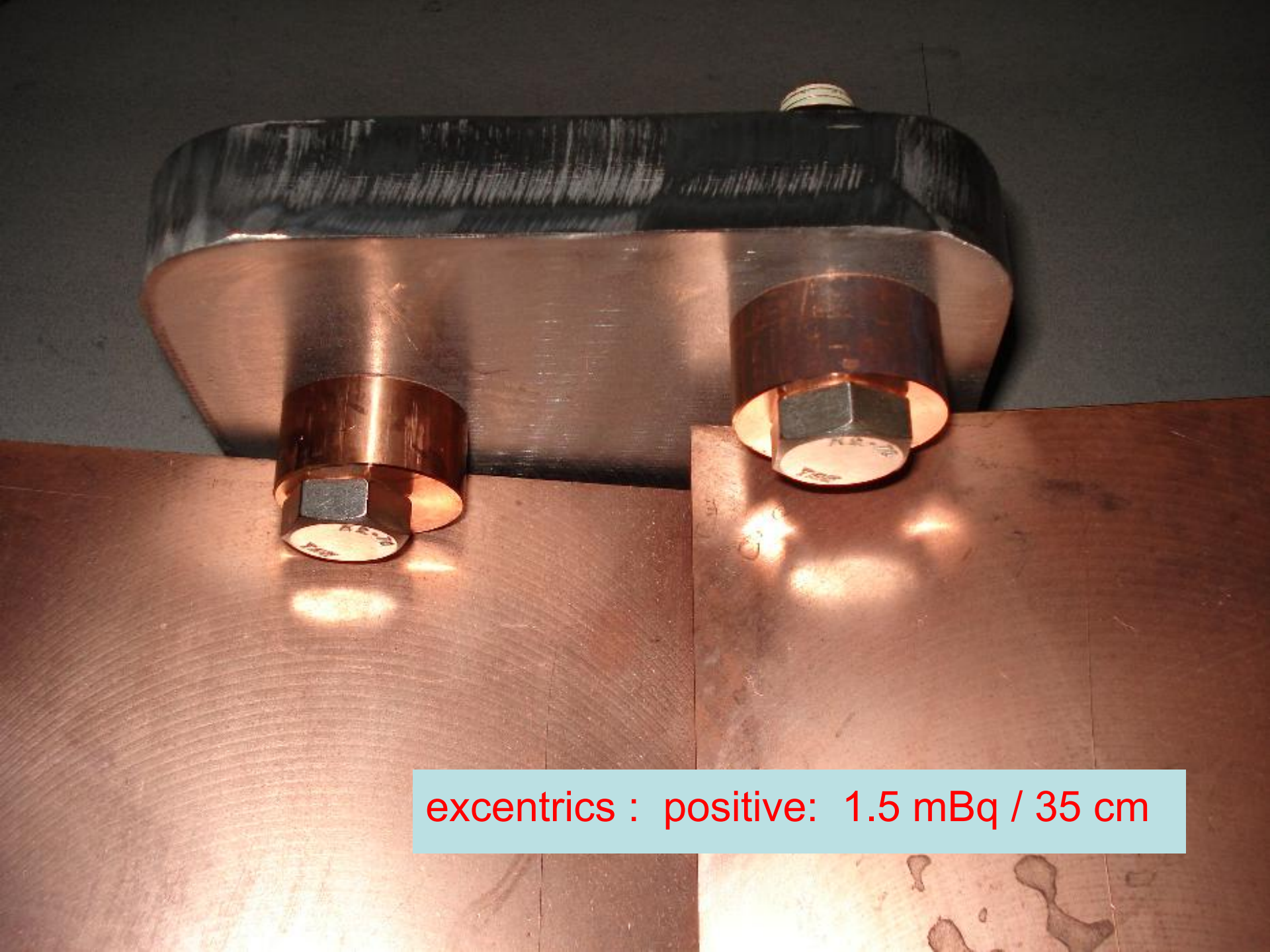
**silvered screws**

**Cu excentric  
w black oxid**





silvered screws : below Rn detection limit  
marker: dto.



excentrics : positive: 1.5 mBq / 35 cm

# Results of screening campaign at HD

see TG11 talks !

marker :	no detectable contribution
silvered screws :	dto.
sulfuric acid from CSN:	dto
oxidized Cu excentrics:	120 cm ► 5.1 mBq – not dominant!
DUST?!	typ. 30 mBq/g
AIR???	~50 Bq/m <sup>3</sup>

**IF results CONFIRMED:**

**Inner Vessel to be cleaned !**

See integration session tomorrow!

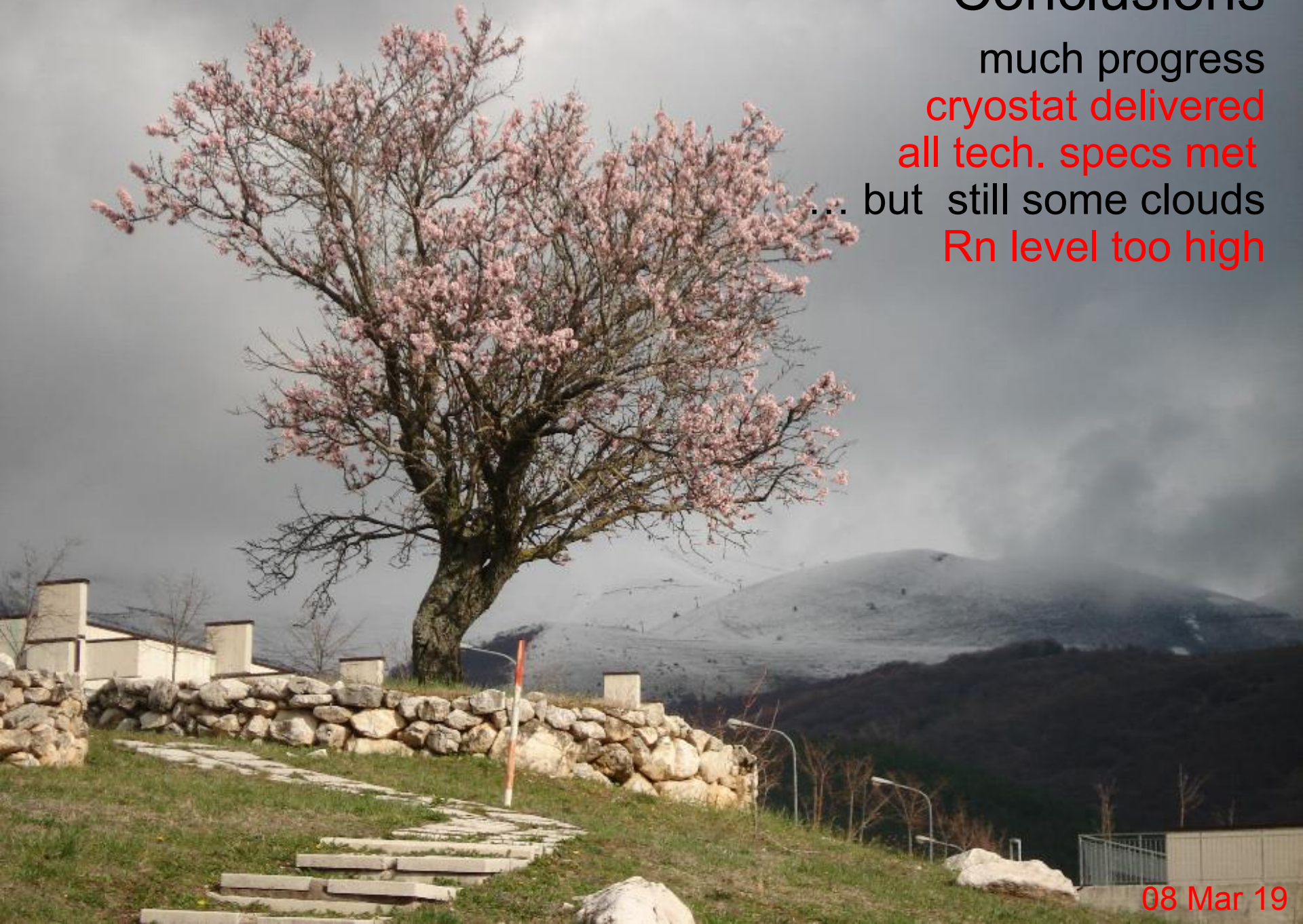
# Conclusions

much progress

cryostat delivered  
all tech. specs met

... but still some clouds

Rn level too high



08 Mar 19

