

KEK Application of High Pressure Gas Safety Regulation

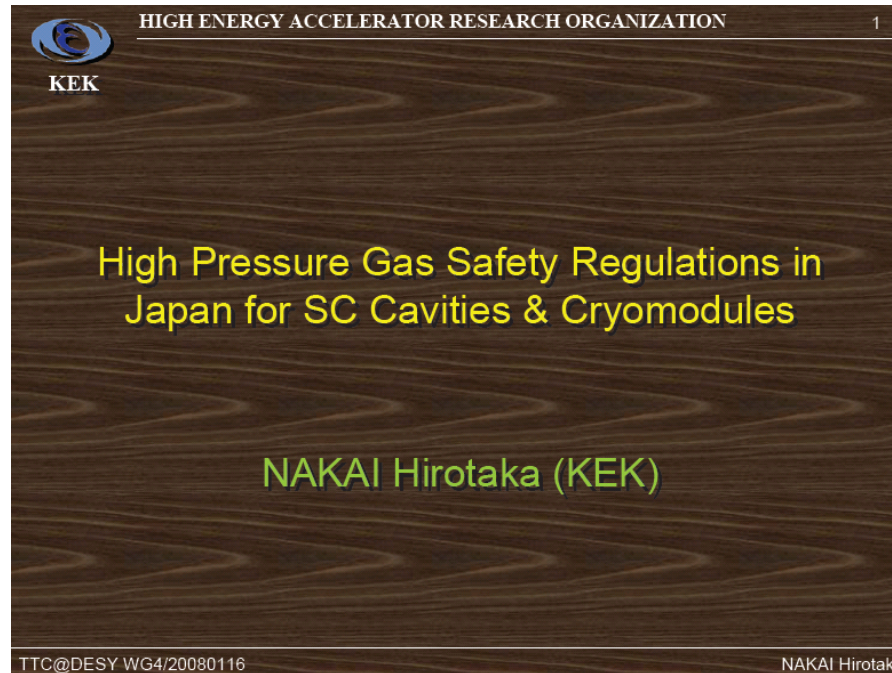
Eiji Kako

(KEK, Japan)



Previous Talk


Summary talk on Japanese legal system by H. Nakai (KEK)
in the TTC meeting at DESY, Jan. 2008,
<https://indico.desy.de/conferenceOtherViews.py?view=standard&confId=401>



Main contents are

“Designated Equipment Inspection Regulations”

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SC Cavities & Cryomodules

- Categorized as “Designated Equipment” in DEIR (Art. 3 of DEIR)
 - Especially requiring inspections on either design, material quality, or the manufacturing process
 - Designated equipment inspection conducted by agencies including KHK
 - Foreign manufacturers of designated equipment for export to Japan may apply for the designated equipment inspection by KHK and others

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Legal Procedures

1. Application for Ministerial Special Technical Approval (MSTA) of METI, if necessary
2. Application for Designated Equipment Inspection (DEI)
3. Application for Welding Procedure Approval of KHK under ETS
4. Various inspections during manufacturing process
5. Leak Test after assembly
6. Completion Inspection by Prefectural Government after installation

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There are many complicated legal procedures for the inspection of “Designated Equipment”

→ Increase of fabrication costs and Time consuming

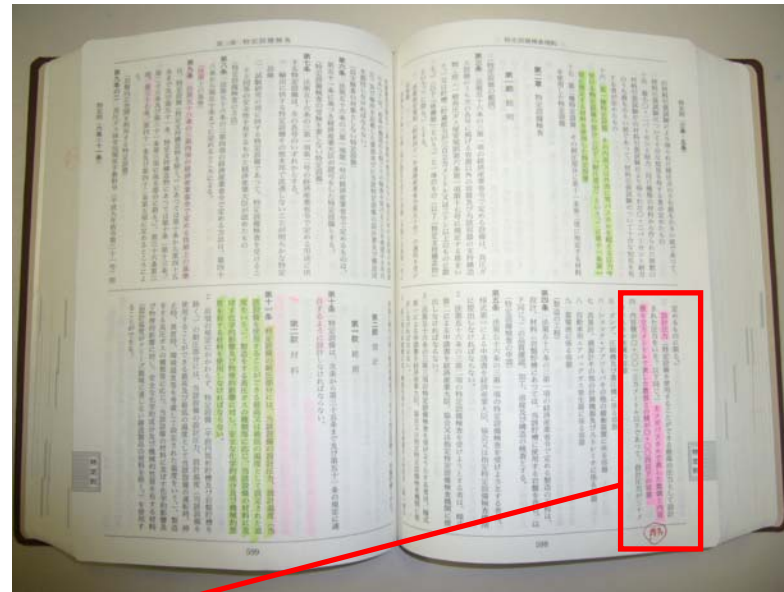
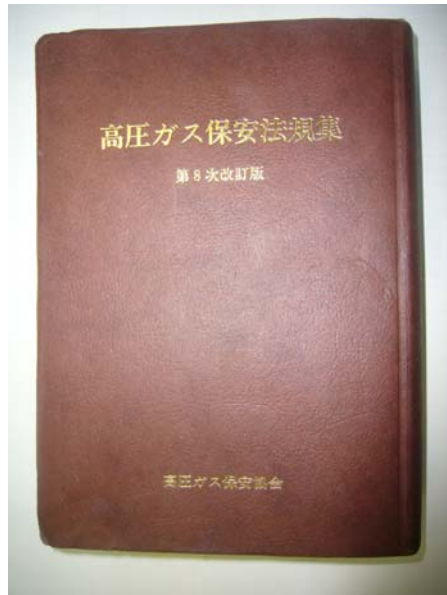
$$P \times V < 0.004$$

P [MPa] : Design pressure

V [m³] : Inner volume of vessel



High Pressure Gas Safety Regulation

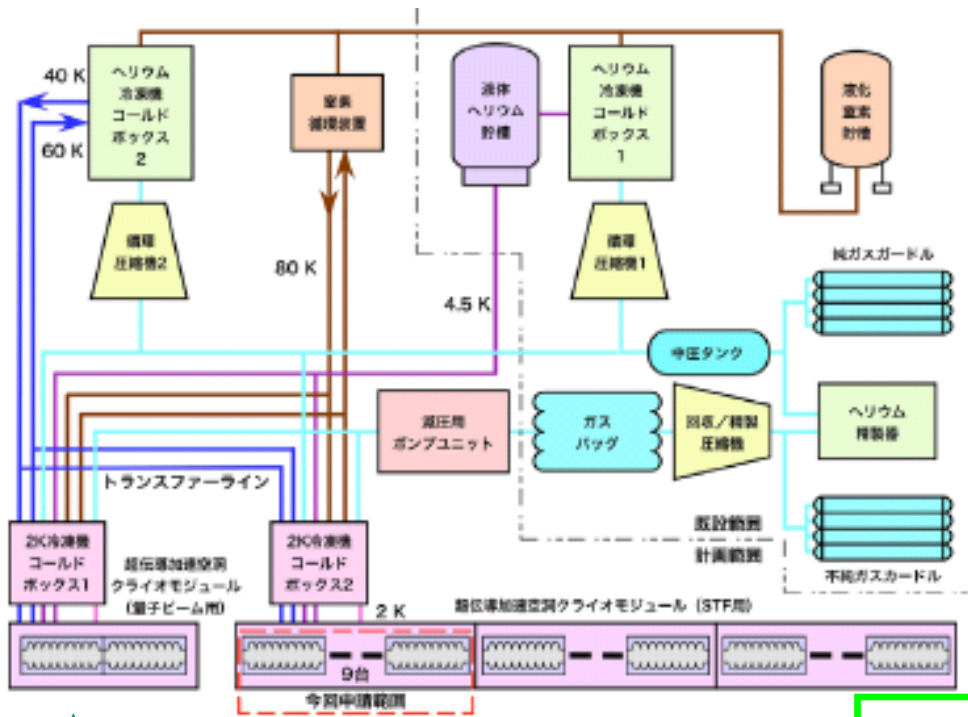


In case of
Design Pressure [MPa] x Inner Volume [m^3] < 0.004,
the vessel is excluded from the “Designated Equipment”.

→ “Standard” High Pressure Gas Equipment



Construction of STF-2 Cryomodule



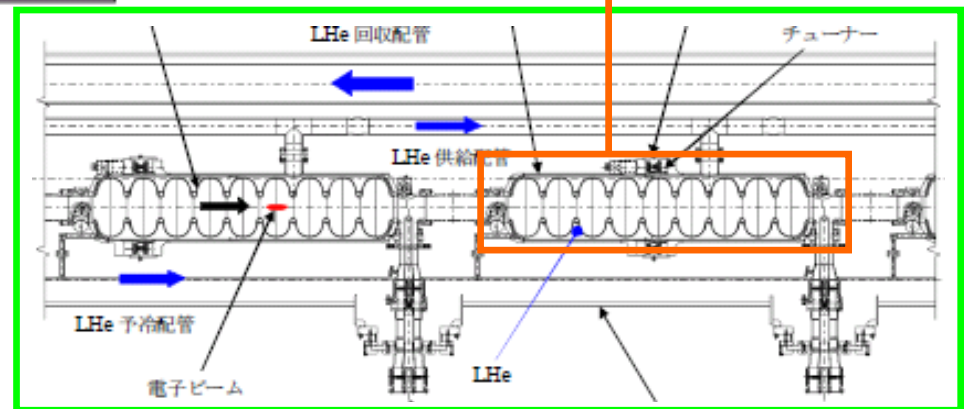
HPG Application for STF is divided to three items;

1. Cavity unit
2. Cryomodule
3. Refrigerator system

1 Cavity Unit

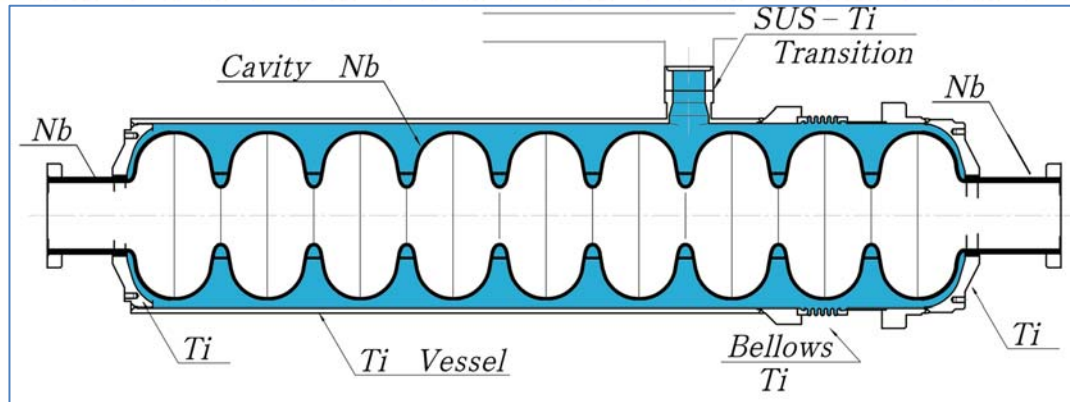
9 Cavities for STF-2 Cryomodule #1

2 Cavities for Capture Cryomodule





Application of STF-2 Cavities, (2+9)



**P [MPa] : Design pressure = 0.0987+0.1013 MPa
Max. pressure = 0.2 MPa**

**V [m³] : Inner volume of vessel
= He vessel – Cavity – Mag. Shield
= 0.016 m³ (not include a 2K He supply line)**

$$P \times V = 0.2 \text{ MPa} \times 0.016 \text{ m}^3 = \mathbf{0.0032} < 0.004$$

One Cavity Unit is

“Standard” HPG (High Pressure Gas) Equipment.



What is advantage of the “standard HPG equipment” ?

- Application for Equipment Inspection is not necessary before fabrication, (after fab. is OK).
- Inspections during manufacturing process with presence of KHK staff are not required.
(confirmation of material, welding bevels, mechanical test of welded parts, and so on)
- Full penetration in EB welding is not required.
- Partial design change is allowed even after fabrication.

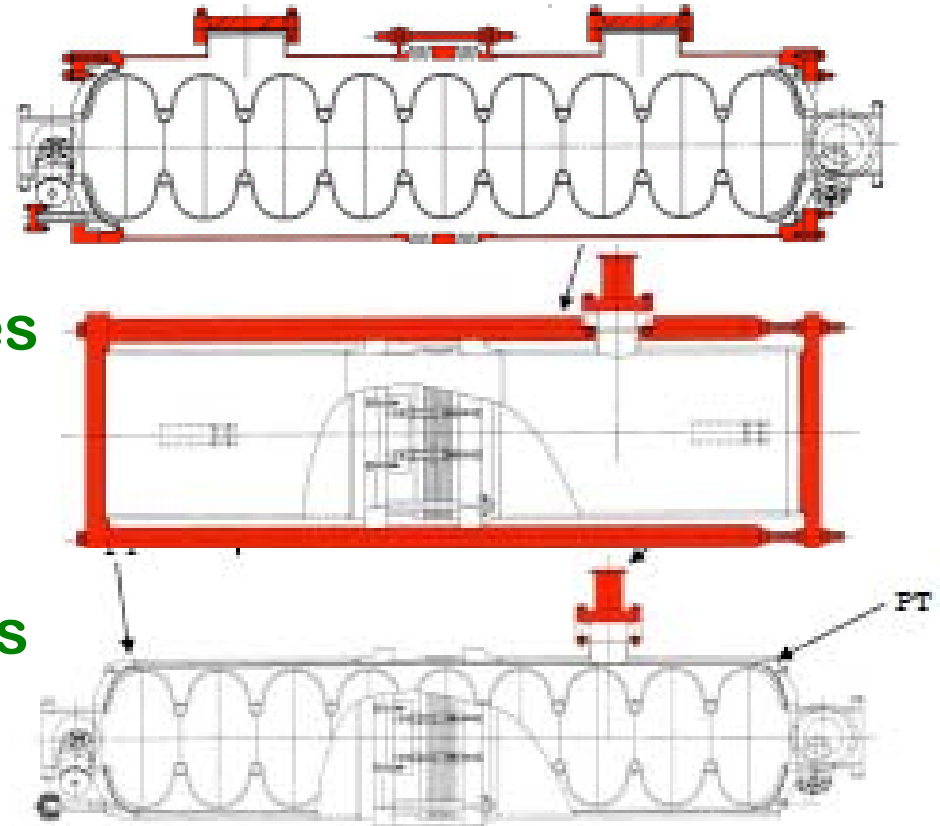
Fabrication process becomes more flexible and simple.



Pressure Test and Gas-tight Test

(with presence of KHK staff)

1. Nb Cavity ; at 1.5 times of design pressure (test with water)
2. Ti He Jacket ; at 1.5 times of design pressure (test with water)
3. Cavity Unit ; at 1.25 times of design pressure (test with gas)
4. Gas-tight test at normal pressure





Thank you
for your attention.....