KEK Application of High Pressure Gas Safety Regulation

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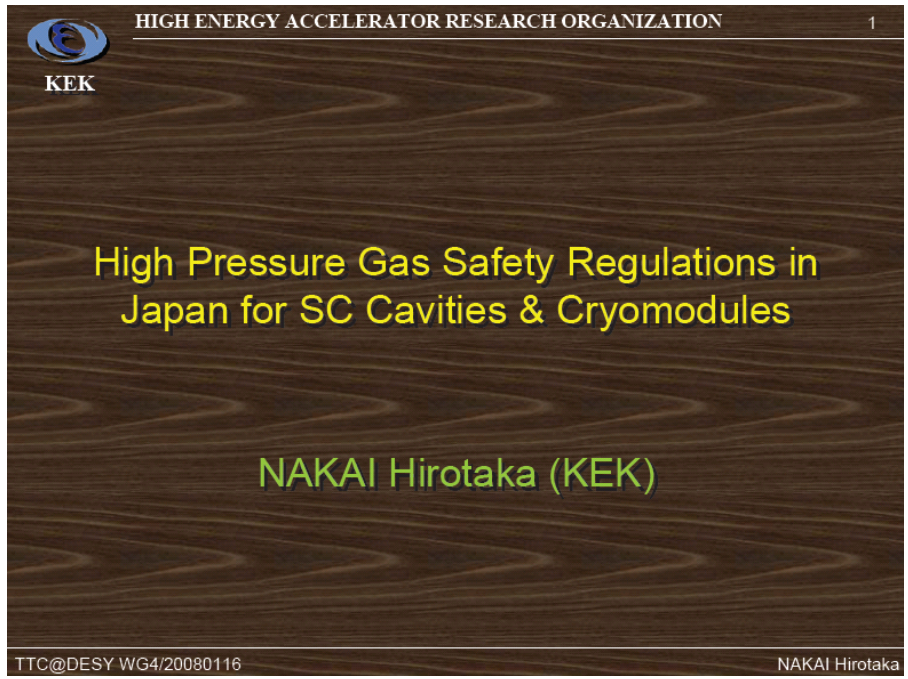
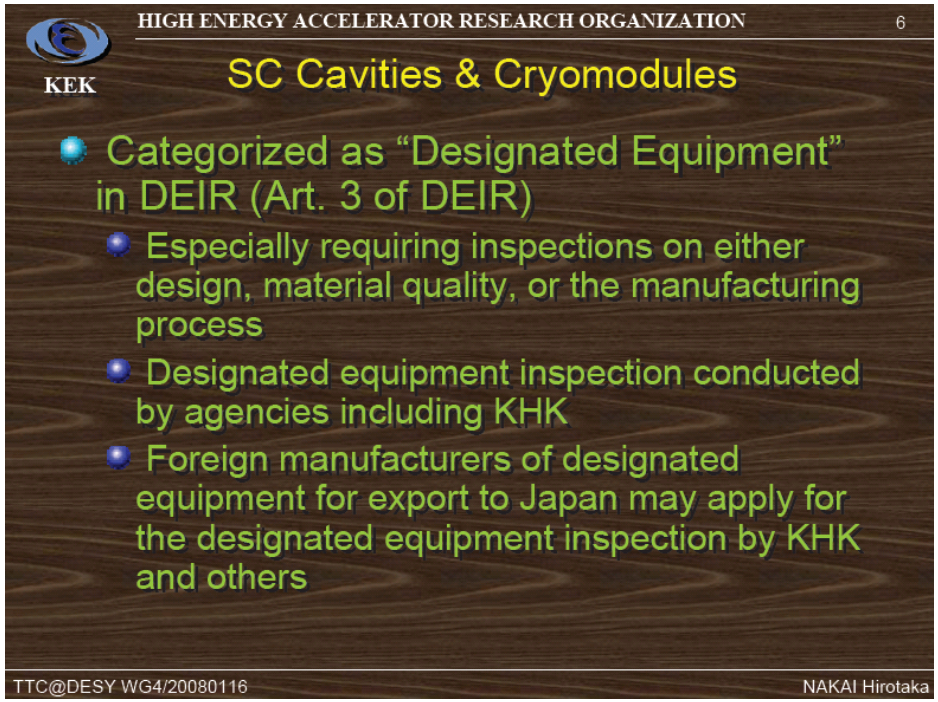
Previous Talk

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”

“Designated Equipment”



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

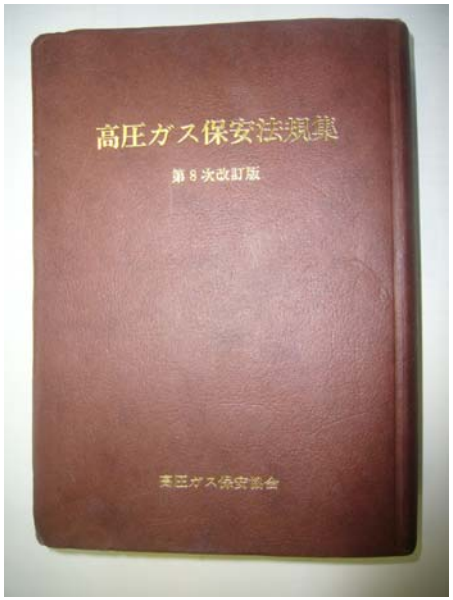
→ Increase of fabrication costs and Time consuming

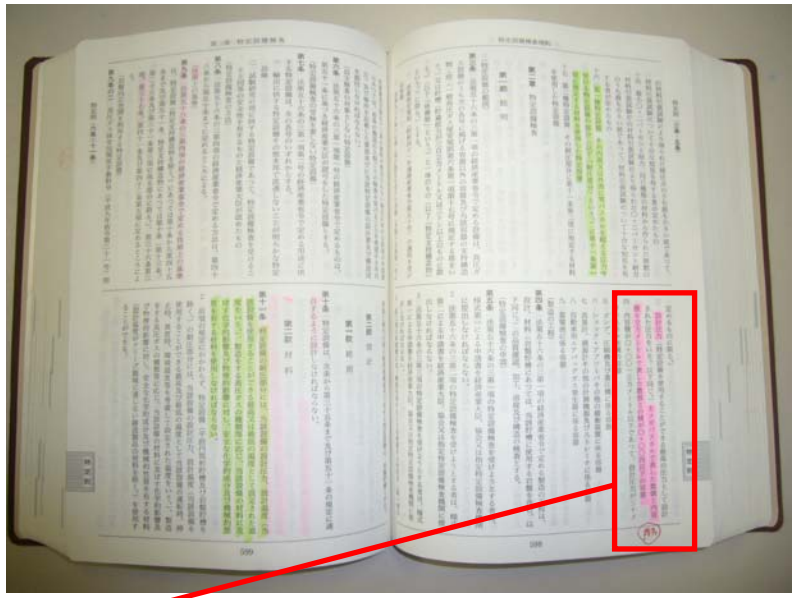
One Important Key-Point

$$P \times V < 0.004$$

P [MPa] : Design pressure
V [m^3] : Inner volume of vessel

High Pressure Gas Safety Regulation

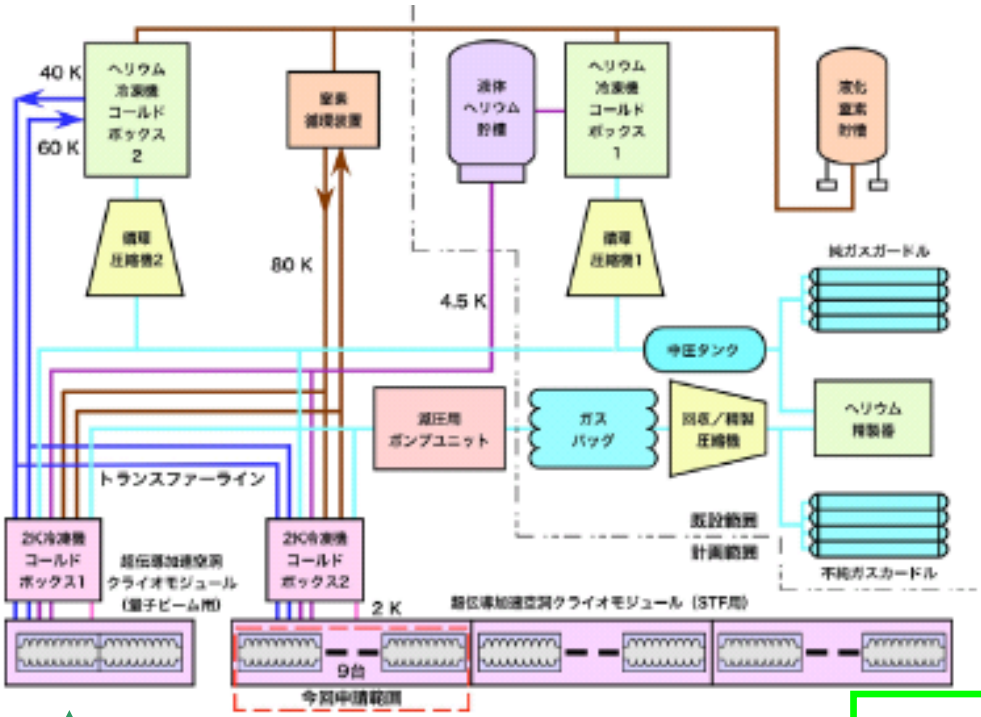




In case of
Design Pressure [MPa] x Inner Volume [m^3] < 0.004,
the vessel is excluded from the "Designated Equipment".

→ **"Standard" High Pressure Gas Equipment**

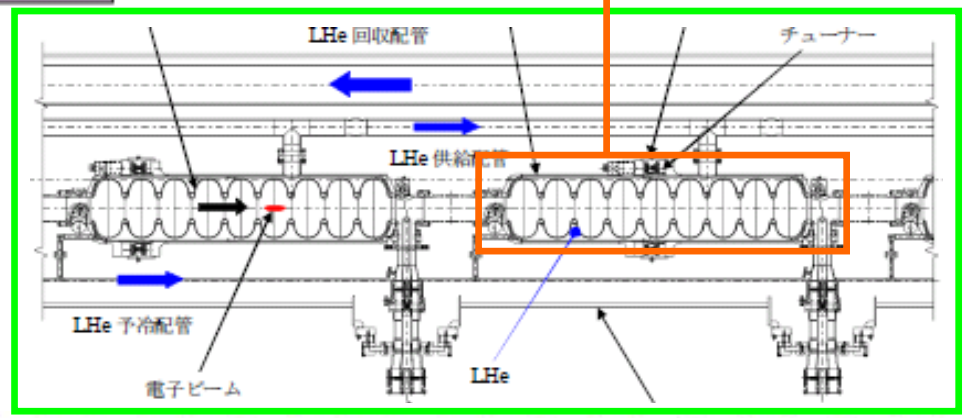
Construction of STF-2 Cryomodule



HPG Application for STF is divided to three items;

1. Cavity unit
2. Cryomodule
3. Refrigerator system

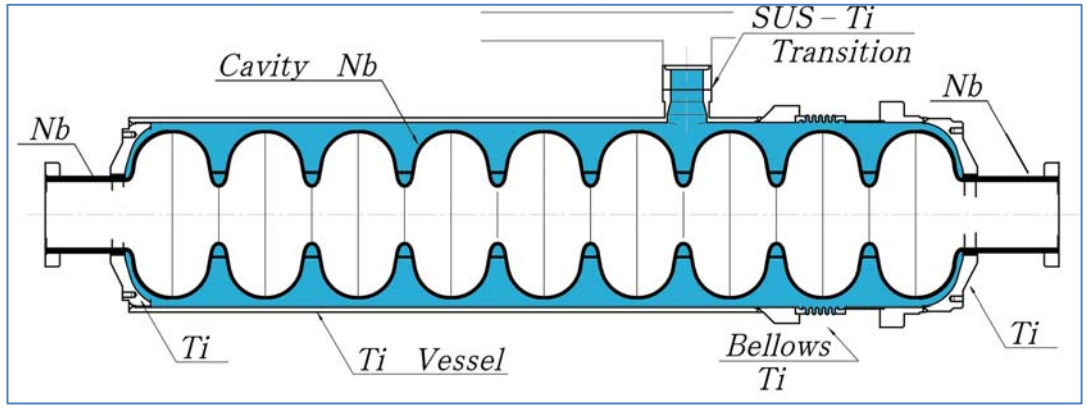
1 Cavity Unit



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 [m^3] : Inner volume of vessel
= He vessel – Cavity – Mag. Shield
= 0.016 m^3 (not include a 2K He supply line)

P x V = 0.2 MPa x 0.016 m^3 = 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.

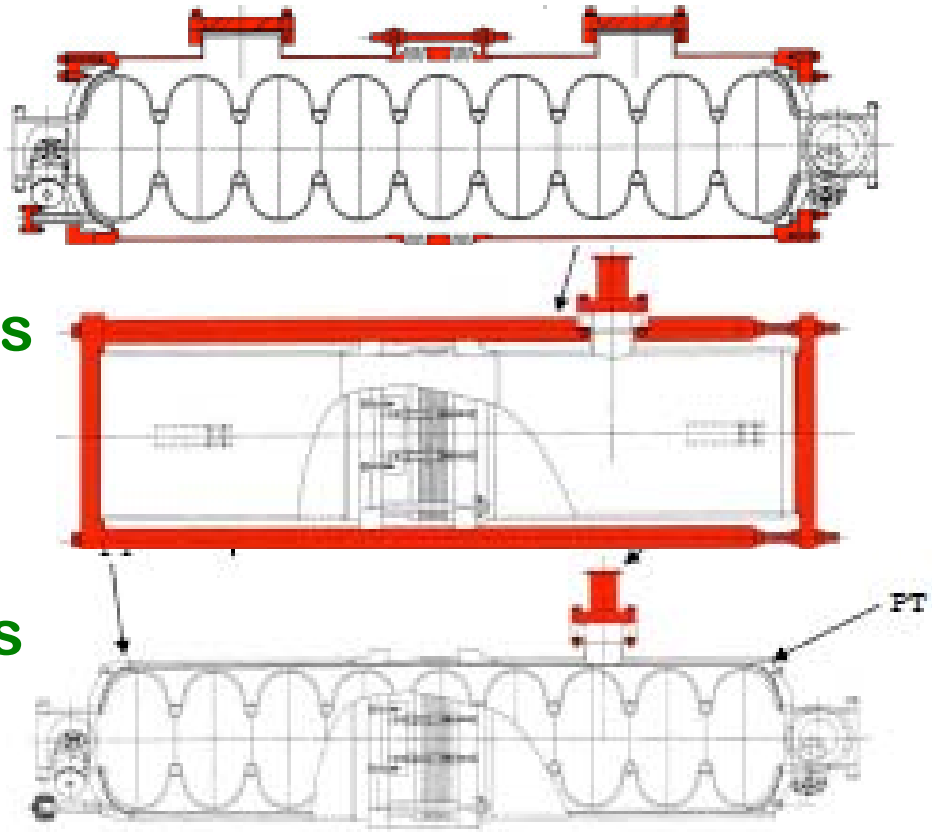
Pressure Test and Gas-tight Test

(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.....