

2003

가

Instrumentation Technology Development for Irradiation Test of Dry Process Fuel in HANARO

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150

가 5

2003 11

3

가

1

Abstract

The irradiation test of dry process fuel using a instrumented rig will be performed in HANARO from November, 2003. For this study, the instrumented rig was developed. The 3 center-line temperature sensors are inserted into each mini-element and in/out temperature sensors and thermal neutron sensor are attached around the element assembly. Instrumentation sensor & cable is designed to be connected by the remote connectors and they are located at the top of the rig to minimum the vibration of connectors. The remote pellet drilling device was developed to bore a center hole and the drilling test was performed in

hot cell. The micro-welding test was carried out to seal the mini-element equipped with a temperature sensor.

1.

1998 2002 가 4
. 2003 11 OR5
가 가 1
(Rig)
가 OR4 1999 8
4 1999 10 4 2
가
2 OR4 2000 5
10 2 [1].
가
3 SPND(Self Power Neutron Detector) 3
가 2001 6 8
2 1 SPND
가 가 가
HALDEN 1970
가
2000 7 가
가
5 5 가 4

2.

가 1998 4
4 6 가
5 가

2.1

4
1 , 1 6 가 3 ,
53mm
6 가
가
3 SPND
가
가
100mm 가
[1.1-1.3].

가. Guide

- 3 SPND , rod tip pin

. support tube

- 3 SPND

. (Element assembly)

- 3 SPND

- Housing support

* 가 142 mm sensor holder 가

* upper housing housing support

. Top guide

- Upper endplate

* sensor holder

- Top guide

* sensor holder

- Grapple head lock

* sensor holder

- Support tube

* Upper support tube upper housing

. Grapple head

- 101mm 가

* 101mm 가

* grapple head

* SPND grapple head hole

2.2

QA T QA
 가 가 Zircaloy-4 2,3 QA
 가 가
 6 가
 가

3.

5 가 4
 1 1986 3.21 %, 35,502 MWD/MTU
 25 cm
 20 가
 10.5 mm,

11.4 - 11.7 mm

1.3mm

4

5

4.

4.1 Seal tube

6

가

Zircaloy-4

sealing

6

seal tube 가

, inconel 600

seal tube

tantalum

sheath

sealing

. 0.15mm

sheath

180V, 5ms, 5Hz, 380

4.2

(He Leak Test)

seal tube가

He-

leak

가

. He-leak

3 bar He

가

. Seal tube

He leak

6

7

[1.4].

5. Data acquisition system

5

DAS(data acquisition

system)

8

0-10V

K-type

3

C-type

6

PC

PC

LAN

on-line

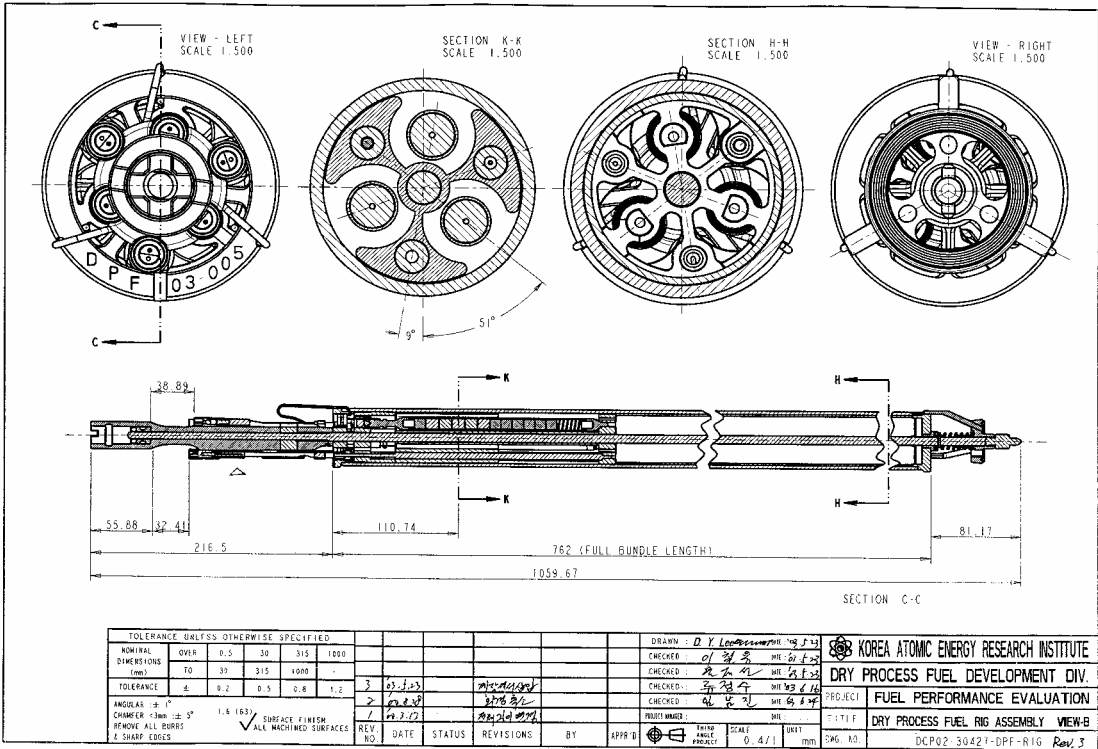
, trend

off-line

.6.

가 5 2003 11
6 가 .
3 가 ,
1 가 .
,
가
, 가 OR5
.

- 1.1 ., DUPIC , KAERI/TR-1484/2000,
, 2000.
- 1.2 ., 가 4 , , 2002.
- 1.3 , 5 , , QD-03-01, 2003.
- 1.4 , DUPIC , , QCI-03-01, 2002.



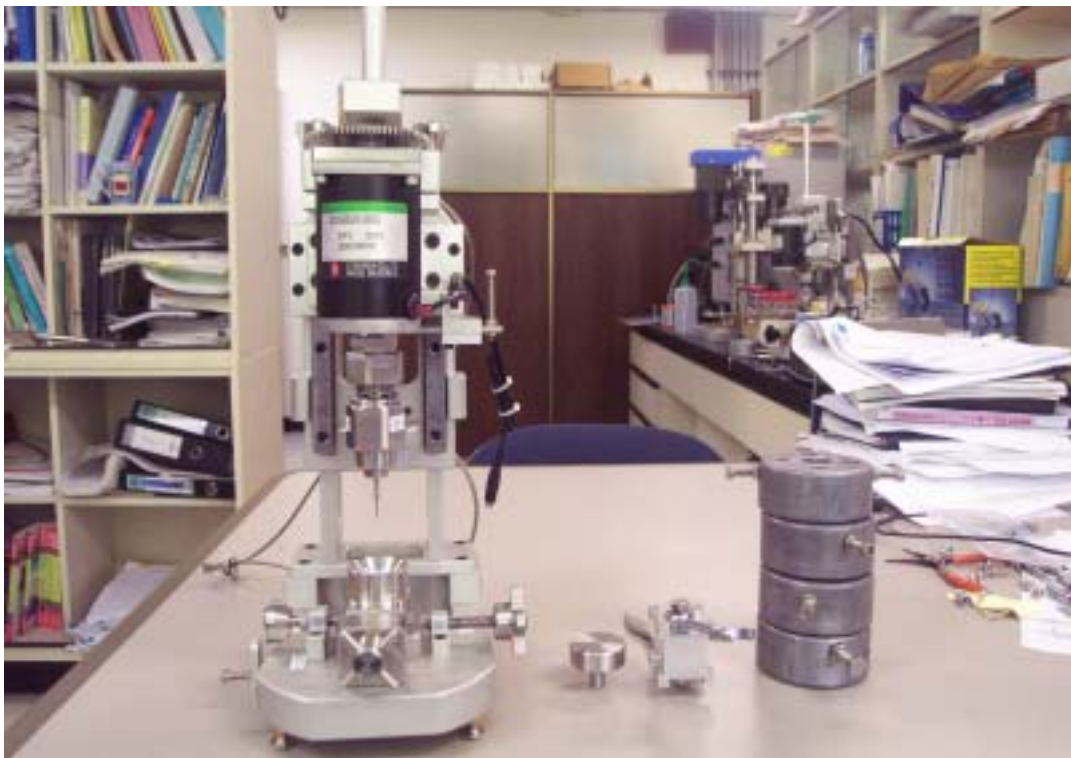
1.5



2.



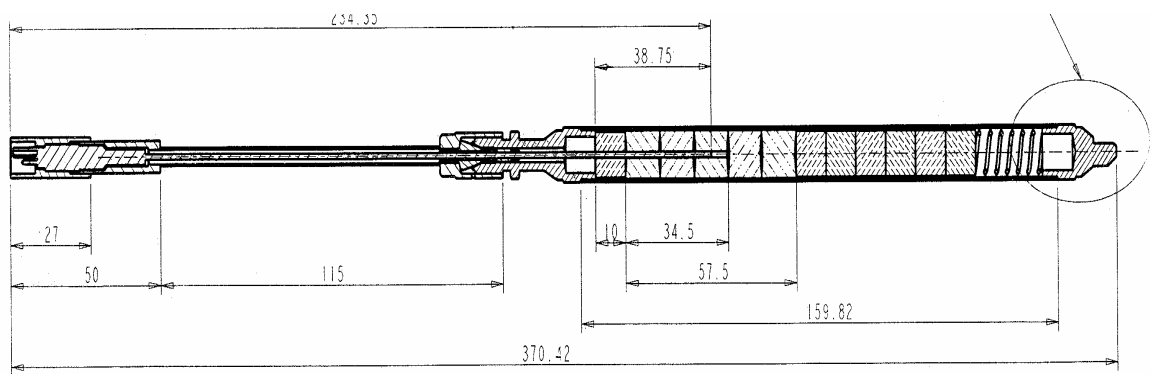
3.



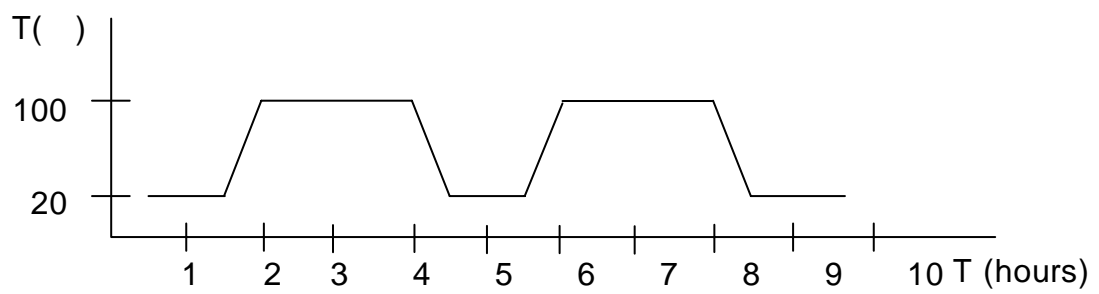
4.



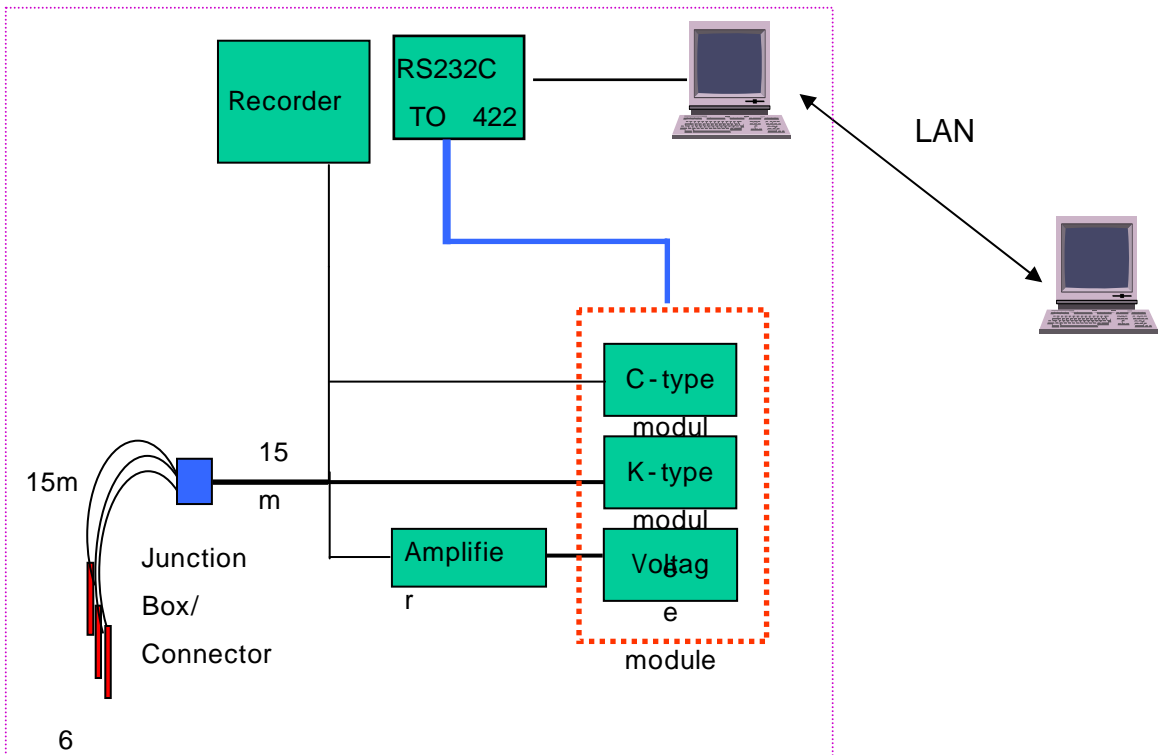
5.



6.



7. He - leak test



8. Data acquisition system