

**SPECIFICATION  
OF THE PARAMETER-SF3 EXPERIMENT  
(Addition)**

**ISTC Project 3690**

**2009**

## INTRODUCTION

Addition to “Specification of the PARAMETER-SF3 experiment” has been prepared to provide codes users with changes in the bundle design characteristic and instrumentations that have been made in SF3 experiment since the Specification was issued.

The changes address paragraph “**3. DESIGN CHARACTERISTICS OF PARAMETER FACILITY**” of Specification.

### 3.1. Test section

Before experiment starting the lower part of the test section is filled with water up to the elevation of – 822 mm for the electrodes cooling down (see Protocol of the results of PARAMETER-SF2 experiment (April 3, 2007), Fig. 7).

### 3.2. Test bundle

The following changes were made in the test bundle (see Table 3 of Specification):

1) Location of steam/argon inlet (radial), mm	-372 (270°/90°)
2) Fuel rod unheated (diameter of central hole, mm)	4.2 <sup>+0.15</sup>
3) FA shroud (diameter/wall thickness, mm)	69.7/1.2
4) FA shroud length, mm	1450
5) Thermoinsulation length, mm	1450

Fuel column length in the central unheated rod is ~ 2200 mm (Fig.1).

To avoid increase of flow area at periphery of the test bundle due to use shroud with larger internal diameter (SF3 shroud  $\varnothing$  69.7×1.2 mm was used instead of SF2 shroud  $\varnothing$  70×2 mm), twelve Zr-1%Nb cylindrical solid rods  $\varnothing$  4 mm were installed in the bundle. The rods were inserted in the test section from the bottom up to the elevation 1300 mm. Length of two rods was reduced to allow installation of pressure sensors p10 (Z = 1000 mm) and p12.5 (Z = 1250 mm).

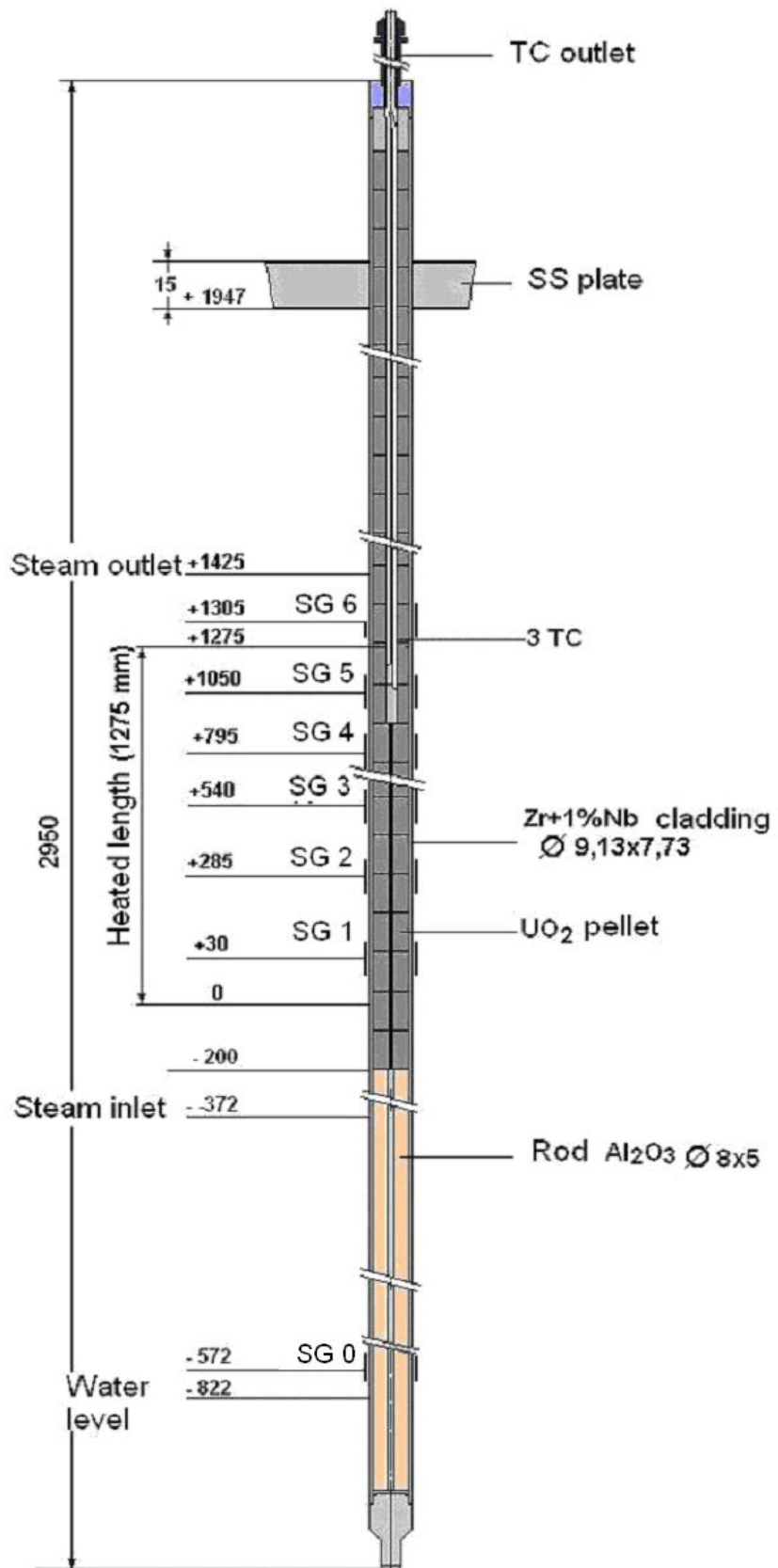


Fig. 1. Unheated fuel rod.

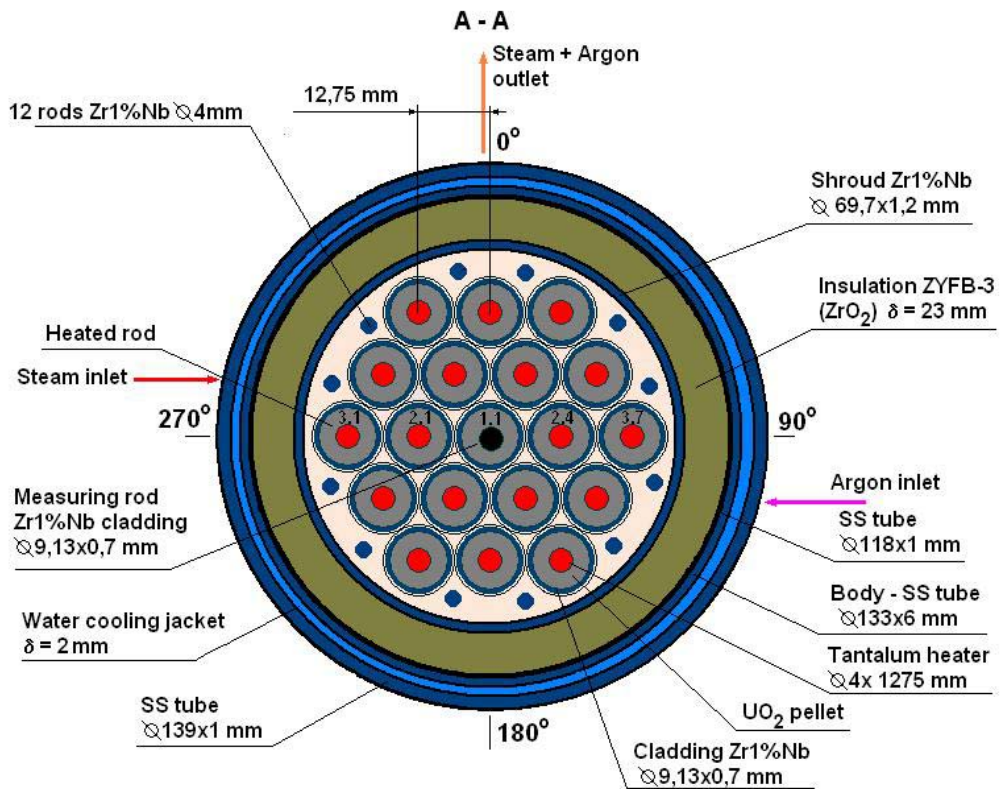


Fig. 2. Cross-section.

### 3.3. Test bundle instrumentation

In SF3 test bundle to measure claddings temperature at the elevations above 800 mm high-temperature WRe5/20 thermocouples are used. The lower bundle region, i.e. below 800 mm elevation, was instrumented with Ch/Al thermocouples. The leads of the Ch/Al thermocouples leave the test section at the bottom whereas the WRe TC are routed to the top avoiding to rout TC through the hot zone.

Changes in Table 4 related to the elevations up to 800 mm are the following:

- table rows 11 (T230.5), 25 (T397), 28 ( $T_{st}8$ ); 8 (p-1.5), and 16 (p2) are deleted;
- Ch/Al thermocouples T3127 и T248 to measure 3.12 and 2.4 rods claddings temperature at the elevations 700 and 800 mm are added.

Corrected list of instrumentation of the test section region above 800 mm elevation is given below.

No.	Designation	Type	Instrument, location	Output in
27	T118	WRe	TC, center line of fuel rod 1.1, 800 mm	°C
28	T239	WRe	TC, Fuel rod 2.3, 900 mm	°C
29	T399	WRe	TC, Fuel rod 3.9, 900 mm	°C
30	P10	-	Pressure sensor near fuel rod 3.2, 1000 mm	MPa
31	T <sub>sh</sub> 9	WRe	TC, Shroud outer surface (opposite fuel rod 3.8), 900 mm	°C
32	T <sub>th</sub> 9	Ch/Cop	TC, Thermoinsulation shroud inner surface (opposite rod 3.8), 900 mm	°C
33	T2110	WRe	TC, Fuel rod 2.1, 1000 mm	°C
34	T3310	WRe	TC, Fuel rod 3.3, 1000 mm	°C
35	T3810	WRe	TC, Fuel rod 3.8, 1000 mm	°C
36	T2611	WRe	TC, Fuel rod 2.6, 1100 mm	°C
37	T3411	WRe	TC, Fuel rod, 1100 mm	°C
38	T3711	WRe	TC, Fuel rod 3.7, 1100 mm	°C
39	T <sub>sh</sub> 11	WRe	TC, Shroud outer surface (opposite fuel rod 3.1), 1100 mm	°C
40	T <sub>th</sub> 11	Ch/Cop	TC, Thermoinsulation shroud inner surface (opposite fuel rod 3.1), 1100 mm	°C
41	T1112.5	WRe	TC, center line of fuel rod 1.1, 1250 mm	°C
42	T2212.5	WRe	Fuel rod 2.2 cladding temperature, 1250 mm	°C
43	T3612.5	WRe	Fuel rod 3.6 cladding temperature, 1250 mm	°C
44	T31012.5	WRe	Fuel rod 3.10 cladding temperature, 1250 mm	°C
45	p12.5	-	Pressure sensor near fuel rod 3.7, 1250 mm	MPa
46	T2513	WRe	Fuel rod 2.5 cladding temperature, 1300 mm	°C
47	T3213	WRe	Fuel rod 3.2 cladding temperature, 1300 mm	°C
48	T3513	WRe	Fuel rod 3.5 cladding temperature, 1300 mm	°C
49	T <sub>sh</sub> 13	WRe	Shroud temperature (opposite fuel rod 3.6), 1300 mm	°C
50	T <sub>th</sub> 13	Ch/Cop	Thermoinsulation temperature (opposite fuel rod 3.6), 1300 mm	°C
51	T1114B	WRe	TC, center line of fuel rod 1.1, 1400 mm	°C
52	T1114	WRe	TC, Fuel rod 1.1, 1400 mm	°C
53	T31114	WRe	TC, Fuel rod 3.11, 1400 mm	°C
54	T31'15	WRe	TC, Fuel rod 3.1, 1500 mm	°C
55	p15	-	Pressure sensor near fuel rod 3.10, 1500 mm	MPa
56	T <sub>st out</sub>	WRe	Steam temperature at the outlet of the test section, steam outlet nozzle, 1425 mm, 0°	°C

The system of measurement of model assembly test parameters includes 39 TCs for measuring the fuel rod cladding temperature at 22 elevations: from -600 to +1500 mm (with 100 mm interval along heated zone); 3 TCs for measuring temperature inside fuel rod 1.1; 8 TCs for measuring the shroud and thermoinsulation temperature at 4 elevations (700; 900; 1100 and 1300 mm) and 3 TC for measuring the temperature of steam and argon at the inlet and outlet of the test section.