

Installation of IPS in HANARO

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1. Introduction

Installation IPS in HANARO, comprise following activities. [1]

- Removal of By-Pass line
- Replacement of IR-1 Flow tube
- Trial installation of IPS
- Adjustment of IPS elevation
- Welding of IPS Nozzle to In-Pool Pipe
- Installation of instrumentation and 1/4" Tube
- Hydro and Pneumatic test

2. Installation and Test

2.1 Helium leak test

The following volumes are helium leak tested after pressure testing using the methods of References [2] and [3]

- Main pressure boundary defined by the primary seals at the PV flange, top flange and instrumentation feedthrough, with the coolant pipes blanked off
- The outer pressure vessel
- The interspaces between the various primary and secondary (back-up) seals

For each of these tests the leak rate shall be no greater than 5×10^{-9} torr litre/s.

2.1 Installation design

IPS nozzle is to be welded with existing In-pool pipe and 1/4" tubes are connected to the IPS.

2.2 Hydro test

Test of the IPS Head, top flange and inner pressure vessel to 125% of the Design Pressure.

2.3 Pneumatic test

After completion of installation of IPS the 1/4" tubes are pneumatically pressure tested at 8 bar g using air or inert gas at room temperature.

The pressure is gradually increased to 4 bar g then in steps of 0.8 bar to 8 bar g, where it is maintained for at least 10 minutes.

3. Results

3.1 Measurement

After the installation, elevation is measured for the confirmation of its design. Fig. 1 shows the installed IPS shape and dimensions.

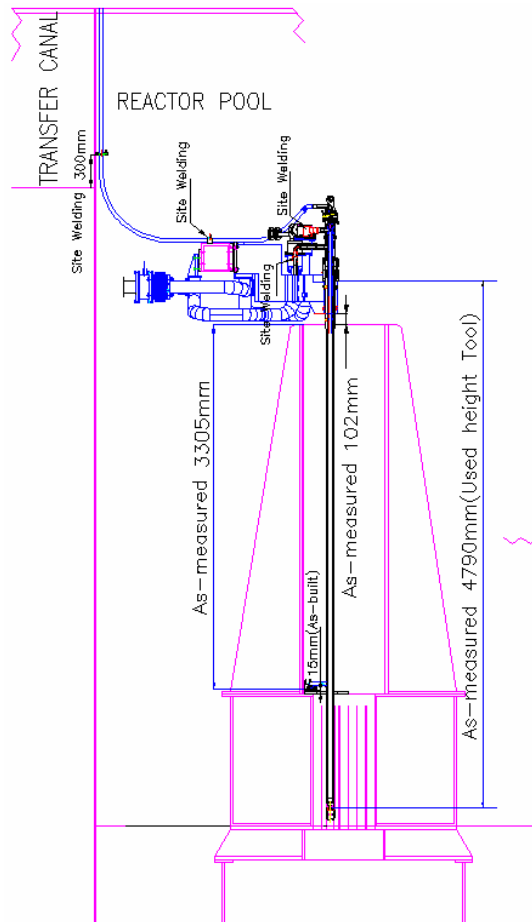


Fig. 1 Installed shape and elevations

3.2 Test results

Table 1 gives the results of the hydro test and pneumatic test.

Table 1 Test results

Test	Results	Criteria
Leakage	2×10^{-9} (torr litre/s)	5×10^{-9} (torr litre/s)
Hydro	Pass	21.87 MPa, Holding 10 min
Pneumatic	Pass	8 bar, g Holding 10 min

4. Conclusion

1. As-built measurement data shows the 1 mm lower installation elevation than the designs but the value is within the installation tolerance.
2. Test results are within the criteria.

3. The data during the IPS installation procedure will be used for the next IPS installation.

REFERENCES

- [1] Procedure for Installation of In-Pool Equipment, HAN-FL-E-300-R009, Revision 0
- [2] Section V 2001 (as amended July 2003), Non-Destructive Examination
- [3] Standard test methods for leaks using the mass spectrometer leak detector in the detector probe method