TEST PROTOCOL FOR PUBLIC DEMO

Test code: 3.2.30

Hyperion lab devise Functional & Performance Test protocol

Test Plans & Test Results

By: Defkalion GT S.A. R&D Team

Table of contents

Hyperion devise Functional & Performance
Test Plans & Test Results

PART I: TEST plan 3.2.30, objectives and permissions (DEFKALION INTERNAL DOCUMENT as part of this protocol)

R5.1 lab prototype testing procedures

Overview

The 3.2.30 scheduled test on Defkalion GT's lab reaction triggering procedures is part of the series of triggering and performance tests of R5 series lab prototype reactions focusing to investigate conditions that influence reaction's triggering and performance versus expected phenomena.

Test Description; Sub-Systems/ Critical Components Being Tested; Main test objectives; Secondary test objectives

Test description

3.2.30 testing of Hyperion Single Reactor Kernel will follow the same procedure as for all 3.X.X testing protocols. Reaction will be triggered in the R5 type reactor (R5.1, using the following test parameters:

Test parameter	Condition	Remark
Atomic Hydrogen production method	SP	As identified in ICCF17 paper by J. Hadjichristos et all
Internal structure	Typical 5.1	
Calibration and control	Calibration of instrumentation Control run using Argon	Argon "blind test" run before the H2 run (actual test)
Leakages control	Yes	H_2 under pressure at min 10bar
Ni mixture	No V04 sample, prepared 4gr	
Initial dry preparation	Yes	With parallel heating up to 200C, for 25min, vacuum for at least 12h prior to the test
Electric pre- heating	Yes	
H_2 or Ar	1st input: >1,1 bar 2nd input, 1,1 bar when reaching mixture temp if required	
Safety levels	Not changed	

Sub-Systems/Critical Components being tested

R5 Kernel reaction ignition

Reaction ignition is expected following the atomic hydrogen production only with the method SP (high voltage spark generator)

Main test objectives

- **Control (Start, Stop, Increase, Decrease) Reaction ignition**
- **Reaction duration to produce enough energy to exceed equivalent energy of a chemical reaction of mass of components internal to the reaction chamber**
- **Total accumulated energy output divided by total accumulated energy input greater than 1.1 on the active test and less than 1 in the Ar control test**

Independent testers/observers

The test will be performed in the presence of:

- Paolo Vitulo (University of Pavia – Researcher for CMS Project, CERN – Geneve),
- Raymond Zreick (News editor, Focus),
- Mats Lewan (Journalist, NyTechnik)
- A member of CICAP (Italian comitee for the control on scientific scams). His name will be announced on Monday, 22.

from Defkalion GT application lab in Milan, Italy. Test will be photographed and videoed from DGT and broadcasted **live** to ICCF18. A short pre-recorded introduction will be broadcasted also before the start of the live test (to be repeated 1 or 2 times during the test without disturbing data broadcast using slit screens)

Test objectives.

- Run Control test using Argon (instead of H2) in the same conditions and with all "powders" in presence within the reactor to isolate the dependence of Hydrogen in the reaction
- Run the test for as long as required to assure that excess heat is not due to chemical reactions
- To calibrate flow meters using scale and stop watch during tests.
- To spot check the power measurements with independent loop meter provided by DGT (RMS factored post test on LabView data) and.

Approval

Approved by: John Hadjichristos, Stavros Amaxas, Luca Gamberale (June 20th 2013., RDF VLT 012/7/2013)

Distribution:

Team Head Members

John Hadjichristos, Luca Gamberale, Stavros Amaxas

Ciro Areni, Fabio Salvaggio,

PART II : Test scheduling

Test Strategy

*Note to Teams: The important components of the **Test Plan** and later **Final Test Plan** are:*

1. ***Reactors type R5***
2. One reactor of type R5 will be configured to run with flow calorimetry.

A R5.1 similar to th one operating will be weighted.

3. ***Monitor temperature***

Calibrated thermocouples will be present inside the reactor chambers, on the external surface of each reactor and in In and Out of the coolant circuit. All temperature monitoring will be through the same DataLogger (NI) and National Instruments Lab-View software. Data sampling every 3 sec.

Observer's thermocouples can be attached in parallel with DGT LabView thermocouples on the coolant circuit.

Pressure will be monitored and logged using both a manual pressure meter on the hydrogen circuit and a digital pressure meter to Data Logger. Data sampling every 3sec.

4. ***Electric consumption of heating element***

Sampling/data logging for electric energy to the heating elements will be through Carlo Gavazzi accuracy measure M2172D-3 phase energy meter will be every 3 sec, logging data in NI board. Manual or when changing conditions upon request of the independent observers/testers, using portable clamp A/V meters. L1 is used to power heating elements.

5. ***Electric consumption of spark high voltage***

Sampling/data logging of triggering currents will be through Carlo Gavazzi accuracy measure M2172D-3 phase energy meter will be every 3 sec, logging data in NI board. Manual or when changing conditions upon request of the independent observers/testers using portable clamp A/V meters. L2 is used to power triggering high voltage mechanism.

6. **Flow meter**

Coolant in use to perform calorimetry will be water. Flow meter will be performed with an Alpha Dynamic (Australia) AM2S pulse (1/4') logging to NI board every 3 sec.

7. **Maintenance of reaction**

After pre-heating the reaction to its triggering level, maintenance of the reaction will be performed with the triggering method, decreasing electric energy to the heating elements and increasing the coolant flow in order to maintain the internal temperatures in the reaction as steady as possible.

What you'll test (and what you won't test)

.

Transmutations and gamma spectrum or gamma emissions will not looked at.

How you'll test: equipment and materials needed, test configurations and procedures

Equipment tested:

As shown in Graph below

Test procedures

1. Leakages testing before tests
2. Test will run in two phases:
    a. Phase I: Run R5.1 with the same input values as any active H2 tests, using Argon instead of Hydrogen as input gas (control test).
    b. Phase II: Run R5.1 with the same input values as with the Phase I test above using Hydrogen instead of Argon as input gas (active test)
3. Calibration/ Accuracy Control curves
    a. Run in R5.1 with Argon in the same apparatus with the test run
    b. Check the accuracy of flow meter with scaling of coolant at 2 different levels (0.2 – 0.8 lt/min)
    c. Measure input electric energy during and after each test using RMS clamp meters versus the recorded in the data logging system.
    d. Calculate measurement error of each instrument.
4. Cool the reactor after shutting down reaction

5. Test procedure
    a. Prior to start of test , dry and hold vacuum in reactors heating to 200C for 45min (approx) and maintenance the vacuum into the reactor's chamber for at least 12h. Leave the reactor to cool to room temperature (first run only)
    b. 1^{st} input of Ar at approx 1,2 bar
    c. Preheat the reactor
    d. Trigger sequence when reaching proper conditions
    e. Maintain the input condition for the period of approx 1.5h by monitoring output power vs input power
    f. Shut down all input energy
    g. Cool the reactor to room temperature and vent Ar using vacuum pump.
    h. Maintain vacuum for at least 30 mins.
    i. 1^{st} input of H_2 at a pressure in the range 1-2 bars
    j. Preheat the reactor
    k. Trigger reaction
    l. 2^{nd} input of H_2 if we observe a leak

m. Maintain the reaction for the period of approx 3h by monitoring output power vs input power.
n. Shut down all input energy
o. Cool the reactor to room temperature

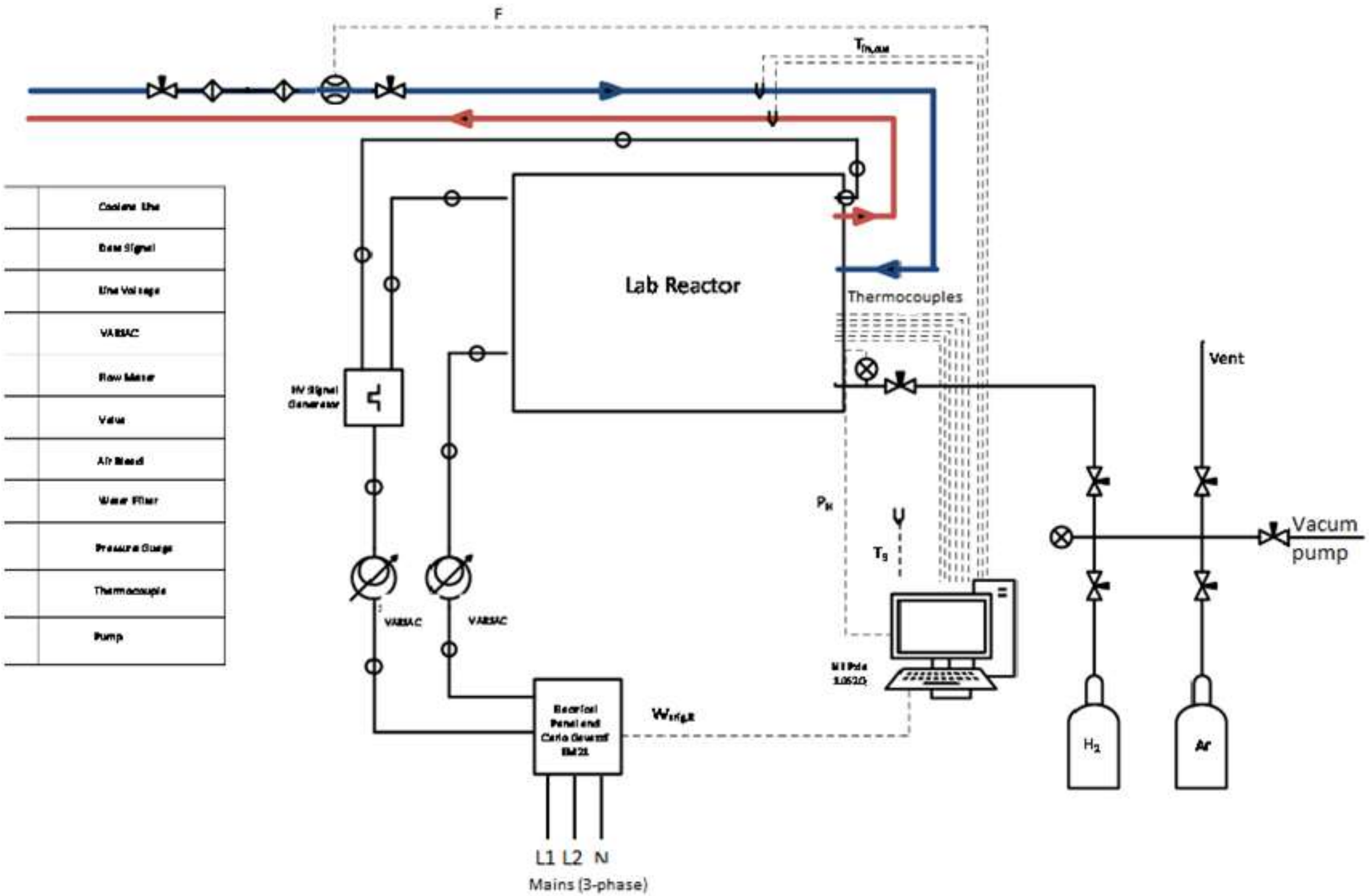
6. Test data logging:
    a. T1(internal), T2, T3, T4, T5, T6 (external on reactors body) from R5.1
    b. T-in and T-out of coolant
    c. Water flow rate
    d. Pressure in hydrogen circuit
    e. Power in from L1+L2 -> TOTAL

Reactor and Test Equipment available

As shown in the following diagram:

defkalion green technologies

Test equipment configuration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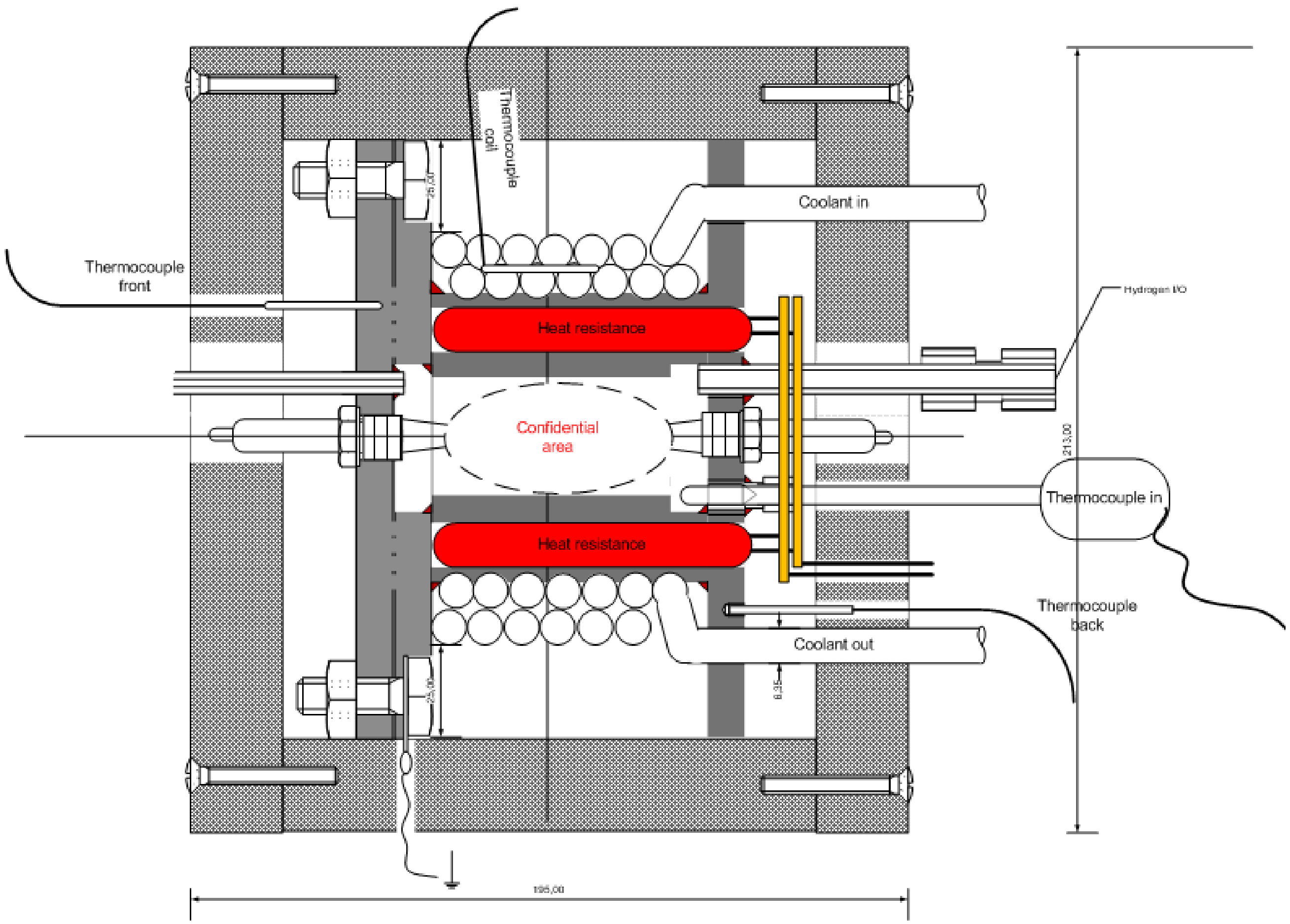
Lab Reactor
Thermocouples
Vent
Vacum
pump
P_R
T_g
H_2
Ar
VARIAC
VARIAC
L1 L2 N
Mains (3-phase)
Coolant Line
Data Signal
Line Voltage
VARIAC
Flow Meter
Valve
Air Bleed
Water Filter
Pressure Gauge
Thermocouple
Pump



(Thermocouple T_body in one of the hole heaters)

New Definitions; Important Terminology; Key Words

The following table describes the sensors attached and the name of the records in the log files:

The actual names and sequence of the data columns are the following

No.	Notation In report file	Notation used In data files	Description
1	T_3	Tamb	Room temperature
2	T_4	T_back	Temperature of back flange of the reactor
3	T_5	T_front	Temperature of front flange of the reactor
4	T_1	Tinside	Temperature inside the reactor
5	T_{in}	Tin	Coolant (cold) input temperature
6	T_{out}	Tout	Coolant (hot) output temperature
7	$T_{6.1}$	T_body	Temperature signal around the reactor from a thermocouple placed in one of the holes (#1) next to heating resistors. Appears as T_6
8	T_2	Tcoil	Temperature between the two coils rounding the reactor where the coolant is driven.
9		Pressure (bar)	Internal gas pressure
10	W_R	P in (heaters) W	Electric consumption of pre-heating resistors
11	W_{Trig}	P in (HV) W	Spark generator electric consumption
12		Pout (flow)W	Energy output from the system
13	F	Flow(lt/min)	Current water flow
14		Minutes since start	Minutes since start logging