

**Annex 1:**

## **Operational boundary conditions for JET restarts and campaigns in 2015/16**

Operation of JET in 2015/16 will concentrate on the full exploitation of the ITER-like Wall. The current shutdown is planned to finish in June 2015. The work during this shutdown includes: a) re-instating the ITER-like Antenna (ILA), b) optimising pellet fuelling and pacing tracks, c) installation of a third disruption mitigation valve, d) refurbishing of some of the divertor tiles, including replacing the tie-rods in tile 7, e) removal of tile samples including the tungsten lamellae from the melt experiment, f) investigating recent failures of the magnetic pick-up coils and g) reconditioning of NBI sources in the test-bed. Also, a newly modified stack-A (tile 5) with specially shaped W-lamellae will be installed to provide spatially resolved IR measurements and more data on W-melting. Due to resource limitations, the LHCD system will not be available until further notice.

Following the shutdown, a Restart phase is planned from the end of June to mid-October 2015, with first plasma expected by mid-August 2015. The target of the Restart phase is to demonstrate operation up to 3MA, a neutral beam power capability of 28 MW for 3s and ICRH up to 4MW in H-mode, with test of the ILA up to 2MW. The diagnostics should be fully commissioned and calibrated with plasma. These ambitious Restart targets will allow a start of the Campaigns at high performance levels of the heating systems with a full capability for the scientific exploitation of ITER-like Wall.

At the end of Restart and the beginning of the experimental campaigns it is planned to rehearse the technical and safety aspects of DT operation (with deuterium plasmas). This will exercise the requirements for DT operation and procedures (including personnel safety). The rehearsal will also determine the readiness of the Active Gas Handling Systems (AGHS) to supply gas (deuterium in this rehearsal) to one neutral beam box (in octant 8) and a Gas Introduction Module (GIM15). This rehearsal is planned for 5 weeks, in parallel to the experimental programme in October-November 2015. During this rehearsal, the number of discharges per shift is reduced by 30%.

During the campaigns, the neutral beam injection system (up to 34MW, see table 1) will be available together with a total ICRH power of up to 9 to 10 MW (including ILA, see table 2). The pellet system should for the first time with the ITER-like Wall be capable of delivering pacing and fuelling pellets at high (> 80%) reliability, while the new DMV will allow further studies of disruption and runaway electron beams and their mitigation. New (or refurbished) diagnostics will come on-line, such as a correlation reflectometer, more flexible TAE amplifiers, a neutral particle analyser and a vertical compact neutron spectrometer.

The campaign is planned to start on 19/10/2015 and to finish on 4/4/2016. The experiment plan includes maintenance days, holidays and additional restart days in early January 2016. Operating 5 days a week, the total numbers of campaign days available will be 101, given a total of 202 shifts for the experimental programme.

Following, the 2015/16 campaigns on 4/4/2016, JET will have a pre-DT shutdown until the end of 2016, so as to complete the preparations for the 100% tritium and DT campaigns in 2017.

Table 1: Neutral beam heating system capabilities for 2015/16:

Parameter	Gas species		
	H <sub>2</sub>	D <sub>2</sub>	<sup>4</sup> He
Maximum beam energy (keV)	90*	125	120
Maximum power per PINI (MW)	1.0*	2.16	1.56
Maximum power per NBI box (MW)	8.0*	17.3	12.5
Maximum total power (MW)	<b>16.0*</b>	<b>34.6</b>	<b>25.0</b>
Restart 2015 target		<b>28 MW</b>	

\*: The power in hydrogen may be reduced after review of the NBI system.

Table 2: RF heating systems capabilities for 2015/16:

System	Power in H-mode		
	33 MHz	42 MHz	51 MHz
Four A2 Antennas (MW), 28-56 MHz	4-6	6-7	4-6
ITER-like Antenna (MW), 33-49 MHz	2-3	3-4	-
Maximum ICRH power (MW)	<b>7 - 9</b>	<b>9 - 10</b>	<b>6</b>
Restart 2015 target (H-mode) – A2 – ILA	<b>3 MW</b> *	<b>4MW</b> <b>25kV</b> <b>(~2MW)</b>	<b>3MW</b> *
LHCD	<b>Mothballed → 0</b>		

\*: Other ILA frequencies will become available during the campaigns.