ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

EUROfusion

Magnetic Characterization of Superconductive Strands in the ENEA-VSM Test Facility

SA-SE.OP.SSO.01-T002 - D003

31/05/2024

WPSA – Status Meeting

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Outline

- TS Title: **2024 Cryogenic system and magnet**

- TS Ref. Nr.: **SA-SE.OP.SSO.01-T002** (Task coordinator Quentin Le Coz)

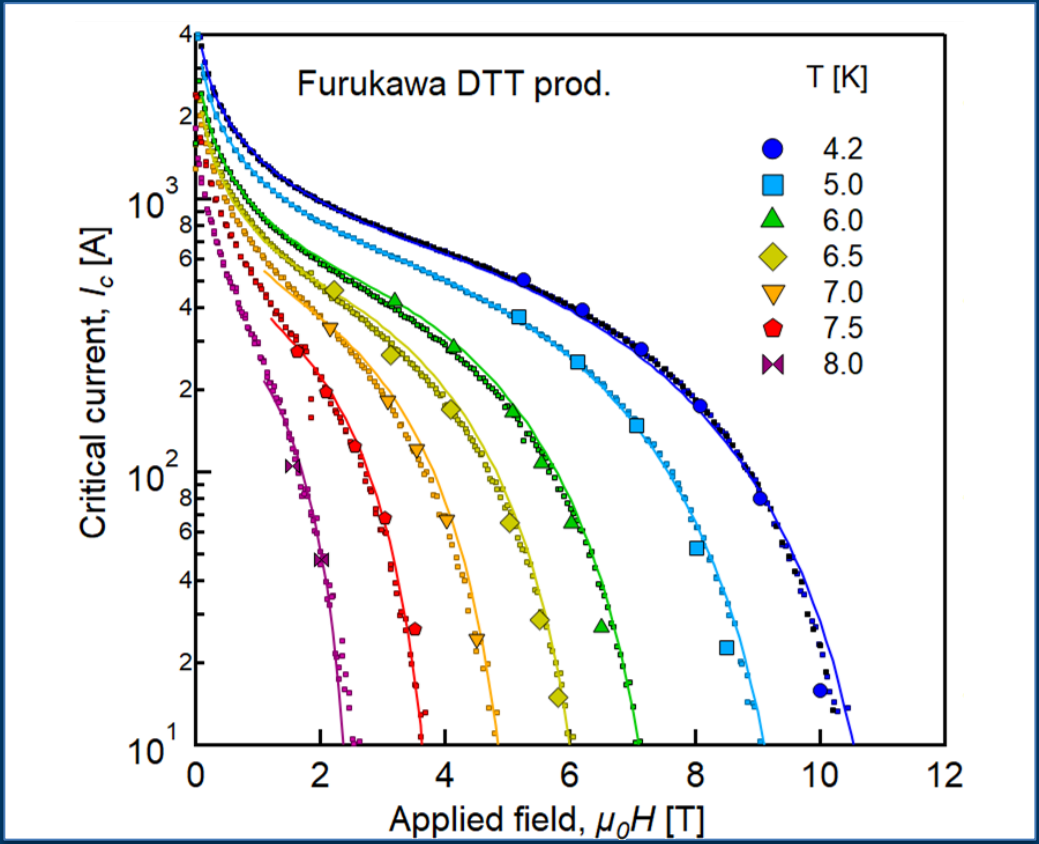
  Tech. spec.: *Magnetic characterization of conductor samples and QDV analysis*

- Deliverable **SA-SE.OP.SSO.01-T002 - D002**
- *Magnetic Characterization of Superconductive Strands in the ENEA-VSM Test Facility*:

  Activities will focus on the magnetic characterization of superconductive strands in the ENEA-VSM test facility. The hysteresis losses, obtained from the magnetization loops, will be used for the assessment of the cable performances. The foreseen samples to be tested are the two types of NbTi strands used in the EF coils and a Nb_3Sn strands of the CS magnet.

STATUS

- Following the updates in the weekly meetings
- NbTi and Nb_3Sn sample shipment on-going (CEA→ENEA)
  - 50cm-lenght strands; Nb_3Sn to be heat-treated in Frascati
- VSM repair contract signed, company visit schedule to be arranged
- Draft of test program edited
  - Similar to JT-60SA TF strand one, with 1 field sweep at ~ 9T and several T scans between 4.2 K and 6.5 K



Results of transport (markers) and magnetization measurements (small square symbols) at several temperatures versus the applied magnetic field. Lines represent the fit to the *two-component model* for the NbTi critical surface.

NbTi strands measured at ENEA

- ITER WST 2580D2
- JT60-SA Luvata C2
- Furukawa DTT PF

L. Muzzi *et al*., IEEE TAS 21. 3132 (2011)

Table 3. Parameters of the two-components model [10,11] for the critical surface of the Furukawa NbTi strand, DTT-PF production.

Parameters	Units	Value
C_0	kA·T·mm^{-2}	32.59
T_c	K	8.93
B_{c20}	T	15.79
δ	-	0.65
α_1	-	2.07
β_1	-	2.32
α_2	-	0.71
β_2	-	5.27
γ	-	1.64
n	-	1.7

Thank You
For Your Attention

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