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## Sun-Mo-Or1-05: Lessons learnt from the HTS Quench Experiment campaign for the EU-DEMO CS design and operation

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An extensive experimental campaign to study the evolution of the quench in REBCO conductors has been carried out within the EU-DEMO programme, motivated by the use of High Temperature Superconducting (HTS) conductors in the Central Solenoid (CS). The aim was to explore the quench initiation and propagation in different conditions in HTS conductors based on stacked tapes layout. Seven 15kA-class samples have been successfully tested in SULTAN facility and the results are presented and compared in the present work. A series of quench events have been triggered on each sample and measurements show that a temperature peak beyond 150 K on the stack of REBCO tapes may lead to the degradation of the DC performance of the conductor, mainly due to thermal gradients. This provides a first reference value the conductor designers may refer to, impacting both the magnet quench detection and protection strategy, as well as the definition of the conductor layout. In fact, the EUROfusion quench experiments suggest that it could be necessary to revise the criterion for the maximum quench temperature, reducing it from 250 K to only 150 K on the tapes. If this new value is confirmed it may be necessary to increase the amount of stabilizer and/or improve the heat transfer from tapes to metals (stabilizer and steel).

In addition, the projection to the expected performance in the EU-DEMO CS is carried out, focusing on the maximum hotspot temperature reached, depending on the layout. Results show that it is more convenient -from the quench protection point of view- having a conductor with a large effective heat capacity.

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