



MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: 780

Type: **Poster Presentation**

Wed-Mo-Po3.10-05 [79]: Cable Compaction as a Possible Factor to Reduce Tcs Degradation of ITER Toroidal Field Conductors

Wednesday, 25 September 2019 09:30 (1h 45m)

The testing of samples of “cable in conduit conductors”(CICC) made of Nb₃Sn and copper strands for ITER toroidal field coils in general cases demonstrated the degradation of current sharing temperature Tcs under cycling electromagnetic loads [1]. This is mostly because of a movement of superconducting strands under Lorentz forces inside a cable that causes the cracking of brittle Nb₃Sn filaments. Samples of toroidal field conductors delivered from Russia demonstrated less or almost no degradation under cycling electromagnetic forces in comparison with other suppliers [2]. Some suggestions have been pronounced about reasons of such behavior, for example larger surface roughness of the strands coated by chromium [3]. In this paper we suggest that some peculiarities in compaction of CICC could lead to higher density of strands in outer layers that prevents their movement and improve behavior under cycling load. Some factors affected the stability of Tcs are discussed and the suggestion to reduce Tcs degradation by the extra compaction of cables has been considered.

[1] A. Devred, et al, Superconducting Science and Technology, No.27, 2014, Article: 044001.

[2] M. Breschi, et al, Superconducting Science and Technology, No.30, 2017, Article: 055007.

[3] C. Sanabria, et al, Superconductor Science and Technology, Volume 29, Number 7, 2016, Article 074002

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Session Classification: Wed-Mo-Po3.10 - Conductors for Large Scale Applications