# Verification Testing of ITER $Nb_3Sn$ Strand at the NHMFL

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## Introduction

The National High Magnetic Field Laboratory (NHMFL) performed verification tests on $Nb_3Sn$ superconducting strands for ITER Toroidal Field (TF) magnets produced by two US vendors [1]. The tests included: unreacted-chrome-plated strand diameter, twist pitch and twist direction, chrome-plating thickness, unreacted-chrome-plated strand Cu-to-non-Cu volume ratio, residual resistivity ratio of Cr-plated strand (RRR), critical current at 4.22 K and 12 T ($I_c$), resistive transition index at 4.22 K and 12 T (n-value), and hysteresis loss per strand unit volume at 4.22 K over a ± 3 T cycle.

## Experimental

ITER TF $Nb_3Sn$ strand testing was completed at the NHMFL. Two magnet systems were used for testing: A 15/17 T superconducting magnet and a 9 T superconducting magnet including a vibrating sample magnetometer inside a physical property measurement system. Heat treatments for RRR, $I_c$, and hysteresis tests were also carried out at the lab.

## Results

Combined phase III and IV data for TF $Nb_3Sn$ strands can be seen below in figures 1 and 2.

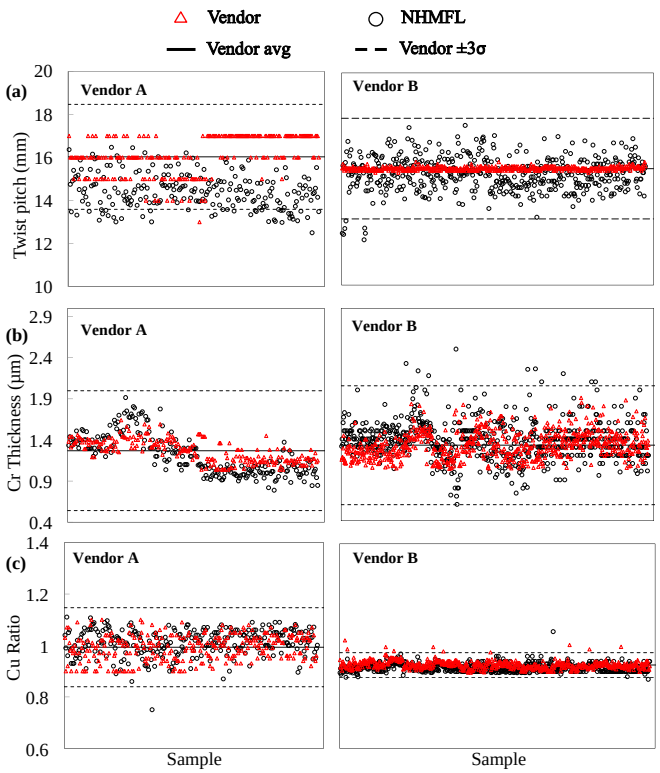


Fig. 1. Room temperature verification test results.

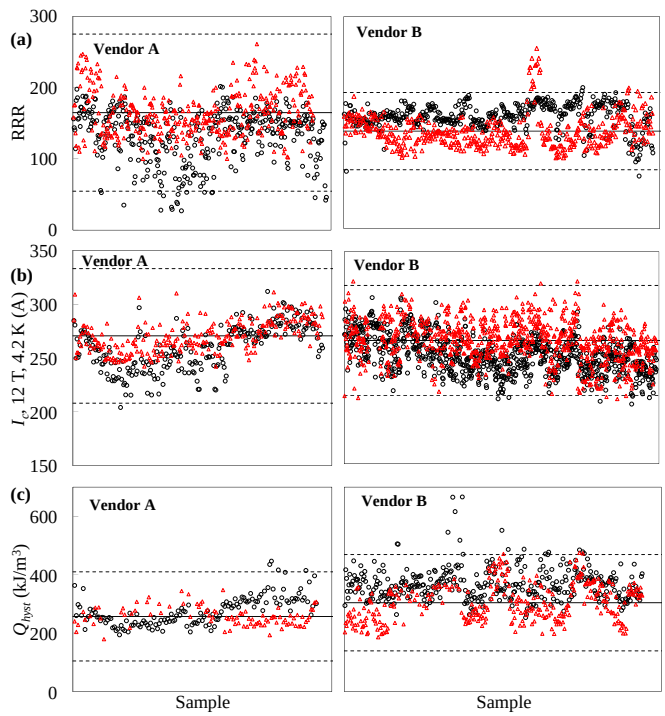


Fig. 2. Low temperature verification test results.

## Conclusions

Verification testing at the NHMFL for phase III and IV ITER TF $Nb_3Sn$ strands has been successfully completed.

## Acknowledgements

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## References

[1] McGuire, D. R., et al., IEEE Transactions on Applied Superconductivity, accepted for publication, June, 2015.