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## **Thu-Mo-Po4.10-02 [70]: Comparison Analysis of Three Different Structures of Current Leads for the Superconducting Energy Pipeline**

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Current lead's Joule-heating and conduction losses are main parts of superconducting cable's cryogenic system total heat load. Superconducting energy pipeline is a new type of hybrid superconducting energy transmission cable, and the heat leakage of its current lead is not negligible.

In this paper, the process of superconducting energy pipeline current leads design, optimization and scale-down models' cryogenic tests are presented. Quasi-analytical numerical method was used to design cylindrical, rectangular and variable cross-section forms current leads. To verify the validity of the designed schemes, a heat leakage measurement platform for current leads was built. Evaporated nitrogen and current lead's temperature profile in Dewar were measured to calculate current lead heat leakage. Compared with the conventional cylindrical current lead, rectangular current lead and variable cross-section current lead both can reduce heat leakage.

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