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A cooling system for practical HTS applications

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The cooling system is a key component for realizing practical HTS applications. Even if the HTS application is ready for commercial use today, its cooling system is still experimental stage. There are several test sites of HTS cables but these cooling systems are not suited for practical applications. It is the same case with other HTS applications such as motors, generators and power systems. Because of this situation, HTS applications are still primitive up to now. There are several types of refrigerators selected in HTS cooling systems such as a G-M cryocooler, a Stirling refrigerator and a Turbo Brayton refrigerator. In order to realize a practical cooling system, the best-fit refrigerators to a HTS cooling system must be chosen. In this paper the characteristics and the structure of refrigerators are explained and the cooling system with those refrigerators are shown and proposed. In a HTS cable cooling system for example, a turbo Brayton refrigerator, heat exchangers and a liquid nitrogen pump are the essential components. However, suitable refrigerators and pumps do not exist. Also this paper describes how a refrigerator cools an HTS system and what kind of cooling capacity is required for HTS applications.

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