

# Current and Voltage Loading Tests of 140 kVA SFCL

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We have performed the current and voltage loading tests of resistive superconducting fault current limiters (SFCLs) based on  $\text{YBa}_2\text{Cu}_3\text{O}_7$  (YBCO) films with the diameter of 2 inch. The SFCL consists of meander-type YBCO stripes covered with 200 nm Au layer grown in situ for current shunt and heat dispersion at hot spots. The minimum quench current of an SFCL unit was about  $25 A_{\text{peak}}$ . Seven SFCL units were connected in parallel for the current loading tests at power source of  $100 V_{\text{rms}}/2,000 A_{\text{rms}}$ . This SFCL units had maximum limiting current of  $170 A_{\text{peak}}$  during the fault instant and then successfully controlled the fault current below  $100 A_{\text{peak}}$  within 1~2 msec after short circuit. Increased short current also reduced the quench completion time with little change of current limiting characterization. We connected six SFCL units in series for the voltage loading tests at power source of  $1,200 V_{\text{rms}}/170 A_{\text{rms}}$  at this time. The shunt resistors were inserted into each SFCL unit to eliminate power imbalance originated from serial connection of SFCL units. Each SFCL unit was quenched simultaneously during the fault condition. The current increased up to  $40 A_{\text{peak}}$  and decreased to  $14 A_{\text{peak}}$  after 3 cycles. Quench was completed within 1 msec after the fault. We confirmed operating characteristics of 140 kVA ( $120 A_{\text{rms}} \times 1,200 V_{\text{rms}}$ ) SFCL and presented the manufacturing possibility of 3.3 kV SFCL using 4 inch YBCO films.

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