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## **Fabrication of a prototype HTS conductor for fusion magnets**

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The design and construction of a 50 kA HTS cable suitable for future fusion reactors have been carried out. The twisted strands in the cable are composed of a stack of coated conductor tapes (4 mm wide) embedded in a copper profile of 6.3 mm in diameter; such strands are rated for about 3 kA at 4.2 K and 12 T. Tapes and copper profiles are soldered together in order to obtain a mechanically solid strand and to keep the inter-tape resistance at minimum, so that current can easily redistribute among the tapes in a strand. A reel to reel apparatus for tape pre-soldering and strand soldering was set-up: the strands are fabricated in pieces 3 m long, but scaling up to industrial production should not present any major problem. A flat cable is manufactured by winding twenty strands around a central copper former; the cable is surrounded by a steel jacket for force flow cooling. The critical current of each strand was measured at liquid nitrogen in self field just after the manufacturing process and after winding in the cable. Two pieces of cable each 3 m long were prepared with tapes from two different manufacturers and assembled into a sample that can be tested in the EDIPO facility. Particular care was taken in the design and fabrication of the terminations, because the superconducting transformer of the EDIPO test facility can provide up to 100 kA of DC current, but only if the total sample resistance is lower than few nano-ohm.

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