

TAPESTAR



Coated conductor quality assessment

The TapeStar™ is a fast quality inspection tool for superconducting tape. Based on a non-destructive mapping technique the instrument produces scans of the critical current along the tape with millimeter resolution and allows detection of local faults or non-uniformities in the superconducting coating. The instrument can assess coated conductors as well as 1st generation multi-filamentary BSCCO tape.

The instrument is a fully automatic turnkey system capable to handle superconducting tape (4 – 12 mm width) up to 300 m length in the basic version or > 1000 m in the XL-version at a maximum data recording speed of 50 m/h (200 m/h XL).

The tape is continuously wound from reel to reel, passes the sensor head in a liquid nitrogen bath and is actively heated up to room temperature to avoid moisture condensation.

The control and data acquisition software package runs on every Windows™ - based computer and allows viewing and statistic evaluation of the data.

Optional accessories comprise spare reels and a spot welding gear for easy connection of metal tape pieces (e.g. to a carrier tape).

Technical features

General features

The TapeStar™ is a turnkey instrument containing all necessary cryogenics and electronics (CE-certified).

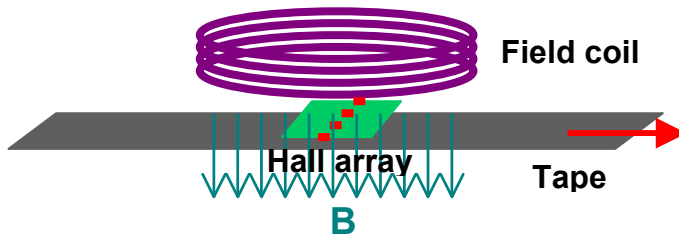
A convenient software running on an optional notebook is used to set scanning parameters and to display and evaluate scans.

All that's needed from your side is a liquid nitrogen can connected to an inlet pipe.

Technical data

Size:	75 x 71 x 86 cm ³ (W,D,H)
Weight:	98 kg
Electrical requirements:	110V, 60 Hz, or 230V, 50 Hz (250 W)
Cryogenic requirements:	Liquid nitrogen @ 0.5 bar
Operating temperature:	77K (boiling point of LN)
Pressure:	ambient pressure
Tape width:	4 - 12 mm
Tape thickness:	50 - 150 μm
Reel capacity:	3 x 10 ⁴ m μm
Max. tape length:	300 m (>1000m XL) (100 μm tape)
Min. bending radius:	50 mm
Max. scanning speed:	15 mm/s (55 mm/s XL)
Max. data acquisition rate:	50 /s
Spatial resolution:	0.5 – 1 mm
Accessible critical current range:	
Hall array	I _c = 3 – 400 A
AC coil	j _c x d = 3 – 150 A cm

Measurement principle



Hall - measurement

High resolution Hall sensor measurement

The high resolution measurement of non-magnetic tape is based on the penetration of a magnetic field into a superconducting sample.

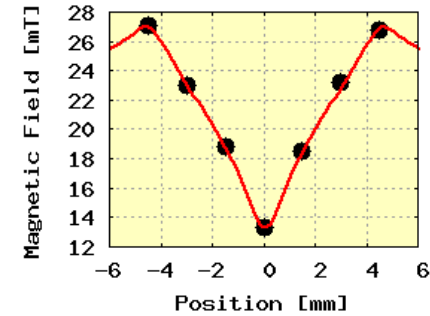
The penetration profile of the external magnetic field generated by a DC-coil (Helmholtz geometry) is recorded by a Hall sensor array across the width of the tape.

3f - measurement

Magnetic tape assessment

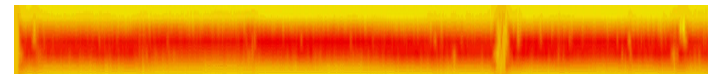
The TapeStar™ comprises two sensor heads which can be switched optionally to characterize magnetic or non-magnetic tape samples, respectively.

The measurement of magnetic tape is based on the same inductive principle as the Cryoscan™ (third harmonic detection).



High resolution Hall sensor measurement

The magnetic field is partially expelled by superconducting screening currents leading to a characteristic field penetration profile as depicted above. The slope of the profile is related to the critical current, which can be deduced from the differential Hall sensor readout.

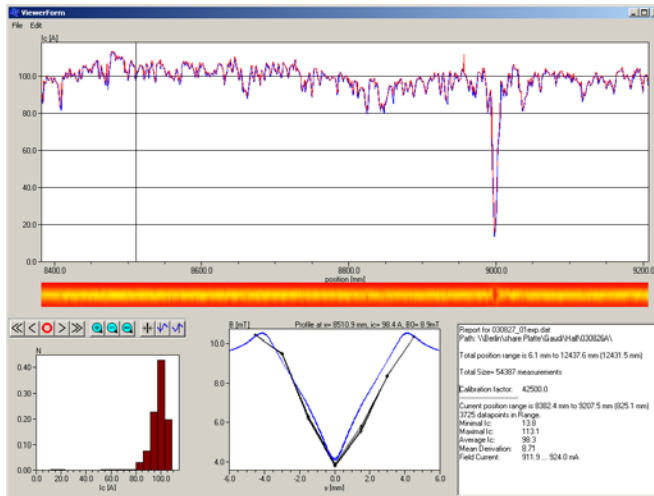


Due to the continuous motion of the tape the Hall sensors produce a 2-dimensional field penetration map which contains additional information about defect structure and distribution..

Certification

TAPESTAR

Scan certificate



Quality certificate

The TapeStar™ produces two dimensional color coded maps of the field penetration and the derived critical current along the tape with millimeter resolution.

The figure shows a screen shot of the data viewer. The main window depicts the scanning data – for longer tape stretches in a compressed format to give an easy overview. Additional windows contain statistic evaluation, the field profile for every data point, and comments.

A simple mouseclick prints a certificate containing all relevant data.

All data can be easily exported as ASCII table for further processing (e.g. Fourier analysis) or as diagrams in graphics format.