# Instructions on the De-collaring of Collared Coil 2032

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## 1. Measurements of the Collared Coil

Magnetic measurements of collared coil 2032 have been carried out on 21st May 03 by A. Musso. These measurements show strong anomalies in 4 positions along the magnet axis in the 1st aperture which triggers red alarms on the multipole values. In addition, yellow alarms on the multipole values can be seen in an irregular pattern. The collared coil also shows a red alarm triggered by 71 microns for the coil positioning (compared to a limit value of 30 microns) in aperture 1. The variations of the even and odd multipoles along the magnet axis are distributed without any obvious pattern.

For further details on the errors, a second measurement with a shorter mole of 0.125 m length was carried out by G. Peiro on the 24th Sept 03. The new measurement data has been analysed and compared with the original measurement from the standard procedure for the two multipoles b8 and a6.

## 2. Analysis of the Measurements and Results

The results of the two measurements for the multipoles b8 and a6 are shown in the Figs. 1 and 2 together with the alarm limits for yellow alarm at 4 sigma and red alarm at 8 sigma, respectively. The blue triangles are the measurement taken at the 20 positions with the standard procedure, whereas the black curve shows the measurement taken in 120 positions with the short mole. As can be seen from the plots, there is a very good agreement between the two measurements.

For the multipole b8, the measurement with the short mole shows that around the positions where the red alarms had been seen, the situation is worse than expected. From the black curve measured on b8, we would now get red alarms in 24 positions (from 120 measurement points). The peak value is located close to the center of the magnet and corresponds to an error of about 16 sigma, indicating an error considerably worse than expected from the standard measurement.

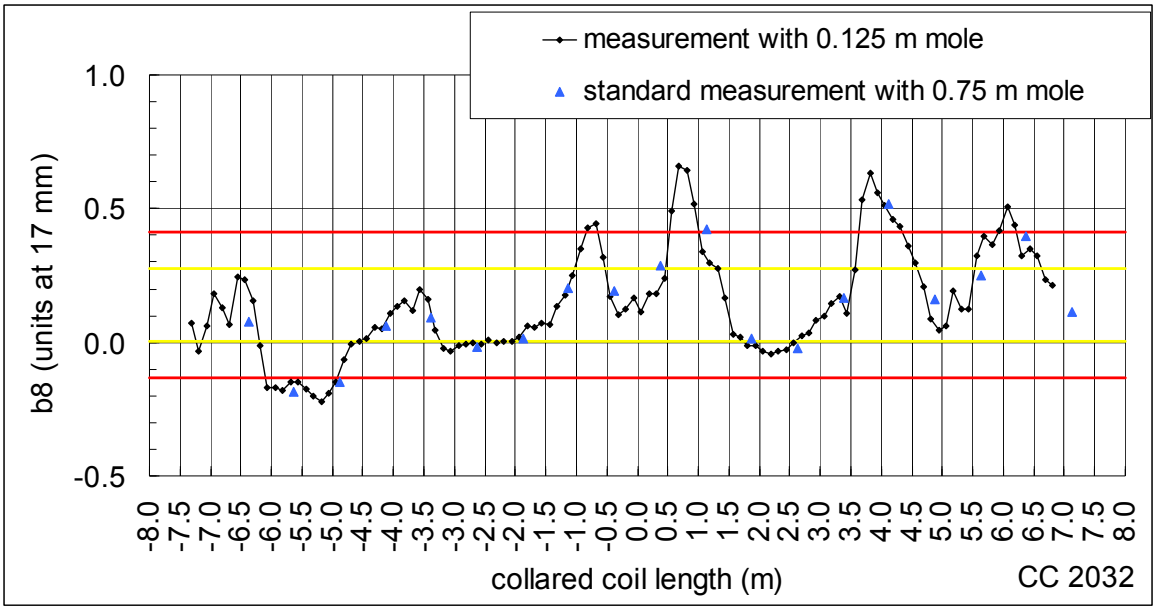


Fig. 1: Comparison between the standard measurement with 20 positions and the measurement with the short mole for multipole b8 of collared coil 2032.

A similar picture can be seen for the multipole a6 in Fig. 2, where we would now get red alarms in 25 positions from 120 measurement points. Also here, the peak value exceeds the observed value from the standard measurement of about 9 sigma and an error of about 15 sigma can now be observed close to the center of the collared coil.

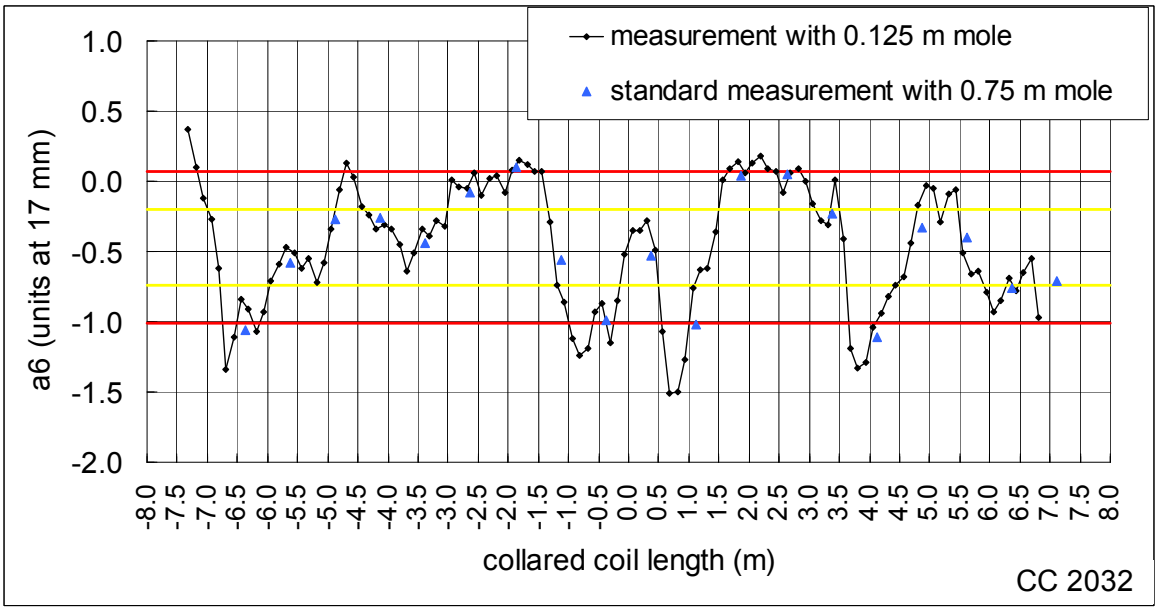


Fig. 2: Comparison between the standard measurement with 20 positions and the measurement with the short mole for multipole a6 of collared coil 2032.

## 3. Instructions for the De-collaring

Since the multipole errors are worst on two positions, these have been investigated in further detail and a possible cause of the alarms could be found by inverse field computation. From this, we expect to see a movement of the top block in the inner layer of the coil inwards by around 0.5 mm in the second quadrant of the magnet aperture 1 as illustrated in Fig. 1. Such a movement could produce the observed pattern of multipoles.

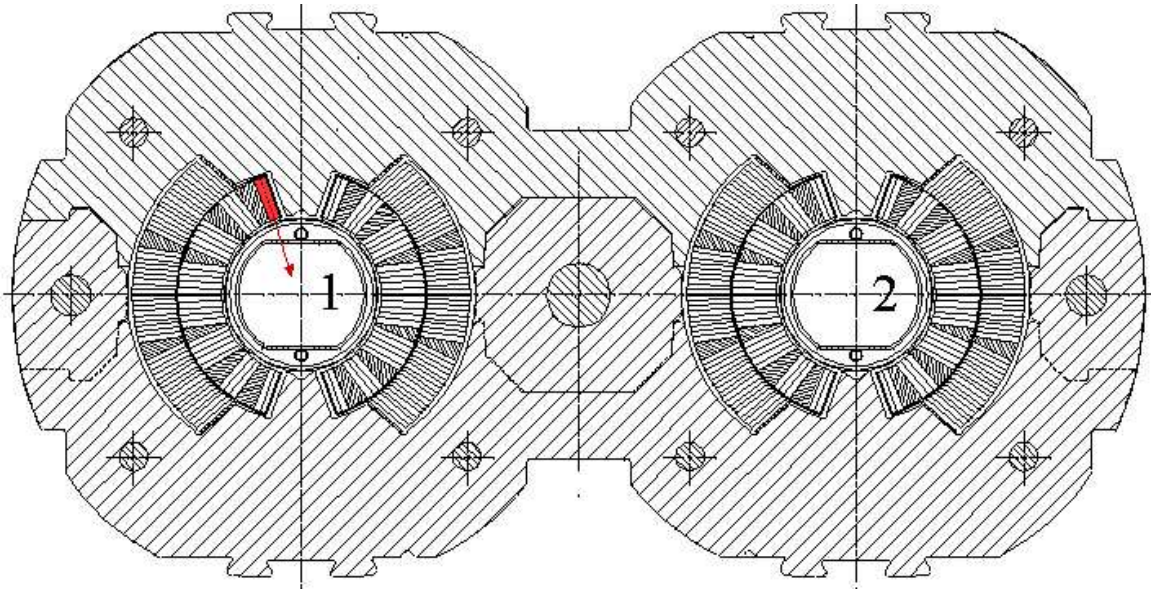


Fig. 3: Movement of the top block in the inner layer of the coil in aperture 1 could produce the observed multipole errors.

We therefore recommend to open the collared coil in such a way that the collar packages are removed from the top side at about 0.5 to 1 m from the coil center towards the coil end of the non-connection side and about 3.5 to 4.2 m also taken from the coil center towards the coil end of the non-connection side (see the errors indicated in Figs. 1 and 2).