The TRD2D read-out chamber has to fulfill the mutually exclusive requirements of lightness and mechanical rigidity, coupled with sub-millimeter precision of relative internal alignment of the components. The first element under scrutiny was the realization of anode and cathode electrodes. The anodes are used in the TRD2D design not only to generate charge amplification but also to provide position sensitive information. As such they imply a strict requirement for a micrometer precision alignment wrt. the chamber and a well controlled mechanical tension during installation. In Fig. 1 an image under microscope is used to prove the positioning of various constructive elements of the TRD2D chamber. In figure, two opposite corners of the chamber are shown aligned on the picture wrt. the alignment holes (dashed yellow). The anode wires are emphasized in yellow while cathodes in red. The projection from the left corner to the next, and the observed difference from the actual positioning of the component illustrate the level of alignment obtained during construction.

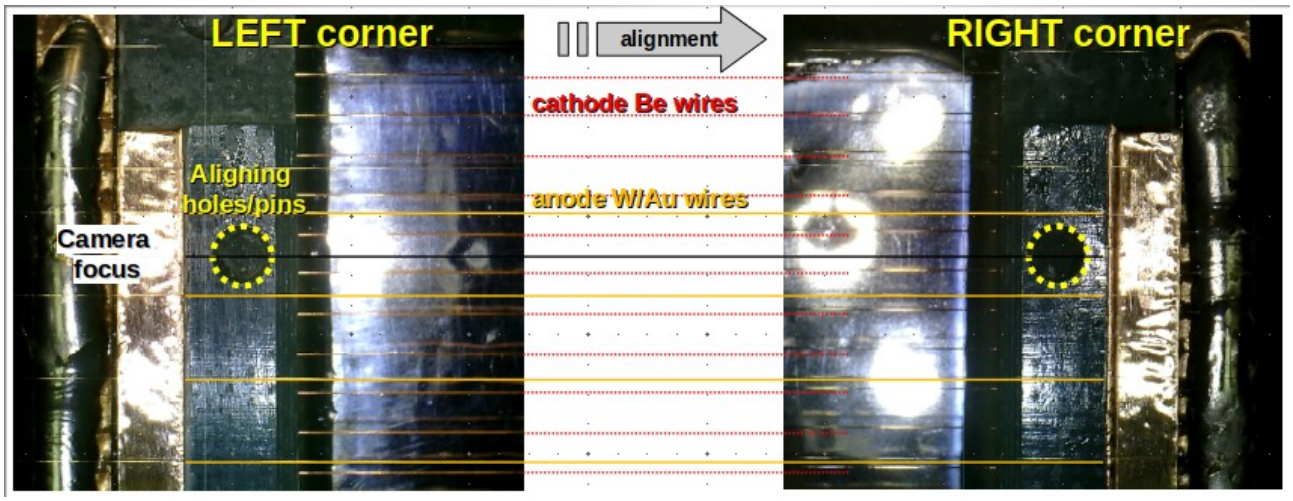

Fig. 1: Alignment of constructive details from the chamber design with anode and cathode wires, for two opposite corners of the TRD2D prototype. Image magnified under microscope used for alignment.

The mechanical tension on the wire electrodes is important as we have assure stable electric fields during operation. After positioning and gluing the anode wires in place a dedicated tool is used to check that the 0.5 N used to pre-tension the wires was kept during installation procedure. In Fig. 2 the post installation measurement on the mechanical tension of each individual anode wire is presented. The target value is marked in yellow while the mean of the measured points in red. Points marked in red represent wires which have deviations larger than 10 % wrt. the mean value and are marked as "probable bad". The real threshold value for the acceptance tests will be defined by estimating the gain uniformity in the next paragraph.

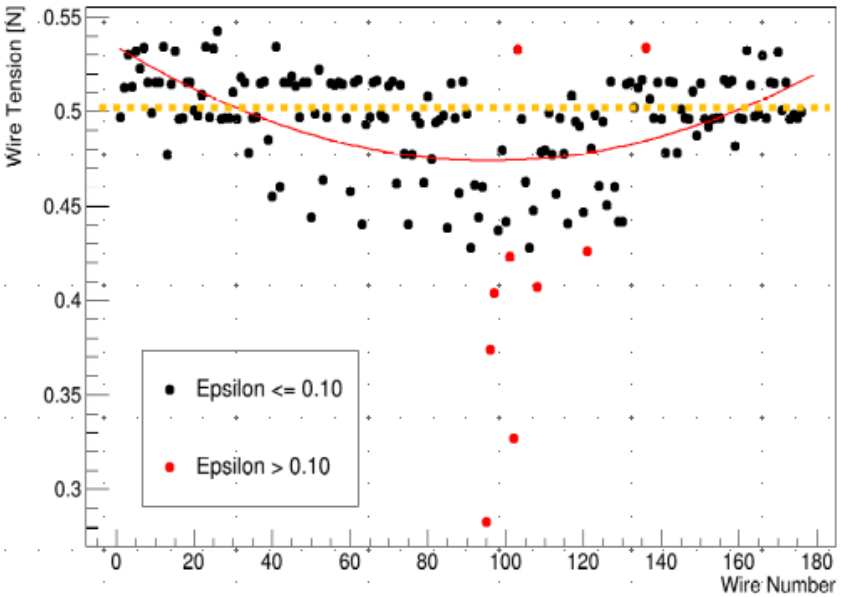

Fig. 2: Anode wire tension after gluing on the chamber support with cathode plane installed.

A fine scan of the chamber was performed in order to determine its gain function. The scan was performed by illuminating the chamber with a ^{55}Fe source in a collimated setup. The source was moved by 1 mm with a step-by-step CNC in front of the detector, perpendicular to the anode wire direction. Each time the current measured on the full anode electrode was registered for 7 s. The correlation of I_{anode} (nA) as function of the position on the detector is shown in Fig. 3, for two positions wrt. the detector, across its middle region (red) and close to the edge where the electrode is glued (blue). Both measurements show qualitatively the same components:

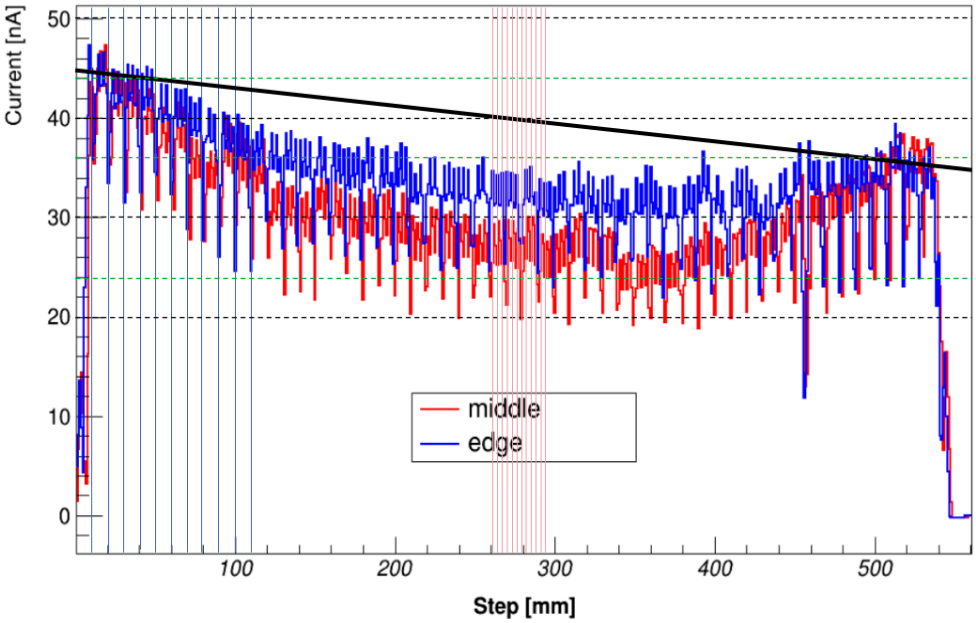

Fig. 3: Correlation of anode wire current with the position on the detector for two measurements done perpendicular to the anode wire direction.

1. A general *linear decreasing trend* of 8 nA (~ 20 %) from left to right correlated with a lack of parallelism between the pad-plane and the anode electrode;
2. A *general parabolic dependence* over the whole scanned area with a minimum in the middle of 8 nA (~ 20 %) maximum deviation from the linear trend correlated with a deformation of the entrance window due to pressure difference;
3. A periodic structure (see blueish vertical lines) of step 1 cm, with a pronounced decrease in current of 14 nA (~40 %) correlated with the cell structure of the honeycomb (HC) used in the reinforcement of the entrance window;
4. A periodic structure (see reddish vertical lines) of step 3 mm, with an increase in current of 4 nA (~5 %) wrt. the neighboring regions, correlated with the position of anode wires;
5. A non-periodic structure which show regions of HC cells higher than the general trend, correlated with cells for which there is an infiltration of $ArCO_2$ from the active volume due to microscopic defects on the structure of the drift electrode (~ 15 -20 %);
6. One anode wire with clear connection problems at position ~ 445 mm.

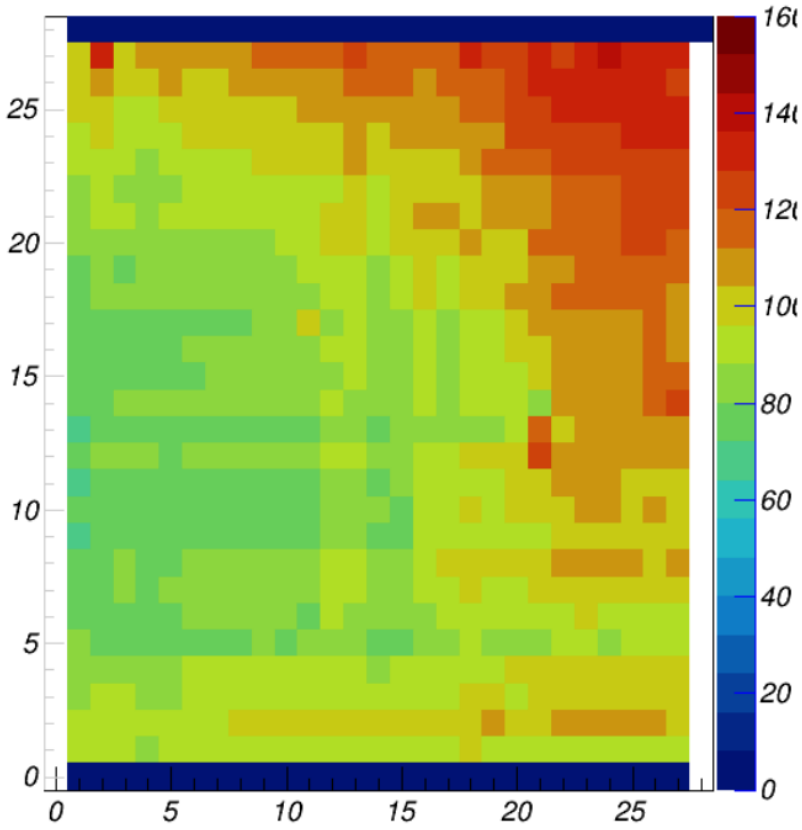

Fig. 4: Anode current measured on the surface of the TRD2D detector after correction for gas leaks and HC cell structure

In Fig. 4, a 2D scan of the whole area was performed, with a step of 2 cm such as to avoid the HC cell structure and correct for the gas leaks through the drift electrode. The surface show a pillow like shape characteristic for the mechanical deformation of the entrance window under pressure difference.

The results presented above describe different tests performed on components, procedures or/and the final product in order to asses the quality of the chamber before being send for installation in the CBM setup. The X ray (6 keV) absorption measurements suggest an entrance window with a non negligible massive structure (HC cell walls) and an insufficient rigidity wrt. gas pressure difference. The main problem was the detection of leaks in the drift electrode which lead to migration of gas from the active area to the entrance widow, effectively increasing the absorption for soft X rays outside the active volume. Additionally the measurements show some problems in assuring the parallelism of some of the chamber's components during construction.