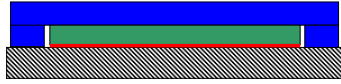


**Construction Procedures for LHCb Muon System Wire Chambers**

Panels ready with wire bars glued on it (with cleaning)



The HV bar has a maximum thickness of 2 mm. The upper side of the HV bar is positioned at a quote of 2.45 mm (maximum) with the help of a special tool. The lower gap is filled with glue.

Positioning of panels in a frame inside the wiring machine



The wiring machine has a rigid structure (blue) with combs on each side which define a precise xy plane (conceptual drawing). The panel (green) is fixed to the frame.

Wire winding

Wire winding is performed with CERN-like machine (possibly with wire tension online control). Expected speed is 20 turns/mn, which should allow to wire 2 panels in about 1 hour (adjustement included).

Wires are glued onto the frames in the wiring machine

Wire gluing can be performed with liquid and not-too-long curing glue (such as Araldite 2012). In this way in few hours the wiring machine is free for another winding.

Wires are cut and each frame is free

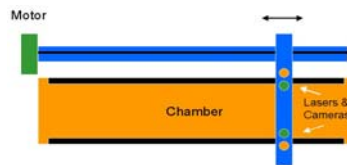
Wires end are kept with scotch tape

The frame is put in the soldering machine

Zeroing of the soldering machine on reference points

In a first scan a camera look at the x position of the wire on both sides

Wires are soldered and the soldering quality checked on each side



The frame is fixed on to the table with the help of reference pins. The station measures the wire pitch with an automatic processing of the image and solders the two ends of the wires. The first operation is completed, on a large chamber, in less than 30 mn. The second step is done, at a speed of about 1 s/wire, in about the same time. To allow a safer (and simpler) operation of the lasers, the shape of the soldering pads is such to have a continuous strip of melted tin. The removal of a single wire with such a configuration is still possible and has been checked. Optical inspection of soldering quality should be done afterwards

Final cut on wires

Connectors for HV, ground and signals are soldered on wire bars and on cathodes

Continuity test on pads is performed

Wire tension test is performed

Panels with wires are put under HV test without and with cover

The HV test will be performed in dry gas: without cover cathode, the chamber should reach 0 nA @ 3200 V in reasonable time; with cover cathode, the chamber should reach 0 nA @ 3000 V in reasonable time. During these operations the maximum current drawn is set to 200 nA. To be independent from external conditions (eg. humidity) the chamber should be flushed in dry nitrogen.

Gas bars are glued on the panel

Structural glue should be used (es. 2015, or better, 2012 that has fast curing)

Spacers and top closing bars are positioned on the panels and glued

Structural glue should be used (es. 2015, or better, 2012 that has fast curing)



Repeat HV test of each single panel

4 layers are assembled, glued and HV tested

Structural glue should be used (es. 2015, or better, 2012 that has fast curing)

Chamber is tested for leakage

Overpressure (5 mbar) is applied and decay time observed closing gas input (< 2 mbar/hour). If needed, peripheral gluing can be done.

Chamber is tested with HV and real gas

Measurement of pad capacity (later on) is a good check for connections and chamber uniformity