The electromagnetic calorimeter (EMC) will play a very important role in the PANDA multipurpose target spectrometer at FAIR. It will be made of a total of 15484 PbWO$_4$ crystals and subdivided into three parts: a central barrel, a forward and a backward end-cap (BWEC).

The EMC’s backward region is a strategic location for the assembling of the whole detector. Through this point all services needed by the inner detectors, such as cooling, power supply and signal readout are routed into the spectrometer. These constraints, together with the need of maximising hermeticity and the other functional requirements of the whole EMC, impose to the BWEC particularly high dimensional accuracy, structural and temperature stability.

Different designs were studied to meet the geometrical requirements. To maximise the scintillation light output, the crystals need to be cooled to about -25°C with a temperature stability of ±0.1°C. A cooling network of 12 cooling shells is being developed and will be manufactured by selective laser sintering. Pressure drop calculations, finite element simulations and heat insulation optimisation were performed to show that the temperature requirements can be fulfilled using the leakless (low pressure drop) cooling system available for all PANDA subdetectors. Several types of carbon fibre alveoli for holding the crystals have been produced and studies are currently ongoing, in order to increase their thermal conductivity.

* corresponding author e-mail: r.valente@gsi.de