Jurčák et al. (2018) demonstrated the existence of a constant vertical magnetic field at the umbra-penumbra boundary of stable sunspots. Due to the similar magnetoconvective modes observed in umbrae and pores, we aim to investigate the similarities between umbrae and pores in terms of their magnetic properties. In addition, we intend to monitor the magnetic properties during the transition between different magnetoconvective modes. We find that the magnetic properties at the boundary of a pore behave similarly to sunspots umbral boundaries during the formation, stability and decay. Although a pore also has a critical vertical field, it is weaker than in sunspots. The formation of penumbral filaments around a protospot does not seem to be related to the pre-existing type of magnetoconvection. In all observed cases, the penumbral filaments form at the umbral boundary and extend radially outwards, while the Evershed flow is observed from the beginning.