Domain walls of ferroelectric BaTiO$_3$ within the Ginzburg-Landau-Devonshire model\textsuperscript{1} P. MARTON, I. RYCHETSKY, J. HLINKA, Institute of Physics, Academy of Sciences of the Czech Republic — Mechanically compatible and electrically neutral domain walls in tetragonal, orthorhombic, and rhombohedral ferroelectric phases of BaTiO$_3$ are systematically investigated in the framework of the phenomenological Ginzburg-Landau-Devonshire (GLD) model. Domain wall thicknesses, energy densities are derived analytically and evaluated numerically for several temperatures. Apart from simple Ising-type solutions of the model we also discuss more complicated solutions (two-dimensional approximation in polarization - curved polarization path). The calculations indicate that the lowest energy structure of the 109-degree domain wall and few other domain walls in the orthorhombic and rhombohedral phases resemble Bloch-like walls known from magnetism.

\textsuperscript{1}The authors are grateful to prof. V. Janovec for helpful discussions. The work has been supported by the Czech Science Foundation (Projects Nos. P204/10/0616 and 202/09/0430)