Magnetic properties and magnetic structures in $\text{R}_2\text{Ni}_{2-x}\text{In}$ ($\text{R} = \text{Gd–Tm}$) for $x = 0$ and (0.22 or 0.3)

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The $\text{R}_2\text{Ni}_{2-x}\text{In}$ ($\text{R}=$Gd–Tm) compounds were investigated by means of different experimental techniques including X-ray diffraction, magnetic and specific heat measurements as well as powder neutron diffraction. The title compounds show two different crystal structure variants, namely: an orthorhombic one of the Mn$_2$AlB$_2$-type in the stoichiometric composition $\text{R}_2\text{Ni}_2\text{In}$ and a tetragonal one of the Mo$_2$FeB$_2$-type in the nonstoichiometric composition $\text{R}_2\text{Ni}_{2-x}\text{In}$. All compounds show antiferromagnetic ordering at low temperatures, however, for a selected rare earth element the Néel temperature found for stoichiometric composition is higher than the one found for nonstoichiometric composition. Neutron diffraction experiments, performed for selected compounds, indicate that rare earths magnetic moments form collinear magnetic structures which are commensurate with the crystallographic unit cells.