The presented thesis focuses on the effect of addition of ytterbium, manganese and zircon in alloys AlYb and AlMnYbZr in the state as casted, cold rolled with the deformation degree of 40 % and 70 % and after high-temperature annealing. The materials were examined with the methods of electrical rezistometry, differential scanning calorimetry and microhardness measurements. The characterization of the examined alloys was completed by a parallel research of the microstructure with the methods of transmission and scanning electron microscopy, electron diffraction and electron backscatter diffraction. A positive influence of the addition Mn and Zr and cold rolling was proven at hardening of the materials. In the context of messurement error a different influence in the microhardness of the materials was not observed among the different degrees of cold roling deformation. The simultaneous addition of Mn and Zr has a positive effect on the size of the grain, whereas the size of the grain at the as prepered state was determined in millimetres (in AlYb) and in hundres of mictometers (AlMnYbZr). On the border of (sub)grains an eutetic phase rich in Yb, Fe (or more precisely Yb, Mn, Cu, Fe for the alloy AlMnYbZR) was observed for both alloys. At the annealing temperature around 400 °C, an additional precipitation of the particles Al_3Yb and Al_3(Yb,Zr) happens. Moreover, an appropriate homogenization temperature was searched. For the material AlYb it was defined of 625 °C. It is necessary to complete the detailed studies of hight-temperature annealing of both of the alloys with more research on microstructure, especially with the help of the electron microscopy.