The effect of process temperature on the microstructure and mechanical properties of Mg-3Al-1Zn sheets processed by ECAP is investigated in this work. A novel tool was developed for the implementation of ECAP to deform sheets with dimension of 200 mm × 200 mm × 1.8 mm. ECAP trials were performed successfully at three temperatures of 175, 200 and 225 °C using an internal channel angle of 130°. After the ECAP process, significant grain refinement and texture changes were observed in the ECAPed sheets. The tensile tests at room temperature showed that uniform elongation along the direction of ECAP process increases with the process temperature. The highest uniform strain was found at 17% using a processing temperature of 225 °C. The tensile uniform elongation at room temperature was improved by 31% in comparison with the as-received material.