Alumina scales formed on FeCrAl-alloys during high-temperature oxidation protect them from corrosion degradation. For thin walled FeCrAl-components, a critical Al-depletion due to the scale formation may occur, which leads to breakaway oxidation of Fe and Cr. The oxidation rate, which largely determines the Al-depletion is significantly affected by the minor alloy composition. It depends on concentrations of the reactive elements, such as Y and Zr, which alter the diffusion processes in the scale by modification of the oxide microstructure and grain boundary composition. RE-incorporation into the alumina scale can in turn be affected by depletion of their very limited alloy reservoir and especially by interaction with common alloy impurities, such as C, N and P. At temperatures of around 900°C, formation of fast growing metastable Al₂O₃ can significantly shorten lifetime of thin walled components. The detailed knowledge of the oxidation kinetics and diffusion processes in the scale is required for a reliable lifetime prediction. Incorrect kinetics description can lead to significant lifetime underestimation.