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Abstract

This paper presents test results of the effect of thermomechanical aging conducted at 100°C, 200°C and 300°C on the fatigue life of EN AW-2024 alloy at ambient temperature. The results of fatigue tests conducted on specimens with no preliminary thermal and mechanical loadings (as-received specimens) are discussed. These results were accepted as a point of reference for the results of fatigue life tests of material previously subjected to simultaneous, preliminary thermal and mechanical loads. Conducted tests made it possible to determine the effect of creep pre-deformation at elevated temperature on the cyclic properties of the tested alloy. The shape of the hysteresis loop obtained for material subjected to different thermomechanical loadings was analyzed in detail. The character of obtained fatigue life curves and cyclic strain curves is also discussed. The direct relationship between these curves and material properties shaped in the process of preliminary creep, at different temperatures and under different load values, was indicated. At the same time, comparative analysis was conducted for fatigue fractures in as-received specimens and fractures obtained in specimens burdened by pre-deformation-related effects.

Keywords: aluminium alloy, strain-controlled fatigue, failure analysis, cyclic properties, creep pre-deformation