

ALUMINIUM ALLOY ELECTRICAL GRADE TUBULAR BUSBARS

The series 6000 aluminium alloys (e.g. 6061) are most often purchased in the T4 condition (not artificially aged) and stored for some period of time before the tube bending operation.

We recommend that client be told of the significance of storage and the consequences of natural ageing whenever advising the purchase of tube in the T4 condition. We would advise that forming and bending operations preferably be conducted within 2 days of receipt. If this can't be effected, storage of tube in a cool place will be of assistance.

Heat treatable alloys are softer and more ductile immediately after quenching than after ageing. As the ageing process starts relatively quickly for many alloys, production schedules must permit forming operations before appreciable natural ageing occurs. As alternatives the parts may be stored under refrigerated conditions to retard ageing or they may be restored to the near fully quenched condition by reversion treatments that dissolve the Guinier-Preston (GP) zones.

The impact of natural ageing is illustrated by data related to 6061-T4. The assumption used is that extrusions are delivered within 10 - 24 hours of pressing, 10 - 24 hours of pressing, 10 hours taken as the base point for the data. If stored at a temperature of 20°C, by six weeks the elongation characteristics decrease by about 20%, the tensile strength increasing by 45%. Five days after (10 hour) delivery the tensile strength will have increased by some 30%. The yield figures are similar. Five days after (10 hour) delivery the yield strength increases by 25%, after six weeks 40 - 45% and after 14 months, 55%. Thus the major effects of natural ageing are achieved quickly.

Higher storage temperatures will increase the rate of ageing, lower temperatures decrease it. Stored at 0°C, the 5 day yield strength would be similar to the 10 hour strength under room temperature. At +20°C the natural ageing process ceases, thus the strength at five days, at six weeks and at 14 months would be some 35% below the normal 10 hour strength.

Thus the storage time and temperature is an important condition for those clients who wish to form the aluminium tubular busbar. The above information is provided by the Aluminium Federation of Southern Africa and is meant to help clients understand the implementation of the natural ageing of aluminium alloys to avoid unexpected problems.