ABSTRACT

Six 4-Point bending creep rigs have been designed, and built, for use with large GRP specimens. The flexure creep behaviour of two types of glass fibre reinforced polyester laminates (with two different post-cures) has been studied in air and with water in contact with one face only, at temperatures of 23°C, 40°C and 60°C. Creep test durations of up to two months have been used. It has been found that the presence of water increases slightly the time-dependence of the deformation of GRP samples within this time-scale.

Two 'Heavy-Duty' tensile creep rigs have also been designed and built. Tensile creep data, at 23°C, of the GRP laminates referred to above have been obtained. The presence of water caused a smaller effect on the tensile creep behaviour of GRP specimens than that observed in flexure.

Tensile creep tests of resin samples have been carried out in air, at 23°C, 40°C and 60°C, and immersed in water at 23°C. Large differences were found in the creep behaviour in air and water. A simple analysis based on the 'rule of mixtures' prediction of composite stiffness suggests that the observed soften effect of the water on the base resin can account for the higher creep strains observed in the GRP specimens tested in contact with water.

The deformed shape of GRP plates with clamped edges and subjected to uniform pressure has been measured experimentally for the case of large deflections. Satisfactory prediction of this behaviour has been made using the creep data for the GRP samples obtained during this research, coupled with the use of a 'Finite Elements Package' PAFEC.