against ε in Fig. 4 showed that above 350 MPa pressure the H values at fracture were significantly lower than those at lower pressures. These facts suggest that at pressures in excess of 350 MPa failure occurred by shear tearing before the resultant triaxial stress component in the neck of the specimen became large enough for large scale void development to occur.

The fracture strains of specimens tested at pressures 375, 400 and 425 MPa were found to be significantly lower than those of specimens tested at slightly lower or higher pressures. This effect has not been previously reported, although some suggestion of its existence may be found in the variation of fracture strain with pressure of a leaded 60/40 brass studied previously.[3] No entirely satisfactory explanation of this unusual behaviour has been found as yet. The main difficulty in explaining the behaviour of fracture strain in this pressure range is that fracture appears to occur by a shear process but the shear fracture occurring at the higher pressures results in fracture strains which are insensitive to pressure.

CONCLUSIONS

1. The approximately linear increase in fracture strain with hydrostatic pressures between 0.1 and 350 MPa in α-brass was found to be accompanied by the progressive suppression of macroscopic void formation within the necked regions of specimens. In this pressure range fracture was found to occur at a constant value (H_f) of the triaxial component of stress at the centre of the neck. The relationship between fracture strain (ε_f) and pressure (P) for pressures up to 350 MPa was found to have the form

$$\varepsilon_f = \frac{P + H_f}{m} + \varepsilon_n$$

where ε_n is the strain at which necking begins and m is the gradient of the H–ε relationship.

2. Pressures in excess of 350 MPa were found to suppress macroscopic void development in the necked region and specimens tested at these pressures fractured by a shear mechanism. The fracture strains of specimens tested between pressures of 350 and 450 MPa were lower than expected whilst fracture strains were approximately constant for pressures between 450 and 600 MPa. The reason for the unusual variation of fracture strain with pressures between 350 and 450 MPa appears to be connected with the fact that the fracture mechanism changes at a pressure of about 350 MPa.

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