# Chart 7: Fracture toughness, $K_{Ic}$, against strength, $\sigma_f$

The chart for safe design against fracture. The contours show the process-zone diameter, given approximately by $K_{Ic}^2/\pi\sigma_f^2$. The qualifications on 'strength' given for Charts 2 and 4 apply here also. The chart guides selection of materials to meet yield-before-break design criteria, in assessing plastic or process-zone sizes, and in designing samples for valid fracture toughness testing. The guide lines show the loci of points for which

(a) $K_{Ic}/\sigma_f = C$ (yield-before-break)

(b) $K_{Ic}^2/\sigma_f = C$ (leak-before-break)

The value of the constant $C$ increases as the lines are displaced upward and to the left.