KIc is defined as the plane strain fracture toughness. It is a measure of the resistance of a material to crack extension under predominantly linear-elastic conditions (i.e. low toughness conditions when there is little to no plastic deformation occurring at the crack tip). It is generally thought of as the lower limiting value of fracture toughness in the environment and at the speed and temperature of the test, and can be considered as a size-independent fracture parameter for brittle materials (although this is a matter of current debate). A test specimen must be chosen with large enough dimensions to give predominantly plane strain conditions at the crack tip. This will depend on the specimen's initial crack length, thickness, and ligament size, as well as the yield strength of the material being tested. For test specimens which are not sufficiently large or brittle to exhibit predominantly linear elastic behavior, it is possible to calculate a value of K using the same approach, but the result will be reported as KQ or Kmat as the material's toughness, instead of a valid KIc. There is no advance assurance that a valid KIc value will be determined from a particular test. Testing standards that include a procedure for KIc testing (e.g. BS 7448-1, ISO 12135, ASTM E399) give two methods that can be used to estimate a suitable specimen size. One is based on calculating the ratio of an estimated value of KIc (e.g. from literature) to the yield strength of the material, and using this to calculate the minimum specimen dimensions. Another uses the ratio of yield strength to Young's modulus and a look up table approach. Checks to determine whether a valid KIc value has been achieved can only be performed after the test. A KQ value is determined from the test results and put into the following equation: Where a is initial crack length, B is specimen thickness, W-a is specimen ligament and ⍰YS is the yield strength of the material. KQ can be called a valid value of KIc if the specimen dimensions satisfy the above check. This means that a valid KIC can be determined from specimens a few mm thick in materials like titanium alloys, but specimens may need to be hundreds of mm thick for valid KIC to be determined for structural steels. KIc is not a suitable fracture parameter for high toughness or high tearing resistance materials where failure involves appreciable amounts of plastic deformation and behavior moves into the realm of elastic-plastic fracture mechanics (i.e. NOT plane strain conditions); calculating K under-estimates the material's fracture toughness since it does not include any allowance for plasticity. In these instances a critical value of CTOD (Crack Tip Opening Displacement) or J should be determined, even if the value of J is subsequently converted into the units of K and reported as a KJ¬ for comparison. A size-independent fracture parameter for ductile materials would be the value of J at a 0.2mm tearing offset to the blunting .line, determined from the tearing resistance curve