

## CRE and CRT

In the 1950s and 1960s, three types of tensile testers were in wide use: constant rate of specimen extension (CRE), constant rate of travel (CRT) and constant rate of loading (CRL). It was therefore advisable to state the rate of operation in a way which would be common to all three types of tester. In addition, the best possible agreement was sought between the test results of the three types of tester. Consequently, the principle of constant time to break was adopted, and 20 s to break was chosen for many standards

In the early 1990s, CRE testers were recognized as the best type but CRT and CRL testers were still in use internationally and there is no assurance that the results from the three types of tester will agree.

Nowadays, most standards consider only the CRE testers, so the time-to-break principle was no longer needed and a simpler statement of rate of extension was used. CRT and CRL testers are now considered to be obsolete and the methods of using them are deprecated.

As many of the standards still in use often refer to CRT strength testing apparatus, we are often asked: what is the difference between CRT and CRE ? This note attempts to explain simply the main difference between the older CRT and newer CRE types of strength testing apparatus.



With constant rate of extension (CRE) instruments, such as Titan, the rate of increase of specimen length is uniform with time and the load measuring mechanism has negligible deflection with increasing force.

The CRE type of tensile testing instrument has become the preferred test apparatus for strength determination. It is recognized that some constant rate of traverse type (CRT) tensile testing machines continue to be used. As a consequence, these test machines may be used when agreed upon between the purchaser and the supplier.

With the constant rate of traverse (CRT) type of machine, the pulling clamp moves at a uniform rate and the force is applied through the other clamp which moves significantly to activate the force measuring mechanism so that the rate of increase of force or elongation is usually NOT constant and is dependent on the extension characteristics of the specimen.

This type of mechanism is usually associated with older types of machine where the force is applied by swinging a weighted pendulum through an arc, i.e., the so called ratchet (rack) and pawl machines. The angle the pendulum has travelled through at the breaking point is then a measure of force. The mechanism is arranged to record the maximum height of the pendulum.