

Tensile Testing of Plastics

ASTM D638

Scope:

Tensile tests measure the force required to break a specimen and the extent to which the specimen stretches or elongates to that breaking point. Tensile tests produce a stress-strain diagram, which is used to determine tensile modulus. The data is often used to specify a material, to design parts to withstand application force and as a quality control check of materials. Since the physical properties of many materials (especially thermoplastics) can vary depending on ambient temperature, it is sometimes appropriate to test materials at temperatures that simulate the intended end use environment

Test procedure:

Specimens are placed in the grips of the Instron at a specified grip separation and pulled until failure. For ASTM D638 the test speed is determined by the material specification an extensometer is used to determine elongation and tensile modulus.

Specimen size:

The most common specimen for ASTM D638 is a Type I tensile bar. The most common specimen for ASTM D882 uses strips cut from thin sheet or film.

Data:

The following calculations can be made from tensile test results:

1. Tensile strength (at yield and at break)
2. Tensile modulus
3. Strain
4. Elongation and percent elongation at yield
5. Elongation and percent elongation at break
6. Comparative toughness (area under curve)

