

PHYSICAL CHARACTERISTICS

LONG-TERM BURSTING STRENGTH

The long term hoop stress of polyethylene is predicted by 'type' testing each specific resin formulation in accordance with AS/NZS 4131 PE Pipe Compounds. Numbers of pipe specimens are pressurised to various predetermined pressures which are estimated to cause rupture over a range of time intervals. The resulting stress-time to failure characteristics are plotted on a log-log basis for various chosen temperatures over a range from 20°C to a maximum of 80°C inclusive.

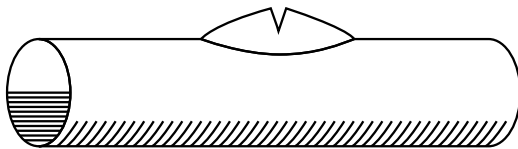
Characteristics for individual resins vary in accordance with the classical natural law known as Arrhenius's Law. The Arrhenius correlation states that for a given stress level the following relationship exists

$$\log t = A + C/T$$

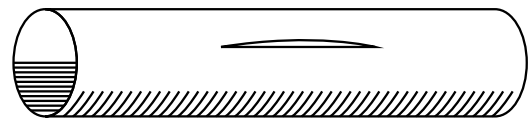
where 't' is the time to failure, 'T' is absolute temperature (Kelvin), A and C are constants.

Comprehensive design data such as derating and quality control factors based on this principle can be derived using the method given in AS/NZS 4131 (which references ISO TR 9080) known as the standard extrapolation method. The aim of this procedure is to meet two requirements, namely:

- i) to provide an estimate of the mean hoop stress which a pipe, made of a given PE material type, can withstand for 50 years at an ambient temperature of 20°C in water. and;
- ii) to provide an estimate of the value of the mean hoop stress at either shorter time periods, or higher temperatures, or with both occurring together.



DUCTILE BURST



BRITTLE BURST

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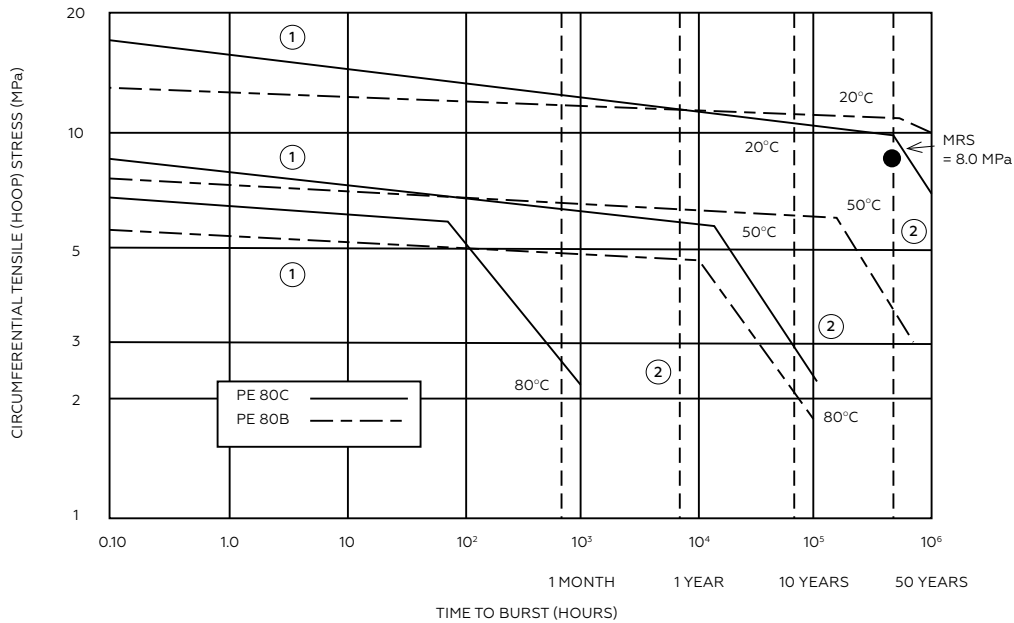


Figure 1.0 Typical stress-time regression curves for POLIplex® STANDARD (PE 80C), BLUE LINE & ALL BLUE (PE 80B)

Note: MRS is below fracture line at both 50 and 100 years.

Time to Fracture (hours)

- ① Ductile Fracture Lines
- ② Brittle Fracture Lines

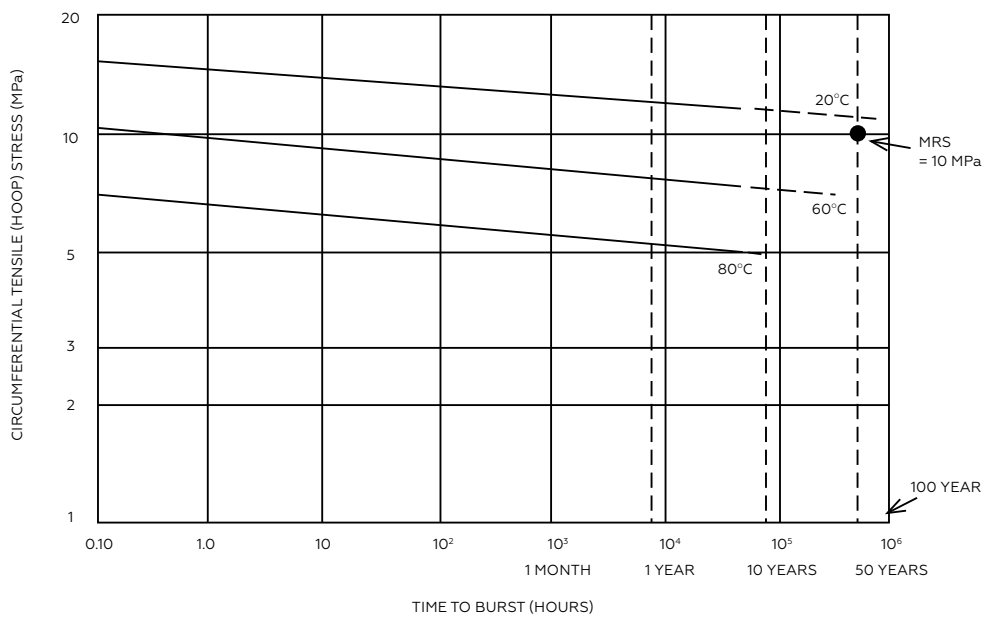


Figure 1.1 Typical stress-time regression curves for POLIplex® ONE HUNDRED (PE 100)

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