



Wagners Composite Fibre Technologies (CFT)

E40

Understanding elastic modulus

Elastic modulus (E), also known as Young's modulus, is a fundamental mechanical property that quantifies the stiffness of a material. It describes the relationship between stress (force per unit area) and strain (relative deformation) in the linear elastic region of a material's stress-strain curve. In more simple terms, it measures how much a material will deflect when a load is applied.

$$E = \frac{\sigma}{\epsilon}$$

Where:

E = Elastic Modulus (in MPa or GPa)

σ = Stress (force per unit area, N/m²)

ϵ = Strain (change in length/original length, dimensionless)

A higher elastic modulus indicates a stiffer material that under goes less deformation under the same applied load. Conversely, a lower modulus implies a more flexible material.



For more information on how Wagners achieve an E-grading of E40 watch the webinar on It's What's Inside That Counts.

Performance Advantages



Superior Stiffness - Resists bending and deflection underload



Improved Structural Integrity - Increased stiffness enhances load-carrying capacity contributing to safer and more reliable designs



Minimised Deflection - Reduced sagging or flexing under load makes E40 FRP ideal for structures with tight deflection limits



Enhanced Vibration Resistance - Stiffer profiles reduces vibration and oscillation making E40 FRP ideal for dynamic load environments like long span bridges



Longer Span Capability - Greater stiffness allows for longer unsupported spans reducing the need for intermediate supports and simplifying installation



Dimensional Stability - Better resistance to deformation or creep over time



Increased Fatigue Resistance - Stiff FRP profiles better endure repeated stress cycles



Improved compatibility with traditional materials - Higher modulus FRP aligns more closely with steel and concrete making hybrid construction more seamless



Design Efficiency - Optimise designs without sacrificing performance



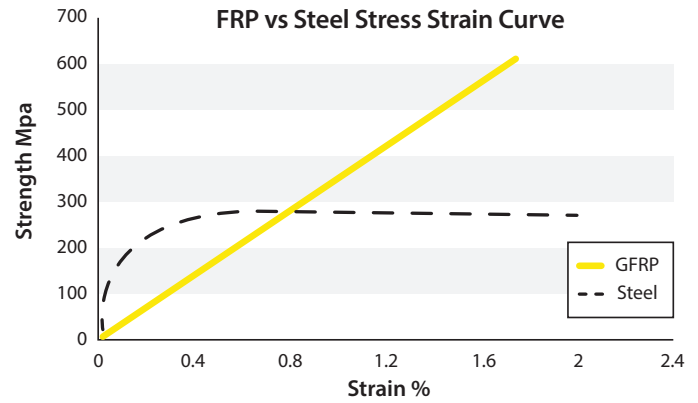
Higher Load Ratings - High modulus = heavier loads

Is your FRP E40?

In structural applications elastic modulus directly influences deflection limits, vibration response, load distribution, span lengths and connection design.

Wagners FRP structural profiles consistently deliver an E-grading of E40 (40 GPa) which means our structures can deliver a stiffness comparable to hardwood or light steel, making them ideal for critical infrastructure where minimal deflection, longer spans and high structural performance is required.

Remember though, that not all FRP is created equal and imported FRP usually has an E-grading of between E17 and E23; which means it is weaker and more flexible than Wagners FRP. This means that infrastructure designed for Wagners FRP cannot simply be substituted for imported FRP as the profiles do not have the same structural integrity. So, the next time you are comparing quotes for FRP make sure you are comparing apples to apples and ask what the E-grading of the FRP is.



The ATSS5880 Austroads specification published in October 2023, references the European code (EN13706 - 3:2002) for the pultrusion properties in which pultruded FRP materials are categorised based on their elastic modulus value.



Wagners CFT meets the international management standards for:



T +61 7 4637 7777
E cftsales@wagnerscft.com.au



Wagners Composite Fibre Technologies (CFT)

wagnerscft.com.au