

GFRP Rebar vs Steel Rebar — Technical Comparison

1. STRENGTH PERFORMANCE

GFRP tensile strength: 800–1300 MPa (tested up to 1300 MPa)

Steel rebar: 300–500 MPa

→ 2–3× stronger in tension

2. WEIGHT & HANDLING

GFRP density: ~2.0 g/cm³

Steel: 7.8 g/cm³

→ 75% lighter → lower transport & labor cost

3. CORROSION RESISTANCE

GFRP: No corrosion

Steel: rusts in chloride / salt / moisture

→ 100+ year design life in harsh environments

4. THERMAL CONDUCTIVITY

GFRP: <0.5 W/m·K

Steel: ~60 W/m·K

→ Eliminates thermal bridging → critical for energy-efficient buildings

5. ELECTRICAL & MAGNETIC PROPERTIES

GFRP: Non-conductive, non-magnetic

Steel: conductive & magnetic

→ Ideal for:

Data centers

Hospitals (MRI rooms)

Power infrastructure

6. ELASTIC MODULUS

GFRP: 50–60 GPa

Steel: 200 GPa

→ Lower stiffness, but design is strain-based, not strength-limited

7. THERMAL EXPANSION COMPATIBILITY

GFRP: Similar to concrete (axial direction)

Steel: higher mismatch

→ Reduced cracking risk

GFRP rebar offers 2–3× tensile strength, 75% weight reduction, zero corrosion, and full electrical insulation, making it ideal for long-life infrastructure, marine environments, and energy-efficient buildings where steel rebar fails due to corrosion and thermal bridging.

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Date: 2026-05-26