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JNTG

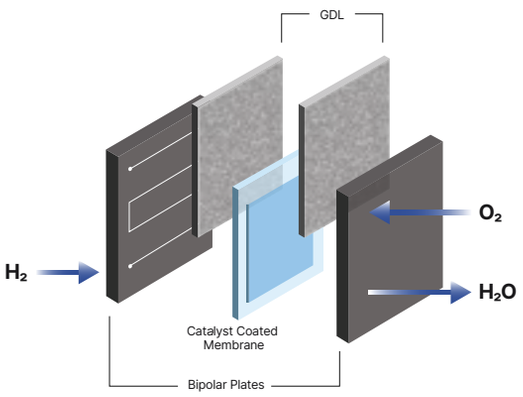
# Carbon Solutions For Clean Energy

- GDL for Fuel Cells
- CS for Electrolyzers/Fuel Cells
- GFE for Flow Batteries

JNTG is a global leader in carbon-based materials, shaping the future of the clean energy industry. We develop and manufacture high-performance materials for fuel cells, electrolyzers, and redox flow batteries — delivering customized solutions tailored to the diverse needs of our clients. Our advanced technology and flexible production capabilities empower global partners striving for optimal performance to achieve fast and meaningful business outcomes. Discover how JNTG's advanced carbon materials elevate energy system performance.

# GDL for Fuel Cells

The Gas Diffusion Layer (GDL) is a key material used in mobility and building fuel cells. It efficiently delivers reactant gases to the catalyst layer and enhances stack performance and durability through high conductivity, effective water and thermal management, and robust mechanical support. Discover optimized GDL solutions for maximum performance.




## Key Strengths

- **Carbon Paper Design Technology**
  Balances high gas permeability and mechanical strength
- **Customized MPL Solutions**
  Tailored for peak performance in diverse conditions
- **Long-Term Durability**
  Engineered to prevent degradation and maximize stack lifetime

## Selection Guide

| Automotive | Marine | Forklift | Automotive/Drone | Stationary |
|---|---|---|---|---|
| - Thin & Lightweight<br>- High Durability | - Long-Term Stability<br>- Corrosion Resistance | - Fast Power Response<br>- Low Humidity Stability | - Lightweight & Durable<br>- Water Retention | - High Humidity Stability<br>- Robust Structure |
| GD018DB5 | JNT17BB2-BA5D | JNT20-A6L | JNT21B-A4G | JNT30-A6 |

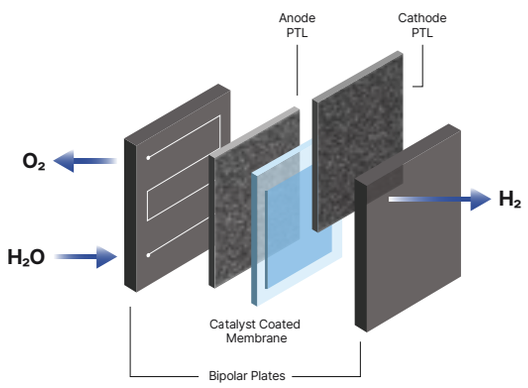
## Key Properties

| Model | Thickness μm | Compressed Thickness μm | Electrical Resistance mΩ · cm² | Areal Weight g/m² | Gas Permeability | | Humidity | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Through-Plane cm³/cm² · sec | In-Plane mbar | High ( ≥ 50%) | Low ( < 50%) |
| **GD018DB5** | 180 | 135 | ≤ 15 | 55 | 0.5 | ≤ 15 | ● | ● |
| **JNT17BB2-BA5D** | 180 | 140 | ≤ 15 | 60 | 3 | ≤ 15 | ● | |
| **JNT21-A4G** | 210 | 170 | ≤ 15 | 80 | 3 | ≤ 100 | ● | |
| **JNT20-A6L** | 250 | 210 | ≤ 15 | 100 | 3 | ≤ 100 | | ● |
| **JNT30-A6** | 320 | 270 | ≤ 20 | 110 | 3 | ≤ 100 | ● | |
| Remark | @12kPa | @1MPa | @1MPa | | @200Pa | @1MPa | | |

※The values presented in this document are typical and should not be regarded as guaranteed specifications.

# CS for Electrolyzers/Fuel Cells

Carbon Substrates (CS) is a high-density sheet material manufactured through lamination and compression processes. In water electrolysis stacks for green hydrogen production, it serves as the cathode-side PTL, while in PAFC fuel cell systems it is used as the GDL. With excellent electrical and thermal conductivity as well as outstanding durability, CS enhances the efficiency and stability of energy systems. Explore JNTG's advanced CS solutions.


## Key Strengths

- **High Mechanical Strength**
  Withstands high-pressure conditions with a high-density carbon sheet
- **High-Temperature Graphitization Technology**
  Ensures low resistance and long-lasting electrochemical durability
- **Optional MPL coating**
  Safeguards the membrane while enhancing reaction stability

## Selection Guide

| PEMWE / AEMWE | PAFC |
|---|---|
| - Hydrogen Exhaust Capability<br>- Water Management Capability | - Hydrogen Diffusivity<br>- High Thermal Conductivity |
| >5bar: JMP200, JMP290<br>≤5bar: JMP40 | JMP40 |

## Key Properties

| Model | Thickness<br>mm | Compressed Thickness<br>mm | Electrical Resistance<br>mΩ | Appearance Density<br>g/cm³ | Gas Permeability | |
|---|---|---|---|---|---|---|
| | | | | | Through-Plane<br>cm³/cm² · sec | In-Plane<br>μm² |
| **JMP40** | 0.425 | 0.38 | 5 | 0.46 | 12 | 6 |
| **JMP200** | 2.05 | 1.95 | 8 | 0.54 | 0.8 | 8 |
| **JMP290** | 2.90 | 2.75 | 9 | 0.58 | 0.8 | 7 |
| Remark | @ 58kPa | @1MPa | @1MPa,<br>1.0 A/cm² | | 38cm²,<br>@125Pa | @ 1 MPa,<br>0.5 ℓ/min |

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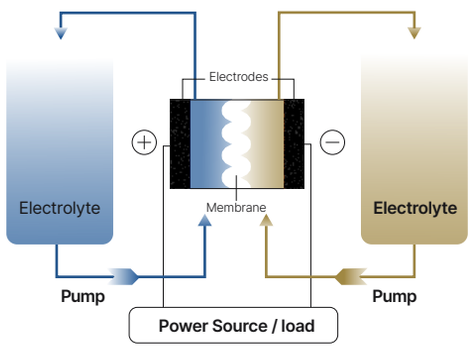
# GFE for Flow Batteries

Graphite Felt Electrode (GFE) is a felt-type electrode used in long-duration energy storage systems (ESS), including vanadium and zinc-hybrid flow batteries. Playing a critical role in both performance and lifespan, JNTG's GFE offers high electrical conductivity, excellent wettability, and long-term durability. Experience the ideal solution for superior battery performance.




## Key Strengths

- **Optimized Electron Pathway Design**
  Maximizes electrical conductivity by minimizing losses during electron flow
- **Excellent Wettability**
  Enhances electrolyte affinity for more reaction sites and uniformity
- **High Durability**
  Nitrogen doping suppresses peroxide formation for long-term stability

## Selection Guide

| Vanadium Redox Flow Battery | Zinc-Hybrid Redox Flow Battery |
|---|---|
| - Thin Structure<br>- Excellent Wettability<br>- Uniform Reactivity | - Thick Structure<br>- Low Electrical Resistance<br>- High Purity |
| GF031BH , GF051BH , GF061AH | GF072A |

## Key Properties

| Model | Thickness<br>mm | Electrical Resistance<br>mΩ · cm² | Areal Weight<br>g/m² | Carbon Content<br>Wt.% | Activation | Graphitization |
|---|---|---|---|---|---|---|
| **GF031BH** | 2.5 | < 230 | 230 | ≥ 99.0 | ● | |
| **GF051BH** | 4.2 | < 180 | 400 | ≥ 99.0 | ● | |
| **GF061AH** | 5.0 | < 180 | 500 | ≥ 99.0 | ● | |
| **GF072A** | 7.0 | < 180 | 840 | ≥ 99.8 | | ● |
| Remark | @ 1kPa | @20% Compressed | | @900°C, Air | | |

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