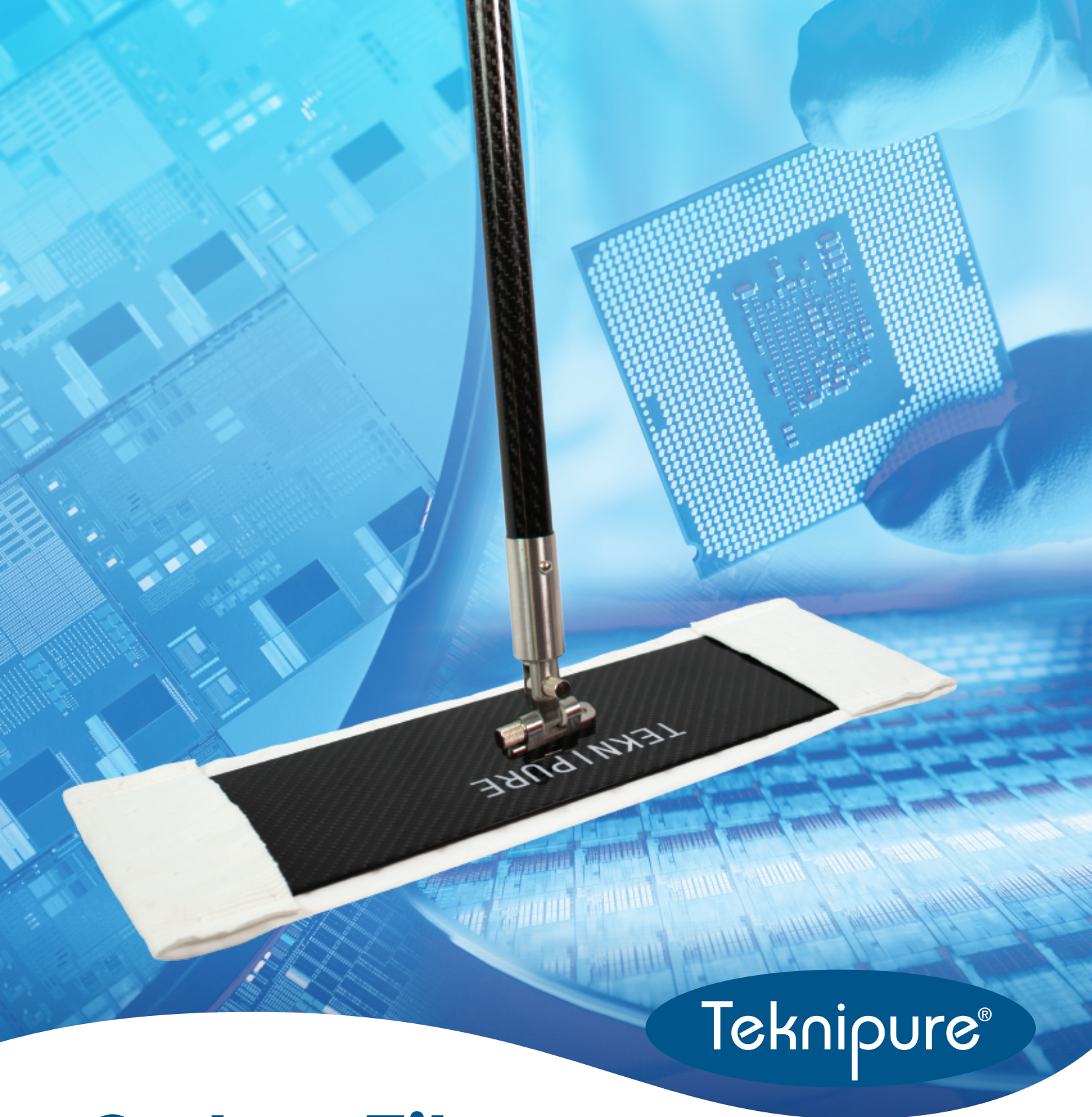




Teknipure®

Carbon Fiber Mop Frames & Handles

CONTAMINATION CONTROL SOLUTIONS

MICROELECTRONICS | SEMICONDUCTOR



OVERVIEW

Teknipure’s **Carbon Fiber** mop frames and handles represent the premium choice for cleanroom surface cleaning in environments where contamination control and regulatory compliance are non-negotiable. Unlike conventional aluminum, stainless steel, or plastic alternatives, carbon fiber delivers a unique combination of material properties that directly translate to **lower contamination risk, higher process yields, and lower total cost of ownership**.

This document details the key features and operational value of carbon fiber mop frames and handles, with specific relevance to the microelectronics industry.

CORE FEATURES & OPERATIONAL VALUE

FEATURE	WHAT IT MEANS	OPERATIONAL VALUE
Ultra-Low Particle Generation	Carbon fiber does not shed fibers or release particulates during normal use. The material is inert and non-friable	Maintain ISO-class cleanliness without additional contamination from the cleaning tool itself. Reduce batch failures and out-of-spec particle counts in monitored environments.
Lightweight Design	Complete carbon fiber handle-and-frame assemblies are 40–60% lighter than equivalent stainless steel configurations.	Improve operator compliance with standard cleaning procedures by reducing physical effort. Particularly valuable in high-frequency cleaning regimes.
Superior Strength-to-Weight Ratio	Carbon fiber is up to 5× stronger than stainless steel at a fraction of the weight. Handles and frames are rigid without being heavy.	Reduce operator fatigue during extended cleaning shifts. Enable the use of longer pole lengths for ceiling and wall cleaning without sacrificing control or adding physical strain.

FEATURE	WHAT IT MEANS	OPERATIONAL VALUE
Exceptional Dimensional Stability	Low coefficient of thermal expansion. Carbon fiber does not warp, flex, or deform under thermal cycling or mechanical stress.	Consistent mop head contact and coverage across every cleaning cycle. Eliminate variable cleaning outcomes caused by handle flex or dimensional drift, supporting validated cleaning procedures.
Broad Chemical Resistance	Carbon fiber is resistant to cleanroom disinfectants and cleaners, including IPA (isopropyl alcohol), hydrogen peroxide (H ₂ O ₂), bleach (sodium hypochlorite), and quaternary ammonium compounds. Studies available.	Use a single tool across your complete disinfectant rotation without tool degradation, discoloration, or chemical interaction. Eliminate the risk of chemical contamination caused by tool corrosion or surface breakdown.
Non-Magnetic Material	Carbon fiber is non-magnetic and does not generate or retain magnetic fields.	Safe deployment in areas with magnetically sensitive equipment, components, or processes, such as MRI-component manufacturing, magnetic disk media production, and precision sensor fabrication.
Smooth, Non-Porous Surface Finish	The composite surface has no microscopic pores, cracks, or recesses where microorganisms or particles can harbor. The surface is easy to wipe clean and decontaminate.	Support effective and verifiable decontamination. Simplify cleaning validation by providing a predictable, uniform substrate that responds consistently to disinfectants.
Long Service Life & Durability	High resistance to impact, corrosion, and chemical degradation. Carbon fiber tools maintain structural and surface integrity across the use cycles.	Reduce replacement frequency and consumable spend compared to aluminum, plastic, or coated steel alternatives. Achieve a lower total cost of ownership (TCO) over the tool lifecycle. Simplify budgeting with more predictable replacement intervals.
Packaging & Traceability	Teknipure mops are pre-cleaned with 70% IPA-saturated wipers and packaged into a polybag and a case. Each box is labeled with the lot number and manufacturing date.	Receive tools ready for direct introduction into your cleanroom. Additional sanitization/disinfection of the tools may be required depending on your SOP. Support incoming qualification, change control, and audit documentation with full traceability records.



VALUE FOR MICROELECTRONICS & SEMICONDUCTOR MANUFACTURING

Semiconductor fabs, PCB assembly facilities, flat panel display plants, and data storage manufacturing environments operate under some of the most demanding contamination control requirements in any industry — down to ISO Class 3 (Class 1). In these environments, particles as small as 0.1 μm and airborne molecular contamination (AMC) at parts-per-trillion levels can cause catastrophic yield loss. Teknipure’s Carbon fiber handles and frames address the unique challenges of these ultra-clean environments with precision.

CHALLENGE	HOW CARBON FIBER HELPS	BUSINESS OUTCOME
Particle-Induced Yield Loss	Carbon fiber’s non-shedding surface generates no particles during cleaning, ensuring the tool contributes zero additional contamination to monitored airstreams and work surfaces.	Protect wafer, die, and component yield. Reduce the incidence of particle-related defects on product that translate directly to financial loss per wafer or panel.
Magnetic Field Interference	Non-magnetic material ensures no field generation or perturbation near magnetically sensitive processes, equipment, or components.	Safe use in areas where magnetic fields could alter device properties or interfere with metrology equipment, such as in HDD, MEMS, or advanced packaging facilities.
Chemical Exposure During Tool Cleaning	Carbon fiber withstands aggressive fab-grade cleaning chemistries, including IPA, DI water rinses, and oxidizing agents without surface degradation.	Extend tool service life in chemically intensive fab environments. Maintain surface integrity and contamination performance specification over the full tool lifecycle.
Dimensional Consistency for Repeatable Coverage	Low CTE and high rigidity ensure the frame and handle geometry remain constant across thermal cycling in temperature-controlled fab environments.	Ensure repeatable cleaning coverage on cleanroom floors, equipment surfaces, and tool pedestals. Reduce variability in cleaning outcomes that can affect process stability.

TECHNICAL SPECIFICATIONS

Material	High-modulus carbon fiber composite material; protective outer acrylic coating
Particle Generation	Non-shedding; meets or exceeds ISO 14644-1 Class 5 material requirements for use in cleanrooms down to ISO Class 3
Chemical Resistance	Compatible with: IPA, H ₂ O ₂ , bleach (sodium hypochlorite), QAC, DI water. Studies available.
Thermal Stability	Operating range: -4°F-104°F (-20°C to +40°C)
Sterilization Methods	Steam autoclave compatible (130°C). Studies available.
Magnetic Properties	Non-magnetic; no field generation or retention
Surface Finish	Smooth composite surface; non-porous; cleanable to semiconductor standards
Packaging	Pre-cleaned with 70% IPA wipes before packaging; lot-coded; available with COC, and qualification support documentation
Applicable Standards	ISO 14644, IEST-RP-CC003, SEMI F57.



WHY TEKNIPURE CARBON FIBER VS. CONVENTIONAL HANDLE MATERIALS

PROPERTY	TEKNIPURE CARBON FIBER	ALUMINUM	STAINLESS STEEL	FIBERGLASS/ PLASTIC
Particle Generation	✔ Non-shedding	⚠ Oxidation risk	✔ Low	✗ Fiber shedding risk
Chemical Resistance	✔ Excellent	⚠ Oxidizes with acids	✔ Good	⚠ Degrades with solvents
Autoclave Compatible	✔ Yes	⚠ Not recommended	✔ Yes	⚠ Limited (deforms)
Weight (vs. stainless steel, SS)	✔ ~30%-50% of SS	✔ ~35% of SS	✗ Benchmark (100%)	✔ ~30% of SS
Non-Magnetic	✔ Yes	✔ Yes	⚠ Depends on grade	✔ Yes
Long-Term Durability	✔ Excellent	⚠ Moderate	✔ Good	✗ Poor

REGULATORY & STANDARDS ALIGNMENT

Carbon fiber mop frames and handles are designed to support compliance with the following regulatory frameworks and industry standards. Customers are responsible for performing their own qualification and validation activities within their specific quality systems.

ISO 14644-1 / -2	Classification and monitoring of cleanrooms. Carbon fiber tools support maintenance of ISO Class 3–8 environments by eliminating the tool as a particle source.
SEMI F57	Standard for components of ultrapure water and chemical distribution systems in semiconductor manufacturing; also referenced for molecular contamination control. Carbon fiber’s low particle-generating profile supports compliance.
IEST-RP-CC003	Contamination control standard for cleaning of cleanrooms and associated controlled environments. Supports cleaning procedure documentation and validation with verifiable tool material properties.

For product specifications, qualification documentation, or sample requests, please contact your account representative.
This document is intended as a technical reference and does not constitute a regulatory submission or quality agreement.