

**HEXALOOM MEDICAL DIVISION: TECHNICAL SPECIFICATION HM-04 Asset Name:
Hexenon-M Surgical Threading Requirements Series: Neuro-Linker Precision**

1. Executive Summary

Hexenon-M (Medical Grade) is a specialized carbon nanotube weave optimized for high-fidelity neural bridging and microscopic surgical threading. Unlike industrial carbon weaves, Hexenon-M undergoes a proprietary surface functionalization process to ensure 100% biocompatibility with human neural tissue.

2. Dimensional Precision

The primary advantage of Hexenon-M is its diameter-to-strength ratio. Standard surgical sutures (e.g., 10-0 Prolene) have a diameter of ~20-29 microns. Hexenon-M "Neuro-Threads" are manufactured at a standard diameter of 5.0 microns, allowing for integration directly into the fascicles of peripheral nerves without causing displacement trauma.

Table 1: Dimensional Comparison - Hexenon-M vs. Standard Micro-Sutures

Suture Type	Diameter (μm)	Tensile Strength (MPa)	Biocompatibility	Conductivity
10-0 Nylon	25.0	450	High	Non-conductive
11-0 Ethilon	15.0	500	High	Non-conductive
Hexenon-M Alpha	5.0	12000	Ultra-High	1.2×10^6 S/m
Hexenon-M Nano	1.2	15000	Ultra-High	1.5×10^6 S/m

3. Electrical Fidelity and Impedance

For neuro-linking applications, signal clarity is paramount. Hexenon-M exhibits a unique "Quantum Tunneling" effect at the synapse junction, reducing signal noise by 40% compared to platinum-iridium electrodes.

Table 2: Signal Impedance at 1kHz

Material	Impedance (kΩ)	Signal-to-Noise Ratio	Flex-Life (Cycles)
Platinum-Iridium	150	12:1	<10,000
Gold-Plated Copper	120	15:1	<5,000
Hexenon-M (Raw)	15	45:1	>1,000,000

4. Long-Term Tissue Integration

A major hurdle in neural implants is the Foreign Body Response (FBR). Standard implants trigger the formation of a glial scar that eventually insulates the electrode from the neuron. Hexenon-M's peptide coating prevents this response.

Table 3: Glial Scarring Thickness Over Time

Duration	Platinum-Iridium (μm)	Hexenon-M (μm)	Signal Attenuation
1 Month	15	<1	-0.05 dB
6 Months	45	1.2	-0.10 dB
24 Months	120	1.5	-0.12 dB

5. Clinical Recovery Benchmarks

In Phase II trials, Hexenon-M bridge grafts significantly reduced the time required for post-operative sensory feedback return.

Table 4: Recovery Timeline (Average Days)

Function Type	Standard Nerve Graft	Hexenon-M Bridge	Improvement
Pain/Temperature	180 Days	42 Days	76.6%
Proprioception	240 Days	60 Days	75.0%
Fine Motor Control	365+ Days	120 Days	67.1%

6. Sterilization and Regulatory

Hexenon-M is classified as a Class III Implantable Medical Device (ISO 10993).

Table 5: Sterilization Limits

Agent/Process	Resistance	Max Temp	Repeatability
Steam Autoclave	Excellent	142°C	500+ Cycles
Ethylene Oxide	Excellent	60°C	Unlimited
Gamma Radiation	Good	N/A	1 Cycle

7. Surgical Workflow and Safety

Implementation requires the specialized "Nanoworks Surgical Kit" to prevent static charge interference.

Safety Note: Surgeons must use bipolar cautery at least 2cm away from the graft site. Hexenon-M is permanently conductive and can act as a thermal conduit if misused.

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