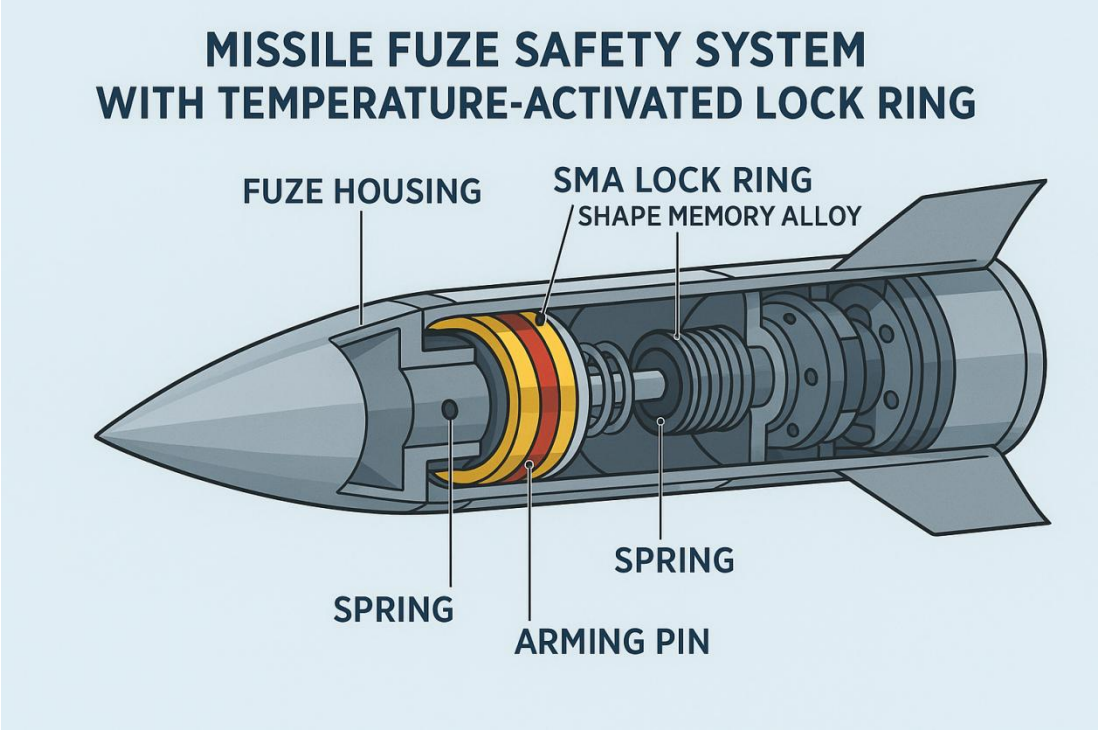
SMA TEMPERATURE-ACTIVATED LOCK RING Technical Description

For Missile Fuze Safety System



Functional Overview:
This system incorporates a shape memory alloy (SMA) lock ring positioned within the fuze assembly. Upon exposure to elevated ambient temperatures exceeding the austenite start temperature (A_s), the SMA ring undergoes radial contraction.

Activation Mechanism:
Radial contraction of the lock ring initiates a controlled mechanical release of internal retention structures. This enables transition from a safe state to an armed state under predefined thermal conditions.

Safety Assurance:
The fuze remains unarmed during storage, handling, or transportation, as the lock ring retains its expanded form below the thermal activation threshold. This passive mechanism prevents unintentional arming due to vibration, shock, or other non-thermal influences.

Environmental Reliability:
The system is designed for consistent performance in extreme environments, including high-altitude, maritime, and desert deployments. The SMA lock ring offers fatigue resistance exceeding one million thermal cycles, ensuring long-term operational safety and reliability.

Technical Specifications

Lock Ring Material: NiTi Shape Memory Alloy

Activation Temperature: As ≥ 110℃，Af ≤ 135℃

Cycle Life: >50 Cycles MIN

Application Interface: Integrated within missile fuze housing (nose section)

Response Time: ≤10 seconds above A_s

Storage Temperature Range: -40°C to +65°C

Operational Temperature Range: -20°C to +120°C

Compliance and Testing

Standards Referenced:

MIL-STD-810H (Environmental Testing)

NATO AQAP-2110 (Quality Assurance)

IEC 60068-2 (Temperature and Mechanical Stress)

Test Protocols:

Thermal cycling endurance tested (50+ cycles)

Drop and vibration test under unarmed conditions

Activation verification at threshold temperature