

DAIS-10 Compliance Rules

A DAIS-10 compliant system must adhere to the following nine measure-theoretic and operational rules to ensure safety dominance:

1. **Fading Operator Implementation:** The system must implement the fading operator F using exponential decay to manage confidence over time.
2. **Scenario Threshold Enforcement:** Risk-mass thresholds (τ_s) must satisfy

$$\tau_s \geq \frac{C_{fp}}{C_{miss}}$$

to ensure safety-prioritized decision-making.

3. **Timeout Guarantees:** The system must enforce a maximum ambiguity duration T_s^* that is a stopping time with a finite expectation:

$$\mathbb{E}[T_s^*] < \infty.$$

4. **Semantic Consistency:** All sensor observations $o_{0:t}$ must remain consistent with the expected labels Λ_s of the active scenario class.

5. **Monotonicity Guarantee:** The risk-mass variable must be non-increasing over time:

$$\theta_{t+1} \leq \theta_t$$

to prevent unsafe confidence spikes.

6. **Decision Logging:** Every decision must be logged along with the full state vector:

$$(\theta_t, s, d_t, u_s, r_t)$$

including risk mass, scenario, duration, epistemic uncertainty, and calibration factor.

7. **Statistical Validation:** The system must demonstrate a statistically significant reduction in catastrophic misses compared to standard thresholding:

$$p < 0.01.$$

8. **Calibration Audit:** A calibration factor r_t must be applied to the risk mass to prevent algorithmic overconfidence:

$$\theta_t^c = r_t \cdot \theta_t.$$

9. **Recursive Uncertainty Modulation:** The decay of risk mass must be modulated based on scenario-dependent epistemic uncertainty u_s .