



How 2D Tri-Coded Tubes Ensure Sample Security and Chain of Custody

2D tri-coded tubes are engineered to provide robust sample security and a lifelong, auditable chain of custody through a combination of advanced identification technologies, secure physical design, and rigorous quality control. In this article, we explore why your lab should consider when purchasing 2D Tri-coded tubes.

Permanent, Redundant Identification

- **Tri-coding system:** Each tube features a permanently laser-etched 2D code on the base, a 1D linear barcode, and a human-readable number on the side. This ensures a permanent and unbreakable link between the physical sample and its digital record, supporting traceability even if one identification method is compromised.
- **Readability in harsh conditions:** The high-contrast 2D codes are readable without removing tubes from racks, even when exposed to frost or condensation, which is essential for cryogenic storage and high-throughput workflows.

Secure Physical Design

- **Leak-tested and contamination-free:** Each tube undergoes 100% quality control, including leak testing to ensure sample security and prevent cross-contamination.
- **Externally threaded caps:** These designs prevent overtightening and provide a more secure seal, reducing the risk of sample loss or contamination compared to traditional O-ring or internally threaded caps.
- **Manufacturing standards:** Tubes are made from USP Class VI virgin polypropylene in ISO Class 8 cleanrooms, ensuring they are free from detectable extractables, leachables, endotoxins, DNA/RNA, and heavy metals.

Chain of Custody and Audit Traceability

- **Unique, lifelong codes:** Every tube's code is unique and permanent, providing a secure, auditable chain of custody for biobanks, compound libraries, and clinical or research samples—even over decades of storage.
- **Compatibility with automation:** The tri-coded design is compatible with automated barcode reading, capping, and sample management systems, enabling seamless tracking, data sharing, and audit trails across multiple users, labs, and locations.
- **Audit-ready traceability:** The combination of physical and digital records, plus compatibility with high-density storage and automated workflows, ensures that every sample movement is logged and traceable, supporting compliance with regulatory and quality standards.

Summary Table

Feature	Security/Chain of Custody Benefit
Permanently etched tri-codes	Unbreakable link between sample and data
Leak-tested, contamination-free	Prevents loss or compromise of sample
External thread design	Secure seal, prevents overtightening
Automation compatibility	Enables full audit trails and efficient tracking
High-contrast, frost-resistant	Maintains identification in harsh conditions
Unique, lifelong codes	Supports long-term, auditable custody

In summary:

2D tri-coded tubes ensure sample security and chain of custody through permanent, redundant identification, secure and contamination-free design, and seamless integration with automated and audit-ready sample management systems. This makes them a gold standard for biobanks, clinical labs, and any environment where sample integrity and traceability are paramount.

At AutoGen, we've taken the time to consider all these factors to provide a tube and rack design perfect for DNA/RNA extraction automation. We call them [STAR 2D Tri-coded Tubes](#), and we believe you won't find a better sample tube on the market.

If you're interested in getting these tubes into your workflows, [get in touch](#). Our team is here to help your lab become more efficient.

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