

AIRKEY FIELD ENGINEERING TOOLKIT

GMP Cleanroom Commissioning & Dynamic Stability Protocol

A Practical Guide to Bridging the Gap Between 'At-Rest' Testing and Real-World Operation
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Introduction: Why This Toolkit Exists

Passing an 'At-Rest' cleanroom inspection is a baseline, not a guarantee of operational compliance. Real-world performance drifts under heat loads, operator movement, and filter loading.

Section 1: Dynamic Recovery & Airflow Buffer Verification

Design supply airflow formula: $Q_{\text{design}} = V \times \text{ACR}_{\text{min}} \times 1.15$ (15% safety buffer).

Recovery Time Protocol: return to ISO limits within 15–20 minutes after aerosol spike test.

Section 2: Pressure Cascade & Airlock Commissioning Matrix

Control Element	CAV Setup	VAV Venturi	Field Metric
Response Time	>30-60s	<3-5s	≥10-15 Pa stability
Interlock	N/A	Electronic sync	<0.5s lag
Filter Compensation	Manual	Automated VFD	Zero seasonal drift

Section 3: FFU Ceiling Grid Audit

Cell-by-cell verification, pressure uniformity, and RPM deviation $\leq \pm 5\%$.

Section 4: HEPA Integrity Checklist

Squareness tolerance <1.5mm, coplanarity <1.0mm, installation temperature $\geq 15^{\circ}\text{C}$.

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