Civil Aviation Safety Authority
of Papua New Guinea

Advisory Circular

AC140-03

Screening Equipment Performance Testing and Detection Standards

Initial Issue

07 May 2025

GENERAL

Civil Aviation Safety Authority of Papua New Guinea Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices or procedures are found to be acceptable, they will be added to the appropriate Advisory Circular.

PURPOSE

This Advisory Circular (AC) provides mandatory guidance on the minimum performance testing, sensitivity settings, and operational verification requirements for security screening equipment used at aviation facilities in Papua New Guinea.

RELATED CAR

This AC relates to Appendix A – A.25 of the PNG Civil Aviation Rules Part 140, which mandates operational performance testing and detection standards for all security screening equipment. It supplements Part 140 and Part 107, providing structured guidance for operators.

CHANGE NOTICE

This Advisory Circular (AC140-03) is the initial issue, introducing the first version of performance testing and detection standards for security screening equipment.

TABLE OF CONTENTS

1. EQUIPMENT PERFORMANCE STANDARDS AND DETECTION CAPABILITIES

This section defines the mandatory performance requirements for security screening equipment, including threat detection capabilities, accuracy metrics, and operational reliability.

This AC applies to all operators responsible for the operation, testing, and maintenance of the following security screening equipment:

(1) Walk-Through Metal Detectors (WTMDs)

(2) Hand-Held Metal Detectors (HHMDs)

(3) X-ray Imaging Systems (Single-View and Dual-View)

(4) Explosives Detection Systems (EDS)

(5) Explosives Trace Detection (ETD) Devices

(6) Security Scanners (Body Scanners)

It defines daily, weekly, monthly, and annual performance testing requirements.

1.1. Minimum Detection Performance Criteria

1.1.1 Walk-Through Metal Detectors (WTMD) must detect concealed metallic threat items, including knives and firearms, with a false alarm rate below 5%.

1.1.2 Hand-Held Metal Detectors (HHMD) must provide targeted threat detection, adjustable sensitivity settings, and both audible and visual alarms.

1.1.3 X-ray Imaging Systems must feature high-resolution imaging, dual-view capabilities, and Threat Image Projection (TIP) functionality for operator training.

1.1.4 Explosives Detection Systems (EDS) must detect a range of explosives including PETN, RDX, TNT, and TATP, meeting ECAC C2–C4 certification levels.

1.1.5 Explosives Trace Detection (ETD) Systems must reliably detect nanogram-level traces, ensuring minimal false alarm rates.

1.2. Performance Degradation Prevention

1.1.1 Equipment must be maintained to prevent performance degradation due to environmental conditions.

1.1.2 Calibration cycles must be established to compensate for factors affecting detection capabilities.

2. TESTING METHODOLOGIES AND OPERATIONAL REQUIREMENTS

2.1 Performance Testing Requirements

2.1.1 Daily Testing

2.1.1.1 Before screening operations begin each day, operators must perform functional checks:

Equipment	Daily Testing Requirements
WTMD	Pass a **Director-approved metal test piece** at multiple heights/positions; verify alarm activation.
HHMD	Verify audible/visual alarms by passing the device over a metal test piece.
X-Ray	Conduct a functional check using a standard threat test bag or activate TIP (if installed).
EDS	Ensure automatic detection of Director-approved simulated explosives.
ETD	Perform calibration verification using a manufacturer-provided positive control sample.
Body Scanner	Verify system initialization and functional check via self-test/manual threat simulation.

Failure Protocol - Equipment failing any part of the daily test must not be used until repaired and retested.

2.1.1.2 Screening equipment must undergo daily operational checks, including:

(a) Detection verification using standardized threat test objects.

(b) Image resolution and penetration capability validation for X-ray systems.

(c) Alarm response accuracy for WTMDs, HHMDs, and ETDs

2.1.2 Weekly Testing

2.1.2.1 Operators must:

(a) Conduct enhanced functionality tests using broader threat items (e.g., knives, firearms, IED simulants)

(b) Record sensitivity settings and detection accuracy.

(c) Review TIP alarm resolution performance (for X-ray systems).

2.1.3 Monthly Testing

2.1.3.1 Operators must:

(a) Verify equipment sensitivity settings align with Director-approved standards.

(b) Conduct full calibration verification if not mandated by the manufacturer.

(c) Perform random bag/person testing drills without operator forewarning.

(d) Analyse failure rates and anomalies in detection performance.

2.1.3.2 WTMD calibration verification, ensuring detection thresholds are optimized.

2.1.3.3 X-ray system penetration assessment, evaluating object differentiation capability.

2.1.3.4 ETD chemical trace sensitivity validation to detect nanogram-level residues.

2.1.4 Annual Certification Testing

2.1.4.1 Annual technical inspection and validation must be conducted by a CASA PNG-approved technician. Certification requirements include

2.2 Equipment Failure Contingencies

2.2.1 If screening equipment fails performance testing, immediate withdrawal is mandatory.

2.2.2 Alternative screening methods (manual search, ETD surface sampling) must be activated.

2.3 Documentation and Compliance Reporting

2.3.1 All testing results must be documented daily, reviewed weekly, and submitted quarterly to the Director.

2.3.2 Operators must retain records for at least three years, ensuring audit traceability.

3. TECHNICAL SPECIFICATIONS AND OPERATIONAL REQUIREMENTS

This chapter outlines the minimum technical specifications, operational conditions, and compliance requirements for all security screening equipment deployed at security-designated aerodromes and navigation facilities across Papua New Guinea. These standards are based on international standards, as well as the regulatory framework established under PNG Civil Aviation Rule Part 140 and CASA PNG's Aviation Security Risk Assessment Methodology (ASRAM).

3.1 Certification and Standards

3.1.1 International Certification

3.1.1.1 All security screening equipment must be certified by internationally recognized bodies such as ECAC (meeting C1 to C4 standards for EDS), TSA (ACSTL certification for screening technologies), or equivalent standards accepted by the Director.

3.1.2 Performance Requirements

3.1.2.1 Certification must cover, at a minimum:

(a) Threat detection performance (types and mass/size of weapons/explosives);

(b) Image quality and resolution standards for X-ray and EDS equipment;

(c) Penetration capability for dense objects;

(d) Alarm rates for detection systems (false alarm rates must not exceed acceptable international thresholds);

(e) Resistance to known methods of concealment and countermeasures.

3.1.3 Suitability for Environment

3.1.3.1 Equipment selected must be suited to the security threat profile of the location, determined through a site-specific risk assessment, and documented within the operator's Aviation Security Programme.

3.2 Procurement and Deployment

3.2.1 Security Risk Assessment (SRA)

3.2.1.1 Prior to procurement, applicants must conduct a formal SRA in accordance with CASA PNG's ASRAM Policy to determine the operational needs and threat environment.

3.2.2 Procurement Specifications

3.2.2.1 Technical specifications must be aligned to the threats identified in the SRA and must include throughput rates, environmental operating conditions (e.g., temperature, humidity), and scalability requirements.

3.2.3 Site Acceptance Testing (SAT)

3.2.3.1 Before deployment, equipment must undergo SAT to verify compliance with procurement

specifications, including

(a) Verification of detection capabilities against standard threat materials;

(b) Validation of image quality, penetration, and material discrimination (X-ray/EDS);

(c) Sensitivity setting validation for WTMD, HHMD, and ETDs;

(d) Confirming alarm presentation functionality (visual/audible/ATR bounding boxes);

(e) Compliance with operational performance under actual site conditions.

3.2.4 Documentation

3.2.4.1 SAT results must be recorded, submitted to the Director for approval, and retained for a minimum period of three years.

3.3 Maintenance and Calibration

3.3.1 Maintenance Program

3.3.1.1 Operators must establish and implement a preventive maintenance and corrective maintenance program:

(a) Compliant with manufacturer guidelines;

(b) Supplemented by national and international best practices.

3.3.2 Calibration Requirements

3.3.2.1 All detection equipment must be calibrated:

(a) Initially upon installation;

(b) Monthly thereafter;

(c) Immediately after any major maintenance or service event.

3.3.2.2 Calibration must utilize Director-approved standard test pieces.

3.3.3 Maintenance and Calibration Records

3.3.3.1 Maintenance and calibration logs must detail:

(a) The date, nature of maintenance or calibration;

(b) Identification of personnel conducting the task;

(c) Any anomalies detected and actions taken to restore serviceability.

3.4 Performance Testing

3.4.1 Daily Testing

3.4.1.1 Prior to commencing operations each day, equipment must pass functionality tests using standard threat test pieces.

3.4.1.2 For X-ray machines, Threat Image Projection (TIP) systems must be used where installed, to automatically and randomly display threat images during live screening operations as a means to assess operator performance. In the absence of a TIP system, manual test bag insertion containing Director-approved threat simulation objects must be conducted at regular intervals to validate the alertness and detection capabilities of screeners. All TIP activities and manual test bag insertions must be logged and reviewed as part of the operator's quality assurance programme.

3.4.2 Weekly and Monthly Testing

3.4.2.1 In-depth operational checks to verify alarm threshold settings, detection capability consistency, image quality (for imaging devices), and chemical trace sensitivity (for ETDs).

3.4.3 Failure Response

3.4.3.1 Any failure during daily or periodic testing must result in immediate removal of the equipment from service until repairs are completed and retested successfully.

3.4.4 Testing Documentation

3.4.4.1 Test results must be logged daily, reviewed weekly, and submitted to the Director quarterly or upon request.

3.5 Training and Competency

3.5.1 Initial Training

3.5.1.1 Personnel operating security screening equipment must successfully complete training that covers:

(a) Theory of detection principles;

(b) Hands-on operational skills;

(c) Threat recognition (including emerging threats);

(d) Emergency response actions.

3.5.2 Recurrent Training.

3.5.2.1 Operators must provide annual refresher training, aligned with changes to threat profiles and technology updates.

3.5.2.2 Practical proficiency must be assessed at least once every 12 months.

3.5.3 Certification

3.5.3.1 Personnel must hold a valid certificate of competency, issued by a CASA PNG-approved training organization or an entity recognized under the NCASTP.

3.5.4 Recordkeeping

3.5.4.1 Training and competency assessment records must be maintained for at least 24 months and be available for CASA PNG audits.

3.6 Contingency Planning

3.6.1 Equipment Failure Protocol

3.6.1.1 In accordance with Appendix A.29 of PNG CAR Part 140, operators must have in place immediate and effective contingency measures for any unserviceability of primary security screening equipment. The following actions must be implemented:

(a) Immediate Withdrawal of Defective Equipment

Any screening equipment identified as defective or failing to meet operational standards must be immediately withdrawn from service to prevent compromised security screening.

(b) Activation of Alternate Screening Methods

Alternate Director-approved screening methods must be activated without delay. These may include, but are not limited to:

(i) Full manual hand search of persons, baggage, or goods;

(ii) Use of Explosive Trace Detection (ETD) systems as the primary screening method;

(iii) Deployment of portable or backup screening devices where available.

3.6.2 Notification Requirements

3.6.2.1 The Director must be notified immediately if a primary item of security screening equipment remains unserviceable for a continuous period exceeding four (4) hours, or as otherwise directed.

3.6.3 Contingency Plan Testing

3.6.31 Contingency procedures must be periodically tested through drills at least once every six (6) months to ensure effectiveness, in accordance with the operator's Security Programme and Quality Assurance system.

3.6.4 Documentation

3.6.4.1 All equipment failures, activation of contingency screening methods, testing drills, and recovery actions must be fully documented, logged, and retained for audit by CASA PNG for a minimum of three (3) years.