

## **SPECIFICATION RT57-06**

### **MOBILE X-RAY SCAN VEHICLE (HIGH ROOF P/VAN MORE THAN 10.0M³)**

#### **1. General:**

- 1.1 The Department requires a Mobile Security Screening Unit (MSSU) capable of scanning baggage and parcels using an integrated X-ray machine.
- 1.2 The Department takes no responsibility for the violation of any patent rights.

#### **2. SCANNER PERFORMANCE REQUIREMENTS**

- 2.1 The selected X-ray scanning unit must meet the following performance criteria:

Detection Capability: The system must demonstrate the capability to reliably detect and differentiate common security threats, specifically firearms and narcotics/drugs.

Image Resolution: The X-ray machine must provide high-resolution images suitable for detailed object analysis.

#### **3. Regulatory Compliance and Approvals**

- 3.1 All modifications, installations, and system operations must comply with relevant national and international standards.

#### **4. Road Authority Compliance**

- 4.1 The conversion must maintain the vehicle's roadworthiness and stability.

##### **4.1.1 Road Traffic Legislation:**

The completed vehicle must comply in all respects with the requirements of the latest provisions of the Road Traffic Legislation applicable to the region of operation.

##### **4.1.2 Approval Type:**

The conversion must obtain the necessary certification, typically through Individual Vehicle Approval (IVA) or equivalent national certification, confirming legality for road use.

##### **4.1.3 Road Traffic Legislation:**

The completed vehicle must comply in all respects with the requirements of the latest provisions of the Road Traffic Legislation applicable to the region of operation.

##### **4.1.4 Structural Certification:**

All structural alterations (e.g., frame mounting, floor reinforcement) must be certified by a registered automotive or structural engineer.

#### 4.1.5 Weight Distribution Report:

A detailed report of the centre of gravity (CoG) and axle load distribution (Laden and Unladen) must be provided, ensuring compliance with the original equipment manufacturer (OEM) limits and national regulations.

### 5. **Radiation Safety Compliance**

#### 5.1 Licensing:

Compliance with national regulatory bodies responsible for radiation protection (e.g., Radiation Protection Authority).

#### 5.2 Interlocks:

The system must incorporate redundant safety interlocks to prevent X-ray generation unless the screening tunnel is fully closed and the operational area is secured.

##### 5.2.1 Dose Monitoring:

Procedures and equipment (e.g., TLD badges) for routine monitoring of operator radiation exposure must be defined and integrated into the operation plan.

### 6. **Structural and Mechanical Integration**

#### 6.1 **X-Ray Scanner Mounting**

##### 6.1.1 Location:

The X-ray scanning unit must be designed and fabricated to fit within the available space of the cargo hold of the vehicle and shall form part of the vehicle once mounted within the cargo area of the Iveco Daily.

#### 6.2 Sub frame/Reinforcement:

A dedicated, robust steel sub frame, bolted through the chassis rails (where permissible by OEM standards) and incorporating floor reinforcement, is required to support the scanner's weight and withstand dynamic forces during transport.

#### 6.3 Vibration Dampening:

The mounting system shall incorporate anti-vibration mounts to protect sensitive X-ray and computer components during road travel.

### 7. **Weight Distribution and Ballast**

#### 7.1 Target centre of gravity:

The system design shall aim to keep the final centre of gravity as low as possible and centred between the axles to maintain stable handling.

## 7.2 Symmetry:

Equipment and shielding must be installed symmetrically to avoid undue stress or leaning on one side of the vehicle. Any necessary auxiliary equipment (e.g., power generator) must be placed to counterbalance the main scanner unit.

## 7.3 Payload Management:

The total added weight (Scanner + Shielding + Generator + Wiring + Operators) must not exceed the specified payload capacity of the Iveco Daily.

## 8. **Radiation Shielding and Operator Safety**

### 8.1. **Shielding Requirements**

#### 8.1.1. Material:

Lead-equivalent shielding materials (e.g., lead sheeting, barium sulphate paint, or specialised composites) must be incorporated into the vehicle's interior structure surrounding the scanner's path.

#### 8.1.2 Coverage:

Shielding must be installed in the floor, walls, and ceiling of the operational area to reduce scatter radiation to As Low As Reasonably Achievable (ALARA).

#### 8.1.3 Operator Control Area:

The operator's desk/console must be separated from the primary X-ray tunnel by a lead-lined barrier and viewing window, offering maximum protection.

### 8.2 **Controlled Access**

#### 8.2.1 External Access Control:

The X-ray operational area must be clearly demarcated. A visible, illuminated warning system and an audible alarm must activate when the X-ray tube is energised.

#### 8.2.2 Interior Interlocks:

The vehicle's rear and side doors (or access points to the scanner tunnel) must have door interlocks linked to the X-ray generator, instantly cutting power if opened during a scan.

## 9. **Electrical and Power Systems**

### 9.1 The system must ensure reliable power for the high-draw X-ray unit without compromising the base vehicle's electrical systems.

#### 9.1.1 Primary Source:

A dedicated auxiliary power source (e.g., silent diesel generator or high-capacity battery/inverter system) is required to power the scanner and associated computing equipment.

#### 9.2 **Generator Specifications:**

9.2.1 The generator must be able to start via a single push-button control located at the operator's main workstation.

9.2.2 The generator must draw fuel directly from the base vehicle's main fuel tank (with a dedicated, correctly positioned fuel sender/pick-up).

9.2.3 The generator must be easily removable for servicing and maintenance.

#### 9.3 **Generator Enclosure:**

9.3.1 The generator must be housed within a soundproofed compartment.

9.3.2 The enclosure door must be lockable to prevent theft.

9.3.3 The enclosure must be properly sealed to prevent the ingress of water and dust as required by industry standards for mobile equipment.

#### 9.3.4 Isolation:

The auxiliary power system must be completely isolated from the vehicle's main battery and charging circuit.

#### 9.3.5 Ventilation and Fumes:

The generator compartment design must ensure that exhaust fumes are safely vented externally and do not leak into the interior of the vehicle cabin or operational area under any circumstances.

### 10. **Scanner Efficiency**

#### 10.1 Power Consumption:

The X-ray machine and all components must be selected for low power consumption during operational use.

#### 10.2 Standby Capability:

The system must incorporate an energy-saving capability/mode when the scanner is on standby or idle.

## 11. **Wiring and Circuits**

### 11.1 Electrical Workmanship:

The electrical system is vital to the functioning of the unit and must meet or exceed industry requirements and the workmanship must be of high quality throughout the installation.

### 11.2 Electrical Distribution Board (DB):

A purpose-built electrical distribution board (DB) must be fitted to the vehicle.

11.2.1 The DB must be fitted with a hinged cover to allow for easy access to all electrical wiring.

11.2.2 The DB must accommodate circuit breakers for the following dedicated circuits: X-ray machine, air conditioning unit, and LED lights.

### 11.3 Power Distribution:

All auxiliary subsystems (X-ray, HVAC, lighting, etc.) will be powered via this main distribution board, incorporating related circuitry and resettable circuit breakers.

### 11.4 AC Power Outlets:

A minimum of three (3) 15 Amp 220 VAC plug points with incorporated USB charge points must be installed in accessible areas of the operational bay.

### 11.5 Earthing:

All provided equipment running on 220 VAC, as well as the entire 220 VAC system, must be properly earthed to prevent electric shock whilst equipment is in operation.

### 11.6 Circuit Protection:

All added electrical circuits must be protected from overcurrent by means of resettable circuit breakers rated appropriately for the connected load.

### 11.7 Labelling:

All circuit breakers and primary functions are to be clearly and permanently identified by engraved labels.

### 11.8 Vehicle Lighting:

A minimum of six (6) high-brightness LED interior ceiling-mounted work lights must be installed in the operational area. A dedicated light switch must be installed at the door to control these lights.

## 11.9 **Wiring Standards:**

11.9.1 The complete wiring system and electrical appliances must be installed according to modern automotive standards throughout the installation.

11.9.2 For wiring that passes through sheet metal, bulkheads, and structural supports, plastic grommets must be used to protect both wiring insulation and looms from abrasion.

All wire bundles must be secured with flat nylon tape or ties, with a maximum centre distance of 150 mm.

## 9.10 **Dedicated Circuits:**

The X-ray machine, computing equipment, and internal lighting must be on separate, fused circuits.

## 9.11 **Cable Routing:**

All high-voltage and low-voltage cables must be routed in compliance with automotive safety standards, using flame-retardant conduit, secured away from heat sources, sharp edges, and moving parts.

## 10. **Operational Ergonomics and Interior Layout**

### 10.1 **Loading/Offloading Ergonomics:**

The scanner and associated conveyors /tables must be positioned and height-adjusted to ensure that the loading and offloading of items does not place undue physical strain on the end users.

### 10.2 **Image Storage:**

The system's digital storage capacity must be capable of securely storing a minimum of 50,000 high-resolution images.

### 10.3 **Console Design:**

A custom console must be fabricated to house the monitor, keyboard, and X-ray controls, secured to prevent movement during transit.

### 10.4 **High Volume Air Conditioner:**

To maintain operational temperature limits and operator comfort, a dedicated 13,500 BTU air conditioning unit must be installed in the cargo/operational bay. This is separate from the base vehicle's HVAC system.

## 10.5 **Safety Equipment and OHS Compliance**

### 10.5.1 **OHS Compliance:**

The entire vehicle conversion, including all fittings, equipment installation, and operational procedures, must conform to all safety features and aspects as laid

down by relevant Occupational Health and Safety (OHS) Legislation.

#### 10.5.2 Fire Extinguisher:

A 2 kg fire extinguisher must be supplied and securely fitted in an easily accessible location within the operational area.

#### 10.5.3 Medical Kit:

A Regulation 3 Medical Kit (approximate dimensions 200mm x 120mm x 100mm) must be supplied and fitted in an easily accessible location.

### 11. **Quality Assurance, Inspection, and Acceptance**

#### 11.1 **Quality Control Plan (QCP)**

11.1.1 The successful bidder must prepare and present a detailed Quality Control Plan (QCP) to Vehicle Fleet Management before the commencement of any modifications or manufacturing processes. The QCP shall detail material sourcing, process checks, compliance verification, and testing procedures.

#### 11.2 **Construction and Workmanship Inspection:**

11.2.1 All materials, workmanship, and construction shall be subjected to inspection and acceptance at any stage of the project by a designated representative of Divisional and Provincial Vehicle Fleet Management, S A Police Service. This includes, but is not limited to, structural, electrical, and shielding installations.

### 12. **Product Guarantee**

12.1 The completely converted product (vehicle, scanner installation, and all integrated subsystems) must be guaranteed in terms of the General Conditions of Contract (GCC).

### 13. **Training:**

13.1 Product training must be provided for the operation of the unit to the end-user, as well as 2 x Department technical staff members, and manuals must be included.

#### 14.2 Training must include:

- Safe operation of the X-ray system.
- Emergency shutdown procedures.
- Interpretation of high-resolution images.
- Daily system checks and operator maintenance.

## 15. **Refresher training modules and maintenance.**

### 15.1 Mandatory Refresher Training modules:

Comprehensive refresher training modules must be included for all operators and maintenance personnel covering:

- Safe operation of the X-ray system.
- Emergency shutdown procedures.
- Interpretation of high-resolution images.
- Daily system checks and operator maintenance.

### 15.2 **Maintenance**

#### 15.2.1 Contract Requirement:

A mandatory, comprehensive maintenance contract plan of two (2) years must be included with the system delivery. This contract must cover preventative maintenance checks, necessary software updates, and emergency repair call-outs.

## 16. **Documentation and Certification Deliverables**

### 16.1 The following documentation must be provided and supplied before the units are delivered and accepted:

#### 16.1.1 Homologation Letter:

A formal Homologation Letter issued by the bodybuilder confirming the conversion meets all design and regulatory standards.

#### 16.1.2 NRCS/e-Natis Model Number:

The final e-Natis model number, obtained through the National Regulator for Compulsory Specifications (NRCS) and subsequent roadworthy approval.

#### 16.1.3 Weighbridge Certificate:

An official weighbridge certificate detailing the actual Laden and Unladen weight of the converted vehicle and confirming axle loads are within legal limits.

#### 16.1.4 Final Weight Certificate and Axle Load Distribution Report.

#### 16.1.5 Structural Integrity Report (Signed by Engineer).

#### 16.1.6 Electrical System Schematic and Certification.

#### 16.1.7 Radiation Shielding Design and Test Results (Dose Rate Survey).

#### 16.1.8 Road Authority Approval (IVA/Equivalent).