

Appendix C – Technical Specification

Equipment	Operational Requirements	Technical Specification	
Cabin baggage Screening equipment (3D X-ray machine)	- Automatic threat detection of explosives, organic objects, inorganic objects, flammable explosive, narcotics alert and prohibited items. - The machine shall be capable of detecting opaque and dense objects. - The machine shall be able to store, export and import images. - The machine shall have advanced detection algorithms which includes automatic target recognition – which enable faster and more accurate decision-making and reduce operational overheads. - The machine shall have automated object recognition software which allows for automated detection of an ever-expanding list of prohibited items (latest threats) improving security outcomes and efficiency. - The machine shall be installed with security features and controls to ensure that customer data and assets are well protected from cyber-attacks. - The machine shall have the capability of producing screener performance detection (TIP Server) reports. - The system shall allow for Screeners to log in and log off on a rotational 20-minute interval. - The system must be able to alert the Screener 15 minutes into log in to allow for a rotation. - The system must allow for the rotation functionality to be auditable. - The machine TIP library shall be expandable to include new threat images. - The machine shall produce quality images to allow the Screener to have a better and accurate judgement on bag contents. - The machine shall reduce human errors, enhance efficiency and increase detection accuracy. - The machine shall have a high detection rate combined with extremely low false alarm rates. - The machine shall have the ability to screen bags with electronics including laptops and with liquids inside the bags.	General Description	Minimum Requirement
		Screening technology	3D/CTX technology
		Design Lifespan	Minimum of 10 years
		Average 'uptime'	99%
		Compliance to:	TSA/ ECAC
		Maximum leakage radiation	Less than 0.1 mR/hr
		Storage format	1280x720 PXL
		Export of Images	OBJ, FBX, GITF, JPEG, TIFF, PNG, GIF, PSD.
		Processor and OS	Latest Windows OS
		Self-diagnostic software	Provider to Specify
		Memory (RAM)	Provider to Specify
		Memory (HDD Storage capacity)	Provider to Specify
		Image Archiving	Minimum 4000 Images
		Software	Source code to be adaptable to enhance future threats
		Dimensions : L x H x W	As per floor plan

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	- The machine shall have the ability to produce 360 rotatable 3D images. - The machine shall be ECAC or TSA approved.	<table><tr><td>Tunnel size (Minimum)</td><td>600 mm x 400 mm (H x W)</td></tr><tr><td>Conveyor speed</td><td>This speed to meet the Processing rate</td></tr><tr><td>Minimum Conveyor Belt Load</td><td>100 kg</td></tr><tr><td>System power</td><td>220V AC ± 10%, single phase, 50Hz Voltage variation = +/-10%, frequency variation = +/-1%</td></tr><tr><td>False alarm rate</td><td>15% for standard passenger baggage</td></tr><tr><td>Gantry rotation</td><td>360°</td></tr><tr><td>Cooling</td><td>forced air (fan)</td></tr><tr><td>Duty Cycle</td><td>100 % Automatic Start-up</td></tr><tr><td>Operating Temperature</td><td>0 to 40°C</td></tr><tr><td>Relative humidity</td><td>5 to 95%</td></tr></table>	Tunnel size (Minimum)	600 mm x 400 mm (H x W)	Conveyor speed	This speed to meet the Processing rate	Minimum Conveyor Belt Load	100 kg	System power	220V AC ± 10%, single phase, 50Hz Voltage variation = +/-10%, frequency variation = +/-1%	False alarm rate	15% for standard passenger baggage	Gantry rotation	360°	Cooling	forced air (fan)	Duty Cycle	100 % Automatic Start-up	Operating Temperature	0 to 40°C	Relative humidity	5 to 95%
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Operating Temperature	0 to 40°C																					
Relative humidity	5 to 95%																					
Cabin baggage Screening equipment (3D X-ray machine)	This equipment will need to comply to the following minimum detection settings as provided by SACAA: 3D X ray (Computed Tomography – CT) for Cabin Baggage <table><tr><th>PAREMETER</th><th>Requirement</th></tr><tr><td>Technology</td><td>CT with volumetric reconstruction, automatic threat detection</td></tr><tr><td>Detection probability (Pd)</td><td>Around 98% for threat objects at threshold alarm level</td></tr><tr><td>False alarm rate (FAR)</td><td>15% for standard passenger baggage</td></tr><tr><td>Liquid/laptop removal</td><td>Not required; system must detect liquid explosives without bag separation</td></tr></table>	PAREMETER	Requirement	Technology	CT with volumetric reconstruction, automatic threat detection	Detection probability (Pd)	Around 98% for threat objects at threshold alarm level	False alarm rate (FAR)	15% for standard passenger baggage	Liquid/laptop removal	Not required; system must detect liquid explosives without bag separation											
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Technology	CT with volumetric reconstruction, automatic threat detection																					
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False alarm rate (FAR)	15% for standard passenger baggage																					
Liquid/laptop removal	Not required; system must detect liquid explosives without bag separation																					

		Resolution	Spatial resolution sufficient to detect 0.16 mm wire in reconstructed images		
		Throughput	gs/hour per lane under typical passenger load		
Machine	Operational Requirements			Technical Specification	
Full body scanner	- The scanner shall have the capability to detect anomalies from head to toe. - The scanner shall have automatic threat detection of explosives, plastic explosives, and prohibited items. - The scanner shall have advanced detection algorithms which includes automatic target recognition, which enable faster and more accurate decision-making and reduce operational overheads. - The scanner shall have an automated object recognition software which allows for automated detection of an ever-expanding list of prohibited items (latest threats) improving security outcomes and efficiency. - The scanner shall be Installed with security features and controls to ensure that customer data and assets are well protected from cyber-attacks. - The scanner shall be capable of adapting to future threats. - The scanner shall be able to display the position of a weapon on a person. - The scanner shall increase the rate of persons passing whilst effectively detecting weapons and prohibited items. - The scanner shall identify multiple locations of weapons on person. - The scanner shall have the ability to provide high speed of detection. - The machine shall be ECAC or TSA approved.			General Description	Minimum Requirement
				Design Lifespan	Minimum of 10 years
				Average 'uptime'	99% under realistic operating conditions
				Compliance to legislation	TSA or ECAC National Department of Health of South Africa
				Processing Capacity	Domestic
					International
					ORTIA (pax/hr)
					3000
					CTIA (pax/hr)
					2400
					1250
					KSIA (pax/hr)
					1750
					350
				Detection Speed	To meet the Processing rate
				Power Supply	220V AC $\pm$ 10%, single phase, 50Hz Voltage variation = $\pm$ 10%, frequency variation = $\pm$ 1%
				Max Radiation	Less than 0.1 mR/hr
				Climatic Condition	Humidity = 5 to 93% Temperature = 0 to 40°C



Full body scanner	This equipment will need to comply to the following minimum detection settings as provided by SACAA: (Millimeter wave or backscatter technology for passenger screening).									
Machine	Operational Requirements	Technical Specification								
Automated Lanes (ATR)	- The Automated Lanes system shall fit into current checkpoints size and layout limitation. - The Automated Lanes system shall be a modular design allowing system to be adapted to available space. - The Automated Lanes system shall be an effective lane integrated with tray handling system. - The Automated Lanes system shall be able to deliver a steady flow of trays,	<table><tr><td>General Description</td><td>Minimum Requirement</td></tr><tr><td>Compliance to legislation</td><td>TSA / ECAC</td></tr><tr><td>Conveyor height divests</td><td>750/800/850</td></tr><tr><td>Conveyor height reclaims</td><td>750/800/850</td></tr></table>	General Description	Minimum Requirement	Compliance to legislation	TSA / ECAC	Conveyor height divests	750/800/850	Conveyor height reclaims	750/800/850
General Description	Minimum Requirement									
Compliance to legislation	TSA / ECAC									
Conveyor height divests	750/800/850									
Conveyor height reclaims	750/800/850									



	- The Automated Lanes system shall deliver the subsequent benefits of increased throughput and an improved passenger experience. - The Automated Lanes system shall remove current capacity bottlenecks and keeping the process moving by addresses the key issues of passenger divestment: - tray loading and return. - re- routing suspicious items. - and 'reclaim'space at the end of the checkpoint. - The Automated Lanes system shall offer the flexibility to develop a variety of configurations to meet different requirements and expand to handle increasing passenger traffic. - The Automated Lanes system shall be future proof with the capability to incorporate new inspection systems and functions. - The Automated Lanes system shall be able to seamlessly be integrated into the other checkpoint components. - The Automated Lanes system shall be capable of throughput increase by more than 100% compared to conventional checkpoints. - The Automated Lanes system shall have a Greater operational efficiency. - Open interfaces for technologies as - Remote screening - Automatic and random diversion	Conveyor height Xray unit	To fit in the entire solution
		Tray spacing	10-50 cm
		Maximum Conveyor Load (kg/ conveyor zone)	25
		Sound pressure	Less than or equal to 65 dB
		Operating temperature	0 to 40°C
		Relative Humidity	10-95%
		Design Lifespan	Min 7 years
		Average 'uptime'	99%
		Power supply	Specify
		Humidity	40-90% non-condensing
Machine	Operational Requirements	Technical Specification	
Arch Way Metal Detector	- The AMD shall have the capability of reliable and consistent detection of ferrous and non-ferrous metal. - Location, orientation and speed of metal passing through should not influence the detection capability. - The electromagnetic field inside the AMD shall meet minimum standards. - The AMD shall have the capability to differentiate between different metals and alloys. (iron based and non-iron-based)	General Description	Minimum Requirement
		Design Lifespan	Minimum of 10 years
		Average 'uptime'	99% under realistic operating conditions



• The AMD shall have both audible and visual alarm indication, and the alarm duration should be adjustable. • The AMD shall be able to indicate the location of the metal detected. • The AMD shall be able to detect at multiple zones. • The AMD shall be able to adjust to selectable settings. • The AMD shall have continuous self-checking of key parameters and will alarm when a malfunction is detected. • The system shall include features to minimize electromagnetic interference from external sources, such as nearby electronic equipment. • The AMD shall be capable of accumulating statistical data such as time of operation; passenger counts and alarm counts. • The AMD shall be designed for ease of maintenance. • The AMD should have a battery backup with automatic intervention in the event of power blackout and battery operation signalling. • Instructions for installation, operation, maintenance, trouble- shooting, list of essential spare parts and equipment guarantees and warranties should be provided by the manufacturer. • The AMD must be fitted with a randomizer. • The machine shall be ECAC or TSA approved.	Compliance to legislation	TSA/ ECAC National Department of Health of South Africa				
	Detection zones	multiple				
	Detection Speed	Up to 15 m/s				
	Sensitivity	0-100 or more adjustable or automatic calibration				
	Power Supply	220V AC ± 10%, single phase, 50Hz Voltage variation = +/-10%, frequency variation = +/-1%				
	Alarm	Audio and visual				
	Maximum Distance	0,3 at low sensitivity and 0,5 at high sensitivity				
Arch Way Metal Detector (Walk Through Metal Detector)	• This equipment will need to comply to the following minimum detection settings as provided by SACAA: Walk Through Metal Detector. <table><tr><th>PAREMETER</th><th>Requirement</th></tr><tr><td>Test object detection</td><td>100% detection of specified test objects (e.g., 100 g ferrous blade, 50 g non-ferrous handgun replica).</td></tr></table>		PAREMETER	Requirement	Test object detection	100% detection of specified test objects (e.g., 100 g ferrous blade, 50 g non-ferrous handgun replica).
PAREMETER	Requirement					
Test object detection	100% detection of specified test objects (e.g., 100 g ferrous blade, 50 g non-ferrous handgun replica).					



		Uniformity	Must detect metallic and non-metallic threat objects (including explosives, firearms, knives) concealed on the body	
		Discrimination	Capability to discriminate between ferrous and non-ferrous metals	
		False alarm rate (FAR)	5% under ambient electromagnetic conditions	
		Calibration	Multi-zone (6 zones) with visual indicator of alarm location	
Goods and Supplies Xray machine (Dual View)	• The machine shall be capable of accommodating bigger and out-of-gauge consignments (pallets). • The machine shall be capable of detecting opaque and dense objects. • The machine shall have an automatic threat detection of explosives, organic objects, inorganic objects, flammable explosive, narcotics alert and prohibited items. • The machine shall have advanced detection algorithms which includes automatic target recognition – which enable faster and more accurate decision-making and reduce operational overheads. • The machine shall be able to store, export and import images • The machine shall have the capability of producing screener performance detection (TIP Server) reports. • The machine shall reduce human errors and enhance efficiency and increase detection accuracy. • The machine shall have a high detection rate combined with extremely low false alarm rates (DPrime). • The machine shall be installed with security features and controls to ensure that customer data and assets are well protected from cyber-attacks. • The machine TIP library shall be expandable to include new threat images. • The machine shall have the capability of producing screener performance detection (TIP Server) reports. • The machine shall produce quality images to allow the Screener to have a better and accurate judgement on bag contents. • The machine shall reduce human errors, enhance efficiency and increase detection accuracy. • The machine shall have a high detection rate combined with extremely low false alarm rates. • The machine shall have the ability to screen bags with electronics including laptops and liquids. • The machine shall be ECAC or TSA.	General Description	Minimum Requirement	
		Compliance to legislation	TSA / ECAC	
		Material discrimination	Dual-energy with colour coding	
		Minimum Tunnel Dimensions (W x H) (cm)	100x100 as per advice from ESC requirements	
		Minimum conveyor speed	0.2 m/s	
		Minimum Conveyor Belt Load	100 kg	
		System power	220V AC ± 10%, single phase, 50Hz Voltage variation = +/- 10%, frequency variation = +/- 1%	
		Guaranteed Detection Capability	Zero False Image Detection	
		x-ray beam	Multiple X-ray fan beams	



		Storage format	1280x720 PXL
		Export of Images	OBJ, FBX, GITF, JPEG, TIFF, PNG, GIF, PSD.
		Processor and OS	Latest Windows OS
		Self-diagnostic software	Provider to Specify
		Memory (RAM)	Provider to Specify
		Memory (HDD Storage capacity)	Provider to Specify
		Image Archiving	Minimum 4000 Images
		Cooling	Sealed oil bath with forced air
		Duty Cycle	100 % Automatic Start-up
		Generator imaging type	Dual Generator Imaging
		Operating temperature	0 to 40°C
		Relative humidity	10 to 95%
		Design Lifespan	Min 10 years
		Average 'uptime'	99%
		Maximum leakage radiation	Less than 0.1 mR/hr
Goods and Supplies Xray machine (Dual View)	This equipment will need to comply to the following minimum detection settings as provided by SACAA: <i>GOODS / OUTSIZE BAGGAGE SCREENING</i>		
		PARAMETER	Requirement



		Equipment type	Large-tunnel X-ray (minimum tunnel dimensions: 1.0 m width × 1.0 m height)
		Wire resolution	0.2 mm (AWG 32) copper wire visible in both orientations
		Steel penetration	30 mm steel (high penetration mode)
		Material discrimination	Dual-energy with colour coding
		Threat detection	Must detect threat objects (including improvised explosive devices) with Pd 98% at FAR 20% when using automatic detection; if manual image interpretation, operator training and certification required
		Trace detection (ETD)	In-line or integrated explosive trace detection (ETD) with minimum detectable mass 100 ng for RDX, TNT, PETN; analysis time 15 seconds
Remote Screening Rooms	This equipment will need to comply to the following minimum detection settings as provided by SACAA: For centralised image analysis where screeners are located away from the physical checkpoint.		
		PAREMETER	Requirement
		Image latency	Maximum expectancy between image capture and display at remote screening station 1 second (end-to-end)
		Image resolution	Image quality (spatial resolution, contrast, colour fidelity) identical to that of the local screening workstation
		System redundancy	Fully redundant network and power; loss of communication must trigger local alarm and revert to local screening mode
		Cybersecurity	Encrypted communication between equipment and remote station; isolated network segment (no internet connectivity)
		Access control	Two-factor authentication for remote screeners; all accesses logged; remote stations located in physically secured rooms with restricted entry
		Audit trail	Full audit trail of all remote screening actions, including time stamps, screener identity, alarm handling, and any override commands



		Fallback mode	Manual override: if remote screening is degraded, local screening capability must remain available within 5 minutes
		CCTV coverage	Continuous CCTV coverage of all remote screening workstations with recording retention 90 days
GENERAL CALIBRATION & COMPLIANCE	• Calibration tolerance: All MDS values shall be maintained within 5% of the established set point during normal operations. • Periodic testing: Daily, weekly, and monthly performance tests shall be conducted using certified test pieces as prescribed in the NASP and Designated Airport Operator test protocol. • Data logging: All screening events, alarms, and system parameters shall be logged and retained for a minimum of 90 days. • Configuration management: Any change to detection settings (including software updates affecting detection algorithms) requires prior CAA approval and re-validation. • Provide distributed load per machine in kg/m²		

Appendix D – Engineering, Risk, and Technical Information (part of the technical proposed solution)

ACSA Requirement	Rationale for request	Additional Comments/Guideline to Bidders
D.1 Contingency planning to prevent interruption of airport operation	Outline the situations that can cause business interruption during the installation of CSP equipment and mitigation thereof.	- Describe the situations/incidents that could occur during the installation and the contingency plan to prevent business interruption. - Provide a view of how redundancy of the current system/s can be leveraged to continue operation while the new devices are being installed. - At a minimum, contingency planning for the following should be contained in the bid: equipment damage during installation; deviations in the rigging plan; environmental occurrence; damage to building; injury to staff and/or passengers. - ACSA further expects that the Estimated Maximum Loss (EML) of these occurrences will be covered by the insurance program of the Bidder. Bidders to confirm this.
D.2 Detailed environmental management plan	Assessing the impact on the environment, disposal/installation and remediation plans	- This is a mandatory requirement for a project of this nature. Particularly on the matter of handling and disposal of radioactive materials. The handling of such matters will be in a live operating environment. Irrespective of whether work will be done after hours, aspects such as isotope half-lives will need to be provided and test certificates issued on a daily basis that radioactivity is within acceptable limits - Guidelines for handling Radio-active substances are prescribed by Department of Health with the completion of certain forms and arrangements for inspection serves and on-site presence during such work. - ACSA expectation is that the environmental program will ensure that the equipment replacement does not negatively impact flora and fauna. ACSA environmental management commitments cannot be compromised as they would threaten our operating permits.

ACSA Requirement	Rationale for request	Additional Comments/Guideline to Bidders
		Bidders to provide such a plan in their bids
D.3 Detailed engineering, technology and quality plans	ACSA receives assessments of the suitability of the terminal infrastructure and obligations to ensure that the quality management program is executed	- ACSA expects a Class 2 cost estimate for this proposal. The level of detail for such an estimate is contained in Appendix 1. - Engineering and structural due diligence, method statements, process and instrumentation diagrams, battery limit conditions, and assurance plan. This should be approved by a Professional Engineer. - This is to ensure that ACSA terminal building infrastructure would not be compromised during the build program. Failing this, a work permit to perform the replacement cannot be issued.
D.4 Plans for commissioning and decommissioning	Ensuring the Airport Operations value chain functions during the program as well as assurance on technology performance without negative impact to health and airport	- The duration of the program is important for each airport to enable ACSA to alert stakeholders and provision for movement of materials to and from the staging area - Plans for the decommissioning and safely disposal of current equipment assets. - Start-up, declaring beneficial operation, and reliability testing. The reliability test condition and the report will be required to provide assurance that safety and equipment deviations (if any) are manageable
D.5 Construction completion guarantee and reliability test program for the new installation	An incomplete construction renders the airport operations value chain interrupted and/or terminal building	This is a significant installation, and an incomplete project can render the airport at risk of disruption for an extended period. In the event of a radio-active incident, there is also risk of contamination, human and environment radiation and permanent damage to high value equipment. ACSA will require this risk to be suitably covered in the Builders all risk insurance program. The underwriting technical report should consider these situations. In the event such situations are triggered, there should be clear remedy in favour of ACSA and its stakeholders that business is able to fulfil its payment obligations. Business interruption is a well-known insurance risk and ACSA has the expectation that ACS provides it with an instrument that addresses and covers such a risk.
D.6 Risk management and safety plan to enable issue of works permits	Risk assessment to enable suitable insurance coverage and to understand the	ACSA has OHS processes for construction and stakeholders. These should be adhered to and will be provided in the tender data-room.



ACSA Requirement	Rationale for request	Additional Comments/Guideline to Bidders
	likely occurrences plus their mitigation	A risk assessment should be performed, and all risks be evaluated from a monetary perspective to enable determination of the loss events that can occur. This is crucial in determining whether the insurance claims procedure and recurrences are properly stipulated.
D.7 Insurance program for the replacement plus policy wording	ACSA and Stakeholders are name insured. Suitable coverage and coverage areas indicated	- ACSA requires the policy wording for the Builders All Risk program and Third-Party Liability that would be project specific. - ACSA also expects to receive a copy of the underwriting technical manuscript. This will be a submission that will form part of the work permit.
D.8 Maintenance Regime and Cost	Determine the maintenance program and associated cost	- Provide details of the preventative maintenance regime to be followed over the useful life of the equipment. Provide indication of cost and duration to perform such work. - Assessment of the top 10 recurring failures on such equipment. The time taken to repair and the components replacements for such work. Provide cost estimate in each case. - View of the maintenance team required to provide maintenance services on such equipment. - Training and development program plus costs to capacitate staff to maintain/operate such equipment
D.9 Life Cycle Costing	Assess the total cost of ownership for the equipment	- Capital cost (Equipment) - Preventative maintenance cost estimate for the duration of the useful live - Reactive Maintenance cost estimate for the duration of the equipment - List of critical spares and spares holding cost per site - Establishment/Set-up costs to enable the maintenance and oversight of equipment. - Operating overheads to enable the asset management program. - Cost to inspection and certify equipment from time to time



Annexure E: Processing Capacity

		Current Processing rate (Pax/Hr)	Targeted Processing Capacity (Pax/hr)	Bidder Proposed Capacity (Pax/hr)	Additional Pax from Targeted Capacity (Pax/hr)	% increase from targeted Capacity	No. of lanes	No. of Machines	Guaranteed Availability
Domestic	ORTIA	2160	3000						
	CTIA	2315	2400						
	KSIA	1191	1750						
International	ORTIA	2880	3000						
	CTIA	750	1250						
	KSIA	332	350						
Local Airports	CDSIA	421	450						
	George	355	450						
	KPA	317	500						
	BFIA	243	300						
	Kimberley	125	150						
	Upington	37	120						