

# PROOF-OF-CONCEPT (POC) SPECIFICATONS AND EVALUATION CRITERIA FOR AI-BASED VIDEO ANALYTICS SOLUTION IN THE TILES MANUFACTURING SECTOR

## 1.0 Scope

1.1. This document outlines the specifications and evaluation criteria for the PoC of AI-based video analytics system in the tiles manufacturing sector. The criteria is intended to enable an objective assessment of the vendors’ PoCs against pre-defined technical and functional benchmarks.

1.2. The scope of PoC would cover the following:

- Live PoC deployment at a designated tile manufacturing line
- The evaluation of AI/ML-based tile and carton counting and reconciliation solution
- The mandatory performance and stress-testing protocols

1.3. The primary objective is to assess the vendors’ performance, through live demonstration and stress-testing, that their proposed solution is accurate, robust, auditable, and fit for purpose in a real-world production setting, not just under ideal conditions.

<b>Business Functions and Performance Requirement from the Solution</b>	
01.	<p><i>The solution specified shall utilize AI-based video analytics to automatically identify tile SKUs, count individual tiles and packaged units and report key metrics including but not limited to number of units for each SKU and type produced in tile manufacturing facilities (Note: System should be able to expand coverage of SKU types through a user-friendly SKU management interface). It will then store the recorded data and transmit to FBR’s system. FBR will access the data and should have access to an interactive dashboard. The user should be able to filter across multiple indicators including by SKU, time frame and information of the company (e.g., site, production line). The user can analyze data and compare it to reported quantities by the manufacturer.</i></p> <p><i>The solution comprises the following components:</i></p> <p>a. <b>Registration and management system:</b> <i>The system will enable loading and registration of SKUs provided by FBR and the manufacturer in the database. The SKU registration and solution management system will provide a user-friendly and secure way of adding new SKUs to authorized users, control and define user administration and rights to the SKU database both on premises and via-cloud to the dashboard interface, and enable SKU management including modules for new product testing and non-commercial production. Vendors are to clearly demonstrate the process for new SKU registration and the solution management system.</i></p>

- b. **Capture data:** Fixed-mount industrial-grade IP cameras will be employed to detect the SKU (vendor may incorporate additional data capture methods to enhance accuracy and redundancy). Sensors such as laser or photoelectric sensors may be deployed within an appropriate distance (to ensure system accuracy and limit human interference) to count individual units being produced under each SKU. The deployment sensors (if installed) should be integrated and synchronized with cameras.
- c. **Ingest, transform and load data:** Cameras and Sensors (optional) will be connected to a Programmable Logic Controller (PLC) and an Industrial PC (IPC) which will ingest the data collected from the camera and allocate it to a database with an associated timestamp. The IPC/PLC will perform data cleaning and cleansing to remove duplicate or irrelevant entries. Vendors must ensure adequate processing power and resilience to varying environmental factors on-site.
- d. **Store data:** Data will be stored in IPC for a determined period.
- e. **Connect data:** Data will be securely published to an internet-based instance, such as a server or cloud-based application. Internet access will be provided by the manufacturing plant (the vendor will be responsible to ensure back-up connectivity), and the system will incorporate warranty cybersecurity features mandated by the FBR, including VPN access and two-factor authentication. The vendor will also ensure seamless integration with FBR's data repositories and enforcement dashboards, enabling automated reporting and analysis i.e., FBR monitoring hub. Vendors are expected to define clear protocols for data storage and transmission during episodes of internet, power, and connectivity outages.
- f. **Visualize data:** User-friendly and mobile-friendly interface will be provided with interactive buttons to enable filtering of data based on parameters such as time frame or SKU. The interface will also display all relevant information and highlights errors. A super user or administrator from the vendor has access to SKUs repository and can add, change or delete based on information shared by the tiles manufacturer, securing that the system has the latest database. The dashboard should also allow users with appropriate rights to add/change metrics as required. Below is an indictive (non-exhaustive) list of metrics that may be displayed on the dashboard:

Metric Category	Metric
<b>Production volumes</b>	Total units produced (by hours/days/months)
	Total units per SKU / Total units per Production Line / Total Units per Facility/ Production Wastage identified and accounted for
<b>Utilization</b>	Total production time
	Total downtime
<b>Comparative analysis</b>	Hour/day/month comparison of total production and production per SKU/Line/Facility

Note: Internet connectivity will be provided by the manufacturer. However, all vendors must provide reliable back-up internet connectivity at each plant to ensure continuous data transmission and system functionality.

- g. **Alert Management System:** Vendors should include effective alerts and reporting system for the production counting solution. The alerts should cover product mismatches, counting errors, unreadable SKUs, system malfunctions, system obstructions, and data discrepancies. The alerts management system should also be customizable to allow for user-defined alerts to be added as required. The alerts system should be capable of issuing audio/visual alerts on-site (e.g. system functionality) as well as through cloud-based integration with FBR systems. Below is an indicative / non-exhaustive list of priority alerts the system should be capable of generating.

Alert Category	Alert
<b>System Functionality</b>	System malfunction
	Camera / sensor obstruction
	Power Outage
	Network outage
	Total downtime
<b>System Accuracy</b>	Unidentified SKU
	Discrepancy between SKU at kiln outfeed stage and sorting/packaging stage.
	Non-production item

- h. **Automated Reporting:** The vendor must demonstrate the system's ability to automatically generate (and download) the following reports:
- Production summary report.
  - SKU-wise reconciliation report.
  - Variance / exception report detailing any mismatches.

*In order to achieve this, the solution at manufacturer's location should have the following hardware components, illustrated in Figure B:*

- *It shall be the Vendor's responsibility to provide appropriate camera enclosures, protective housings, dust/heat shields, stabilizing mounts, illumination units (if required), guards, and/or screens to protect deployed equipment and to limit human interference, deliberate obstruction, or counting of non-production movements (e.g., rework, rejected/broken tiles, sample pulls, manual handling) in the vicinity of the production line.*
- **Object Detection Sensor:** Sensors might be employed to boost accuracy. However sensors are not a mandatory requirement. Cameras should be positioned along the production line to

	<p>detect/count individual units. It is the vendors responsibility to provide protective covers, guards, and / or screens to protect deployed sensors and to limit human or non-production item interference.</p> <ul style="list-style-type: none"> <li>• <b>Video Camera:</b> Video cameras will be placed at specified points of interest giving full coverage and visibility to the production line(s) with capability to provide live video streaming to FBR. The feed from the video camera should also be securely stored on a Network Video Recorder on premises with a storage capability of a minimum of two months per production line.</li> <li>• <i>Electrical cabinet:</i> A robust electrical cabinet, compliant with tiles industry standards (e.g., IP66 or equivalent), houses essential components such as a power supply unit, an industrial Ethernet switch, and at least one Industrial PC (IPC).</li> <li>• <b>Workstation:</b> A dedicated workstation or table equipped with a mouse, keyboard, and screen enables users to calibrate the cameras and sensors as needed and perform other operational tasks.</li> </ul> <p><i>In reference to cable management and network components:</i></p> <ul style="list-style-type: none"> <li>• <i>All the hardware must be powered by the Power Supply Source located in the cabinet.</i></li> <li>• <b>Local Area Network (LAN):</b> The LAN will consist of the cameras, object detection sensor, Ethernet switch, Industrial PC (IPC) / PLC, and peripherals such as the keyboard, mouse, and screen.</li> <li>• <b>Internet Connectivity:</b> The Industrial PC /PLC will connect to the internet via an Ethernet cable or, alternatively, through Wi-Fi. However, Ethernet is the preferred method for ensuring reliable connectivity, with Wi-Fi serving as a less favored option. While internet connectivity will be the responsibility of the taxpayer (manufacturer), the vendor will be required to make back-up connectivity arrangements in case primary connectivity at the manufacturer’s facility is unavailable.</li> <li>• <i>Industrial PC / PLC will be connected via ethernet cable or via Wi-Fi to internet. Wi-Fi is less preferred option.</i></li> </ul>
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**1.1. INTERVENTION MAPPING:**

Below are minimum required interventions. Use of sensors is optional and may be used to enhance accuracy.

**Intervention Point 1: Kiln Outfeed (Camera 1)**

- **Objective:** Primary unit-level production counting, downtime detection, and anomaly detection (e.g., blockages, pile-ups, abnormal stoppages).
- **Monitored Object:** Individual tiles moving on the kiln exit conveyor.
- **Counting Logic:** Unit-wise and SKU-aware. The AI model shall detect individual tile boundaries, classify tiles by SKU/variant, and record counts in real-time. Production data shall be time-stamped and aggregated into batch-wise summaries.

**Intervention Point 2: Sorting/Grading Area (Camera 2)**

- **Objective:** Reconciliation of kiln output with graded/packed quantities, and detection of reject diversion or unrecorded movement.
- **Monitored Object:** Tile stacks moving to/from sorting lines.
- **Counting Logic:** The system shall count and classify tiles by grade (e.g., A-grade, B-grade, rejects) and reconcile these figures against kiln outfeed counts for the corresponding SKU.
- **Manipulation Prevention:** Continuous video monitoring shall be maintained. The system shall generate alerts if tiles are diverted to unmonitored areas or reject routes without being recorded and accounted for in the system’s reconciliation logic.

**Intervention Point 3: Packaging Stage – Carton Counting (Camera 3)**

**Objective:** Carton counting, label data extraction (SKU, quantity per carton), verification of unit-to-carton conversion, final dispatchable quantity record.

**Monitored Object:** Sealed cartons before palletizing.

**Counting Logic: Carton-wise + SKU-wise.** OCR extracts data from printed label. System validates that (Carton Count × Units per Carton) reconciles with tiles received from sorting for that SKU.

**Manipulation Prevention:**

- Cameras positioned to capture all sides of carton.
- Sealed cartons only counted; open cartons ignored.
- Alert if carton without seal/label passes.

**2.0 Evaluation Criteria**

This section details the comprehensive framework for the PoC evaluation.

2.1 Core Performance Metrics under which PoC will be judged are as under:

Metric Category	Core Requirement	Qualification Criteria
<b>Unit-Level Tile Counting Accuracy</b>	The system must accurately detect and count individual tiles on a moving conveyor at <b>kiln outfeed</b> , correctly associating each count with the relevant. The SKU should be clearly attributed to the concerned production line as well.	<p>≥ 99%: Preferred</p> <p>≥ 95% &amp; &lt; 99%: Satisfactory (Pass)</p> <p>&lt; 95%: Unsatisfactory (Fail)</p>
<b>SKU Changeover Without Reset</b>	The system must automatically detect the new SKU, ceases attributing counts to the old SKU, and begins	<b>100% Pass required</b>

	accurately counting under the new SKU classification in near-real time.	
<b>SKU Identification &amp; Differentiation Capability</b>	The system must reliably distinguish between visually similar SKUs (e.g., variations in size, thickness, grade, design) and reflect changes in near-real time on the dashboard. Identification of difference in tile grades at sorting stage is a must.	<p>≥ 95%: Pass</p> <p>&lt; 95%: Fail</p>
<b>Carton-Level Counting &amp; Reconciliation</b>	At the packaging stage, the system must accurately count sealed cartons and reconcile the unit count from the kiln/sorting stage against the carton count, flagging any mismatches.	<p>≥ 99%: Preferred</p> <p>≥ 95% &amp; &lt; 99%: Satisfactory (Pass)</p> <p>&lt; 95%: Fail</p>
<b>System Stability &amp; Real-Time Performance</b>	The system must operate continuously without crashes or freezes, with count latency of ≤ 1 second. No manual intervention or resets should be required during the test period.	<p><b>Pass:</b> Stable, real-time operation demonstrated.</p> <p><b>Fail:</b> Observable lag, freezes, or required resets.</p>
<b>Live Dashboard</b>	<p>The system must display a dashboard showing, in real time:</p> <ul style="list-style-type: none"> <li>○ Current production count.</li> <li>○ SKU-wise breakdown of production.</li> <li>○ Grades (Premium, Standard, commercial) of an SKU should be shown separately</li> <li>○ Operational status of the camera and AI processing pipeline and other hardware and software.</li> </ul>	<p><b>Pass:</b> Dashboard working</p> <p><b>Fail:</b> Dashboard not working</p>
<b>Alert Management</b>	<p>The system must prove its ability to generate automated alerts, at a minimum, for the following four critical events:</p> <ul style="list-style-type: none"> <li>○ Camera obstruction or tampering</li> <li>○ System downtime or processing failure</li> <li>○ Demonstrating more alert types would result in a plus for a vendor</li> </ul>	<p><b>Pass:</b> Alerts generated</p> <p><b>Fail:</b> Alerts not generated</p>
<b>Addition and Deletion of SKU with log and Timestamps</b>	Addition and Deletion of SKU with log and Timestamp	100% required Pass

<b>Power / Network Interruption Scenario</b>	The vendor must demonstrate that counts are buffered locally during an interruption and are automatically reconciled upon restoration of connectivity. The system must also maintain a log of these events with proper timestamps.	100% required	Pass
<b>Playback</b>	The vendor must demonstrate an immediate playback capability whereby each individual production count displayed on the dashboard or report is directly clickable and linked to the original video snippet of that specific event (i.e., clicking on a count navigates the user to the exact, time-stamped video frame(s) that generated the count). This playback must be overlaid with clear visual indicators, including the bounding box identifying the object (a visible marker showing the specific tile detected in the frame).	100% required	Pass
<b>Demonstration of Role-based Access (RBA)</b>	The vendor must demonstrate a clearly defined role-based access control mechanism, showing that system privileges are segregated by user role (e.g., administrator, operator etc.). Any access, login attempt, or privilege escalation must be fully logged with user identity, timestamp, and action performed.	100% required	Pass

**5.0 MINIMUM INSTALLATION SPECIFICATIONS:**

**1. Mandatory GPU & CPU Specifications**

(Note: CUDA cores are NVIDIA-specific; AMD, Intel, Huawei equivalents such as stream processors, execution units, or AI cores are acceptable.)

**2. Industrial PC Operating System Requirements (Indicative)**

<b>Operating System</b>	<b>Service Pack / Update</b>
Windows 10 (64-bit) or equivalent	Version 1809 (OS build 17763) or newer

Name	Indicative Requirements	Indicative Brands (or equivalent)
Industrial PC	<p><b>Minimum GPU Specifications (Indicative but Mandatory):</b></p> <ul style="list-style-type: none"> <li>• CUDA Cores: 10,000+ (or equivalent compute units)</li> <li>• Tensor Cores: 300+ (or equivalent AI accelerators)</li> <li>• RT Cores: 80+</li> <li>• Base Clock: <math>\geq 2</math> GHz</li> <li>• Boost Clock: <math>\geq 2</math> GHz</li> <li>• Memory: 16–24 GB minimum</li> <li>• Memory Bus Width: 256-bit or higher</li> <li>• Bandwidth: <math>\geq 1000</math> GB/s</li> <li>• Cooling: Dual-fan or liquid cooling</li> <li>• PSU: 1300W Platinum-grade or above</li> </ul> <p><b>Minimum CPU Specifications (Indicative but Mandatory):</b></p> <ul style="list-style-type: none"> <li>• Processor: AMD Ryzen 9 7950X or equivalent</li> <li>• 16 cores / 32 threads</li> <li>• RAM: 32 GB DDR5</li> <li>• Storage: 2 × 1TB SSD (RAID 1)</li> <li>• PCIe 4.0 × 16 interface</li> <li>• 1 Gigabit Ethernet (RJ45)</li> <li>• Base Clock <math>\geq 4.5</math> GHz</li> <li>• Boost Clock <math>\geq 5.7</math> GHz</li> <li>• Motherboard: X670 AORUS or equivalent</li> <li>• Liquid cooling supported</li> </ul> <p>Must be capable of handling multiple data processing requests in parallel</p> <p>Must have reliable and scalable storage for database access and application files</p> <p>Must have defined automated maintenance and backup routines to ensure data integrity and recovery</p> <p>Must be robust industrial design with various ports (ethernet, USB, HDMI, etc.) and necessary peripherals (e.g. monitor, mouse, keyboard, etc.)</p> <p>Must have enough RAM and disk space for backing-up data for a minimum of two months for each production line.</p> <p>Minimum 1 TB of solid-state drive (SDD)</p>	<p>Lenovo Dell Advantech Onlogic</p>

	Must be able to transmit information to remote or cloud-based server	
<b>Programmable Logic Controller</b>	<p>PLC must include an integrated software environment for programming, testing, debugging, and remote access such as Ladder and Function Block support</p> <p>Must support a high number of I/O points (minimum 14/10)</p>	<p>Unitronics</p> <p>Yokogawa</p> <p>Siemens</p> <p>Rockwell</p> <p>Mitsubishi</p> <p>Schneider</p>
<b>Power Supply</b>	<ul style="list-style-type: none"> <li>Power supply must be 1.25 times the system power requirements</li> <li>Source: AC - DC Single output Industrial DIN rail power supply</li> <li>Output 24Vdc at 5A; metal case</li> </ul>	<p>Eaton</p> <p>Phoenix Contact</p> <p>Mean Well</p>
<b>Web Browser</b>	Google Chrome™ (or equivalent)	<p>Google Chrome</p> <p>Mozilla Firefox</p> <p>Microsoft Edge</p>
<b>Video Management System (VMS)</b>	<ul style="list-style-type: none"> <li>The VMS must support:</li> <li>Multi-camera live streaming and playback.</li> <li>User access controls and detailed audit logs.</li> <li>Health monitoring and uptime analytics.</li> <li>Integrated visualization of AI counts and alerts.</li> <li>APIs for external system interoperability</li> </ul>	-
<b>Camera</b>	<p>Camera type: IP camera</p> <p>FPS: 30 fps</p> <p>Video parameter: 1080P(1920*1080), 8 bit, color camera with colored night vision, support for H.264, H.265, and other video compression formats</p> <p>Code rate: &gt; 5 Mbps</p> <p>Power supply: DC24V</p> <p>Material: Erosion protective material, with IP65 protection level</p>	<p>Hikvision</p> <p>Dahua</p> <p>Honeywell</p> <p>Samsung</p>

<b>Network Video Recorder</b>	Support up to 16 channels of IP cameras Code rate should be higher than 120 M bps Video should store for more than 1 month Software: User-friendly interface for managing and viewing video feeds Support for H.264, H.265, and other video compression formats Security: Encryption: Data encryption for secure video transmission and storage. User Authentication: Multi-level user access control and authentication	Hikvision Unifi VIGI by TP-LINK Reolink Dahua Honeywell Samsung
<b>Display</b>	LED-TV at least 43 inches – latest retail model	Samsung, LG, Dell, Asus
<b>Electrical cabinet</b>	Electrical cabinet IP67	Schneider Electric, APC
<b>Power Backup</b>	UPS with capacity to sustain operations for 2 hours for all on-premises devices	APC, Eaton, Vertiv
<b>Power supply</b>	MW NDR-240-24	MeanWell
<b>Peripherals</b>	Monitor, keyboard and mouse	Dell
<b>Misc. items</b>	Networking and power cabling, industrial grade POE switches, Circuit breaker, Ethernet cables (depends on factory setup)	Schneider Electric, Phoenix Contact, Eaton

Additional requirements include:

1. Industrial switch: unmanaged switch speed with more than 5 ports
2. PoE injector or PoE switch: number of ports depending on number of sensors and requirements for it
3. Protective circuit breakers to protect against overcurrent and short circuit

### Specific Technical Requirements – Network and Communication Specifications

#### 1. Local Area Network(S):

Local Area Network (LAN): The LAN will consist of the cameras, object detection sensors if applicable, Ethernet switch, Industrial PC (IPC) / PLC, and peripherals such as the keyboard, mouse, and screen.

## 2. Wide-Area Network:

- a) ISO: 5021-1:2023
- b) Equipment and software: Industrial PC must be connected to internet with REST API or similar in order to reach external server or cloud. Cybersecurity best practices must be ensured in order to warranty data protection (e.g., demilitarized zone, VPN Tunnel)
- c) Other communications equipment: If manufacturer is not capable to provide internet access, the vendor must deploy a standard modem with internet access that fulfills application requirements (e.g., data transmission speed)

## Software Specifications

### 1. Networking and Communications Software:

- a) Domain Name System (DNS): Offered across the infrastructure to resolve domain names to IP addresses
- b) Virtual Networking: Ability to create your own networks (subnets), firewall rules, etc., providing flexible and secure network configurations
- c) Physical Networking Segmentation: Segmentation between production and development environments to enhance security and manageability

### 2. Communication software:

- a) Proxy and NTP Services: Networking protocol for clock synchronization between computer systems, ensuring accurate timekeeping
- b) WAF Services (Web Application Firewall): Firewall that helps protect web applications by filtering and monitoring HTTP traffic
- c) Remote Access Services: Access to the infrastructure from different locations, enabling remote management and operations
- d) Internet Access through Proxy: A gateway to connect the infrastructure to the internet, update packages, and apply security patches

### 3. General-Purpose Software:

SQL (Structured Query Language) to be used in all systems.

Description: A language used for managing and manipulating relational databases. It allows users to create, read, update, and delete database records efficiently.

Example: MySQL, PostgreSQL and Python or equivalent

### 4. Database Software and Development Tools:

Example: *SQL Database, MySQL or equivalent*

### 5. Business Application Software:

Vendor must use an interactive and user-friendly software to display data.

Example: HTML and CCS languages or equivalent

## System Management, Administration, and Security Specifications

- i. General Requirements: In addition to the management, administration, and security requirements specified in each section covering the various hardware and software components of the System, the System must also provide for the following management, administration, and security features at the overall system level.
  - a. Technical management and troubleshooting
  - b. User and usage administration
  - c. Maintenance protocols and training of manufacturer's staff
  - d. Security

**General Technical Requirements**

- ii. Language Support: All information technologies and the counting system must provide support for English language. Specifically, all display technologies and software must support the ISO 639-1 EN character set and perform sorting according to ISO/IEC 14651
- iii. Dates: All information technologies MUST properly display, calculate, and transmit date data, including, but not restricted to 21st-Century date data.
- iv. Electrical Power: All active (powered) equipment must operate on 220v +/- 20v, 50Hz +/- 2Hz for V AC. For DC, power must be supplied by an industrial Power Supply Source for 24V or 12 V, depending on the hardware required as IPC, sensors, industrial switch, etc. All active equipment must include power plugs standard in Pakistan.
- v. Environmental: All equipment must comply with tiles industry standards. Specifically, jigs fixing the sensors, cables, enclosures and electrical cabinets must use connectors and buttons made of stainless steel. The equipment must be robust enough to meet IP66.

**Service Specifications**

**Training and Training Materials:**

**User:**

Professional Trainings & Certifications (Inland and International) of video monitoring and counting system management, etc. for tiles manufacturers and FBR officers to manage/handle/enhance/develop system.

*To build a minimum curriculum covering the following topics:*

*General overview of the solution*

*How to run the solution on site and confirm if it is working properly*

*How to run the web-based application and perform an analysis against reported data*

*How to perform regular maintenance on the solution*

*How to add new SKUs*

*How to calibrate or adjust for new cameras*

*Most common troubleshooting procedures*

**Technical Support:**

Vendor shall provide the technical support during the operationalization of the deployed equipment for at least 03 years, which may be further extended if required.

Compliance Sheet with every proposed product name and model number (for cameras, Computing machines & software integrations) should be presented on separate sheet with soft copy.

All software and network devices shall be compatible with well-known international brands/third party.

The Vendor will be responsible for the services, replacement of faulty parts and issue diagnostic after handing over the equipment for the standard warranty periods.

Validity of all the equipment will be at least 03 Years including Critical, Important & Security updates, firmware / Version Up- gradation when released.

Vendor shall be liable to install, configure, check and commission the cameras at all the tiles manufacturing facilities.

Vendor will replace, restore, reinstall, and reconfigure failed components/ devices, firmware, software and allied components without any additional cost during the warranty period.

Vendor shall provide the technical support during the operationalization of the deployed equipment for at least 03 years, which may be further extended if required.

User support / hot line to be available 24 hours – 6 days a week.

Data Conversion and Migration: Responsibilities and solution details will be mutually agreed upon between the vendor and the FBR during implementation.

Post-deployment maintenance services: The vendor will provide immediate support for the first 3 months for troubleshooting and improving the performance of the solution in a real working environment as well the web-based application. Support shall particularly be provided when the auditor is cross checking data from manufacturers versus data received in FBR's system

After the 3 months, the vendor will be supporting in a planned way in the following ways:

- Adding new SKUs provided by the manufacturer (log and timestamp at addition)
- Calibrating the sensor for new SKUs
- Improve data capturing from the sensor
- Improve data visualization in web-based application
- Develop app if needed within the same budget
- Training of manufacturing teams on regular maintenance of solution

### **Documentation Requirements**

- i. End user documents:
- ii. Technical Documents:

*Documentation should be shared in paper (located in the electrical cabinet) and digital.*

*Documentation must cover the following:*

- a) *User Manual*
- b) *Maintenance Manual*
- c) *Electrical diagrams*
- d) *Network diagrams*
- e) *Mechanical drawings*
- f) *Bill of Material: list of all components used, with manufacturer, part number, number of parts used*
- g) *Datasheet of most relevant materials used*
- h) *Spare parts and consumables (if needed)*
- i) *Warranties*

***A soft copy should also be maintained by the vendor to share with the FBR and concerned field formation of need basis.***

**Note:** The FBR may, at its discretion, refine the PoC component requirements subject to the PoC results and performance validation. POC dates and venues will be published in a separate letter.

**Annexures:**

**Annex-A: Definitions**

**In this document, unless there is anything repugnant in the subject or context:**

- a. **“FBR” or “Board”** refers to the Federal Board of Revenue, responsible for authorizing vendors to deploy the specified system and ensuring compliance with the technical and operational requirements as specified.
- b. **“Authorized vendor” or “Vendor” or “Supplier”** refers to any registered company authorized by the Board to deploy a production counting system specified by FBR after solution is finalized.
- c. **“Client” or “Manufacturer” or “Taxpayer”** refers to tiles manufacturers that are required to implement the specified system.
- d. **“Tiles facility(ies)” or “Tile manufacturing facility(ies)”** refers to tile production sites where tiles are produced.
- e. **“Tiles production lines”** refers to the end-to-end production line of tiles from raw materials preparation to final warehousing.
- f. **“Installation point(s)”** refers to the exact point in the tile production chain where the vendor will deploy their proposed solution for production counting
- g. Any term or expression not specifically defined herein shall have the same meaning as assigned to it under the TORs, Chapter XIV-BA of the Sales Tax Rules, 2006, and, where not defined therein, under the Sales Tax Act, 1990 and Sales Tax Rules, 2006 generally.

## Annex-B: Abbreviations

<b>Term</b>	<b>Explanation</b>
AI	Artificial Intelligence
API	Application Programming Interface
Bps	bits per second
Cps	characters per second
DBMS	Database Management System
DOS	Disk Operating System
Dpi	dots per inch
Ethernet	IEEE 802.3 Standard LAN protocol
GB	Gigabyte
Hz	Hertz (cycles per second)
IEEE	Institute of Electrical and Electronics Engineers
IPC	Industrial Personal Computer
ISO	International Standards Organization
KB	Kilobyte
kVA	Kilovolt ampere
LAN	Local area network
Lpi	lines per inch
Lpm	lines per minute
MB	Megabyte
MTBF	Mean time between failures
NIC	Network interface card
NOS	Network operating system
ODBC	Open Database Connectivity
OLE	Object Linking and Embedding
OS	Operating system
PCL	Printer Command Language
PoE	Power Over Ethernet

<b>Term</b>	<b>Explanation</b>
Ppm	pages per minute
PS	PostScript -- Adobe page description language
PSS	Power Supply System
RAID	Redundant array of inexpensive disks
RAM	Random access memory
RISC	Reduced instruction-set computer
SCSI	Small Computer System Interface
SKU	Stock-Keeping Unit
SNMP	Simple Network Management Protocol
SQL	Structured Query Language
TCP/IP	Transmission Control Protocol / Internet Protocol
V	Volt
VPN	Virtual Private Network
WLAN	Wireless LAN