



**Transportation Worker Identification Credential
(TWIC) Qualified Technology List (QTL)
Program**

**Fixed Physical Access Control Reader Approval
Procedures**

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 TWIC QTL Fixed Physical Access Control Reader Approval Procedures

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1 Introduction

1.1 Background

The United States Congress mandated the Transportation Worker Identification Credential (TWIC) in the Maritime Transportation Security Act of 2002 (MTSA) as amended by the Security and Accountability for Every Port Act of 2006 (SAFE Port Act). The mission of the TWIC Program is to design and field a tamper resistant credential (referred to as a TWIC card) for all maritime workers requiring unescorted physical access to secure areas of the nation's port facilities, outer continental shelf facilities, and vessels regulated under the MTSA, and all U.S. Coast Guard credentialed merchant mariners. The TWIC program is administered by the Department of Homeland Security (DHS) with joint management responsibility shared by the Transportation Security Administration (TSA) and the U.S. Coast Guard. TSA is responsible for enrollment, identity vetting and credential issuance. The Coast Guard is responsible for enforcement, access control requirements and regulations.

The TWIC card is subject to visual inspection at points of entry or can be automatically read and validated by reader devices which have been deployed by maritime operators. The TWIC Reader Hardware and Card Application Specification (hereafter, referred to as the TWIC Specification) is a document issued by the Transportation Security Administration (TSA) which describes the behavior of the TWIC card application, card interface, as well as the reader hardware performance and technical requirements. The TWIC Specification addresses both fixed and portable reader devices.

The Transportation Security Administration (TSA) working with the Department of Homeland Security (DHS), the National Institute of Standards and Technology (NIST), and other federal agencies has established a process and program to test and qualify TWIC reader products that read, verify, and authenticate the TWIC cards used in the TWIC Program. Products that are deemed to be compliant with the TWIC Specification will be placed on a list referred to as the TWIC Reader Qualified Technology List (QTL) which can be used by owners and operators of regulated maritime facilities and vessels to assist in their TWIC reader purchasing decisions.

The TSA TWIC Program Management Office operating under the Office of Security Policy and Industry Engagement (OSPIE) has established the QTL program to provide an on-going process of TWIC reader qualification by independent laboratories accredited by NIST under the National Voluntary Laboratory Accreditation Program (NVLAP). The initial focus of the QTL effort is to establish NVLAP accredited test laboratories capable of assessing the conformance of fixed and portable TWIC readers with the TWIC Reader Hardware and Card Application specification.

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1.2 Purpose and Scope

Per the TWIC specification, a Fixed Physical Access Control Reader is defined as a *TWIC reader installed in a wall, turnstile or similar type installation which communicates with an external access control system to control a door, gate, turnstile, etc. Fixed TWIC readers may operate in indoor environments or in outdoor environments exposed to the weather.*

This document (referred to as the Approval Procedure) provides details on the application submission requirements that an Applicant shall provide in order for their Fixed Physical Access Control Reader to be included for listing on the Qualified Technology List (QTL).

1.3 Understanding the Approval Procedure

Applicants that are interested in developing Fixed Physical Access Control Reader products conformant to the TWIC specification need to reference this approval procedure to determine: (i) the requirements that apply to a Fixed Physical Access Control Reader under the TWIC specification, and (ii) the information (documentation, artifacts, test results etc.) to be submitted to the QTL Program to demonstrate conformity of the product to these requirements.

Section 2 of this document describes the product review activities or various types of documentation (e.g., test results, Applicant documentation etc.) that needs to be submitted along with the product application. Each required application package artifact is assigned an identifier that is associated with the type of approval mechanism. For example, product reviews are prefixed with an identifier of “R”, while documentation submission criteria are prefixed with a “D”.

Figure 1 provides an example of the applicant documentation content that is required to demonstrate the capability of the product to configure authentication modes.

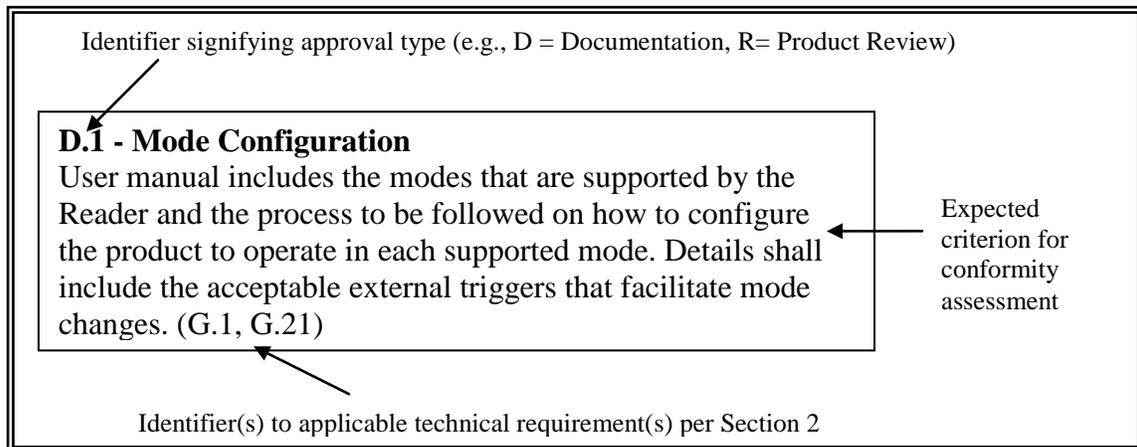


Figure 1 - Example of Conformity Assessment Criterion

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2 Fixed Physical Access Control Reader Requirements

In general, technical requirements for TWIC Readers are classified into the following categories:

- **Mandatory Requirements** – These requirements apply to all readers. Conformance shall be demonstrated in order to get listed on the QTL.
- **Conditional Requirements** – These requirements do not apply to all readers. Conformance shall be demonstrated in order to get listed on the QTL only if the reader claims to have certain characteristics (e.g. can operate outdoors) or support certain functionality (e.g. biometric capability). If the TWIC Reader implements a conditional requirement, it needs to be in accordance with the specification.
- **Optional Features** – Optional features are those that are recommended by the specification, but not mandated. Readers may implement such features however it is not compulsory for these to be implemented in order to be listed on the QTL.

The following sub-sections identify the mandatory and conditional requirements, as well as the optional features that apply to a Fixed Physical Access Control Reader under the TWIC specification. Along with each requirement is an approval mechanism which identifies the method that is used to determine conformity. Please note that a requirement may have multiple approval mechanisms. Section 3 provides the definition and details of each type of approval mechanism.

2.1 General

This section identifies all mandatory requirements and optional features that apply to all Fixed Physical Access Control Readers regardless of supported modes, interfaces or location.

2.1.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 1.

Requirement ID	Requirement Description	Approval Mechanism
G.1	TWIC Readers shall support configuration of one or more authentication modes per Table 4.1, TWIC Identification and Authentication Modes.	Applicant Documentation (D.1)
G.2	TWIC readers shall operate within a range of 8-48 VDC.	Applicant Documentation (D.3)

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G.3	Where necessary to operate from line voltage, a power supply approved for use with a TWIC reader shall be provided.	Product Review (R.1)
G.4	All TWIC readers shall not exceed a 2.0 Amperes current requirement.	Applicant Documentation (D.3)
G.5	All TWIC readers shall provide reverse voltage protection.	Applicant Documentation (D.3)
G.6	All TWIC readers shall be FCC certified.	Electrical Testing (E.1)
G.7	All TWIC readers shall return automatically to normal operation after a loss of power event.	Functional Testing
G.8	Intentionally left blank	
G.9	All TWIC readers shall not possess sharp corners or edges that may puncture, cut, or tear the skin or clothing or otherwise cause bodily injury.	Product Review (R.2)
G.10	All TWIC readers shall not possess external wires, connectors, or cables other than the power cable, data cable and the optional TWIC Privacy Key reading sub-assembly (i.e. magnetic stripe reader).	Product Review (R.2)
G.11	All TWIC readers shall not possess loose coverings and cowlings.	Product Review (R.2)
G.12	Cryptographic algorithms within the reader are implemented correctly.	Product Review (R.5)
G.13	Visual indicators for all TWIC Readers shall be visible in daylight.	Product Review (R.3)
G.14	All TWIC readers shall provide a means to create a time-stamped log of operations for use in assessing exception conditions such as fingerprint rejections.	Applicant Documentation (D.6), Functional Testing
G.15	All TWIC readers shall be designed to yield a Mean Time Between Failure (MTBF) of 25,000 hours or greater.	Reliability Testing (RE.1)
G.16	All TWIC readers shall include technical manuals covering installation, operation and maintenance.	Product Review (R.4)

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G.17	All TWIC Readers shall explicitly select the TWIC Application while performing the user authentication.	Functional Testing
G.18	In TWIC readers using the TWIC card, the SELECT "AID" APDU command shall always ask for a partial TWIC AID and analyze the information returned from a TWIC card when the SELECT APDU command is successful.	Functional Testing
G.19	All TWIC readers shall require that a TWIC card, once read, shall be removed from the RF field for at least one second before attempting to read any new contactless card.	Functional Testing
G.20	A TWIC reader (or panel, with bi-directional wiring) shall be locally configured with the X.509 certificate containing the public key for all currently active Certificate Authorities (CAs) that are trusted for issuance of TWIC Certificates.	Functional Testing
G.21	TWIC readers that support multi-mode operation shall be able to accept external triggers for the mode change.	Applicant Documentation (D.1)
G.22	The Operational TWIC Card AID (A0 00 00 03 67 20 00 00 01 01 01) shall be recognized.	Functional Testing
G.23	A TWIC reader shall verify if the TWIC reader supports the release edition (or test mode) returned by the TWIC card.	Applicant Documentation (D.7)
G.24	The contactless smart card TWIC reader component shall conform to the ISO/IEC 14443A/B parts 1, 2, 3, and 4 (T=CL protocol) as specified for FIPS 201-1.	Applicant Documentation (D.8)
G.25	TWIC readers shall have a maximum contactless smart card read range of 10cm.	Functional Testing
G.26	Contactless enabled TWIC readers shall be able to communicate with a contactless card at 106kbit/s, 212kbit/s or 424kbit/s.	Applicant Documentation (D.8)
G.27	A TWIC Reader shall reject all of the presented cards if two or more contactless smart cards are presented at the same time in a TWIC reader's contactless field.	Functional Testing

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G.28	All data shall be retrieved from the TWIC card application for all authentication modes except for operations involving Active Card Authentication.	Functional Testing
G.29	The Test TWIC Card AID (A0 00 00 03 67 20 00 00 01 81 01) shall be recognized	Functional Testing
G.30	The key required to decipher the reference biometric template of the user, called the TWIC Privacy Key (TPK), shall be obtained from one of several sources. These sources include the magnetic stripe encoded on each TWIC card, the TWIC card memory (but only accessible through the contact interface) or from the physical access control system where the TPK has been registered.	Functional Testing
G.31	TWIC readers shall support the V1.0 and V2.0 marked TWIC cards in all supported modes of operation.	Functional Testing
G.32	The TWIC reader log of operations shall include the current date as year, month and day and the current time as hours, minutes and seconds.	Functional Testing
G.33	The TWIC reader log of operations shall include the card FASC-N of each TWIC card presented, the operation performed using the card (reader mode) and the status of the operation (success or failure) with an indication of the reason for any failures.	Functional Testing
G.34	TWIC readers shall provide a means to export the TWIC reader log of operations in human-readable form in the English language.	Functional Testing

Table 1 - Mandatory Requirements for Fixed Physical Access TWIC Readers

2.1.2 Optional

A reader submitted for listing on the QTL may implement the features listed in Table – 2. However, it is not required that the reader implement these features to be listed on the QTL.

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Requirement ID	Requirement Description	Approval Mechanism
GO.1	All TWIC Readers should provide a mechanism that assures that only authorized/authenticated firmware/software updates are permitted.	Applicant Documentation (D.12)
GO.2	A TWIC Reader may configure itself in a diagnostic mode for the purpose of testing/diagnostics with test TWIC Cards	Applicant Documentation (D.14)
GO.3	All TWIC reader corners and edges should have at least a 1mm exposed radius of curvature.	Product Review (R.6)
GO.4	All TWIC readers should clearly and continuously display power status (on, ready or out of service).	Product Review (R.7)
GO.5	The interface between the TWIC card and a TWIC reader may be via the contact or the contactless interface	Applicant Documentation (D.10), Functional Testing

Table 2 – Optional Features for Fixed Physical Access TWIC Readers

2.2 Fixed Readers

The following requirements apply to fixed readers.

2.2.1 Mandatory

Every fixed reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 3.

Requirement ID	Requirement Description	Approval Mechanism
F.1	Fixed TWIC reader mountings shall be tamper-proof.	Applicant Documentation (D.2)
F.2	Fixed TWIC reader verification functionality shall not be degraded by low frequency vibration typical at terminals stemming from sources such as vessel departure/landings, heavy foot traffic, electric carts, large HVAC systems, sub-floor bag conveyors, and outdoor truck traffic.	Environmental Testing (EN.1)

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Requirement ID	Requirement Description	Approval Mechanism
F.3	Fixed TWIC readers shall survive a shock event defined by IEC 68-2-27 (1987) using one half-sine pulse with a nominal peak acceleration of 5 g (50m/s ²) and nominal pulse duration of 30 ms with no observable change in performance.	Environmental Testing (EN.2)
F.4	Fixed TWIC readers shall survive 100 bumps defined by IEC 68-2-29 (1987) each with a nominal peak accelerating of 10 g (100 m/s ²) and nominal pulse duration of 16 ms with no observable change in performance.	Environmental Testing (EN.3)
F.5	Fixed TWIC readers shall comply with IEC 61000-4-2 (Electrostatic Discharge) for: (i) Contact Discharge Mode at 2 kV and 4 kV Air Discharge Mode at 2 kV, 4 kV and 8 kV. (ii) Presumes 8 to 10 equipment discharge test points plus coupling planes, positive and negative discharge waveform polarities. (iii) Performance Criteria B	EMC Testing (EM.1)
F.6	Fixed TWIC readers shall comply with IEC 61000-4-3 (Radiated RF Immunity) for: (i) 10 V/meter, 80 MHz to 1 GHz. (ii) Four sides of EUT, 1% steps, 2.8 sec. dwell. AM Mod., 80%, 1 kHz. (iii) Performance Criteria A.	EMC Testing (EM.2)
F.7	Fixed TWIC readers shall comply with IEC 61000-4-4 (Electrical Fast Transient/Burst) for: (i) AC and DC Power Ports at 0.5kV, 1kV and 2kV. (ii) Signal Lines over 3 meters at 0.25 kV, 0.5kV and 1kV. (iii) Performance Criteria B.	EMC Testing (EM.3)
F.8	Fixed TWIC readers shall comply with IEC 61000-4-6 (Radio Frequency Common Mode) for: (i) 10 Vrms, 150 kHz to 80 MHz. (ii) Power ports and signal lines over 3 meters, 1% steps, 2.8 sec. dwell. (iii) Performance Criteria A.	EMC Testing (EM.4)

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Requirement ID	Requirement Description	Approval Mechanism
F.9	Fixed TWIC readers shall comply with IEC 61000-4-5 (Surges) for: (i) AC power port at 2kV line to earth, 1kV line to line at 0, 90 and 270 deg. (ii) DC Power Ports at 0.5 kV line to earth, 0.5 kV line to line. (iii) Signal Lines over 30 meters at 1 kV line to earth. (iv) Positive and negative polarity, 5 surges per mode of appearance. (v) Performance Criteria A.	EMC Testing (EM.5)
F.10	Fixed TWIC readers shall comply with IEC 61000-4-8 (Power Frequency Common Mode) for: (i) 30 A/m, 50 or 60Hz. (ii) Performance Criteria A.	EMC Testing (EM.6)
F.11	Fixed TWIC readers shall comply with IEC 61000-4-11 (Voltage Dips and Interruptions) for: (i) 30% reduction for 0.5 periods (10 ms), Performance Criteria B. (ii) 60% for 5 periods (100 ms), Performance Criteria C. (iii) 60% for 50 periods (1 sec), Performance Criteria C. (iv) 95% for 250 periods (5 sec), Performance Criteria C.	EMC Testing (EM.6)
F.12	Fixed TWIC readers should have communication ports supported by the PACS cable plant and control panels. Communication ports supported by fixed TWIC readers shall include: A unidirectional Wiegand port for connection to standard access control panels.	Product Review (R.2), Applicant Documentation (D.4)
F.13	Fixed TWIC readers should have communication ports as required by the PACS cable plant and control panels. Communication ports supported by fixed TWIC readers shall include: A bidirectional RS-485 or 10/100baseT (Ethernet) for connection to computer systems or access control systems.	Product Review (R.2), Applicant Documentation, (D.5)

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Requirement ID	Requirement Description	Approval Mechanism
F.14	Fixed TWIC readers shall support the 75 bit Wiegand output format specified by the GSA Approved Product Listing test for FIPS 201-based systems as specified in Table 7.1.	Applicant Documentation (D.4), Functional Testing
F.15	Fixed, indoor-use TWIC readers shall operate in a humidity range of 5-90%, non-condensing.	Environmental Testing (EN.4)
F.16	For the 75 bit Wiegand output format, the Credential Number field shall be used to transport the values of the Credential Number and the Individual Credential Issue (ICI) fields as per Section 1, Note 1.	Functional Testing
F.17	A standalone TWIC reader is one that has no two-way communications connection. In this case, when a TWIC card is presented to a contactless only TWIC reader, the TWIC Privacy Key shall be read from the magnetic stripe on the TWIC card	Functional Testing
F.18	Fixed TWIC readers shall comply with UL 294, Standard for Safety of Access Control System Units, or internationally recognized equivalent.	Applicant Documentation (D.4)
F.19	A fixed TWIC reader shall have access to a system clock capable of providing the current date and time.	Functional Testing

Table 3 - Mandatory Requirements for Fixed TWIC Readers

2.2.2 Optional

A fixed reader submitted for listing on the QTL may implement the features listed in Table - 4. However, it is not required that the reader implement these features to be listed on the QTL.

Requirement ID	Requirement Description	Approval Mechanism
FO.1	TWIC Readers should have the ability to send an external signal in the event that there is an attempt at unauthorized entry into a TWIC Reader or removal of a TWIC Reader.	Applicant Documentation (D.9)
FO.2	Fixed TWIC readers that include a real time clock may support an additional Wiegand output format of 48 bits as specified in Table 7.2.	Applicant Documentation (D.10), Functional Testing

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Requirement ID	Requirement Description	Approval Mechanism
FO.3	Fixed Readers that support both 48-bit and 75-bit Wiegand output shall provide a method of setting the Wiegand output format as required by the local PACS.	Applicant Documentation (D.11), Functional Testing
FO.4	For the 48 bit Wiegand output format, the Credential Number field shall be used to transport the values of the Credential Number and the Individual Credential Issue (ICI) fields as described in the TWIC Reader Hardware and Card Application Specification Section 7, Note 1.	Functional Testing
FO.5	TWIC readers may optionally support PoE or PoE+ (Power over Ethernet or Power over Ethernet Plus) in accordance with IEEE 802.3af (48VDC/15.4W max) or 802.3at (48 VDC/56W max).	Applicant Documentation (D.13)
FO.6	The retrieval of the TWIC Privacy Key from a TWIC card may occur at every TWIC reader during each access transaction or obtained by a TWIC reader from the PACS where the corresponding TPK was stored as a one-time operation during card registration.	Functional Testing
FO.7	A fixed TWIC reader may determine whether a card is on the CCL.	Functional Testing
FO.8	A fixed reader may determine whether a certificate is on the CRL.	Functional Testing
FO.9	Fixed TWIC readers may support expiration checking.	Functional Testing
FO.10	Fixed TWIC readers may support a configurable option to disable reader exception checking for use in installations where expiration date is transmitted to and verified by a PACS.	Functional Testing

Table 4 – Optional Features for Fixed TWIC Readers

2.3 Outdoor Readers (Conditional Requirements)

The following conditional requirements apply to readers that operate outdoors.

2.3.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 5.

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Requirement ID	Requirement Description	Approval Mechanism
OUT.1	All TWIC readers shall conform to a NEMA 4 rating.	Environmental Testing (EN.5)
OUT.2	All TWIC readers shall be capable of operations in direct sunlight. All TWIC readers shall neither require nor be affected by ambient light sources.	Environmental Testing (EN.6)
OUT.3	Fixed, outdoor-use TWIC readers shall operate within a temperature range of -20°C to +70°C (-4°F to +158°F).	Environmental Testing (EN.7)
OUT.4	Fixed, outdoor-use TWIC readers shall operate in a humidity range of 5-100%, condensing.	Environmental Testing (EN.8)

Table 5 - Mandatory Requirements for Outdoor TWIC Readers

2.4 Readers used in Hazardous Materials Environment (Conditional Requirements)

The following conditional requirements shall apply to readers that operate in a hazardous materials environment.

2.4.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 6.

Requirement ID	Requirement Description	Approval Mechanism
FH.1	TWIC readers that support intrinsically safe operation in a hazardous materials environment where explosive vapors are present in the atmosphere shall be certified for use in explosive atmospheres.	Environmental Testing (EN.9)

Table 6 - Mandatory Requirements for TWIC Readers used in Hazardous Materials Environment

2.5 TWIC Authentication Mode Requirements (Conditional Requirements)

The conditional requirements listed within this sub-section are categorized based on the TWIC authentication modes. Readers are required to implement those requirements that apply to the mode that they support. It is not required for the reader to support all authentication modes specified by TWIC.

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2.5.1 Authentication Mode 1

The following requirements apply to a reader that supports CHUID verification mode.

2.5.1.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 7.

Requirement ID	Requirement Description	Approval Mechanism
M1.1	TWIC readers may support Signed CHUID Verification	Functional Testing
M1.2	The TWIC reader verifies that the id-TWIC-content-signing object identifier is present in the card issuer's digital signature certificate for the document signer. If the id-TWIC-content-signing object identifier is not present in the card issuer's digital signature certificate for the document signer, the TWIC reader shall reject the card.	Functional Testing
M1.3	TWIC readers shall verify the CHUID signature and origin up to and including the trust anchor.	Functional Testing
M1.4	TWIC reader shall decode the FASC-N TLV record and extract the Agency Code, System Code, Credential Number, Credential Series and Individual Credential issue. The TWIC reader may transmit data in a method prescribed by the security system panel manufacturer that may include the entire FASC-N or selected elements of the FASC-N.	Functional Testing
M1.5	If a TWIC reader is configured for expiration checking using the signed CHUID, the date encoded in the signed CHUID data object is compared to the current date/time. If the date encoded in the signed CHUID data object is before the current date/time, the reader shall reject the card.	Functional Testing

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M1.6	If the TWIC reader is configured to use the TWIC Cancelled Card List to check for card revocation using the signed CHUID, the TWIC reader checks to see if the FASC-N from the signed data object is listed on the latest version of the CCL accessed by the reader. If the FASC-N from the signed CHUID data object is listed on the latest version of the CCL accessed by the reader, the TWIC reader shall reject the presented card.	Functional Testing
M1.7	When configured for unsigned CHUID signature verification using the Security Data Object, the TWIC reader shall verify the signature and origin of the unsigned CHUID, up to and including the trust anchor using the Security Data Object.	Functional Testing
M1.8	When configured for unsigned CHUID signature verification using the Security Data Object, if the id-TWIC-content-signing object identifier is not present in the card issuer's digital signature certificate for the document signer of the Security Data Object, the TWIC reader shall reject the card.	Functional Testing
M1.9	3) If a TWIC reader is configured for expiration checking using the unsigned CHUID, the date encoded in the unsigned CHUID data object is compared to the current date/time. If the date encoded in the unsigned CHUID data object is before the current date/time, the reader shall reject the card.	Functional Testing
M1.10	5) If the TWIC reader is configured to use the TWIC Cancelled Card List to check for card revocation using the unsigned CHUID, the TWIC reader checks to see if the FASC-N from the unsigned CHUID data object is listed on the latest version of the CCL accessed by the reader. If the FASC-N from the unsigned CHUID data object is listed on the latest version of the CCL accessed by the reader, the TWIC reader shall reject the presented card.	Functional Testing

Table 7 - Mandatory Requirements for TWIC Readers supporting Authentication Mode 1

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2.5.1.2 Optional

A reader submitted for listing on the QTL may implement the features listed in Table - 8. However, it is not required that the reader implement these features to be listed on the QTL.

Requirement ID	Requirement Description	Approval Mechanism
M1O.1	Alternatively, a TWIC reader may perform Unsigned CHUID signature verification using the Security Data Object.	Functional Testing
M1O.2	The TWIC reader may support use of the unsigned CHUID without signature verification for use in cases where the CHUID signature has been previously verified by and registered in the PACS.	Functional Testing

Table 8 - Optional Requirements for TWIC Readers supporting Authentication Mode 1

2.5.2 Authentication Mode 2

The following requirements apply to a reader that supports the Active Card Authentication mode

2.5.2.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 9.

Requirement ID	Requirement Description	Approval Mechanism
M2.1	TWIC readers may support Active Card Authentication	Functional Testing
M2.2	A TWIC reader, or the system to which the TWIC reader is connected, shall support asymmetric cryptographic operations.	Functional Testing
M2.3	The reader shall compare the “issuer” name in the Certificate against the “subject” name in each trusted issuing CA certificate stored on a TWIC reader. For each CA with a matching name, the Public Key is used to attempt to verify the signature on the token’s certificate. If no matching CA certificate is found on a TWIC reader with the same name and with a Public Key that verifies the signature on the certificate, then the reader shall reject the card containing the certificate.	Functional Testing

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M2.4	If a TWIC reader is configured for expiration checking using card authentication, the date encoded in the Card Authentication Certificate’s “notBefore” validity date is after the current date/time, or if the Certificate’s “notAfter” validity date is before the current date/time, the reader shall reject the card containing the Certificate.	Functional Testing
M2.5	The Certificate’s subjectAltName extension identified as twicFASC-N (1.3.6.1.4.1.29138.6.6) name entry shall be retrieved from the certificate and used as the unique credential number (e.g. for optional transmission to a panel or back-end or to IDMS infrastructure).	Functional Testing
M2.6	The response (i.e. the card’s signature) from the GENERAL AUTHENTICATE APDU command shall be verified using the Public Key from the Certificate. If verification of the response (i.e. the card’s signature) from the GENERAL AUTHENTICATE APDU command fails, the TWIC reader shall reject the card.	Functional Testing
M2.7	If the TWIC reader is configured to use the TWIC Cancelled Card List to check for card revocation using card authentication, the TWIC reader checks to see if the FASC-N from the Card Authentication Certificate is listed on the latest version of the CCL accessible by the reader. If the FASC-N from the Card Authentication Certificate is listed on the latest version of the CCL accessible by the reader, the TWIC reader shall reject the presented card.	Functional Testing
M2.8	If the TWIC reader is configured to sue the TWIC Certificate Revocation List (CRL) to check for card revocation, the TWIC reader checks to see if the Card Authentication Certificate is listed on the latest version of the CRL accessible by the reader. If the Card Authentication Certificate is listed on the latest version of the CRL accessible by the reader, the TWIC reader shall reject the presented card.	Functional Testing

Table 9 - Mandatory Requirements for TWIC Readers supporting Authentication Mode 2

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2.5.3 Authentication Mode 3

The following requirements apply to a reader that supports the CHUID Verification + Biometric User Authentication mode

2.5.3.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 10.

Requirement ID	Requirement Description	Approval Mechanism
M3.1	TWIC readers may support Signed CHUID + Biometric	Functional Testing
M3.2	The TWIC reader shall perform signed CHUID verification as defined in A.1.	Functional Testing
M3.3	The TWIC reader verifies that the digital signature on the CBEFF record was produced by an authorized document signer. This requires that the TWIC reader have a verified copy of the document signer's X.509 digital certificate. If signature verification of the CBEFF record using the public key from this verified document signing certificate fails, the TWIC reader shall reject the card.	Functional Testing
M3.4	The reader compares the FASC-N from signed CHUID with the FASC-N with the FASC-N from the CBEFF record. If the FASC-N from the signed CHUID and the FASC-N from the CBEFF record do not match, the TWIC reader shall reject the card.	Functional Testing
M3.5	The TWIC reader samples a fingerprint image from the cardholder. The TWIC reader shall convert the sampled image to a minutiae template and match the template against the fingerprint minutiae templates stored in the signed biometric data object at an appropriate level of confidence (see Section B).	Functional Testing
M3.6	If the fingerprint does not match one of the templates on the first attempt, the TWIC reader shall prompt the cardholder for subsequent attempts without requiring the TWIC card to be read again.	Functional Testing

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M3.7	If the number of subsequent matching failures exceeds the reader’s configurable retry counter, the TWIC reader shall reject the card.	Functional Testing
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Table 10 - Mandatory Requirements for TWIC Readers supporting Authentication Mode 3

2.5.4 Authentication Mode 4

The following requirements apply to a reader that supports the CHUID Signing Certificate + Active Card Authentication + Biometric User Authentication mode.

2.5.4.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 11.

Requirement ID	Requirement Description	Approval Mechanism
M4.1	TWIC readers may support Active Card Authentication + Biometric	Functional Testing
M4.2	The TWIC reader verifies that the id-TWIC-content-signing object identifier is present in the card issuer’s digital signature certificate for the document signer. If the id-TWIC-content-signing object identifier is not present in the card issuer’s digital certificate for the document signer, the TWIC reader shall reject the card.	Functional Testing
M4.3	The TWIC reader shall verify the CBEFF signature and origin up to and including the trust anchor. If signature verification of the CBEFF record using the public key from the verified document signing certificate fails, the TWIC reader shall reject the card.	Functional Testing
M4.4	The reader compares the FASC-N from the Card Authentication Certificate with the FASC-N from the CBEFF record. If the FASC-N from the Card Authentication Certificate and the FASC-N from the CBEFF record do not match, the TWIC reader shall reject the card.	Functional Testing

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M4.5	The TWIC reader samples a fingerprint image from the cardholder. The TWIC reader shall convert the sampled image to a minutiae template and match the template against the fingerprint minutiae templates stored in the signed biometric object at an appropriate level of confidence (see Section 8).	Functional Testing
M4.6	If the fingerprint does not match one of the templates on the first attempt, the TWIC reader shall prompt the cardholder for subsequent attempts without requiring the TWIC card to be read again.	Functional Testing
M4.7	If the number of subsequent matching failures exceeds the reader’s configurable retry counter, the TWIC reader shall reject the card.	Functional Testing

Table 11 - Mandatory Requirements for TWIC Readers supporting Authentication Mode 4

2.5.5 Biometric Requirements

The following requirements apply to a reader that supports any authentication mode that involves the use of the fingerprint biometrics

2.5.5.1 Mandatory

Every reader submitted for listing on the QTL shall meet all of the requirements listed in Table - 12.

Requirement ID	Requirement Description	Approval Mechanism
B.1	For biometric-enabled TWIC Readers, if the number of minutiae is zero, then the TWIC Reader shall deny access.	Functional Testing
B.2	Readers shall provide an automated alert or lockout after a configurable number (facility configured) of consecutive failed biometric matching attempts	Applicant Documentation (D.15), Functional Testing
B.3	TWIC readers shall first check the number of minutiae present to determine if a 1:1 match may proceed.	Functional Testing
B.4	Biometric-enabled TWIC readers shall be able to handle 1 million touches without degradation.	Reliability Testing (RE.2)

Table 12 - Mandatory Requirements for TWIC Readers supporting Authentication Modes involving biometrics

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2.5.5.2 Optional

A reader submitted for listing on the QTL may implement the features listed in Table - 13. However, it is not required that the reader implement these features to be listed on the QTL.

Requirement ID	Requirement Description	Approval Mechanism
BO.1	Biometric-enabled TWIC readers should provide liveness detection.	Applicant Documentation (D.17)
BO.2	Intentionally left blank.	
BO.3	Intentionally left blank.	
BO.4	All biometrically-enabled TWIC readers should provide a mechanism to adjust the security level sensitivity as required.	Applicant Documentation (D.16)
BO.5	The biometric sub-system on the TWIC Reader should provide an equal error rate (EER) of 1% (i.e. 1% false rejections at a setting of 1% false acceptance) on a per transaction basis. Note: This presumes up to three attempts as a minimum standard error rate.	Biometric Testing (B.1)
BO.6	All TWIC readers should have a finger guide to aid in proper finger placement on the sensor.	Product Review (R.10)
BO.7	All TWIC Readers should be capable of achieving a standard maximum transaction time (defined as the time between presentation of the contactless card to a TWIC reader and completion of the biometric match) of three seconds. Note: This does not include the time required to acquire the TPK either using a magnetic stripe or through download from a PACS.	Applicant Documentation (D.18), Product Review (R.9)
BO.8	For biometrically enabled TWIC readers, the fingerprint sensor should be embedded in the same chassis as the TWIC reader, or if a separate fingerprint sensor module is used, the wiring between the TWIC reader and the biometric unit shall not be exposed.	Product Review (R.8)

Table 13 - Optional Requirements for TWIC Readers supporting Authentication Modes involving biometrics

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3 Conformity Assessment Criteria

The following sections outline the criteria (e.g., documentation, artifacts, test results etc.) that are required to be submitted by an Applicant to demonstrate conformity of the product with the technical requirements identified in Section 2.

3.1 Applicant Documentation

Table -14 outlines the criteria that need to be addressed in the submitted Applicant documentation in order to meet the applicable requirement.

Conformity Criteria	<p><u>MANDATORY REQUIREMENTS</u></p> <p>D.1 -Mode Configuration User manual includes the modes that are supported by the Reader and the process to be followed on how to configure the product to operate in each supported mode. Details shall include the acceptable external triggers that facilitate mode changes. (G.1, G.21)</p> <p>D.2 - Reader Mounting Reader specifications describe the mechanism(s) implemented by the product to ensure that the mountings are tamper-proof. (F.1)</p> <p>D.3 - Electrical Requirements Reader specifications include that the reader’s operating voltage is within a range of 8-48 VDC. (G.2) Reader specifications include that the reader’s operating amperage doesn’t exceed a 2.0 Amperes current requirement. (G.4) Reader Specifications include the provision for reverse voltage protection within the product. (G.5)</p> <p>D.4 - Wiegand Support Reader specifications include the provision of a Wiegand port within the product for connection to a physical access control panel and the support for the 75bit Wiegand output format as defined by the GSA FIPS 201 Evaluation Program. (F.12)(F.14)</p> <p>D.5 - RS-485 and 10/100baseT Support Reader specifications include the provision of an RS-485 and/or 10/100baseT Ethernet port(s) within the product for connection to a computer system or physical access control panel. (F.13)</p> <p>D.6 - Log Generation Capability User Manual includes a description of the logging capabilities of the product and the process to be followed to configure and manage this functionality within the product. (G.14)</p>
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D.7 Release Edition

User manual includes details on the release editions and/or test modes that the product supports. (G.23)

D.8 - Contactless Interface

Reader specifications include Applicant claims that the contactless smart card reader component conforms to the ISO/IEC 14443A/B parts 1, 2, 3, and 4 (T=CL protocol) as specified for FIPS 201-1. (G.24)

Reader specifications include Applicant claims that the contactless readers can communicate at speeds of 106kbit/s, 212kbit/s or 424kbit/s with the TWIC Card. (G.26)

OPTIONAL FEATURES**D.9 - Tampering**

Reader specifications describe the functionality available within the product to send external alerts due to an attempt at unauthorized entry into a TWIC reader or removal of a TWIC reader. (FO.1)

D.10 - Real Time Clock Support

User manual describes the process to be followed to view and configure the time on the product. (FO.2)

Reader specifications describe whether expiration date checks are performed using the real time clock support (GO.5)

D.11 - 48 bit Wiegand Support

User manual describes the process to be followed to configure the reader's output format to either 75 bit or 48 bit Wiegand. (FO.3)

D.12 - Reader functionality Update

User manual describes the process to be followed for updating reader software/firmware. Updates are permitted only after a successful authentication operation. (GO.1)

D.13 - Power over Ethernet Capability

Reader specifications state that the reader supports PoE or PoE+ (Power over Ethernet or Power over Ethernet Plus) in accordance with IEEE 802.3af (48VDC/15.4W max) or 802.3at (48 VDC/56W max). (FO.5)

D.14 - Test Configuration

User manual includes details on how to configure the product in either test or production mode. Configuration of this within the reader permits test TWIC cards to be accepted by the product and facilitates testing of the reader and access control system. (GO.2)

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	<p><u>CONDITIONAL REQUIREMENTS</u></p> <p>D.15 - Lockout Capability User Manual includes a description of configuration options available within the product for either (i) sending an automated alert and/or (ii) locking out the reader after a configured number of failed biometric matching attempts has been reached. (B.2)</p> <p>D.16 – Biometric Sensitivity Configuration User manual describes the process to configure the security sensitivity level for the purposes of 1:1 biometric matching. (BO.4)</p> <p>D.17 – Liveness Detection Reader specifications describe the liveness detection capabilities available within the product (BO.1)</p> <p>D.18 – Transaction Time Reader specifications describe the time it takes between presentation of the contactless card to a TWIC reader and completion of the biometric match (BO.7)</p>
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Table 14 - Applicant Documentation

3.2 Product Review

Table - 15 outlines the set of activities that the QTL Program Management Office (PMO) staff will perform in order to determine conformity with each applicable requirement.

Conformity Criteria	<p><u>MANDATORY REQUIREMENTS</u></p> <p>R.1 - Power Supply Review the product components and determine if a power supply has been provided when operating from a line voltage. (G.3)</p> <p>R.2 - Reader Design Examine the reader casing to determine if it possesses any sharp corners or edges that can cause bodily injury. (G.9) Examine the product to determine if there are any external wires, connectors or exposed cabling. (G.10) Examine the product design to check if there are any loose coverings and cowlings. (G.11) Examine the product to determine the presence of a Wiegand port. (F.12) Examine the product to determine the presence of a RS-485 and/or 10/100baseT (Ethernet) port. (F.13)</p>
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	<p>R.3 - Visual Indicators Examine the display and indicators in sunlight to determine its visibility. (G.13)</p> <p>R.4 - Product Documentation Review documentation that accompanies the product to determine completeness of its manuals in terms of installation, operation and maintenance. (G.16)</p> <p>R.5 - Cryptographic Operations Cryptographic algorithms have been tested by the NIST Cryptographic Algorithm Validation Program (CAVP) test tool. The AES-128 (ECB mode), SHA-1 and RSA algorithms are supported by the reader’s crypto-module. (G.12)</p> <p><u>OPTIONAL FEATURES</u></p> <p>R.6 - Product Design Examine the reader and determine whether the product’s edges and corners have at least 1mm radius of curvature (i.e. no sharp corners). (GO.3)</p> <p>R.7 - Status Display Examine the reader to determine its capability in displaying its status (e.g. on, ready or out of service). (GO.4)</p> <p><u>CONDITIONAL REQUIREMENTS</u></p> <p>R.8 - Product Design - Biometrics Examine the product design to determine whether the fingerprint sensor is embedded in the same chassis as the TWIC reader, or if a separate fingerprint sensor module is used, the wiring between the TWIC reader and the biometric unit is not exposed. (BO.8)</p> <p>R.9 – Transaction Time Observe and measure the transaction time. (BO.7)</p> <p>R.10 Fingerprint Guide Examine the product to determine the presence and effectiveness of a finger guide to aid the user in proper placement on the sensor. (BO.6)</p>
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Table 15 - Product Review Activities

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3.3 Environmental Testing

Table - 16 outlines the environmental test results that need to be submitted as part of the Applicant documentation in order to meet the applicable requirement.

<p>Conformity Criteria:</p>	<p><u>MANDATORY REQUIREMENTS</u></p> <p>EN.1 – Low Frequency Vibration Applicants demonstrate product compliance by providing test results based on IEC 60068-2-64 - <i>Environmental Test – Part 2: Test Methods – Test FH: Vibration Broadband Random (Digital Control) and Guidance</i>. (F.2)</p> <p>EN.2 – Shock Survival Applicants demonstrate product compliance by providing test results based on IEC 68-2-27 (1987) - “<i>Basic Environmental Testing Procedures, Part 2: Tests – Test Ea and Guidance: Shock</i>” using one half-sine pulse with a nominal peak acceleration of 5 g (50m/s²) and nominal pulse duration of 30 ms with no observable change in performance. (F.3)</p> <p>EN.3 – Bump Survival Applicants demonstrate product compliance by providing test results based on IEC 68-2-27 (1987) - “<i>Basic Environmental Testing Procedures, Part 2: Tests- Test Eb and Guidance: Bump</i>” each with a nominal peak accelerating of 10 g (100 m/s²) and nominal pulse duration of 16 ms with no observable change in performance. (F.4)</p> <p>EN.4 – Humidity Range (Indoor) Applicants demonstrate product compliance by providing test results based on IEC 62599-1 (2010) – “<i>Alarm systems - Part 1: Environmental test methods</i>”. (F.15)</p> <p><u>CONDITIONAL REQUIREMENTS</u></p> <p>EN.5 – NEMA 4 Rating Applicants demonstrate product compliance by providing test results for NEMA 4 rating per NEMA 250:2008 Enclosures for Electrical Equipment (1000 volts maximum). (OUT.1)</p> <p>EN.6 – Operation in direct Sunlight Applicants demonstrate the ability of the product to operate in direct sunlight. Examples include the capability of capturing live authentication fingerprints with the mandated Error Rejection Rate (ERR) and the capability to read the instructions displayed. (OUT.2)</p>
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	<p>EN.7 – Temperature Range Applicants demonstrate product compliance by providing test results based on IEC 62599-1 (2010) – “<i>Alarm systems - Part 1: Environmental test methods</i>”. (OUT.3)</p> <p>EN.8 – Humidity Range (Outdoor) Applicants demonstrate product compliance by providing test results based on IEC 62599-1 (2010) – “<i>Alarm systems - Part 1: Environmental test methods</i>”. (OUT.4)</p> <p>EN.9 – Hazardous Materials Environment Product documentation shows evidence of certification in accordance with recognized standards for equipment used in explosive atmospheres. (FH.1).</p>
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Table 16 – Environmental-related test results submission artifacts

3.4 Electrical Testing

Table - 17 outlines the electrical test results that need to be submitted as part of the Applicant documentation in order to meet the applicable requirement.

Conformity Criteria:	<p><u>MANDATORY REQUIREMENTS</u></p> <p>E.1 - FCC Certification Applicants demonstrate product compliance with applicable FCC technical requirements in 47 CFR Part 15 and 47 CFR Part 18 and approved in accordance with the FCC equipment authorization procedure (G.6)</p>
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Table 17 – Electrical-related test results submission artifacts

3.5 Electromagnetic Compatibility Testing

Table - 18 outlines the environmental test results that need to be submitted as part of the Applicant documentation in order to meet the applicable requirement.

Conformity Criteria:	<p><u>MANDATORY REQUIREMENTS</u></p> <p>EM.1 – Electrostatic Discharge Applicants demonstrate product compliance with IEC 61000-4-2 - <i>Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test</i> for (i) Contact Discharge Mode at 2 kV and 4 kV Air Discharge Mode at 2 kV, 4 kV and 8 kV; (ii) Presuming 8 to 10 equipment discharge test points plus coupling planes, positive and negative discharge waveform polarities and (iii) Performance Criteria B. (F.5)</p>
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	<p>EM.2 - Radiated RF Immunity Applicants demonstrate product compliance with IEC 61000-4-3 - <i>Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test</i> for: (i) 10 V/meter, 80 MHz to 1 GHz; (ii) Four sides of EUT, 1% steps, 2.8 sec. dwell. AM Mod., 80%, 1 kHz; and (iii) Performance Criteria A. (F.6)</p> <p>EM.3 - Electrical Fast Transient/Burst Applicants demonstrate product compliance with IEC 61000-4-4 - <i>Testing and Measurement Techniques - Electrical Fast Transient / Burst Immunity Test</i> for: (i) AC and DC Power Ports at 0.5kV, 1kV and 2kV; (ii) Signal Lines over 3 meters at 0.25 kV, 0.5kV and 1kV and (iii) Performance Criteria B. (F.7)</p> <p>EM.4 - Radio Frequency Common Mode Applicants demonstrate product compliance with IEC 61000-4-6 - <i>Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments</i> for (i) 10 Vrms, 150 kHz to 80 MHz; (ii) Power ports and signal lines over 3 meters, 1% steps, 2.8 sec. dwell; and (iii) Performance Criteria A. (F.8)</p> <p>EM.5 - Surges Applicants demonstrate product compliance with IEC 61000-4-5 - <i>Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test</i> for (i) AC power port at 2kV line to earth, 1kV line to line at 0, 90 and 270 deg; (ii) DC Power Ports at 0.5 kV line to earth, 0.5 kV line to line; (iii) Signal Lines over 30 meters at 1 kV line to earth; (iv) Positive and negative polarity, 5 surges per mode of appearance; and (v) Performance Criteria A. (F.9)</p> <p>EM.6 - Power Frequency Common Mode Applicants demonstrate product compliance with IEC 61000-4-8 - <i>Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test</i> for: (i) 30 A/m, 50 or 60Hz; and (ii) Performance Criteria A. (F.10) Applicants shall demonstrate product compliance with IEC 61000-4-8 - <i>Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test</i> for: (i) 30% reduction for 0.5 periods (10 ms), Performance Criteria B; (ii) 60% for 5 periods (100 ms), Performance Criteria C; (iii) 60% for 50 periods (1 sec), Performance Criteria C; and (iv) 95% for 250 periods (5 sec), Performance Criteria C. (F.11)</p>
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Table 18 - EMC-related test results submission artifacts

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3.6 Safety Testing

Table - 19 outlines the safety related test results that need to be submitted as part of the Applicant documentation in order to meet the applicable requirement.

Conformity Criteria:	<p><u>MANDATORY REQUIREMENTS</u></p> <p>S.1 – Safety of Access Control System Units Product documentation shows evidence of certification in accordance with UL 294 by an OSHA Recognized NRTL with an appropriate scope of recognition. (F.18)</p>
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Table 19 - Safety-related test results submission artifacts

3.7 Functional Testing

Table - 20 describes the process used within the TWIC QTL Program to test functionality of the submitted product.

Conformity Criteria:	<p>Conformance with requirements that have an approval mechanism as that of functional testing will be determined based on the test methods provided in the “Fixed TWIC Physical Access Reader Test Procedure” document.</p>
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Table 20 - Functional Tests

3.8 Biometric Testing

Table – 21 outlines the biometric test results that need to be submitted as part of the Applicant documentation in order to meet the applicable requirement

Conformity Criteria:	<p><u>CONDITIONAL REQUIREMENTS</u></p> <p>B.1 – Equal Error Rate Applicants demonstrate product compliance showing how the biometric sub-system on the TWIC Reader provides an equal error rate (EER) of 1% (i.e. 1% false rejections at a setting of 1% false acceptance) on a per transaction basis. (BO.5)</p>
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Table 21 – Biometric-related test results submission artifacts

3.9 Reliability Testing

Table - 22 outlines the reliability-related test results that need to be submitted as part of the Applicant documentation in order to meet the applicable requirement.

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Conformity Criteria:	<p><u>MANDATORY REQUIREMENTS</u></p> <p>RE.1 – Mean Time Between Failure Applicants demonstrate the capability of their product to have a Mean Time Between Failure (MTBF) of 25,000 hours or greater. (G.15)</p> <p><u>CONDITIONAL REQUIREMENTS</u></p> <p>RE.2 – Degradation Applicants demonstrate the capability of their product to handle 1 million touches without degradation. (B.4)</p>
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Table 22 - Reliability-related test results submission artifacts