Alcohol and Gaming Commission of Ontario

Casino Electronic Gaming Equipment and Gaming Systems Minimum Technical Standards

June 2018

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Introduction

The Registrar of Alcohol, Gaming and Racing is appointed under the *Alcohol and Gaming Regulation and Public Protection Act, 1996* and has powers and duties under the *Gaming Control Act, 1992* and its Regulations. Under section 3.8 of the *Gaming Control Act, 1992*, the Registrar is authorized to establish standards and requirements for the conduct, management and operation of Gaming Sites, "lottery schemes" or businesses related to a Gaming Site or a "lottery scheme" or for goods or services related to that conduct, management or operation. The Registrar has established these Technical Standards as the minimum standards electronic Gaming Equipment and Gaming Systems shall comply with, as applicable to a specific electronic solution. The intent of this document is to provide minimum technical standards for electronic casino Gaming Equipment and Gaming Systems with regards to the technical integrity, public interest and security of the Equipment or the systems, including their accounting capability.

These revised Minimum Technical Standards will become effective on TBD. Electronic Gaming Equipment and Gaming Systems submitted for approval prior to this date will be considered under the previous version of the standards.

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From time to time, as necessary, modifications will be made to these Minimum Technical Standards.

Other Standards and Requirements Applicable

Suppliers and Operators of electronic Gaming Equipment and Gaming Systems must comply with the standards described in this document**.** While every attempt has been made to ensure these Minimum Technical Standards are the comprehensive set or requirements Gaming Equipment and Gaming Systems need to be developed against, and to avoid contradiction of information with the Registrar's Standards for Gaming, the Registrar's Standards for Gaming override these Minimum Technical Standards in the event of contradiction. Please see the Registrar's Standards for Gaming for additional information.

Application of Standards

Intent statements have been included in the standards to assist in better understanding the expected outcome. The Gaming Equipment may be approved provided the intent is demonstrated to be satisfied. Additionally, the Gaming Equipment or Gaming System may also be approved provided the regulatory principles of technical integrity, public interest, security, and accounting capability are met.

Introduction of New Innovative Technology in Ontario

The AGCO encourages innovation in Ontario's gaming industry by supporting the early adoption of new technology/concepts. Published Technical Standards are based on known technology, and may not extend or apply to innovative concepts or technologies. In the absence of Technical Standards, interim approvals for innovative concepts or technologies will be based on the regulatory principles of technical integrity, public interest, security, and accounting capability until the relevant standards are published. Stakeholders are encouraged to submit innovative concepts or technology for approval at any time after consultation with the AGCO Gaming Lab, including when related minimum technical standards have not yet been developed.

Early consultation with the AGCO Gaming Lab is encouraged during the concept and/or design phase of the product's development lifecycle to support Suppliers' in developing innovative products that meet regulatory principles leading to expedited speed to market of new technology/concepts. The AGCO Gaming Lab both acknowledges and appreciates those Suppliers that consult the Gaming Lab in early stages of development of new concepts.

It is recognized that the evolution of technology and Game design may result in some standards becoming obsolete. In such cases, we encourage Suppliers to contact the Director/Deputy Registrar to discuss how the proposed technology/Game design can comply with the intent of these standards.

Glossary

Accumulated Award: A payout that is calculated by adding multiple Awards that result from a single Wager.

Associated Equipment: Any internal or external equipment that is not part of the Gaming Equipment itself and is required for its complete operation, e.g. progressive controllers, bill validators, Slot Monitoring System interface device, etc.

Attendant Pay Limit: The value which all cash-outs either below, or at or below, are paid by printing a Ticket and/or dispensing a token.

Authorization List: A file (possibly dynamic) containing sufficient data to identify and verify integrity of each Critical File. The Authorization List may include a Hash table, or signature table.

Award: A term describing a prize that can be awarded by Gaming Equipment. If one or more symbols can be substituted by a wild symbol, resulting in a winning combination with the same pay as that using the original symbols, then both combinations are considered to be the same Award. In the context of odds, an Award shall be defined to be a credit prize, a multiplier, entry into a bonus Game or feature, etc.

Bill Validator/Acceptor: An electronic device that accepts or rejects inserted bills or Tickets/Vouchers after validation.

Cashless Wagering System: The collective hardware, software and other equipment used to facilitate wagering without chips, tokens, or other legal tender of Canada.

Coin: Monetary Coin or token accepted by the Gaming Equipment from the patron for the intent to place Wagers, or received as a payout from Gaming Equipment.

Coin Validator: A Coin Acceptor or Coin Comparator used by the Gaming Equipment that accepts or rejects inserted Coin(s) after validation.

Coin Acceptor: An electronic device programmed to accept specific Coins and reject others. It may have the additional capability of rejecting specific Coins.

Coin Comparator: An electronic device used to validate the inserted Coin based on comparison with the sample Coin in the Coin Comparator.

Control Program: Any software, source language or executable code which affects the result of a Wager by determining win or loss. This term includes, but is not limited to, software, source language or executable code associated with the random number generation process, mapping of random number to Game elements to determine Game outcome, evaluation of the randomly selected Game elements to determine win or loss, payment of winning Wagers, Game recall, Game accounting including the reporting of meter information to the slot accounting system, monetary transactions conducted with Associated Equipment, software verification and authentication functions which are specifically designed and intended for use in Gaming Equipment, monitoring and

generation of Game tilts or error conditions, and gaming operating systems which are specifically intended for use in Gaming Equipment.

Community Bonus: A type of bonus Play where two or more machines are connected to a controller that allows players to collaborate and/or compete for a shared prize.

Coupon: A printed Wagering Instrument that has a fixed dollar wagering value that can only be used to acquire non-cashable credits.

CRC, Cyclic Redundancy Check: A software algorithm used to verify the accuracy of data during its transmission, storage, or retrieval. The algorithm is used to validate or check the data for possible corruption or unauthorized changes.

Critical Files/Software: Any software and data which affects the integrity or outcome of a Game, the interpretation of Game Play, Game outcome, or accounting/metering information. This includes, but is not limited to, any software that comprises the operating system; or is used to control Game functions, Game outcome, payout, security or accounting functions; and related data including fixed data and graphics files used to interpret Game Play or outcome. It can also include Gaming System software such as that pertaining to maintenance of accounting or alarm information. Critical Files do not include Critical Game Data.

Critical Game Data: Stored data that is considered vital to the continued operation of the Gaming Equipment. This includes, but is not limited to:

a) RNG outcome corresponding to the current Game;
b) all auditing meters;
c) current credits;
d) gaming machine/Game configuration data;
e) information pertaining to the last 10 Plays (including the current Play if incomplete)
f) gaming software/system state (the last normal state the Gaming Equipment software was in before interruption)

Critical Game Options: Options and configurations of software, which, if configured incorrectly, would result in a violation and/or introduce vulnerabilities that leads to a violation of the Standards in this document. The following list contains some examples of Critical Game Options:

a) Game configurations (payout percentage, lines, denominations, etc.);
b) Progressive type (e.g. Standalone, Linked, Wide Area, etc.);
c) Jurisdiction, as applicable, when the jurisdiction controls one or more Critical Game Options.
d) Tournament mode

Critical Software: Same as Critical Files.

Critical Memory: Memory locations storing Critical Game Data.

Cryptographic RNG: An RNG which is resistant to attack or compromise by an intelligent attacker with modern computational resources, and who has knowledge of the source

code of the RNG and/or its algorithm. Cryptographic RNGs cannot be feasibly 'broken' to predict future values.

Disabled: Any condition when the Game is unplayable.

Gamble Feature: An option to allow a Player to gamble the prize they receive from a winning Wager in an "all-or-nothing" bet, e.g. double-or-nothing.

Game: A betting scheme with the outcome based on pure Chance, mixed Chance and Skill, or pure Skill.

Game-Within-A-Game: A Play or series of Plays within the primary Game which requires a separate Wager and which has a separate theoretical payout percentage from the primary Game.

Gaming Equipment: Electronic equipment, including a slot machine, that:

a)   Could influence the outcome of a Game held at a Gaming Site; or
b)   Is integral to the conduct, management or operation of a Game described in clause
(a).

Gaming Session: The period of time commencing when a Player initiates a Game or series of Games on Gaming Equipment by committing a Wager and ending at the time of a final Game outcome for that Game or series of Games and coincident with the opportunity for the Player to retrieve their credit balance.

Hash: the value returned by a Hash function (a one-way algorithm that deterministically generates fixed-length output data based upon a set of input data).

Hopper - An electromechanical assembly inside the machine that receives, holds and dispenses Coins. When the Hopper is full, Coins are diverted to the drop box.

Identifier: Any specific and verifiable fact concerning a Player or group of Players which is based upon objective criteria relating to the Player or group of Players and which may be utilized to affect some prescribed change to a Game or Gaming Equipment configuration.

Jackpot Limit: The value which all prizes either below, or at and below, are paid by crediting the Player's credit meter.

Kiosk: A device that is connected to a Slot Monitoring System and/or a Cashless Wagering System that is capable of accepting Wagering Instruments and providing cash redemption or automated jackpot redemption functionality, or other gaming related functions.

Metamorphic Game: A Game where free Games, feature Games or prizes (other than progressive jackpots) are triggered by the cumulative result of a series of Plays.

Example: a metamorphic Game may Award tokens during Game Play which accumulate from Game to Game and trigger a prize once a certain number are accumulated. When no tokens have been accumulated, it may not be possible to trigger the prize on the next

Game; however, once a certain number of tokens have been accumulated, it would be possible to trigger the prize.

Mystery Award: An Award that is not associated to any specific Game outcome, and is awarded randomly.

Optimal Play or Strategy: The choice from among more than one option presented to a Player by a Game which, if selected by the Player, offers the greatest theoretical payout percentage to the Player.

PCB, Printed Circuit Board - A hardware component of a computer or other electronic device, consisting of a flat piece of a non-conductive, rigid material to which Integrated Circuits (ICs) and other electronic components such as capacitors, resistors, etc. are mounted. Electrical connections are made between the ICs and components using a copper sheet that is laminated into the overall board assembly.

Play: All gaming events that may be initiated by the making of a specific Wager. A Play includes the making of a Wager, the activation of the Gaming Equipment Game by the patron and an indication to the patron of the outcome of the Wager including, if an Award is won, the payment of the Award.

Primary Game: Base Game that is initiated upon placing a Wager.

Printer Limit: The maximum amount that can be paid by printing a Ticket.

Progressive Game: A Game that contributes a portion of Wagers to a jackpot Award or other feature of the Game.

Promotional Account: an electronic ledger used in a Cashless Wagering System to record transactions involving a patron or patrons that are not otherwise recorded in a wagering account.

Randomness or **Chance:** Observed unpredictability and absence of a pattern in a set of events that have definite probabilities of occurrence.

Random Number Generator (RNG): Hardware and/or software used to generate numbers which exhibit Randomness.

Restricted Technical Procedure: Refers to a procedure, tool or other mechanism that requires special software, special access identifier, or other information or technology that is restricted to specific staff members employed at a gaming site (e.g. supervisors).

Scripting: a programmed sequence of events included in Gaming Equipment Game that is used to disclose a randomly pre-selected variable outcome to a patron in a particular manner but does not otherwise affect the outcome.

Skill: The knowledge, dexterity or any other ability or expertise of a natural person.

Skill-Based Gaming: Any Gaming Equipment Game where the expected payback of a committed Wager is dependent in whole or in part upon the Player's Skill. (A Game is considered Skill-based when the ratio of the expected return from optimal Play to the expected return from worst Play is at least 1.005).

Strategy: A choice, or set of choices, for how to proceed in a Game where the decision impacts the expected payback of a committed Wager.

SMS: The Slot Monitoring System used at the gaming site.

Ticket: A printed Wagering Instrument that has a fixed dollar wagering value that can only be used to acquire an equivalent value of cashable credits or cash.

Tilt: A programmed error state for Gaming Equipment.

Top Award: The highest displayed Award.

Volatility Index: The half-width of the 95% confidence interval of a Game's actual payout percentage for 10,000 handle pulls at the lowest available Wager. The confidence interval is centred on the Game theoretical payout percentage. The confidence interval for any number of Games Played determines the range of statistically expected actual payback percentages. Highly volatile Game payback may result in a large deviation of the actual Game payback from the theoretical payback, either above or below the theoretical value.

This index is calculated using the following formula:

$$VI = 0.0196 \times \sqrt{\sum_i \left[(prize_i)^2 \times prob_i \right] - GTP^2}$$

Voucher: Same as Ticket.

Wager: The total value of Wagering Instruments that are required to activate a particular Play.

Wager Category: A term used to describe different bet options/levels available to the Player in regards to the commitment of credits or money which could have an impact on Game outcome.

Wagering Instrument: Monetary Coins, tokens, bills, Tickets/Vouchers, Coupons, or electronic payment mechanisms made within the casino accepted by Gaming Equipment with intent to place Wagers by the patron or receive as a payout from the Gaming Equipment.

Wide Area Progressive (WAP) Game: A Game with a progressive jackpot that is shared among multiple gaming sites.

Pre-Approved Gaming Equipment and Gaming Systems

Per Standard and Requirement 4.5 from the Registrar's Standards for Gaming, all Gaming Equipment and Gaming Systems must be submitted to the Registrar for approval prior to being provided to any gaming site. The Registrar has determined that some types of Gaming Equipment and Gaming Systems may be pre-approved. These types of products will not need to be submitted to the Registrar for approval and will be considered as pre-approved Gaming Equipment and Gaming Systems, provided specified conditions are met. This is based on these types of Gaming Equipment and Gaming Systems being of low risk and reliance being placed on the Gaming Related Supplier's quality assurance and compliance with any applicable standards. Two categories of pre-approved Gaming Equipment and Gaming Systems have been determined; pre-approved Gaming Equipment and Gaming Systems not requiring notification, and pre-approved Gaming Equipment and Gaming Systems requiring notification.

1 Gaming Equipment and Gaming Systems Pre-Approved for Use in Ontario without Requiring Notification

The Gaming Equipment and Gaming Systems listed below are deemed to be approved by the Registrar for use in Ontario without notification to the AGCO being required, provided the following conditions are met:

i) The Gaming Equipment and Gaming Systems, and other Gaming Equipment and Gaming Systems where they are used, meet these minimum technical standards and do not suffer from any integrity, security, public interest, and accounting capability concerns;

ii) The Gaming Equipment and Gaming Systems do not introduce functionality that is not currently in use in Ontario (e.g. bill acceptor incorporating Near Field Communication (NFC) is not currently in use as of the date of these standards);

iii) For any modified equipment, all outstanding terms and conditions from the previous approval must be satisfied;

iv) Gaming Equipment and Gaming Systems that are discovered to suffer from integrity, security, public interest, or accounting capability concerns at any time after deployment, including but not limited to those that are pre-approved, must be promptly removed from Play or have other action taken to mitigate the integrity, security, public interest, or accounting capability concern; and

v) Gaming Equipment and Gaming Systems are only deployed with compatible Gaming Equipment and Gaming Systems, and configured to ensure integrity, security, public interest, and accounting capability is maintained.

Notes:

1. The Registrar may request an exact replica of this Gaming Equipment or Gaming System be provided to the Gaming Lab, as appropriate.

2. The Registrar may revoke this pre-approval for a particular Gaming Related Supplier when deemed necessary.

3. The Registrar may revoke this pre-approval for a particular Gaming Equipment or Gaming System when deemed necessary.

Pre-Approved Gaming Equipment and Gaming Systems not Requiring Notification:

- Bill acceptor hardware;
- Coin Acceptor hardware;
- Coin Acceptor software;
- Coin Hopper;
- Button panel hardware and software;
- Modifications to previously approved motherboards or previously approved other printed circuit boards (PCB) that have the same architecture as the previously approved motherboard / PCB and that does not contain any embedded Critical Software;
- Any other PCB that does not include logic that could impact gaming integrity;

- Printer hardware;
- Printer software;
- Display and/or sound controller firmware or software that only displays graphics and/or Plays sounds, but does not store graphics or sounds that are integral to gaming nor have logic that could impact gaming integrity;
- Display and/or sound controller hardware, including progressive displays;
- Monitors;
- Video and graphics cards;
- Off-the-shelf networking infrastructure such as routers, switches, and cables not modified for the purposes of being used for gaming;
- Off-the-shelf computers not modified for the purposes of being used for gaming;
- Protocol conversion software for use with industry standard protocols;
- Mechanical reel driver firmware;
- Mechanical reel hardware (excluding reel strips for specific Games, which must be included with the submissions of those Games);
- Power supplies;
- Top box or Topper hardware that does not contain logic that could impact gaming integrity;
- Storage devices excluding all data and files stored on the devices (e.g. CF card, CFast card, hard drive, solid state drive, etc); and
- Random access memory (RAM) modules.

2   Gaming Equipment and Gaming Systems Pre-Approved for Use in Ontario Requiring Notification

The Gaming Equipment and Gaming Systems listed below are deemed to be approved by the Registrar for use in Ontario provided the following conditions are met:

i)   Notification is provided to the Registrar by providing the fully and accurately completed AGCO form "*Casino Electronic Gaming Equipment and Gaming Systems Pre-Approval Notification Form*" and, for software or firmware items, an exact copy is provided to the Registrar at the same time or prior to it being provided to a gaming site in Ontario;

ii) The Gaming Equipment and Gaming Systems, and other Gaming Equipment and Gaming Systems where they are used, meet these minimum technical standards and do not suffer from any integrity, security, public interest, and accounting capability concerns;

iii) The Gaming Equipment and Gaming Systems do not introduce functionality that is not currently in use in Ontario (e.g. bill acceptor incorporating Near Field Communication (NFC) is not currently in use as of the date of these standards);

iv) For any modified Gaming Equipment and Gaming Systems, all outstanding terms and conditions from the previous approval must be satisfied;

v)   Gaming Equipment and Gaming Systems that are discovered to suffer from integrity, security, public interest, or accounting capability concerns at any time after deployment, including but not limited to those that are pre-approved, must be promptly removed from Play or have other action taken to mitigate the integrity, security, public interest, or accounting capability concern;

vi) Gaming Equipment and Gaming Systems are only deployed with compatible Gaming Equipment and Gaming Systems, and configured to ensure integrity, security, public interest, and accounting capability is maintained; and

vii) For hardware items, an exact replica is provided to the Registrar promptly upon request.

Notes:

1. The Registrar may request an exact replica of this Gaming Equipment or Gaming System be provided to the Gaming Lab, as appropriate.

2. The Registrar may revoke this pre-approval for a particular Gaming Related Supplier when deemed necessary.

3. The Registrar may revoke this pre-approval for a particular Gaming Equipment or Gaming System when deemed necessary.

Pre-Approved Gaming Equipment and Gaming Systems Requiring Notification:

- Bill acceptor software;
- Game theme software that is a full source code clone of Game software that is approved for use in Ontario (i.e. only graphical symbols and/or sounds change from another approved Game; all underlying Game framework and OS functionality, Game logic, math model, Game payouts, and Game rules are the same as another Game approved for use in Ontario);

> **Commented [RK(2):** This form will be released at the time this document becomes effective.

- Software used at the Gaming Equipment and/or Gaming Systems solely for the purposes of installation, licensing, and/or configuration of the Gaming Equipment and/or Gaming Systems (e.g. optioning software, RAM clear software, etc., but excluding remote installation, licensing, and/or configuration software such as server-assisted or server-based software);
- Modifications to a previously approved Gaming Equipment cabinet that could impact Game integrity;
- Electronic card shoe software and hardware that does not have the capability to shuffle cards nor have other Game logic included;
- Top box or Topper hardware that includes logic that could impact gaming integrity inside; and
- Local area progressive controller software that does not include a random number generator as part of the determination of Award.

Submission Requirements

Gaming Related Suppliers must provide necessary information, training, and tools pertaining to the Gaming Equipment and/or Gaming Systems that approval is being requested for to ensure the AGCO will be able to assess, test, and issue approval decisions without delay.

To achieve this, all requests for approval of Gaming Equipment and Gaming Systems must adhere to the submission requirements, "*AGCO Casino Gaming Lab Submission Requirements*", including being accompanied with fully and accurately completed AGCO submission form(s).

Gaming Related Suppliers are encouraged to provide their submissions electronically in a secure fashion, e.g. sFTP.

Standards

3   Critical Software and Data Integrity

Intent: The integrity of the Critical Software and the Critical Game Data on the Gaming Equipment is maintained at all times.

3.1   Critical Software Integrity

Intent: Maintain the integrity of the Critical Software on the Gaming Equipment at all times to ensure the Game operates as designed.

3.1.1   The Gaming Equipment must verify the integrity of Critical Software as part of the boot up process prior to the Critical Software being executed. Detection of any compromised Critical Software must cause a tilt and place the Gaming Equipment into an unplayable state.

Guidance:

a) *An example of an acceptable approach for ensuring the integrity of Critical Software is for each component to confirm the authenticity of the next component in the boot process prior to launching the next component, to ensure a chain of trust is maintained.*

b) *Gaming Related Suppliers are encouraged to use industry good practices for software verification.*

c) *When Critical Software is copied from one medium/device to another in whole or in part, the integrity of the copied Critical Software should be verified prior to the Critical Software being loaded into Random Access Memory (RAM) for execution.*

3.1.2   The integrity of Critical Software must be safeguarded from the point it is loaded into memory through the duration of its execution.

3.2   Critical Game Data Integrity

Intent: The Game accurately maintains the integrity of Critical Game Data to ensure the Game operates as expected and is auditable.

3.2.1   The Game must employ methods to detect corruption and unauthorized alteration to its Critical Game Data to prevent integrity issues from occurring.

Guidance:

The current industry standard of employing methods to detect corruption and unauthorized alteration of Critical Game Data during boot, prior to display of Game outcome, and upon clearing a tilt are acceptable.

3.2.2   Detection of corrupted or unauthorized alteration of Critical Game Data that cannot be recovered from must cause Game Play to be halted immediately and must cause the Gaming Equipment to enter into a tilt condition, and not resume Play until the condition has been addressed.

3.2.3   The Critical Game Data must be preserved when power to its storage media is lost.

3.2.4 Clearing of Critical Game Data must only be performed through a Restricted Technical Procedure.

3.3 On-Demand Critical Software Authentication

Intent: All Critical Software can be securely authenticated when deployed at Gaming Sites to ensure only approved Critical Software is installed.

3.3.1 All deployed Critical Software must be able to be securely authenticated when deployed at Gaming Sites to ensure only approved Critical Software is installed.

3.3.2 The Gaming Equipment and the authentication tool must implement an authentication mechanism that meets industry good practices and provide one of the following methods to authenticate all Critical Software:

   a) The Gaming Equipment must provide a mechanism to authenticate all Critical Software on demand via a communication port using Game Authentication Terminal (GAT); or

   b) Another mechanism as approved by the Registrar.

   Guidance:

   The industry is encouraged to standardize the method used for on-demand Critical Software authentication. GAT appears to be the method that is most commonly used currently.

3.4 Remote Critical Software Authentication

Intent: All deployed Critical Software is capable of being securely authenticated by the gaming management system when deployed at Gaming Sites to ensure only approved Critical Software is installed.

3.4.1 All Gaming Equipment must be capable of calculating and providing cryptographic Hashes or CRCs of all Critical Software upon request from a gaming management system (e.g. a request from a gaming management system using SAS protocol LP21).

3.4.2 In the event the gaming management system communicates to the Gaming Equipment that the Gaming Equipment is to be disabled (e.g. through the SAS protocol), the Gaming Equipment must disable itself without impacting the integrity of the Gaming Equipment nor any active Gaming Session.

4   Financial Transaction Logging

Intent: Appropriate information pertaining to Wagering Instruments is captured and maintained to enable review of recent transactions.

4.1.1   Gaming Equipment that accepts bank notes must retain and be capable of displaying the denomination of at least the last ten (10) bank notes accepted.

4.1.2   Gaming Equipment that accepts and/or pays out Tickets must retain and be capable of displaying the following information about the last thirty-five (35) Ticket transactions:

   a)   Date and time of issuance and/or acceptance;

   b)   Currency value; and

   c)   Sufficient information to uniquely identify the Ticket without displaying complete information that could be used to enable the Ticket to be counterfeited.

4.1.3   Gaming Equipment that accepts and/or pays out via electronic payments/transfers made within casino Gaming Site must retain and be capable of displaying the following information about the last thirty-five (35) electronic payments/transfers accepted and/or paid out by the Gaming Equipment:

   a)   Date and time of issuance and/or acceptance;

   b)   Currency value; and

   c)   Sufficient information to uniquely identify the source/target of the payment/transfer without displaying complete information that could be used to enable theft.

5   Accounting Meters

Intent: Appropriate information pertaining to Wagering Instrument transactions, revenue and payout is captured and maintained to enable reconciliation of Wagering Instruments, payout calculations, and audits to be performed.

5.1.1   The Gaming Equipment must capture sufficient accounting meters pertaining to Wagering Instruments accepted by the machine and pay outs made such that these amounts can be reconciled for every type of Wagering Instrument source/destination and for every mechanism by which Wagering Instruments are accepted/paid out.

Guidance:

Some examples of types of Wagering Instrument sources/destinations may include bank notes, Tickets, electronic funds transfers (EFT), wagering account transfers (WAT), non-cashable promotional, cashable promotional, etc.

Some examples of mechanisms by which pay outs are made may include machine pay, attendant pay, Coin drop, etc.

5.1.2   The Gaming Equipment must capture sufficient accounting meters to enable payout calculations to be accurately performed, including providing a mechanism to identify which Gaming Equipment, controller, etc. the payout is to be accounted from.

Guidance:

This standard may necessitate having separate accounting meters for the Gaming Equipment the payout is to be accounted from. Some examples of Gaming Equipment the payout may need to be accounted from may include the Game itself, external bonus/mystery/progressive controllers, etc.

5.1.3   For multi-game and/or multi-denomination Games, the Gaming Equipment must accumulate the accounting meters necessary, on a per paytable basis, to enable calculation of a weighted average payback percentage.

5.1.4   Each Game-within-a-Game shall have sufficient independent accounting meters for reconciling the Game.

5.1.5   For each feature where a Player may place an additional Wager with intermediate winnings from the current Wager (e.g. double-up or Gamble Feature), sufficient accounting meters must be captured by the Gaming Equipment to determine the value of Wagers placed in the feature and the value of winnings from the feature.

5.1.6   All accounting meters must be capable of being displayed on demand.

5.1.7   Accounting meters must be accurately communicated to the Slot Monitoring System used to collect accounting information.

6   Communication

Intent: The integrity of all gaming-related transactions is maintained during communication between all Gaming Equipment and Gaming Systems.

6.1   General Communication

6.1.1   Gaming Systems, infrastructure, data, activity logs and all other related components shall be protected from threats, vulnerabilities, attacks or breaches. Requirements – At a minimum:

1. All users shall be authenticated.

2. All components shall be hardened in accordance with industry and technology good practices prior to going live and prior to any changes.
3. The appropriateness and effectiveness of steps taken to harden technology components shall be regularly assessed.
4. Patches to correct any security risks shall be updated regularly.

6.1.2   Mechanisms must be in place to prevent the unauthorized alteration of all gaming-related transactions and Critical Game Data communicated between Gaming Equipment and/or Gaming Systems.

6.1.3   Interruptions in communication between Gaming Equipment, Associated Equipment and/or Gaming Systems must not impact the integrity or security of the Game nor gaming related transactions/information.

6.2   Mobile Gaming Equipment within Gaming Sites

6.2.1   All gaming applications provided by the Gaming Site must be approved, including but not limited to applications provided by the Gaming Site intended for installation on a patron's personal mobile device.

6.2.2   Mobile Gaming Equipment must be operated by an eligible person.

Guidance:

This can be achieved through Operator controls or other mechanisms within the mobile Gaming System.

6.2.3   In the event the mobile Gaming System verifies the mobile Gaming Equipment is operated by an eligible person, the mechanism must be capable of being initiated both on demand and on a regular basis.

6.2.4   Gaming applications must be designed and implemented such that compromising the software on the mobile Gaming Equipment does not compromise the Game.

6.2.5   The gaming application and its data must be protected from unauthorized alteration and corruption by other applications or any other means on the mobile Gaming Equipment.

6.2.6   Communication between mobile Gaming Equipment and the Gaming System, and operation of the mobile Gaming Equipment must not be permitted when the mobile Gaming Equipment goes beyond the boundary of the gaming site.

7   Wagering Instrument Peripherals

7.1   Bill and Coin Validators

Intent: Bill and Coin Validators accept only valid wagering Instruments, resist tampering/cheating, and send and receive all relevant communication to and from the host gaming Equipment to ensure proper crediting and to act appropriately to maintain the security and integrity of the Gaming Equipment.

7.1.1   Bill and Coin Validators must only accept valid Wagering Instruments and reject invalid Wagering Instruments when technically possible.

7.1.2   The Wagering Instrument must be rejected when technically possible when instructed by the host Gaming Equipment.

7.1.3   Bill and Coin Validators must resist any tampering of its operation.

> *Guidance:*
>
> *Tampering may be attempted in a number of ways, such as: fishing, stringing, altering communication, interrupting the acceptance process.*

7.1.4   Bill and Coin Validators must be automatically disabled when:

a) A condition prevents the proper operation of the bill or Coin Validator; or
b) The host Gaming Equipment is not in a state to accept Wagering Instruments.

> *Guidance:*
>
> *Examples of such conditions are: cashbox removed or full; hardware/software error; communication error; host Gaming Equipment is in tilt, disabled, slot tournament or administrative mode.*

7.1.5   Bill and Coin Validators must accurately communicate all relevant information and any abnormal conditions to the host Gaming Equipment.

7.1.6   Bill and Coin Validators must act in accordance with all commands received from the host Gaming Equipment.

7.2   Software Integrity of Bill Validators

Intent: Authentication can be performed on the bill validator software to ensure the use of approved software.

7.2.1   Bill validators must provide host Gaming Equipment with their software's name and version.

7.2.2   The software name and version provided to the host Gaming Equipment for display purposes by the bill validator must be the same as the item name and version approved.

7.2.3   Bill validators must perform a check at each power up to ensure the software has not been altered or corrupted. In the event of a failure, the bill validator shall automatically disable itself.

7.2.4   Bill validators must provide the host Gaming Equipment or an external authentication program with their software's cryptographic Hash or CRC value on demand to ensure the installed software is approved for use in Ontario.

Guidance:

> *It is recommended that the bill validator software is capable of internally calculating its software's cryptographic Hash or CRC value on demand based on a seed value provided by the host Gaming Equipment, and returns that calculated cryptographic or CRC value back to the host Gaming Equipment.*

7.3   Hopper
Intent: Hoppers dispense the correct number of Coins/tokens, resist tampering/cheating, and send and receive relevant communication to and from the host Gaming Equipment in order act appropriately to maintain the security and integrity of the Gaming Equipment.

7.3.1   Hoppers must accurately dispense Coins/tokens based on the cashed-out amount.

7.3.2   Hoppers must resist any tampering of their operation.

Guidance:

> *Tampering may be attempted in a number of ways, such as: shaving, spooning, monkeypaws, lightwands, altering communication, interrupting the dispensing process.*

7.3.3   Hoppers must automatically be disabled when:
a) A condition prevents the proper operation of the Hopper; or
b) Errors in Coin/token processing are detected.

7.3.4   Hoppers must accurately communicate all relevant information and any abnormal conditions to the host Gaming Equipment.

7.4   Printers
Intent: Printers accurately print the information received from the host Gaming Equipment and send and receive all relevant communication to and from the host Gaming Equipment necessary for its operation.

7.4.1   Complete and accurate information, as provided by the host Gaming Equipment and/or gaming management system, must be printed and clearly presented to Players/Operators.

7.4.2   Printers must accurately communicate all relevant information and any abnormal conditions with the host Gaming Equipment.

Guidance:

Relevant information and abnormal conditions to be communicated with the host Gaming Equipment may include, but is not limited to, conditions such as paper empty, paper jam, and print failure.

7.4.3   The printer must communicate the status of printed Vouchers to the host Gaming Equipment.

Guidance:

This information is necessary for the host Game to ensure that duplicate Vouchers are not printed (i.e. two Vouchers that contain identical and sufficient information to be redeemed), and that credits are only cleared following the successfully printing of a Voucher.

7.4.4   Printers must be automatically disabled when:

a) A condition prevents the proper operation of the printer;

b) Errors in Voucher processing are detected; or

c) When instructed by the host Gaming Equipment.

8 Electronic Gaming Equipment Cabinets

8.1 General Cabinet Construction

Intent: Critical Memory, Critical Software, and areas within the Gaming Equipment holding Wagering Instruments are protected from unauthorized access.

8.1.1 The cabinet must be secured to prevent unauthorized access to critical components that impact Game's integrity, with the following items separately secured inside the main gaming Equipment cabinet:

a) The CPU, any critical Game software and data storage equipment and Critical Memory and,

b) The cashbox.

8.1.2 Door open/close conditions must be detected.

8.1.3 All Gaming Equipment must display a non-removable unique identifier on the outside of the cabinet that is sufficient to allow for its monitoring and tracking.

8.2 Electromagnetic Immunity

Intent: Game integrity, security and audit capability remain intact under electromagnetic influence.

8.2.1 All assembled Gaming Equipment cabinets intended for use on the gaming floor must undergo an independent[1] review of the submitted cabinet to demonstrate electro-magnetic immunity sufficient to preserve the integrity of Game, Critical Game Software and Critical Game Data in accordance with good industry practices for IT equipment, i.e. CAN/CSA-CEI/IEC 61000-4-2, level 4 for Electrostatic Discharge (ESD), and CAN/CSA-CEI/IEC 61000-4-4, level 3 for Electrical Fast Transient/Bursts (EFT), or equivalent. The results of this review must be included with the submission of the new cabinet.

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[1] Performed by an individual or group not directly involved in the development of the Gaming Equipment.

9   Gaming Equipment Control Programs

9.1   Source Code Review

Intent: To gain additional confidence that critical functions of the Gaming Equipment do not suffer from regulatory issues that cannot be detected during regulatory assessment and testing.

9.1.1   New platforms[2] must undergo an independent[3] review of the submitted source code, and the results of this review must be included with the submission of the new platform. The review must include the following topics, as a minimum:

   a) Authentication procedures of all Critical Software: Self-authentication must be performed according to section 3 Critical Software and Data Integrity;

   b) Updating of Critical Game Data: Critical Game Data must only be updated by legitimate processes at appropriate times;

   c) Detection and recovery of corrupted memory: Memory must be verified by appropriate means in accordance with the requirements in section 3.2 Critical Game Data Integrity. Functions which handle recovery of Critical Memory must perform as intended;

   d) Flow of code from calling the RNG to the determination of the Game outcome: the RNG result must be the only result used to determine the Game outcome. No other routines may exist that modify the outcome, or that bypass the RNG outcome in exchange for something else;

   e) All other procedures that use the RNG: All calls to the RNG must be determined and accounted for, e.g. shuffling, pick with/without substitution, pick from bonus table. Each call must use the RNG output appropriately, without modification, so that the scaled output has its expected probability; and

   f) Redundant code and/or implementation of cheat code: There must not be any code that can affect the proper operation of the software (e.g. cheating, "Easter egg", etc.).

9.1.2   Modifications to Gaming Equipment Control Programs that impact on one or more of the topics in 9.1.1 may require that a source code review be performed on the modifications, depending on the complexity and number of changes. These will be identified by the AGCO on a case-by-case basis.

9.1.3   The Registrar may require additional reviews of source code, as deemed necessary depending on the complexity of changes made, the timing of the last review, etc.

9.2   Security Assessments of Gaming Applications

Intent: To gain confidence that publicly exposed gaming applications (e.g. accessible through public networks) have integrity and cannot be compromised

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[2] Platforms are defined as the core Gaming Equipment software that controls the functions listed in this section.
[3] Performed by an individual or group not directly involved in the development of the source code.

9.2.1   New Gaming Equipment or Gaming Systems that are publicly exposed (e.g. web applications accessible through public networks) must be assessed for security vulnerabilities, and the results of this assessment must be included with the submission of the gaming application. The assessment must include the following, as a minimum:

   a)   Source code analysis using Static Application Security Testing (SAST) tools to identify data entry points, perform data flow analysis, trace user controllable data from entry points, and search the code base for known gaps and software vulnerabilities; analysis of the results to remove false positives; and manual analysis of specific codebase areas to confirm results of the automated tools, and if other identified risks require a manual inspection of the code; and

   b)   Penetration testing through the use of Dynamic Application Security Testing (DAST) tools to identify weaknesses in the applications with both authenticated and unauthenticated scans; analysis of the results to remove false positives; and manual testing to confirm the results from the tools and to identify the impact of the weaknesses;

9.2.2   Modifications to publicly exposed gaming applications may require assessment per 9.2.1 to be performed on the modifications, depending on the complexity and number of changes. These will be assessed on a case-by-case basis.

9.3   Game Randomness

Intent: All elements of chance in a Game are unpredictable.

9.3.1   Games must draw upon a random source in the determination of which of the set of possible Game outcomes is provided to the Player.

   Guidance:

   Random sources can come in many forms, typically either mathematical algorithms implemented in software or physical phenomena.

9.3.2   The output from the random source must be used for Game outcome without alteration by the Game.

9.3.3   The random source output(s) used in the determination of the Game outcomes must be capable of producing all possible Game outcomes required by the Game design.

9.3.4   The outputs provided by the random source must pass applicable statistical tests of Randomness, and demonstrate:

   a)   Statistical independence;

   b)   Uniform distribution over their range, for intended Game(s); and

   c)   Unpredictability.

9.3.5   The random source and its outputs must not be capable of being influenced by any means (e.g. by the amount Wagered, style or method of Play, Play history, etc.).

Software-Based Random Number Generators (RNGs)

9.3.6   All software-based RNGs must be cryptographically strong such that the following requirements are met:

   a)   Given an initial state or a sequence of past values produced by the RNG, it must be computationally impossible to predict or estimate future values; and

   b)   The RNG shall periodically modify its state through use of an external source of entropy.

   Guidance:

   This standard is only intended for RNGs used in the exclusive determination of game outcome (E.g. not intended for RNGs to control a fan to blow a ball onto a roulette wheel).

Physical Random Number Generators (RNGs)

9.3.7   The Gaming Equipment must prevent physical RNGs used in electronic Games from being configured such that the RNG would violate standard 9.3.4 when deployed in that configuration.

9.3.8   Physical RNGs used in electronic Games must prevent decomposition of any component over time by being constructed of suitable materials and having appropriate measures in place to maintain Randomness.

   Guidance:

   Replacement parts may be required after a predetermined amount of time has passed in order for the physical RNG to comply with this requirement, and the device may require periodic maintenance to ensure the ongoing integrity of the physical RNG. Suppliers should communicate the expectations regarding when to replace parts and when to perform maintenance to the Operators.

9.3.9   The Player must not have the ability to physically interact with, come into physical contact with, or otherwise manipulate physical RNGs except where necessary for operation of the Game.

9.3.10 Gaming Equipment must be able to determine if there is statistical evidence that a physical RNG is not performing as expected for the Game in question, and appropriately communicate this to the Operator for prompt action.

9.4   Game Options and Limits

Intent: Mechanisms are in place, as applicable, to set Critical Game Options and limits in a manner that ensures and maintains Game integrity, enabling the Operator to control limits for internal controls.

9.4.1   The gaming Equipment must have the capability to set the following limits:

   a)   Credit Limit;

   b)   Jackpot Limit;

   c)   Printer / Attendant Pay Limit; and

   d)   Maximum limit a Player may Wager using a Gamble Feature, if applicable.

9.4.2   Total accumulation of all cashable credits from currency must not exceed three-thousand dollars ($3,000).

9.4.3   The Gaming Equipment must be designed so that setting and changing the limits specified in 9.4.1, 9.4.2, and Critical Game Options can only be performed by authorized personnel, through the use of restricted and controlled access and/or tools.

9.5   Diagnostic and Test Modes

Intent: Gaming Equipment provides the ability to view Game configuration and to verify proper operation of the Game without compromising Game integrity.

9.5.1   Gaming Equipment must provide the capability to perform the following activities at minimum, as applicable:

   a)   Identify all Critical Software and/or firmware installed, including the software's name, version and cryptographic Hash or CRC value; and

   b)   Perform Player input device calibration tests (e.g. touch screen, joystick, etc.) to enable the functional health of the device to be assessed against its intended design.

9.5.2   The Game must only allow entry into the diagnostic / test mode through a mechanism that is only accessible to the gaming sites' authorized personnel.

9.5.3   When diagnostic / test mode is entered:

   a)   The operation of the Game must not be affected;

   b)   The security, integrity, and accounting capability of the Gaming Equipment must not be compromised;

   c)   The Gaming Equipment must clearly indicate when it is in diagnostic/test mode; and

   d)   The Gaming Equipment must return to its original state upon exit from the diagnostic/test mode.

9.6   Error Conditions

Intent: The gaming Equipment detects, records, and reports errors, and takes appropriate action to maintain Game integrity.

9.6.1   The Gaming Equipment must be capable of immediately detecting, recording, and displaying error conditions that could affect the Game's integrity (e.g. door open, memory corruption, Critical Software authenticity check failure, etc.).

9.6.2   Immediately upon an error condition from 9.6.1 being detected, the Gaming Equipment and all peripherals must be Disabled and may only be enabled only after the error condition has been resolved.

9.6.3   The Gaming Equipment must be capable of immediately detecting, recording, and displaying appropriate error conditions that could affect the operational capabilities of the Game (e.g. bill acceptor jam, printer paper out, etc.).

9.6.4   Immediately upon an error condition from 9.6.3 being detected, the affected peripherals must be Disabled and may only be enabled after the error condition has been resolved.

9.6.5   Immediately upon an error condition from 9.6.1 or 9.6.3 being detected, the gaming Equipment must accurately communicate the error condition to the Slot Monitoring System connected to the Game, if technically possible.

9.7   Forensics

Intent: Critical Game Data is preserved and capable of being examined without alteration in order to enable forensic examination.

9.7.1   It must be possible to extract Critical Game Data through Restricted Technical Procedures without contaminating the data in the original storage media.

9.7.2   A mechanism must be available to interpret the Critical Game Data.

9.7.3   The Critical Game Data must be preserved when power to its storage media is lost.

> *Guidance:*
>
> *The intent of this standard is to provide protection in the event of power outages as well as time for transportation and examination of Critical Game Data storage devices.*

9.8   Gaming Equipment Remote Disable Capability

Intent: The Gaming Equipment can be disabled by the Operator without requiring the Operator to be physically present at the machine.

9.8.1   Gaming Equipment must be capable of being remotely disabled by a disable command issued from the Slot Monitoring System without affecting the integrity of the Game.

10 Games

10.1 Rules of Play and Information Display

Intent: All information required for Player's understanding of the rules of Play and paytable Awards are clearly and accurately disclosed to the Player in order to enable Players to make informed decisions prior to and during participation in Games.

Game Information Display

10.1.1 All paytable Awards and Game rules must be available to the Player prior to the Player committing to a bet.

10.1.2 All paytable Awards, rules of Play and other information communicated to the Player must be accurate, clear, and not misleading. At a minimum:

a) All displays of potential Game outcomes, including any advertised Awards, must be attainable on any given Wager unless clearly stated otherwise in the Game rules;

b) The units of the displayed paytable Awards (e.g. denominational units, currency) must be clear;

c) When symbols are displayed during video animation of reel spins, video reel strips must be used, with symbol sequences and appearances followed as closely as technically possible to the video reel strips; and

d) Game displays must not use language that suggests the probability of a particular outcome is more likely to happen than its actual probability. Examples include the use of terms, "Due", "Overdue", "Ready", and "Ready to Hit".

10.1.3 For Games that make automatic picks for a patron, complete and accurate rules regarding the feature must be available to the Player prior to committing to a bet.

10.1.4 Demonstration and attract displays must not be misleading and must not interfere with the Player's ability to make informed decisions during a Game.

10.1.5 Changes to Play conditions including rules of Play, Awards, and Award probabilities (e.g. changes in reel strips) that may occur within the Game must be disclosed to the Player prior to the Player committing a Wager.

10.1.6 Gaming Equipment must provide clear and sufficient information for Players to be able to track their status within the current Game in progress, as well as their status as it relates advancing to the next Game state (e.g. for Metamorphic Games).

10.1.7 All paytable Awards and Game rules that are available in multiple languages must all contain the same information and must be consistent across all languages.

Display of Other Information on the Gaming Equipment / Gaming System

10.1.8 Operational, non-gaming-related information (e.g. advertisements for a gaming site's restaurant or entertainment) displayed on Gaming Equipment displays must be clearly distinguishable from Game-related information and must not be misleading nor affect the Player's ability to Play, see or interact with the Game.

10.2 Credit Play, wagering, and Redemption

Intent: Clear and accurate information is provided to enable the patron to be fully aware of the value of the funds available for Play / redemption, Wagered, won, and redeemed.

10.2.1 All accepted Wagering Instruments must be accurately credited by the Game and available for wagering.

10.2.2 The Gaming Equipment must default to display the credit meter in dollars and cents for each new Player, unless the Player chooses to display in credit amounts.

10.2.3 The credit meter must be displayed to the Player at the beginning and end of Game Play and anytime a Player has an option to place a Wager.

10.2.4 The bet options relevant to the Game (e.g. lines to be played, amount to be wagered, denomination being played, etc.) must be displayed to the Player prior to the Player committing a Wager, and at any time a Game outcome is displayed as a result of Game Play until the Player interacts with the Game.

10.2.5 When applicable, the winning conditions as a result of Game Play must be displayed to the Player until the Player interacts with the Game.

10.2.6 Non-cashable credits must be Wagered prior to cashable credits being Wagered.

10.2.7 Cashable credits must be able to be redeemed at all times, except during any error condition which prevents a valid collection of the available credits, during Game Play, and when the Game is in a state where the displayed value of credits available is changing.

10.2.8 Upon cash out, the Game must clearly display the amount paid to the Player.

10.3 Player Interface

Intent: Games respond to Player interactions in a way that maintains Game integrity.

10.3.1 All mechanisms used to interact with the Game shall operate in accordance with the applicable rules of Play.

10.3.2 Gaming Equipment which utilizes Player interaction devices that impact Game Play (e.g. a joystick for a Skill-based Game) must ensure that any differences between such interaction devices do not provide an unfair advantage or disadvantage to any Player.

Guidance:
The use of a calibration algorithm is encouraged to ensure adjustments are made when necessary.

10.4 Determination of Game Outcome

Intent: The outcome of the Game is determined in a manner that ensures the integrity of the outcome for each Wager placed on the Game.

10.4.1 The probabilities of outcomes in Games which simulate live Games (e.g. virtual card Games, virtual roulette) shall be the same as in the associated live Game, unless the differences are clearly set out in the rules of Play.

10.4.2 Events of chance shall be independent and shall not correlate with any other events within the same Game, or events within previous Games, unless clearly explained in the rules of Play.

Guidance:

> *The intent of this standard is to ensure that the outcome of a Game of chance is not dependent or based upon any Playing history or other factors. This standard is not meant to prohibit Games which are based on cumulative Play, e.g. Metamorphic Games, Progressive Games.*

10.4.3 Wagers shall be committed before the selection of Game outcomes. Any Wager received after the selection of Game outcomes shall be voided and returned to the Player.

10.4.4 Games that generate a predetermined set of outcomes (e.g. a shuffled deck of cards) must keep the information secure to prevent prediction of the outcomes.

10.4.5 Game design shall not give the Player the perception that speed of Play or Skill affects the outcome of the Game when it does not, unless clearly explained in the rules of Play.

10.4.6 Games that offer a Player the opportunity to select their prize from multiple concealed outcomes may not substitute and reveal outcomes that were not available for the patron to select.

10.4.7 Scripting may only be permitted if:

   a) It does not include any outcome for which no prize is awarded;

   b) It does not display any unachievable result; and

   c) It is not otherwise deceptive in a manner that adversely affects the patron.

10.5 Skill-Based Games

Intent: Skill-based Games provide appropriate measures to enable Players to make informed decisions regarding participation, and Game outcomes are determined in a manner that ensures the integrity of each Wager placed on the Game.

10.5.1 Prior to committing a Wager, it must be clear to Players that the payback of the Game is affected by the Player's Skill.

10.5.2 Where Strategy or selection advice is provided to the Player, it must be fair and not misleading, and the Player must be able to override automatic selection and reject any or all Strategy advice provided.

10.5.3 Features that automatically adapt the payout of a Game are not permitted.[4]

10.5.4 Games where the Player is charged for specific actions through the course of the Game (e.g. in a high action shooting Game where the Player is charged for each shot) must operate in accordance with responsible gambling principles.

> *Guidance:*
>
> *An example of a potential mechanism to achieve this is to incorporate appropriate limits for the maximum total amount the Player is charged during the Game and/or Gaming Session.*

Competitive Skill-Based Games

10.5.5 Prior to committing a Wager, it must be clear to Players that the payback of the Game is affected by the relative Skill of other Players and/or computerized or house-sponsored opponent(s).

10.5.6 If a rake or fee is charged to Play the Game, this information must be available to the Player.

10.5.7 Skill-based Games may offer Players the opportunity to compete against a computerized or house-sponsored opponent provided that the computerized or house-sponsored opponent is prevented from gaining advantage by having access to information that is unavailable to the Player (i.e. the opponent's hole cards or upcoming events).

10.5.8 Skill-based Games may contain a feature allowing patrons to gain an advantage over other Players provided that all patrons are advised of the existence of that feature and have a mechanism to achieve such a feature. Such features may include, but are not limited to, patron purchased enhancements, randomly awarded enhancements or other advantages.

10.6 Progressive, Mystery, and Community Bonus Awards

Intent: All progressive, mystery, and Community Bonus Awards are accumulated and awarded in a manner that does not disadvantage any Player participating in the Game, and the integrity of such Awards is maintained.

General Requirements

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[4] This standard is under review.

10.6.1 There must be a mechanism to authenticate all Critical Software stored on controllers on-demand in accordance with section 3.3 On-Demand Critical Software Authentication.

10.6.2 Service interruptions that impact a Player's Gaming Session shall be dealt with in a manner that does not adversely affect the Player. At minimum, the following must occur in the event of a service interruption that impacts a Player's Gaming Session:

a) The Game being Played with the current Wager must be completed when technically possible provided the integrity of the Game is maintained;

b) The current Wager must be voided and the Wagered credits returned to the Player if the Game cannot be completed;

c) A service interruption event must be recorded at the appropriate locations (e.g. at minimum at the source in the event of a communication or power loss);

d) The Player must be notified of the service interruption;

e) The Player must be provided with an option to cash out their credits when technically possible; and

f) The Gaming Equipment must immediately disable all Games it has available for Play that are affected by the service interruption (e.g. communication loss) from further Play.

Shared Prizes

Linked Gaming Equipment that has a shared prize (e.g. a linked progressive) must have the same chance of winning that shared prize proportional to the amount wagered. For example, if a $1 wager placed on the link has a probability of one (1) in 1,000 to win the shared prize, a $2 wager placed on the link must have the same probability of winning the shared prize adjusted for the wager amount, i.e. (1) in 500.

10.7 Tournament Games

Intent: Tournament mode Games do not impact the integrity or accounting of regular Game Play.

10.7.1 Gaming Equipment in tournament mode must not accept or dispense Wagering Instruments.

10.7.2 Gaming Equipment in tournament mode must not increment any meters unless they are meters designed exclusively for use with tournament software, and must not communicate any tournament related accounting information to the Slot Accounting System unless the system is designed to process and store such information separately from cash Play information.

10.7.3 Tournament mode paytables are not subject to the standards in section 10.9 Game Payout.

10.8 Gamble Features

Intent: When Gamble Features are provided, mechanisms are in place to enable Players to make informed choices.

10.8.1 Initial entry to a Gamble Feature must be conditional on an immediately preceding occurrence of a winning event, and only credits awarded by that winning event are eligible for the feature.

10.8.2 When a Gamble Feature is provided, the Game must provide the following to the Player:

a) Information regarding how the Gamble Feature works; and

b) A choice of whether to enter the Gamble Feature.

10.8.3 The Gamble Feature must have a 100% theoretical payout percentage to the Player.

10.9 Game Payout

Intent: Gaming Equipment meets minimum theoretical return to player (RTP).

Theoretical Payout Percentage

10.9.1 The minimum theoretical payout percentage of a Game must be eighty-five (85.000) percent.

a) The theoretical payout percentage of Skill-based Games that are traditional card Games (e.g. video poker) or disclose a Strategy is to be calculated using the optimal or disclosed Strategy respectively.

b) The theoretical payout percentage of Skill-based Games that do not disclose a Strategy and are not traditional card Games must be mathematically demonstrable (i.e. calculated based on an expected distribution of Players' Skill levels). The mechanism and assumptions for how the theoretical payout percentage is calculated must be provided by the Gaming Related Supplier at the time of request for approval.

Guidance:

The expected distribution of Players' Skill levels is to be evaluated by the Supplier, based on considerations including but not limited to, historical performance of similar Games, difficulty of the Skill component, and availability of Strategy information.

10.9.2 The minimum theoretical payout percentage must be met for each Wager Category available on a Game, without including any Awards that may not be available at the start of each Wager available on the Game.[5]

10.9.3 The minimum theoretical percentage of a Game must be met when playing any bet configuration. This requirement extends to Games such as Keno, whereby the continuous Playing of a certain spot combination may result in a theoretical payout percentage lower than the minimum required percentage.

10.9.4 The theoretical payout percentage of a higher Wager amount must not be less than the theoretical payout percentage of a lower Wager amount for the same paytable and Wager Category.

Guidance:

A tolerance of up to 0.5% decrease in theoretical payout percentage will be permitted for a Game where the theoretical payout of a higher Wager is less than that of a lower Wager.

Volatility[6]

Guidance:

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[5] This standard is under review.
[6] The volatility standards are under review.

The volatility standards are only applicable to pure chance Games.

In the following Volatility Index calculations, the contribution of shared prizes (e.g. Wide Area Progressive jackpots) is excluded, due to the large number of machines that share these prizes. These Games will be considered on a case-by-case basis with the same intent in mind.

10.9.5 The Volatility Index calculated for 10,000 handle pulls at minimum bet level must not exceed 100%.

10.9.6 The Volatility Index (VI) and the Game theoretical payback (GTP) must satisfy the following relationship:

$$VI \leq (GTP - 85.000) \times 31.623$$

For example: Using the expected average Volatility Index of 18.500%, this formula works out to state the following:

$$18.500\% \leq (GTP-85.000\%) \times 31.623$$
$$85.585\% \leq GTP$$

Monitoring of Actual Payout Percentage for Skill-based Games

10.9.7 Skill-based Games that do not disclose a Strategy and are not traditional card Games must be monitored to ensure they are paying a minimum of eighty-five (85) percent (e.g. the Game payback is within a statistically reasonable range of the minimum payout of eighty-five (85) percent).

10.9.8 In the case there is evidence that the Skill-based Game is paying below eighty-five (85) percent (e.g. the Game payback is below a statistically reasonable range from eighty-five (85) percent), one of the following must occur:

    a) The Game must be removed from Play; or

    b) The condition must be addressed through a manual method (i.e. not an automated adaptive feature pursuant to standard 10.5.3) that is disclosed at the time of product submission and approved by the Registrar.

Guidance:

It is recommended that Games include a mechanism to self-monitor their actual return to Player to ensure this standard is met. Alternatively, Operators can monitor the payout of the Games to ensure this standard is met.

10.10 Award Odds

Intent: Available Awards meet minimum requirements pertaining to the likelihood of those Awards being hit.

10.10.1 The Top Award displayed on the Gaming Equipment must not have odds exceeding 17 million : 1.

10.10.2 All Awards and Accumulated Awards aside from the Top Award displayed on the Gaming Equipment must not have odds exceeding 34 million : 1.

10.10.3 Any single shared Wide Area Progressive Award may have odds of up to 50 million : 1. These Games will be evaluated on a case-by-case basis taking into consideration the prize amount, the intended use, number of Games, etc.

Questions for Gaming Related Suppliers to respond to in order for the AGCO to consider an increase in the above odds limits:

a. What are your proposed odds limits?

b. In the event the proposed odds are higher than those listed in section 10.10 of this document, could you please provide an explanation for what would necessitate a Game being designed at the odds limits proposed?

c. For a typical Game with an Award at these proposed odds limits, how long would it take for a single Gaming Equipment deployed at a casino to hit that Award for the first time on average? Please state your assumptions as part of your response.

10.11 Reel Strips

Intent: Each reel spin is displayed to the Player in a manner that is not misleading.

10.11.1 Where Games involve reels:

a) For single line Games, jackpot symbols shall not appear in their entirety more than 12 times on average, adjacent to the pay-line, for every time they appear on the pay-line; and

b) For multi-line Games, jackpot symbols shall not appear in their entirety more than 12 times, on average, not on any pay-line, for every time they appear on any pay-line.

10.11.2 All symbols displayed in the Game's physical reels that are not associated with an advertised or otherwise displayed Award in the rules of Play, including blanks, must:

c) Each occupy a space with a minimum length of (L/N)*0.4 and maximum length of (L/N)*1.6, where L is the length of the physical reel strip and N is the number of physical stops on the reel strip; and

d) Each occupy a space on the reel in a manner that makes it clear and unambiguous which symbol belongs to each reel stop.

10.11.3 If virtual reels that map to displayed reels are used, each of the reel stops of the virtual reel strip shall be mapped to a displayed symbol and shall have the same probability of occurring (i.e. if the virtual reel consists of N positions, the probability of occurrence of each position must be 1/N). There cannot be any displayed symbol with a virtual reel weight of zero; all displayed reel symbols must have a non-zero probability to occur.

10.12 Game History

Intent: Accurate and sufficient information is recorded and retrievable to enable review of recent Games Played for audit purposes.

10.12.1 All Gaming Equipment must have the capacity to display a complete Play history for at minimum the last ten (10) Games Played. The date and time of the Game Played must be available, as must sufficient information to enable full and accurate reconstruction of Game Play. This includes the Game outcome (or a representative equivalent), intermediate Play steps including but not limited to bonus, secondary and Game-within-a-Game activity, denomination, credits available, bet amounts, credits paid, and credits cashed out. Gaming Equipment offering Games with a variable number of intermediate Play steps per Game or where a variable number of "free Games" are awarded may satisfy this requirement by providing the capability to display the last fifty (50) Play steps or "free Games".

10.12.2 The Gaming Equipment must clearly indicate when it is in Game history mode.

11   Gaming Systems

Intent: The Gaming System securely and accurately records, captures, communicates, tracks and stores all connected gaming Equipment's accounting meters, security events, cashless transactions, Player account transactions, and all other critical information.

11.1.1   Sensitive data, including Player information and data relevant to determining Game outcomes, shall be secured and protected from unauthorized access or use at all times.

11.1.2   Communication of sensitive Game data shall be protected for integrity.

Critical Software Integrity

11.1.3   The Gaming System must verify the integrity of its Critical Software as part of the boot up process prior to the Critical Software being executed and verify the integrity of its Critical Software automatically thereafter, to ensure compromised Critical Software is not executed by the Gaming System. In the case of gaming management systems, the system interface devices deployed on the gaming floor are considered part of the Critical Software of the Gaming System.

Guidance:

Gaming related Suppliers are encouraged to use industry good practices for software verification.

In lieu of this standard being met by the Gaming System itself, Operators can put measures in place to ensure the integrity of Gaming System software is verified on an ongoing basis.

11.1.4   The integrity of Critical Software must be safeguarded during its execution.

On-Demand Authentication

11.1.5   All deployed software critical to the integrity of the Gaming System must be able to be securely authenticated on-demand using a mechanism that meets industry good practises when deployed at gaming sites to ensure only approved Gaming System software is installed.

Access Control

11.1.6 The Gaming System shall limit access to only authorized personnel, for various functions, based on segregation of duties.

11.1.7 The Gaming System must automatically lock out accounts should identification and authorization requirements not be met after a defined number of attempts.

Records and Reporting

11.1.8 The Gaming System must accurately record all activities related to additions, changes, or deletions made to user accounts and critical Gaming Systems' features, functions, settings, and parameters.

11.1.9 All records, including, but not limited to, those in standards 11.1.8, 11.2, 11.3, 11.4, and 11.5, must include the origin (e.g. the Gaming Equipment, the Gaming System user account, etc.) of the activity/transaction/event and date and time stamping.

11.1.10 Reporting capability must be available to satisfy audit and reconciliation of the Gaming System transactions.

11.2 Slot Accounting Systems

Intent: The Gaming System securely and accurately records, captures, communicates, tracks and stores all connected Gaming Equipment's accounting meters to enable accurate reconciliation to be performed.

11.2.1 The Gaming System must accurately receive, accurately record, accurately maintain, and securely store each connected Gaming Equipment's accounting meters in accordance with section 5 Accounting Meters.

> *Guidance:*
>
> *An acceptable approach to meet this standard is by accurately receiving, accurately maintaining, and securely storing each connected Gaming Equipment's accounting meters in accordance with industry accepted protocols (e.g. SAS, G2S).*

11.3 Slot Monitoring Systems

Intent: The Gaming System securely and accurately records, captures, communicates, tracks and stores all connected Gaming Equipment's security events for the purposes of maintaining the integrity of all Gaming Equipment on the gaming floor.

11.3.1 The Gaming System must be capable of receiving, recording, and alerting the Operator in real-time of all events and error conditions that may impact Game integrity, security or otherwise warrant Operator intervention, such as slot door opened/closed status, jackpot events, etc.

11.3.2 The Gaming System must be capable of detecting, recording, and alerting the Operator in real-time of any communication loss and door access events at all times including during power loss to Gaming Equipment.

11.3.3 The Gaming System must be capable of authenticating the Critical Software of all gaming Equipment it interfaces with, recording the results of authentications performed, and disabling the Gaming Equipment or initiating another action to enable the Operator to ensure only approved Critical Software is being used by the Gaming Equipment.

11.3.4 The Gaming System must be capable of remotely disabling Gaming Equipment it is monitoring on demand.

11.3.5 For multi-site Gaming Systems, critical configurations of the Gaming System must be applied to all of the gaming sites and it must not be possible for the critical configurations to be altered or overridden for any of the sites.

11.4 Cashless Wagering Systems

Intent: The Gaming System securely and accurately processes, records, captures, communicates, tracks and stores all connected Gaming Equipment's cashless transactions.

11.4.1 The Gaming System must accurately issue, record, track, validate, and redeem only valid cashless Wagering Instruments.

11.4.2 The Gaming System must accurately distinguish between cashable and non-cashable credits, if applicable, and between patron deposit funds and promotional funds.

11.4.3 The Gaming System must have a settable limit for the maximum value of a Ticket that can be accepted by or produced by any connected Gaming Equipment.

11.4.4 Sufficient information to identify the following must be included on all wagering Vouchers and Coupons produced by Gaming Equipment connected to the Gaming System:

  a) Gaming site;

  b) Gaming Equipment identifier or printer station identifier, as applicable;

  c) Date and time of issuance; and

  d) Unique Identifiers (e.g. bar code, validation and sequence numbers, etc.).

11.4.5 Information which could compromise Ticket integrity when displayed on electronic devices including but not limited to Gaming Equipment must not be available to unauthorized individuals (e.g. information that could be used to counterfeit unredeemed Tickets).

> *Guidance:*
>
> > *An acceptable approach to meet this standard is by appropriately masking the validation numbers of unredeemed Tickets when viewable through any display, aside from on the Ticket itself, to prevent generation of counterfeit Tickets.*

11.4.6 If communications between Gaming Equipment or Gaming Equipment / Gaming System interface component and the Cashless Wagering System are lost, the Gaming Equipment or the Gaming Equipment / Gaming System interface component may issue offline Vouchers provided that:

  a) The Voucher is capable of being authenticated by the Gaming System as a unique and valid Voucher;

  b) It can be verified that the redeeming Gaming System was also the issuing Gaming System; and

  c) The Voucher amount can be validated.

11.5 Advanced Funds Transfer (AFT) / Electronic Funds Transfer (EFT) Systems

Intent: The Gaming System securely and accurately records, captures, communicates, tracks and stores all AFT / EFT funds transfers to ensure Player account balances are accurately maintained.

11.5.1 The Gaming System must accurately record and perform AFT/EFT transactions associated with Player accounts, and accurately record and maintain each Player's account balance.

11.5.2 The Gaming System must assign to each patron initiated AFT/EFT transaction a unique Identifier that includes an Identifier of the Gaming Equipment where the transaction was initiated.

12 Kiosks

Intent: Access to Kiosk is physically secure, and the Kiosk performs all transactions accurately, securely, and maintains the integrity and auditability of all its transactions.

12.1.1 Sensitive data, including Player information and data relevant to determining Game outcomes, shall be secured and protected from unauthorized access or use at all times.

12.1.2 Communication of sensitive Game data shall be protected for integrity.

12.2 General Construction and Error Conditions

Intent: Critical Memory, Critical Software, and areas holding Wagering Instruments are protected from unauthorized access**.**

12.2.1 Door open/close conditions must be detected.

12.2.2 The Kiosk must be capable of immediately detecting, recording, and displaying error conditions that could affect the integrity of the Kiosk (e.g. door open, memory corruption, Critical Software authenticity check failure, etc.). Immediately upon any such error condition being detected, the affected peripherals must be disabled and may only be enabled after the error condition has been resolved.

12.2.3 The Kiosk must be capable of immediately detecting, recording, and displaying appropriate error conditions that could affect the operational capabilities of the Kiosk (e.g. bill acceptor paper jam, printer paper out, etc.). Immediately upon any such error condition being detected, the affected peripherals must be disabled and may only be enabled after the error condition has been resolved.

12.2.4 Immediately upon an error condition from 12.2.2 or 12.2.3 being detected, the Kiosk must accurately communicate the error condition to the Slot Monitoring System connected to the Kiosk, if technically possible.

12.3 Critical Programs

Intent: The integrity and security of the Critical Software, data, and functions of the Kiosk is maintained**.**

12.3.1 The Kiosk must validate and process all transactions accurately, rejecting any attempted invalid transactions.

12.3.2 The Kiosk must include safeguards to protect against transaction failure and data loss due to power loss. The Kiosk must not send communication to the Gaming System for the purposes of altering the state of any transactions in the Gaming System until successful completion of the transaction by the Kiosk.

12.3.3 The Kiosk must take appropriate action (e.g. recover, reject Voucher, display error messages, etc.) for all transactions in the event of power loss.

12.3.4 The integrity of Critical Software must be safeguarded during its execution.

12.3.5 All deployed software critical to the integrity of the Kiosk must be able to be securely authenticated on-demand using a mechanism that meets industry good practises when deployed at gaming sites to ensure only approved Kiosk software is installed.

12.3.6 The Kiosk must have a settable limit for the maximum value of a Ticket it can accept and print.

12.4 Audit Records and Reporting

Intent: Information is readily available for accounting, reconciliation, and audit purposes.

12.4.1 Each connected Kiosk must be uniquely identified by the gaming management systems it is connected to.

12.4.2 The Kiosk must be capable of accurately recording all transactions, patron and Operator activities performed at the Kiosk.

12.4.3 The Kiosk must comply with the standards in section 4 Financial Transaction Logging.

12.4.4 The Kiosk system must have the capability to provide necessary information used for auditing the Kiosk system and its transactions.

12.4.5 The Kiosk must have the capacity to display a complete transaction history for each the last thirty-five (35) transactions at minimum prior to the most recent transaction for each of the following transaction types:

      a) Voucher Redemption;

      b) Jackpot Redemption;

      c) Bill Breaking; and

      d) Wagering Account Transactions.

For each transaction, the history must include disposition of transaction, date and time of occurrence of transaction, and the amount of transaction at minimum.