



Licensing and Regulatory Group
**Gaming Licensing and Development
Department**
Slot Machine Department

Monitoring and Enforcement Group
**Compliance Monitoring and Enforcement
Department – Integrated Resorts**

**PAGCOR TECHNICAL
STANDARDS FOR
ELECTRONIC GAMING
MACHINES**

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EXECUTIVE SUMMARY

The purpose of this document is to outline the minimum technical requirements set forth by Philippine Amusement and Gaming Corporation (PAGCOR) for the operation of Electronic Gaming Machine (EGM) in gambling establishments under its jurisdiction. It is important to note that these requirements do not encompass technical specifications for Server-based Gaming Machines.

PAGCOR assumes no liability for errors or inaccuracies contained within these Standards. Additionally, PAGCOR must not be held responsible for any loss or damage that may be incurred as a result of compliance with these requirements, regardless if such loss was caused by negligence on their part or not. EGM manufacturers and approved testing laboratories may request clarification on any aspect of the standard, however, any clarification/s provided by PAGCOR must be in writing and subject to the same limitation of liability.

It is imperative that all changes made to EGMs, particularly those affecting the operation, fairness, security, reliability, or auditability of the game, must comply with the requirements stated in these Standards. PAGCOR will consider submissions made by authorized manufacturers regarding the nature of changes, but they reserve the right to make a binding determination as to whether the change constitutes a material alteration.

In case of discrepancies between these Standards and any laws, regulations, dispatches, executive orders, or binding instructions concerning EGMs, the provisions of the latter must take precedence.

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1. Introduction

1.1. Overview

PAGCOR is responsible for regulating all licensed casino gaming operations within the Philippines. All licensed casinos must ensure that the EGMs on their premises comply with The Technical Standards for EGMs, Version 1.1 ('Standards') established by PAGCOR.

The objective of these Standards is to guarantee that wagering on EGMs in PAGCOR-regulated casinos is conducted in a fair, secure, reliable, and auditable manner.

These Standards also serve to establish the requirements for the design and operation of EGMs and provide guidance to testing laboratories and certification entities regarding EGM technical compliance.

It is important to note that these Standards are subject to ongoing review and, if deemed necessary or appropriate, PAGCOR reserves the right to unilaterally amend or re-issue this document without prior notice.

1.2. Objectives

The objectives of these Standards are as follows:

- 1.2.1. To eliminate subjective criteria in analyzing and certifying EGM operations.
- 1.2.2. To only test those criteria that impact the credibility and integrity of an EGM from both the Revenue Collection and Player's perspective.
- 1.2.3. To create a standard that will ensure that EGMs in the casinos can be operated in a manner that is fair, secure, reliable, and auditable.
- 1.2.4. To distinguish between local public policy and laboratory criteria.
- 1.2.5. To recognize that non-gaming testing (such as Electrical Testing) should not be incorporated into these Standards but left to appropriate test laboratories that specialize in that type of testing. Except where specifically identified in these Standards, testing is not directed at health or safety matters. These matters are the responsibility of the manufacturer, purchaser, and operator of the equipment.
- 1.2.6. To construct a standard that can be easily changed or modified to allow for new technology.

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1.2.7. To construct a standard that does not specify any particular methodology or algorithm. The intent is to allow a wide range of methodology to be used to conform to the standards, while at the same time, to encourage new methodology to be developed.

1.3. Acknowledgement

These Standards were developed by reviewing and using portions of the documents from the groups listed below. We acknowledge these organizations and regulators who have assembled these documents and thank them:

- 1.3.1. Gaming Laboratories International (GLI), LLC
- 1.3.2. Bellamy, Miller and Monypenny (BMM) Testlabs
- 1.3.3. Gaming Inspection and Coordination Bureau of Macao SAR
- 1.3.4. Gaming Regulatory Authority of Singapore
- 1.3.5. Gaming Machine National Standard of Australia/New Zealand

2. Hardware Requirements

This chapter delineates the physical attributes, components, and internal functions of an EGM, with the intent of providing PAGCOR-specific standards for gaming manufacturers. The primary objective of these Standards is to ensure that all compliant EGM platforms can be operated in a manner that is fair, secure, reliable, and auditable.

2.1. Cabinet Identification

It is a prerequisite that an EGM is equipped with an identification badge that is permanently affixed to the exterior of its cabinet by the manufacturer. The badge ought to comprise the following particulars:

- 2.1.1. The name of the manufacturer;
- 2.1.2. A unique serial number;
- 2.1.3. The gaming machine model number/name; and
- 2.1.4. The date of manufacture.

The identification plates must exhibit a reasonable degree of resistance to scratching, in order to prevent any potential defacement or fraudulent alteration.

2.2. Cabinet Security

2.2.1. Locked Area

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2.2.1.1. The entirety of an EGM which does not form part of the player's input interface (e.g., buttons) must be stored within one or more locked areas of the EGM.

2.2.1.2. All locked areas that provide access to the secured parts / components of the EGM must be equipped with access detection devices / switches.

2.2.1.3. It must not be possible to disable a door open sensor without first opening the door using the designed manner (e.g., key) or leaving physical evidence of forced entry.

2.2.1.4. If the door open sensor indicates that the door is still open, it must not be possible to reset the door open state via software means.

2.2.2. Program or Logic Area

The program or logic area is a locked compartment area (with its own independently locked door), within the cabinet, which houses electronic components that have the potential to significantly influence the operation of the EGM. There may be more than one (1) such logic area in an EGM.

There must be a provision for a physical seal on the logic area door, which must be broken when accessing or removing the logic area.

2.3. Electrical - Cabinet Wiring

2.3.1. The EGM must be designed in a manner that ensures that power and data cables into and out of the EGM are not accessible to the general public.

2.3.2. Security-related wires and cables that are routed into a logic area must not be removable without first unlocking the logic area door.

2.4. Tower Light

An EGM may be equipped with a tower light that is located on top of its cabinet, which is designed to automatically illuminate in the event of any of the following circumstances:

2.4.1. When a player has won an amount or is redeeming credits that exceed the EGM's payout limit;

2.4.2. When an error occurs, including the detection of an open door; or

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2.4.3. When a “call attendant” situation has been triggered by the player.

In the event where it is impractical to locate a light on top of the cabinet (e.g., “bar-top” style machine), alternative measures must be implemented that serve the same purpose as a light on top of the cabinet. This may include the use of an audible alarm or a machine communication system (paging) that can instantly alert a floor attendant of any real-time machine events.

2.5. Interference

In the interest of conducting accurate and thorough electrical testing of EGMs, it is required that such testing be performed while the devices are fully operational and installed as they would be in the venue. These electrical tests may be conducted by appropriate test laboratories, such as UL (Underwriters Laboratories) or CE (Conformité Européenne).

2.5.1. Electromagnetic Radiated Emissions

The EGM must comply with the CISPR 32 Class A or equivalent specifications.

2.5.2. Electrostatic Discharge (ESD)

2.5.2.1. EGM must exhibit total immunity to human body model electrostatic discharges (no disruptions in game performance) on all areas exposed to player contact.

2.5.2.2. EGMs may exhibit temporary disruption when subjected to a more significant electrostatic discharge, but they must recover and complete any interrupted play without loss or corruption of any control or data information associated with the EGM. The tests must be conducted according to IEC 61000-4-2 with a severity level of $\pm 20\text{kV}$ air discharge.

2.5.3. Radio Frequency Interference (RFI)

EGMs must not be affected in any way by the application of RFI at a frequency range from 27 MHz to 1000 MHz with a field strength of 3 volts per meter.

2.5.4. Electrical Safety

The EGM must comply with the IEC 60335-2-82 or equivalent specifications.

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2.6. Environmental

In order to ensure optimal performance and reliability, it is essential that an EGM is designed to withstand a range of potentially extreme environmental conditions. As such, it is the responsibility of the manufacturer to provide explicit specifications that outline the specific environmental conditions under which the EGM can be expected to operate within its full specifications.

- 2.6.1. Performance of EGMs must not be degraded while operating within manufacturer's specified range of environmental parameters.
- 2.6.2. In the event that the operating conditions exceed the environmental parameters specified by the manufacturer, and the EGM is incapable of continued operation, it must perform an orderly shutdown without loss of current status, accounting, and security event data.

2.7. Power Supply and Surges

- 2.7.1. The EGM must operate from electric mains power of nominally 100-240V 50-60Hz.
- 2.7.2. The EGM must comply with the requirements of IEC 61000-3-2 Class D, or Class A if specified power is greater than 600W, for harmonic currents when operated at nominal mains voltage.
- 2.7.3. The EGM must be unaffected by Electrical Fast Transients as defined by IEC 61000-4-4. Criteria must be 2.5kV polarities, each conductor, 5ns rise, 50ns duration, 5kHz, one minute.
- 2.7.4. The EGM must be unaffected by continuous operation when supplied with the mains electric power that deviates from the nominal voltage by $\pm 10\%$.
- 2.7.5. The EGM must either be unaffected by or must recover from:
 - 2.7.5.1. A surge or dip of $\pm 20\%$ of the supply voltage that lasts for 600 seconds;
 - 2.7.5.2. Voltage dips and interruptions as defined in IEC 61000-4-11, 30% dip 500ms;
 - 2.7.5.3. Electrical surge as defined in IEC 61000-4-5 2kV line to line and 2kV line to earth;
 - 2.7.5.4. Repeated switching on and off the AC power supply; and
 - 2.7.5.5. Jiggling the AC cord at the wall outlet.

The EGM must not be adversely affected, other than resets, by surges or dips of $\pm 20\%$ of the supply voltage.

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Note: If no damage to the equipment or loss or corruption of data occurs during operation, it is permissible for the equipment to reset. The game must resume from its previous state after reset. It is also acceptable for the game to return to a completed state, as long as the game history, all credits, and accounting meters reflect the completed game.

2.8. External Doors and Compartments

- 2.8.1. Doors must be manufactured of materials that are suitable for allowing only legitimate access to the inside of the cabinet (i.e., locks, doors, and their associated hinges must be capable of withstanding determined and unauthorized efforts to gain access to the inside of the EGM and must leave evidence of tampering if such an entry is made);
- 2.8.2. The seal between the cabinet and the door of a locked area must be designed to resist the entry of objects;
- 2.8.3. All external doors must be locked and monitored by door access sensors, which when opened must cease game play (with the exception of a drop box door), disable all acceptance, and enter an error condition, which at a minimum must illuminate the tower light and send the error condition to the on-line system, when applicable;
- 2.8.4. It must not be possible to insert a device into the EGM that will disable a door open sensor when the EGM's door is shut without leaving evidence of tampering; and
- 2.8.5. The sensor system must register an external door as being open when the door is moved from its fully closed and locked position, provided power is supplied to the device.

2.9. Electronic Components

Electronic components that are required to be housed in one (1) or more logic areas are:

- 2.9.1. A CPU and any storage device containing software that has the potential to impact the integrity of gaming including, but is not limited to, game accounting, system communication, and any other software that significantly affects the operation and calculation of game play, game display, game result determination, game accounting, revenue, or security; and

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2.9.2. The Non-Volatile (NV) memory back-up device, if applicable, must be kept within a locked logic area.

2.10. Liquid Spills

Liquid spills applied to the outside of an EGM must not affect the normal operation of the EGM or affect the integrity of the material or information stored inside the cabinet (or affect the safety of the patrons operating the EGM). It is recognized that as a result of a liquid spill some peripheral components such as touch screen, button, button panels, and bill acceptor may lose normal operation until the surface dries or the component replacement.

2.11. Printed Circuit Boards

2.11.1. Each Printed Circuit Board (PCB) in an EGM must be identifiable by a name (or number) and revision level that is displayed on the board.

2.11.2. The circuit board assemblies, used in EGMs, must conform functionally to the documentation of the PCBs that was submitted to the recognized testing laboratory.

2.11.3. All patch wires and track cuts must be documented in the relevant service manual and submitted to the recognized testing laboratory.

2.11.4. All switches and jumpers must be fully documented for evaluation by an approved testing laboratory.

2.11.5. Hardware switches and/or jumpers which may alter the jurisdictional specific configuration settings, pay tables, game denomination, or payout percentages must meet applicable sections of these Standards and must be housed within a logic compartment of the EGM. This includes top award changes (including progressives), selectable settings, or any other option that would affect the payout percentage.

2.12. Critical Memory

2.12.1. Maintenance of Critical Memory

2.12.1.1. All critical data must be stored using a fault tolerant methodology that enables errors to be identified and corrected in most circumstances;

2.12.1.2. Critical memory data storage must be capable of reliably preserving its memory contents for at least thirty (30) days with the mains power switched off. A rechargeable or non-

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rechargeable backup power source may be used to meet this requirement; and

- 2.12.1.3. A proven and reliable mechanism must be implemented to check for any corruption of critical memory locations used for crucial EGM functions.

2.12.2. Contents of Critical Memory

Critical memory must maintain all data that is considered vital to the continued operation of an EGM. This includes, but is not limited to:

- 2.12.2.1. All soft meters required in ***Item 3.4 Soft Meters*** including last Bill In data, last Ticket-In and Ticket-Out data;
- 2.12.2.2. Information pertaining to the play and final outcome of the most recent game and the last 9 base games prior to the most recent game;
- 2.12.2.3. The last drawn random number generator outcome should be stored in critical memory. It may not be relevant for Cryptographic RNGs;
- 2.12.2.4. Credits available for play; and
- 2.12.2.5. The last software state (the last normal state, last status, or tilt status) of the EGM before interruption.

2.12.3. Detection of Corrupted Memory

- 2.12.3.1. Comprehensive checks of the relevant contents of the EGM's critical memory must be undertaken at least:
 - 2.12.3.1.1. After restart of the device; and
 - 2.12.3.1.2. When the main or logic door is closed;
- 2.12.3.2. After an EGM restart (e.g., power off and on), the device must complete its validity check of the entire critical memory storage area and then perform a comparison check of all good logical copies of critical memory.
- 2.12.3.3. Any failure of a validity check is to be considered either:
 - 2.12.3.3.1. A recoverable memory corruption if at least one copy of critical memory is established to be good, or
 - 2.12.3.3.2. An unrecoverable memory corruption.

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2.12.4. Program Storage Device (PSD)

- 2.12.4.1. All removable and internal PSDs, including but not limited to ROM, EPROM, FLASH ROM, USB drive, Hard Disk, CD-ROM, SSD, Compact Flash Cards, CFast Cards, and DVD must be clearly marked with sufficient information to identify the software and revision level of the information stored in the devices.
- 2.12.4.2. All removable and internal PSDs must maintain an internal hash / signature of the contents of the media, using a secured hashing method such as SHA1. This value must be stored on the storage media. Verification of the contents of the entire program storage device is to be performed after every restart and, if the verification fails, the equipment must enter a “fatal error” state.
- 2.12.4.3. All EPROMs (and Programmable Logic Devices (PLDs) that have erasure windows) must be fitted with covers over their erasure windows.
- 2.12.4.4. Employs a mechanism which recognizes unused or unallocated areas of the alterable media for unintended programs or data and tests the structure of the media for integrity. The mechanism must prevent further play of the gaming device if unexpected data or structural inconsistencies are found.
- 2.12.4.5. A CD, DVD or Blu-ray devices must not be used as a re-writeable disk.
- 2.12.4.6. When the CD-ROM, DVD-ROM or Blu-ray device is created, the write cycle must be “finished” such that it is not possible to write any further data to the PSD.
- 2.12.4.7. Writeable program storage, such as hard disk or flash disk may be used provided that it:
 - 2.12.4.7.1. Employs a mechanism which verifies that all control program components, including data and graphic information, are authentic copies of the approved components. The verification mechanism must have an error rate of less than 1 in 10 to the 38th power and must prevent the execution of any control program component if any component is determined to be invalid. Any

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program component of the verification or initialization mechanism must originate from a secure location that must be capable of being authenticated using commercially available tools.

- 2.12.4.7.2. Employs an integrity check method to verify that there are no additional or missing program(s) or fixed data records/files on the storage device. The mechanism must prevent further play of the gaming device if unexpected data or structural inconsistencies are found.

2.12.5. Writeable Disk

Writeable disk may be used for storage of critical memory provided that the following requirements are met:

- 2.12.5.1. Critical memory stored on a disk must be recoverable after any form of restart of the EGM;
- 2.12.5.2. The critical memory files are to be protected against accidental or malicious access/damage by threads/programs outside the critical memory maintenance software; and
- 2.12.5.3. Suitable hash values or other such means must be used to enable corrupted disk files to be identified.

2.12.6. USB Drive

Universal Serial Bus (USB) drives are primarily used in EGM applications for software upgrades.

General Requirements:

- 2.12.6.1. The USB used must be reliable.
- 2.12.6.2. It must be possible to read the contents of the USB externally using appropriate tools. This is necessary to verify the contents of the USB for the field inspection.
- 2.12.6.3. USB must incorporate suitable error detection and correction methods.

The following requirements apply when USB is used for storage of PSD executables:

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2.12.6.4. There must be no possibility to alter the contents of the USB while it is installed in the EGM;

2.12.6.5. The EGM must enter into a non-playable error state with a suitable message when an attempt is made to alter the contents of the USB or an unexpected USB drive is detected and generate an exception code;

2.12.6.6. When a USB drive is used for software upgrade, the software in the EGM should have the capability to authenticate the contents in the USB drive before any software download from the USB drive to the EGM is commenced; and

2.12.6.7. The USB drive(s) must be installed within the secure logic area.

2.12.7. Solid-State Drive (SSD)

2.12.7.1. The SSD used must be reliable.

2.12.7.2. It must be possible to read the contents of the SSD externally using appropriate tools. This is necessary to verify the contents of the SSD for the field inspection.

2.12.7.3. SSD must incorporate suitable error detection and correction methods.

2.12.7.4. The SSD drive(s) must be installed within the secure logic area.

2.12.7.5. If used for storage of PSD executables, it must only be possible to alter the contents of SSD using a secure approved method.

2.12.7.6. The EGM must enter into a non-playable error state with a suitable message when an attempt is made to alter the contents of the SSD and generate an exception code.

2.12.7.7. When SSD is used to store critical memory contents, it must use a suitable method to achieve redundancy, recovery, and reliability of critical memory contents. A suitable method for example is to use a RAID architecture to implement a single reliable drive to store critical memory contents.

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2.12.7.8. This critical memory implementation of the SSD must also comply with all the applicable requirements given in **Item 2.13 Critical Memory.**

2.12.8. RAM Reset (RAM Clear)

2.12.8.1. After a recognized RAM Clear method is used to initiate a RAM Reset procedure, the game program must perform a routine that resets each and every bit in critical memory to its default state. If partial RAM clears are allowed, the process must be accurate, and the game must confirm the contents of critical memory that have not been cleared.

2.12.8.2. Clearing non-volatile memory must only be able to be undertaken by accessing the logic area in which it is housed.

2.13. Information Displays

2.13.1. The default reel position after a RAM Reset must not be the top award on any selectable line.

2.13.2. In order to ensure the correct operation of electromechanically controlled display devices, such as spinning reels, a sufficiently closed loop of control must be implemented, which enables the software to detect malfunctions or attempts to interfere with the device's operation. This is necessary to ensure that the device is able to detect when a reel is not in its intended position and that an error condition is generated, rendering the device inoperable.

2.13.3. Reel assemblies must have a clearly identifiable reference point at which the start of the strip symbol artwork is located.

2.14. Display Monitors

If an EGM is furnished with a display monitor, it is subject to the following provisions:

2.14.1. The monitor along with its surrounding bezel must fit precisely into the machine in a manner that avoids gaps, defends against the entry of external objects, and which does not physically obscure any required game display information;

2.14.2. The monitor must be constructed of toughened material to resist patron abuse;

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2.14.3. The resolution of the configured monitor must be compatible with the resolution supported by the gaming device software in a manner that ensures the intended function of the display;

2.14.4. The resolution of the configured monitor must not fail to display any information critical to game play;

2.14.5. Where adjustment mechanisms for a monitor unit are provided for use by gaming attendants (i.e., not service technicians), they must:

2.14.5.1. Be clearly labelled; and

2.14.5.2. Be accompanied by detailed instructions in the Operator's Manual.

2.15. Touch Screens

2.15.1. Accuracy

Touch screens must be accurate so that a user's actions can be interpreted correctly.

2.15.2. Button Icons

Touch screen button icons must be sufficiently separated to reduce chances of the wrong icon being selected due to miscalibration or parallax errors.

2.15.3. Calibration Facility

2.15.3.1. A touch screen must have a software recalibrating facility unless the touch screen is designed never to require recalibrating;

2.15.3.2. Once calibrated, the touch screen must maintain that accuracy for at least the manufacturers recommended maintenance period; and

2.15.3.3. A touch screen should be able to be recalibrated by venue staff without access to the machine cabinet other than opening the main door unless it does not require calibration.

2.15.4. Construction

Touch screens must be resistant to scratching from conditions likely to occur during normal use.

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2.16. Audible Alarm

- 2.16.1. A suitable audible alarm in the EGM must be provided for effectively signaling any of the error or security features required by these Standards.
- 2.16.2. There may be a method whereby legal access can be made into the internal area of the EGM (by authorized personnel via an audit mode or other accountable method) where the audible alarm is not activated.
- 2.16.3. A technique may be provided to enable authorized personnel to adjust the volume level (without the need to enter the logic area). However, the adjustment of the volume must not allow the alarm output to be below a threshold level whereby the alarm cannot be heard with the door shut in a typical gaming environment.
- 2.16.4. The duration of the alarm when activated must be at least 3 seconds.

2.17. Printers

- 2.17.1. If an EGM is equipped with a printer, it must be located inside locked cabinet of the EGM.
- 2.17.2. A printer must have mechanisms to allow software to interpret and act upon the following conditions:
 - 2.17.2.1. Out of paper;
 - 2.17.2.2. Paper low;
 - 2.17.2.3. Printer jam;
 - 2.17.2.4. Printer failure; and
 - 2.17.2.5. Disconnected.

2.18. Bill Acceptor Devices

2.18.1. General

- 2.18.1.1. The bill input system must be constructed in a manner that protects against vandalism, abuse, or fraudulent activity.
- 2.18.1.2. The acceptance device(s) must be electronically based and configured to exclusively receive valid bills of PHP or any permitted currency, as well as authorized coupons, tickets, or other forms of casino script, while rejecting others.

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2.18.1.3. All accepted valid bills of legal tender plus valid coupons, tickets, or other approved casino script are to be deposited into the secure bill storage area (stacker).

2.18.1.4. All invalid or unauthorized bills are to be rejected and returned to the player.

2.18.1.5. The interconnecting cables linking the bill acceptor device to the EGM must not be externally exposed or easily accessible to unauthorized personnel.

2.18.2. Functional

2.18.2.1. The credit meter of the EGM must only accept bills for crediting when the EGM is enabled for play. In the event of other states such as door open states, fault conditions, and audit mode, the bill acceptor system must be disabled (except in the case of bill acceptor self-test mode, if supported).

2.18.2.2. Under all circumstances, it is imperative that credits are not lost when bills are accepted by the EGMs. The EGMs should either provide the appropriate credit or return the bill, with the exception of a brief period of potential power failure during which credits may not be given. However, in such cases, the duration of the window should not exceed one (1) second.

2.18.2.3. The EGM must register credits only when the bill/ticket is stacked.

2.18.2.4. It is required that bill acceptors accept currencies such as PHP or any other permitted currency.

2.18.3. Bill Stacker

2.18.3.1. The bill acceptor device must have a 'stacker full' sensor.

2.18.3.2. The stacker must be secured with a separate lock independent of the main cabinet and logic area.

2.18.3.3. The stacker device (housing) must be equipped with sensors that can detect whether the stacker door is open or closed, or if the stacker has been removed.

2.18.3.4. A separate lock must be required to remove the bills from the stacker.

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2.18.3.5. There must be a sensor which detects and reports to the software whenever there is access to the bill door or the stacker has been removed.

2.19. Coin Input/Output Systems

Coin input/output systems and coin hoppers are prohibited to use in PAGCOR-regulated gaming floors.

2.20. Communication with Bill Acceptors

The bill acceptor device must employ reliable, multi-directional protocol that incorporates error detection for communication with the EGM. Any message that contains an error must be either corrected or rejected.

2.20.1. Bill Acceptor Self-Test

The bill acceptor device is required to conduct a self-test each time it is powered up. In the event of a self-test failure, the bill acceptor must disable itself automatically until the error state has been resolved.

2.20.2. Bill Acceptor Error Conditions

Each EGM and/or bill acceptor must have the capability of detecting and displaying the following bill acceptor error conditions:

- 2.20.2.1. Bill-in Jam;
- 2.20.2.2. Bill Acceptor Door Open; and
- 2.20.2.3. Stacker Door Open or Stacker Removed.

2.21. Credit Acceptance Conditions

It is mandated that the acceptance of any Valid Ticket/Coupon, Bills, or other media for crediting to the credit meter is only permitted when the gaming device is enabled for play. The credit acceptance system must be disabled in other states, such as error conditions, including door opens, audit mode, and game play.

2.22. Hardware Detection

2.22.1. Software intended for providing games designed to operate on EGMs fitted with essential hardware (e.g., touch screen, top box LCD, and additional RAM) must incorporate a mechanism to detect the presence of the required hardware.

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2.22.2. The detection of required hardware is to occur during configuration.

2.22.3. In the event that the required hardware is not detected during the configuration process, the game must not initiate, and an appropriate message must be displayed to notify the user of the missing hardware requirement.

2.22.4. There must be no facility to disable the function of detecting required hardware.

2.23. Charging Mechanisms

An EGM may possess the ability to support an externally accessible charging mechanism, which can include a Universal Serial Bus (USB) charging port, wireless charging, or other comparable technology (e.g., cables or inductive chargers). The charging mechanism may be utilized to provide external power or charging access for an electronic device, such as a tablet or smartphone. If such a mechanism is incorporated, the following requirements must be met:

2.23.1. The charging mechanism must be appropriately fused and/or electrically protected to ensure proper safety measures;

2.23.2. The mechanism must not have any impact on the integrity, proper operation, or outcome of the EGM; and

2.23.3. There must not be any connection between the charging mechanism and the gaming device's logic unit.

3. Software Requirements

This chapter outlines the software requirements for EGMs to ensure proper functioning and provide a fair and reliable experience for players. The purpose of these requirements is to establish minimum Standards of functionality that all compliant EGM platforms must adhere to, in order to meet the Standards for a fair, secure, reliable, and auditable platforms, as specified in their design specifications.

3.1. Software Requirements for Percentage Payout

3.1.1. Each game shall theoretically payout a minimum of seventy five percent (75%) and a maximum of ninety eight percent (98%) except for EGMs with live games correlation which shall have a theoretical payout of less than one hundred percent (100%), during the expected lifetime of the game. However, progressives, bonus systems, merchandise, etc. shall not be included in the percentage payout if they are external to the game. In consonance with this requirement, PAGCOR may require a specific range within the

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prescribed percentage payout range for EGMs used in a casino or any PAGCOR-authorized gaming establishment.

3.1.1.1. Optimum Play Used for Skill Games

EGMs that may be affected by player skill shall meet the requirement of this section when using a method of play that will provide the greatest return to the player over a period of continuous play.

3.1.1.2. Minimum and Maximum Percentage Requirements Met at All Times

The minimum and maximum percentage requirements of 75% and 98% respectively, shall be met at all times. The minimum percentage requirement shall be met when playing at the lowest end of a non-linear pay table (i.e., if a game is continuously played at a minimum bet level for the cycle of the game and the theoretical RTP is lower than the minimum percentage, then the pay table is not permissible). This example also extends to games such as Keno, whereby the continuous playing of any spot combination results in a theoretical return to player lower than the minimum percentage.

Note: The laboratory will provide the minimum and maximum theoretical payout percentage for the game within the certification report, unless otherwise noted. Additional external awards added to a game will require a re-evaluation of the theoretical payout percentage, considering the value of the award and possibly other factors. The laboratory will re-evaluate a game's theoretical payout percentage if/when requested.

3.2. Control Program Requirement

3.2.1. EGM control programs (software that runs the EGM's functions) must be authenticated against possible corruption caused by the failure of the program storage medium and all critical game functions during each power-up cycle. The method must detect at least 99.9% of all possible failures.

3.2.2. Any program component of the authentication or initialization mechanism must originate from a secure location and must be capable of being authenticated using commercially available tools.

3.3. PSD Identification

All discrete PSD (e.g., Flash drives, Optical drives, USB drives, hard disks, and solid-state drives) must be uniquely identified and must display the

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following information through label, attendant menu, or any alternative means:

- 3.3.1. Game name (and/or shell name, if applicable);
- 3.3.2. Manufacturer;
- 3.3.3. Version number;
- 3.3.4. Type and size of media (where applicable); and
- 3.3.5. Location in EGM (if critical, e.g., socket position U3 on PCB).

3.4. Soft Meters

3.4.1. Master Meters

- 3.4.1.1. All EGMs must be equipped with soft meters (electronic digital storage meters) with at least 10 digits capable of recording and displaying the required information listed in this section where applicable to the EGMs.
- 3.4.1.2. Except for the credit meter, all soft meters must be updated when a particular event occurs. The update operation must include a memory fetch of the current value of the updating meter, an arithmetic addition operation, and a storing operation of the updated value.
- 3.4.1.3. The EGMs must furnish only the essential meters for the functions that have been authorized and are supported by the devices.
- 3.4.1.4. The meter information under **Item 3.4.2 Meter Definitions** must be displayed based on the defined currency.

3.4.2. Meter Definitions

- 3.4.2.1. Coin In: The EGM must have a meter that accumulates the total value of all wagers, regardless of whether the wagered amount is obtained through the insertion of valid tickets/coupons, currency, deduction from a credit meter, or any other means. This meter must:
 - 3.4.2.1.1. Not include subsequent wagers of intermediate winnings accumulated during game play sequence such as those acquired from “double up” games;
 - 3.4.2.1.2. Provide the information required to calculate a weighted average theoretical payback percentage on a per pay table basis for

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multi-game and multi-denomination/multi-game gaming devices; and

- 3.4.2.1.3. Maintain and display coin in meters and the associated theoretical payback percentage for each wager category with a different theoretical payback percentage and calculate a weighted average theoretical payback percentage for that pay table for gaming devices that are considered EGMs and contain identifiably different games (such as an ante-bet game).
- 3.4.2.2. **Coin Out:** The EGM must have a meter that accumulates the total value of all amounts directly paid by the machine as a result of winning wagers, regardless of whether the payout is made from the ticket printer, to a credit meter, or through any other means. This meter will not record amounts awarded as a result of a bonusing system or a progressive payout.
- 3.4.2.3. **Attendant Paid Jackpots:** The EGM must have a meter that accumulates the total value of credits paid by an attendant as a result of a single winning alignment or combination, the amount of which cannot be paid by the machine itself. This excludes progressive amounts or amounts awarded as a result of an external bonusing system. This meter should only include awards resulting from a specific amount listed on the manufacturer's Probability and Accounting Report (PAR) sheet.
- 3.4.2.4. **Attendant Paid Cancelled Credits:** The EGM must have a meter that accumulates the total value paid by an attendant as a result of a player-initiated cash-out that exceeds the EGM's physical or configured capability to make the proper payout amount.
- 3.4.2.5. **Bill In:** The EGM must have a meter that accumulates the total value of currency accepted. Furthermore, the EGMs must have a meter for each denomination of currency accepted that records the number of bills accepted by each denomination.
- 3.4.2.6. **Ticket-In (Voucher In):** The EGM must have a meter that accumulates the total value of all EGM wagering tickets accepted by the EGM.

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- 3.4.2.7. Ticket-Out (Voucher Out): The EGM must have a meter that accumulates the total value of all EGM wagering tickets and payout receipts issued by the EGM.
- 3.4.2.8. Electronic Funds Transfer In (EFT In): The EGM must have a meter that accumulates the total value of cashable credits electronically transferred to the EGM via a cashless wagering system.
- 3.4.2.9. Wagering Account Transfer In (WAT In): The EGM must have a meter that accumulates the total value of cashable credits electronically transferred to the EGM from a wagering account via an external connection between the EGM and a cashless wagering system.
- 3.4.2.10. Wagering Account Transfer Out (WAT Out): The EGM must have a meter that accumulates the total value of cashable credits electronically transferred from the EGM to a wagering account via an external connection between the EGM and a cashless wagering system.
- 3.4.2.11. Non-Cashable Electronic Promotion In: The EGM must have a meter that accumulates the total value of non-cashable credits electronically transferred to the EGM from a promotional account via an external connection between the EGM and a cashless wagering system.
- 3.4.2.12. Cashable Electronic Promotion In: The EGM must have a meter that accumulates the total value of cashable credits electronically transferred to the EGM from a promotional account via an external link between the EGM and a cashless wagering system.
- 3.4.2.13. Non-Cashable Electronic Promotion Out: The EGM must have a meter that accumulates the total value of non-cashable credits electronically transferred from the EGM to a promotional account via an external connection between the EGM and a cashless wagering system.
- 3.4.2.14. Cashable Electronic Promotion Out: The EGM must have a meter that accumulates the total value of cashable credits electronically transferred from the EGM to a promotional account via an external link between the EGM and a cashless wagering system.

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- 3.4.2.15. Coupon Promotion In: The EGM must have a meter that accumulates the total value of all EGM coupons accepted by the EGM.
- 3.4.2.16. Coupon Promotion Out: The EGM must have a meter that accumulates the total value of all EGM coupons issued by the EGM.
- 3.4.2.17. External Bonus Payout Meter: The EGM must have a meter that accumulates the total value of additional amounts awarded as a result of an external bonusing system and paid by the EGM.
- 3.4.2.18. Attendant Paid External Bonus Payout: The EGM must have a meter that accumulates the total value of amounts awarded as a result of an external bonusing system paid by an attendant.
- 3.4.2.19. Attendant Paid Progressive Payout: The EGM must have a meter that accumulates the total value of credits paid by an attendant as a result of progressive awards that cannot be paid by the EGM.
- 3.4.2.20. Machine Paid Progressive Payout: The EGM must have a meter that accumulates the total value of credits paid as a result of progressive awards paid directly by the EGM. This meter excludes awards paid as a result of an external bonusing system.

3.4.3. Games Completed Meter

EGMs must have soft meters that record the number of games completed under the following conditions:

- 3.4.3.1. Since power reset;
- 3.4.3.2. Since main door close; and
- 3.4.3.3. Since game initialization (RAM clear).

3.4.4. Bill In Count Meters

An EGM with a bill acceptor device must keep sufficient metering to be able to report the following:

- 3.4.4.1. Total monetary value of all items accepted;
- 3.4.4.2. Total number of all items accepted;
- 3.4.4.3. Total monetary value of all bills accepted;
- 3.4.4.4. Total number of bills accepted;

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- 3.4.4.5. Total count of rejected bills;
- 3.4.4.6. Total number of bills accepted for each bill denomination;
- 3.4.4.7. Value of the last ten bills accepted with the time stamps;
and
- 3.4.4.8. Total number of items accepted for all other notes (tickets and coupons), excluding bills. Moreover, it must be a separate meter.

3.4.5. Credit Meter Limit

EGMs must refuse to accept any addition to the credit meter (e.g., insertion of bill, ticket, coupon, or Wagering Account Transfer In), where such addition will cause the credit meter balance to exceed the credit meter limit. However, the EGMs may continue to accept all jackpot transfers even when this limit is reached.

3.4.6. Gamble Meters

If the gamble feature is implemented, the following meters must be recorded and made visible in the audit mode:

- 3.4.6.1. The number of games where gamble was invoked;
- 3.4.6.2. The number of games where gamble was won;
- 3.4.6.3. Amount played in the gamble feature; and
- 3.4.6.4. Amount won in the gamble feature.

If the Gamble Meters are not supported, the gamble feature must be disabled.

3.5. Doors to be Monitored

The EGM must possess the capability to detect unauthorized access to the following secured doors or areas:

- 3.5.1. The main door(s) of the EGM;
- 3.5.2. The door(s) leading to the logic area;
- 3.5.3. The door(s) of the drop box;
- 3.5.4. The bill acceptor door(s), including the stacker door;
- 3.5.5. The belly door(s) of the EGM;
- 3.5.6. Any other area (housing) that contains a critical processor;
- 3.5.7. Any other area used for currency storage that is equipped with a door; and
- 3.5.8. Communication boards, provided that access can be obtained without opening any of the aforementioned doors.

When any door is closed, an appropriate message must be displayed to inform the user that the door has been closed. This message must remain on the screen until the commencement of the next game.

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3.6. Credit Redemption Conditions

Patrons may collect their available credits from the EGM by pressing the "COLLECT / CASHOUT" button at any time, with the exception of the following circumstances:

- 3.6.1. During an active game play;
- 3.6.2. While the EGM is in audit mode;
- 3.6.3. While the EGM is in test mode;
- 3.6.4. If any door is in an "open state";
- 3.6.5. If the player's credit meter or total wins meter is currently incrementing;
- 3.6.6. If the EGM has been disabled by a CMS or any other external system; and
- 3.6.7. If any fault conditions exist excluding:
 - 3.6.7.1. Progressive controller failure (except when the progressive controller is required to validate the payment); and
 - 3.6.7.2. Bill acceptor full.

3.7. Test/Diagnostic Mode

If in a test mode, any test that involves credit entering or leaving the EGM (e.g., a bill test) must be completed prior to resumption of normal operation. Furthermore, no test mode that increments any of the electronic meters is permitted. Any credits accumulated on the EGM during the mode must be cleared before exiting the test mode. Test meters are acceptable provided the meter indicates as such.

3.7.1. Entry into Test/Diagnostic Mode

The EGM's main cabinet door sensor may automatically put the machine in service or test mode. During an audit mode access, a proper instruction from an attendant may also be used to enter test/diagnostic mode.

3.7.2. Exit from Test/Diagnostic Mode

Upon exit from the test mode, the game must revert to its original state prior to the initiation of the test mode.

3.7.3. Test Games

While in a test mode, the EGM must explicitly indicate that it is in a test mode and not accessible for regular gameplay.

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3.8. Data Partitioning

EGM software must be designed in such a way that machine specific information (e.g., machine address or other configurable parameters) are not stored in the same PSD as game and system software. When performing signature calculations, this partitioning will allow for the use of common game and system software devices among machines of the same type.

3.9. Electronic Gaming Machine Events (Tilt Situation)

A description of tilt must be displayed in a self-explanatory way.

3.9.1. Self-Clearing Events

EGMs must detect and display the following conditions and may be automatically cleared when the fault is cleared by the EGM upon the commencement of a new play sequence. Furthermore, these events should be communicated to the online monitoring and control system if applicable:

- 3.9.1.1. Power reset;
- 3.9.1.2. Any door open (including bill acceptor & stacker);
- 3.9.1.3. Any door just closed;
- 3.9.1.4. Inappropriate bill in or ticket in if it is returned to the player;
and
- 3.9.1.5. Stacker removed/inserted

3.9.2. Events Cleared by Attendant Intervention

EGMs must be capable of detecting and displaying the following error conditions, which must be cleared by an attendant and communicated to an on-line monitoring and control system if applicable:

- 3.9.2.1. Bill in jam;
- 3.9.2.2. Low RAM battery for batteries external to the RAM itself or low power source;
- 3.9.2.3. Uncorrectable RAM error (defective or corruptive RAM);
- 3.9.2.4. Print failure, if the EGM has no other means to make a payout, a replacement ticket may be printed once the failure condition has been cleared;
- 3.9.2.5. Printer mechanism paper jam. A paper jam conditions must be monitored at all times during the print process;

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- 3.9.2.6. Printer mechanism paper out;
- 3.9.2.7. Presentation error;
- 3.9.2.8. Program error (Defective program storage media);
- 3.9.2.9. Reels spin error of any type including a mis-index condition for mechanical reels. The specific reel number must be identified as part of the error condition; microprocessor-controlled reels as well, if applicable, must be monitored to detect malfunctions such as a reel which is jammed, or is not spinning freely, or any attempt to manipulate their final resting position;
- 3.9.2.10. Removal of control program storage media; and
- 3.9.2.11. Player-initiated attempt to cash-out after insertion of an operator-specified threshold amount of bills and/or cashless in without initiating any play.

EGMs must be capable of storing and displaying a minimum of the last 100 events.

3.10. Audit Mode

3.10.1. Audit Mode Requirements

The following represent the minimum requirements that must be displayed in the Audit Mode of an EGM:

- 3.10.1.1. Display of all electronic meter information as per **Item 3.4.2 Meter Definitions**;
- 3.10.1.2. Last play recall;
- 3.10.1.3. Display of terminal identification;
- 3.10.1.4. Display of software/game identification;
- 3.10.1.5. On-screen hashing algorithm signature verification;
- 3.10.1.6. Last Bill In, Ticket-In, and Ticket-Out Data; and
- 3.10.1.7. EGM configuration information;

3.10.2. Audit Mode Access

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3.10.2.1. Access to Audit mode is limited to the operation of a key-switch or other secure methods.

3.10.2.2. Auditing of metering information must be accessible by an authorized person at any time, except during collect in progress or during play (except where play is interrupted by a fault condition).

3.10.2.3. The EGM must not be playable while in Audit mode.

3.10.3. Signature Verification

The EGM must provide capability to verify the signature of all PSDs used in the EGM in the audit mode. This function must support the following:

3.10.3.1. The EGM must provide capability to verify the signature of all physical or logical PSDs using a secure hashing method such as HMAC-SHA1 or other better well-known security algorithms which are recognized by the gaming industry;

3.10.3.2. The EGM must allow the manual entry of a signature key for the hashing algorithm. Signature key entry must be via an interface provided by the EGM and there must be an on-screen legend displayed. The default signature key is hexadecimal 00 / 0000;

3.10.3.3. Signature key entry must be:

3.10.3.3.1. In hexadecimal characters;

3.10.3.3.2. Suitably formatted for displaying for easy reading; and

3.10.3.3.3. EGM with multiple physical or logical PSDs must display the individual signature results of each physical/logical PSD on the EGM.

3.10.4. Software Verification

3.10.4.1. The EGM must be designed in such a way that allows for an independent verification of its software from an external source. This may be achieved either by the ability to remove the storage medium and have it authenticated by an external device, or by providing an interface port that can be utilized by an external device for the purpose of software authentication. This integrity test procedure must provide the necessary means for conducting field

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tests on the machine's software for the purpose of verification.

- 3.10.4.2. The EGM must be equipped with the capability to perform self-authentication of its software in conjunction with its electronic gaming management system. This process will be carried out in accordance with the specific communication protocol established between the EGM and the electronic gaming management system.

4. Games

This chapter outlines the necessary requirements for EGM platforms. The purpose of these requirements is to guarantee a consistent, reliable, and fair gaming experience for players. These requirements are established as the minimum Standards for all compliant EGM platforms, ensuring that they meet industry Standards and provide players with a secure, fair, and trustworthy gaming environment. These requirements are designed to ensure that all conforming EGMs are secure, fair, reliable, and auditable and that they operate in accordance with their specified specifications.

4.1. Game Play

In order to initiate game play, the player must activate the designated play or bet button, or any other suitable player interface (e.g., touch screen).

4.2. Game Play Information

An EGM must always display the following information to the player when the machine is available for player input:

- 4.2.1. The current credit balance;
- 4.2.2. The current bet amount;
- 4.2.3. All possible winning outcomes, or be available as a menu item or help menu;
- 4.2.4. Win amounts for each possible winning outcome or be available as pay table, menu or help screen item;
- 4.2.5. The amount won for the last completed game (until the next game starts or the betting options are changed);
- 4.2.6. The player options selected (e.g., bet amount, number of lines/patterns/ways played) for the last completed game (until the next game starts or the betting options are changed);

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- 4.2.7. The denomination of the game being played;
- 4.2.8. A disclaimer regarding malfunction voids all pays;
- 4.2.9. The results for the last complete game, including the winning play lines/patterns/ways must be clearly indicated to the player (until the next game starts or the betting options are changed); and
- 4.2.10. For multi-line/multi-way games, the display must provide a mechanism for clearly indicating to the player each possible line that can be played.

4.3. Player Interface

The player interface is defined as the interface in which the player interacts with the game, including the button panel(s), the touch screen(s), or other forms of player interaction devices. The player interface must meet the following requirements:

- 4.3.1. All player-selectable touch points or buttons represented on the player interface that affect game play and/or the integrity or outcome of the game must be clearly labeled according to their function and must operate in accordance with applicable game rules;
- 4.3.2. Any resizing or overlay of the player interface screen must be mapped accurately to reflect the revised display and touch points; and
- 4.3.3. There must be no hidden or undocumented touch points or buttons anywhere on the player interface that affect game play and/or that impact the integrity or outcome of the game, except as provided for by the game rules.

4.4. Simultaneous Inputs

The EGM must not be adversely affected by the simultaneous or sequential activation of the various inputs, such as 'play buttons' which might, whether intentionally or not, cause malfunctions or invalid results.

4.5. Display Requirements with Non-zero Credit Meter

While the EGM is in idle mode and if there are credits on the credit meter, the following information must remain visible until the next play is initiated or the betting options are changed:

- 4.5.1. The total number of credits wagered for the last play;

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- 4.5.2. The final results for the last game played;
 - 4.5.3. The total number of credits won and other prizes associated with the combination resulting from the last play; and
 - 4.5.4. If the player has made one or more initial play selections for the upcoming game, the display must clearly indicate that the information displayed is appropriate to the potential next game to be played.
- 4.6. Wagers
- 4.6.1. Credits Bet

Credits bet must only come from the credit meter, which is to be decremented at the start of play or when additional wagers are made during the game as per the game rules. Additional wagers from the credit meter must not be available to gamble games.
 - 4.6.2. Default Bet Value

Except when there is only a single wagering option available, bet values should not default to the maximum bet values.
- 4.7. Games with Components of Skill
- Games involving player physical dexterity (e.g., hand/eye coordination) must return at least the minimum return to player [MINRTP] without adaptive strategies.
- 4.8. Win Probability
- 4.8.1. Any advertised prize must occur at least once in every 100 million games, excluding all linked progressive jackpots.
 - 4.8.2. This does not apply to multiple awards won together on the same game play where the aggregate prize is not advertised.
 - 4.8.3. This probability rule must not apply to games which make it possible for a player to win the advertised prize or even multiple times through the use of free games.
 - 4.8.4. This rule does apply to each wager that wins the advertised prizes and events

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4.8.5. If the advertised award or event can occur within a bonus or free game feature, the odds calculation must include the odds of obtaining the bonus round including the odds to achieve the advertised prize or event.

4.9. Individual Game Cycle

A game is considered completed when the final transfer to the player's credit meter takes place (in case of a win), or when all credits wagered or won that have not been transferred to the credit meter, are lost. The following are all considered to be part of a single game:

- 4.9.1. Games that trigger a free game feature and any subsequent free games;
- 4.9.2. "Second screen" bonus feature(s);
- 4.9.3. Games with player choice (e.g., Draw Poker or Blackjack);
- 4.9.4. Games where the rules permit wagering of additional credits (e.g., Blackjack insurance or the second part of a two-part Keno game);
- 4.9.5. Double-up/Gamble features; and
- 4.9.6. Games that trigger progressive jackpots.

4.10. Game Fairness Objectives

- 4.10.1. All games are to be fair to players in that the game must not be designed to give the player a false expectation of better odds by falsely representing any occurrence or event.
- 4.10.2. The display of the result of a game outcome must not be misleading or deceptive to the player (e.g., must not improperly indicate a near-miss).
- 4.10.3. The mapping of numbers directly from the RNG output or through a scaling algorithm must not influence a symbol to occur with a probability not equal to its statistical expectation.

4.11. Win Truncation

The win awarded in any individual game element or sequence of game elements must not be truncated.

4.12. Display of Lines/Patterns/Ways Selected

The EGM must employ a mechanism to clearly indicate each individual possible line/pattern/way sequentially or concurrently which is activated as a lit selected line (by betting additional credits), so that the player is in no doubt as to which line/pattern/way a wager was placed.

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4.13. Display of Lines Won

The winning play line(s)/winning pattern(s)/winning way(s) must be clearly highlighted to the player.

4.14. Bonus Games

4.14.1. All EGMs that offer bonus game or extended play feature, which requires player selection or interaction, are prohibited from automatically making selections or initiating games or features unless:

4.14.1.1. The patron is presented with a choice and specifically acknowledges his/her intent to have the EGM auto-initiate the bonus or extended play feature by means of a button press or other physical/machine interaction;

4.14.1.2. The bonus or extended feature provides only one choice to the patron (i.e., press button to spin wheel). In this case, the machine may auto initiate the bonus or extended feature after a time out period of at least 2 minutes; or

4.14.1.3. In cases where player input is required within a finite period of time (e.g., selection of bonus prize symbols), an appropriate time period of not less than 2 minutes must be provided. When input time elapses, the EGM is suggested to make a random input for the player. Additionally, this random input operation will be displayed in the pay table or help/game rules.

4.14.2. The game's player return including all bonuses over the cycle must conform to the set theoretical RTP percentage stated in the above sections.

4.14.3. The game must not adjust the likelihood of a bonus occurring, based on the history of prizes obtained in previous games (i.e., games must not adapt their theoretical return to player based on past payouts).

4.15. Game Recall

For the Game Recall information held by the EGM, it must be possible to show to the player the results of the play(s) as the player originally saw it. The manner in which the information is provided must enable observers to clearly identify the game sequences and result(s) that occurred.

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Information on at least the last ten (10) games is to be always retrievable on the operation of a suitable key-switch, or another secure method that is not available to the player.

4.15.1. Game Recall Information Required

- 4.15.1.1. Reels in final resting position, card values, balls drawn, or other form of games result;
- 4.15.1.2. Total number of credits at the start of play (less credits bet);
- 4.15.1.3. Total number of credits at the end of play;
- 4.15.1.4. The total number of credits bet including number of lines played and credits per line;
- 4.15.1.5. The total number of credits won associated with the prize resulting from the last play or the value in peso and cents for progressive prizes;
- 4.15.1.6. The total number of credits added (separated into bills and cashless) since the end of the previous play and through to the end of the last play;
- 4.15.1.7. The total number of credits collected (separated into tickets and cashless) since the end of the previous play and through to the end of the last play;
- 4.15.1.8. The total value of cancelled credits (in peso & cents) since the end of the previous play and through to the end of the last play (credits added or collected after the last play will be recorded on the completion of the next play);
- 4.15.1.9. Any player choices involved in play outcome including lines/patterns/ways selected, units wagered, cards held, balls selected, etc.;
- 4.15.1.10. Results of gambles; and
- 4.15.1.11. The value of all standard meters (as defined in **Item 3.4.2 Meter Definitions**) at the end of the last play and for each game recall. Specific meters that are not applicable may be omitted.

Note: The above requirements are the default for Last Play Information in those events after the completion of the last play (such as inserting money

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to add credits or collecting credits) do not form part of the Last Play Requirements. However, it is permissible for manufacturers to display this information provided it is clear what happened after the completion of the last play.

4.15.2. Game Sequences

4.15.2.1. If the feature is capable of being re-triggered within the feature (i.e., the number of games in a feature sequence can theoretically be infinite), the Last Play Recall function must be able to replay a minimum of last 50 feature games regardless of number of played.

4.15.2.2. In all cases of a feature or free game sequence, the initial trigger game and final game must be available for display.

4.15.2.3. The replay of alternate display game sequences (free games, feature games, etc.) must allow each game in the sequence to be examined. Progression to the replay of the next game in the game sequence must require external input (e.g., button press, touch screen input, etc.). Alternatively, the replay function may provide a 'Pause' input to allow the replay to be suspended between games of a game sequence.

4.16. Gamble Feature

4.16.1. The gamble option must have a theoretical return to player of at least 100%.

4.16.2. If gamble is offered on the result of bonus/feature games, only money not transferred from the win meter to the credit meter may be wagered on the gamble feature.

4.16.3. Amounts bet on gamble are not to be added to the Coin In meter.

4.17. Configuration Settings

4.17.1. It must not be possible to change a configuration setting that causes an obstruction to the electronic accounting meters without a RAM clear.

4.17.2. Change of critical parameter (i.e., denomination, RTP, etc.) must be done by a secure means, which includes access to the locked logic area.

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4.18. Configuration of Multi-Game EGM

In the event where an EGM has multiple games stored in its memory and allows for selection between them, the following must be complied with:

- 4.18.1. The selection of games available to the player, or to the pay table, can only be modified through a secure method; and
- 4.18.2. No modifications to the selection of games available to the player (or to the pay table) are permitted during periods when the player has credits on their credit meter or while a game is in progress.

4.19. Random Number Generator

The purpose of this section is to establish requirements for random selection processes with the use of random number generators (RNGs). In most implementations of an EGM, there will be the need for a Random Number Generator (RNG).

4.19.1. RNG Design

- 4.19.1.1. A manufacturer may employ one or more mechanical RNG, hardware RNG, Cryptographic RNG, PRNG or combinations of them.
- 4.19.1.2. The choice of algorithms and devices is left to the manufacturer. Each component or combination of components used to provide random numbers must satisfy the requirements of this document.

4.19.2. Live Game Correlation

Unless otherwise denoted on the pay table, where the EGM plays a game that is recognizable to be a simulation of live casino game such as Poker, Blackjack, Roulette, etc., the same probabilities associated with the live game must be evident in the simulated game. For example, the odds of getting any particular number in Roulette where there is a single zero (0) and a double zero (00) on the wheel, must be 1 in 38; the odds of drawing a specific card or cards in Poker must be the same as in the live game.

4.19.3. Symbol Probability

For other game types (such as spinning reel games or video spinning reel games), the mathematical probability of a symbol appearing in a position for any game must be constant, unless otherwise denoted on the pay table.

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4.19.4. Card Games

The requirements for games depicting cards being drawn from a deck are the following:

- 4.19.4.1. At the start of each game/hand, the cards must be drawn fairly from a randomly shuffled deck; the replacement cards must not be drawn until needed, and in accordance with the game rules, to allow for multi-deck and depleting decks;
- 4.19.4.2. Cards once removed from the deck must not be returned to the deck except as provided by the rules of the game depicted; and
- 4.19.4.3. As cards are removed from the deck they must be immediately used as directed by the rules of the game (i.e., the cards are not to be discarded due to adaptive behavior by the EGM).

Note: It is acceptable to draw random numbers for replacement cards at the time of the first-hand random number draw, provided the replacement cards are sequentially used as needed.

4.19.5. Ball Drawing Games

- 4.19.5.1. At the start of each game, only balls applicable to the game are to be depicted. For games with bonus features and additional balls that are selected, they should be chosen from the original selection without duplicating an already chosen ball;
- 4.19.5.2. The pool must not be re-mixed except as provided by the rules of the game depicted; and
- 4.19.5.3. As balls are drawn from the pool, they must be immediately used as directed by the rules of the game (i.e., the balls are not to be discarded due to adaptive behavior by the EGM).

4.19.6. Scaling Algorithms

- 4.19.6.1. If a random number with a range shorter than that provided by the RNG is required for some purpose within the EGM, the method of re-scaling, (i.e., converting the number to the lower range), is to be designed in such a

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way that all numbers within the lower range are equally probable.

- 4.19.6.2. If a particular random number selected is outside the range of equal distribution of re-scaling values, it is permissible to discard that random number and select the next in sequence for the purpose of re-scaling.

4.19.7. Mechanical-Based RNG Games

Mechanical-based RNG games are games that employ the laws of physics in any way to generate the outcome of the game. All mechanical-based RNG games must meet the requirements of these Standards except for **Item 4.19.6 Scaling Algorithms** that dictate the requirements for electronic random number generators. In addition, mechanical-based RNG games must meet the following rules:

- 4.19.7.1. The test laboratory will test multiple iterations to gather enough data to verify the randomness. In addition, the manufacturer may supply live data to assist in this evaluation;
- 4.19.7.2. The mechanical pieces must be constructed of materials to prevent decomposition of any component over time (e.g., a ball must not disintegrate);
- 4.19.7.3. The properties of physical items used to choose the selection must not be altered; and
- 4.19.7.4. The player must not have the ability to physically interact or come into physical contact or manipulate the machine physically with the mechanical portion of the game.

Note: The laboratory reserves the right to require replacement parts after a pre-determined amount of time for the game to comply with **Item 4.19.7.2** In addition, the device(s) may require periodic inspections to ensure the integrity of the device. Each mechanical-based RNG game must be reviewed on a case-by-case basis.

4.20. Game Interruption and Resumption

4.20.1. Game Interruption

After a game interruption (e.g., power down), the software must be able to recover to the state it was in prior to the interruption taking place.

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4.20.2. Game Interruption Procedures

On game interruption, the following procedures must be executed at the least:

- 4.20.2.1. The ticket or coupon printer must be inoperable;
- 4.20.2.2. The power-down routine, if applicable, must be fully completed; and
- 4.20.2.3. The interruption procedures must not compromise the integrity of critical variables.

4.20.3. Restoration from Error Situation

In the event that an EGM is powered down while in an error state, upon restoration of power, the error message must be displayed, and the machine must remain locked until the error is resolved. This requirement applies unless the power down is executed as part of the error reset procedure, or if upon power up or door closure, the EGM performs a check for the error state and determines that the error no longer exists.

4.21. Artwork

For the purposes of this chapter, artwork is defined as any of the following, represented by any image, text or sound that is provided by the gaming machine (except in audit and test modes) including: game instructions; pay table; game name; reels and symbols; any other text or images; any other visual components of the game (e.g., themes, multigame panels, linked progressive panels, etc.).

This includes, but is not limited to, anything that appears on the top panel, belly panel, buttons, video display surround, and the video display itself.

This definition of artwork includes any messages, images or sounds presented to the player which do not provide instructions, rules or pay table information or do not provide part of the display of the game. Such messages, images or sounds will be subject to the requirements of this section.

- 4.21.1. There must be sufficient game instructions to allow a player to determine the correctness of prizes awarded.
- 4.21.2. All statements on the artwork must be true.
- 4.21.3. The pay table applicable to the EGM, including “mystery awards” (an award that is not tied to any specific symbol combination), must be clearly visible, or the means of displaying such information must be

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readily available to the player prior to committing to a bet and when the EGM is waiting for player input.

- 4.21.4. The pay table on the artwork must correspond to the pay scale used in the PAR sheet.
- 4.21.5. The message “Malfunction Voids All Pays and Play” or its equivalent must be displayed on each EGM.
- 4.21.6. The game instructions must be clearly visible, or the means of displaying such instructions must be readily available to the player prior to committing to a bet and when the EGM is waiting for player input.
- 4.21.7. All game instructions on the artwork must be easily interpreted, not ambiguous, and sufficient to explain all game rules.
- 4.21.8. The name of the game being played must be clearly visible to the player.
- 4.21.9. The display of the result of a game outcome must not be misleading or deceptive to the player (e.g., must not improperly indicate a near-miss or a future win).
- 4.21.10. Written messages must be in English, or other official language. Other language(s) can be made available via a player selectable option. However, the EGM must default to English following a cash-out or if a player does not play a game and a period from 30 to 60 seconds has elapsed since the end of the last completed game. All available language(s), including words/characters/game symbols, should be grammatically and syntactically correct.
- 4.21.11. The functions of all buttons (physical or touch screen) in normal game mode must be clearly indicated preferably on the buttons.
- 4.21.12. Any game instructions that appear on the video screen should be accessible and visible without the need for credits to be inserted or wagered. This requirement does not apply to messages that will be displayed which are specific instructions that may be required to proceed to the next stage of the game.
- 4.21.13. The help screen must provide adequate information in detail for the player to understand the game and all information provided must be correct.
- 4.21.14. The artwork must display the minimum and maximum lines/ways when the EGM is available for player input.

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4.21.15. The artwork must display the minimum and maximum bet in credits when the EGM is available for player input.

4.21.16. The denomination of all games configured for play must be displayed when the EGM is available for player input.

5. External Communication

The purpose of this chapter is to ensure the security of communications with EGMs in order to prevent unauthorized access or alterations of communicated data. Moreover, this chapter aims to ensure that all associated translations are accurate and free from errors.

5.1. Communication Requirement

5.1.1. All external data communication must be protocol-based and/or integrate an error detection and correction scheme to ensure an accuracy of not less than 99% of messages received.

5.1.2. The communication protocol must ensure that incorrect data or signals would not harmfully affect the operation of the EGMs.

5.1.3. Certificates, keys, or seeds that are used for encryption purposes must not be hard coded and must be changed from time to time, whereas certificates must be renewed as needed.

5.1.4. The communication protocol must also ensure that erroneous data or signals would not adversely affect the operation of the EGM through the use of proven error checking mechanism on the transmission. The error checking mechanism used must be at least Cyclic Redundancy Check (CRC) of 16 bits.

5.1.5. External data communication protocols must as far as possible be open standards-based to allow for interoperability between EGMs and the electronic gaming management systems.

6. Tournaments

A tournament is an organized EGM event, which enables players to participate in competitive play against other players. This provides a unique gaming experience and allows players to demonstrate their skills and compete for prizes.

To facilitate tournament play, EGMs may be equipped with a certified program that enables tournament mode play. The tournament option is set to be disabled by default to ensure that regular play is not impacted. However, if the tournament mode is an option, it must be activated using a regulator-approved and controlled

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method that requires manual intervention and/or a complete replacement of the logic board with a certified tournament board.

This ensures that tournament mode play is secure and that players can trust that the tournament games are fair and reliable. The use of a regulator-approved method for enabling tournament mode play and the requirement for manual intervention and/or a certified tournament board also helps to prevent unauthorized changes or tampering with the tournament mode.

6.1. Tournament – Hardware

The game must comply with the requirements set forth in **Item 2. Hardware Requirements** of this document, if applicable.

6.2. Tournament – Software

In the event that an EGM is on tournament mode, it must not accept credit from any source, nor pay out credits in any way, but must utilize credit points only. Tournament credits must have no cash value. These games must not increment any mechanical or electro-mechanical meters unless they are meters designed exclusively for use with tournament software and must not communicate any tournament-related accounting information to the system.

All EGMs used in a single tournament must utilize the same electronics and machine settings as other EGMs involved in the tournament, including reel speed settings.

7. Glossary of Terms and Acronyms

Particulars	Description
Audit Mode	The mode where it is possible to view gaming machine meters, statistics, etc. and perform non-player related functions.
Bill Acceptor	The device using photo-optic, electromagnetic or magnetic sensors (internal or external to the gaming machine) and any additional devices used to validate a bill and/or printed ticket.
Bonus/Feature Game	An additional function not part of the base game which allows extra credits to be won. They may take the form of free games and/or second screen features.
Cancel Credit	Credits which are paid by manual cancellation at the gaming machine or by ticket payment to the player.
CE	Conformité Européenne – a mark of manufacturers or importers that indicates affirmation of compliance with

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	European health, safety, and environmental protection standards
CISPR 32 Class A	Comité International Spécial des Perturbations Radioélectriques 32 (International Special Committee on Radio Interference) - an EU electromagnetic emissions or radio interference requirements on non-household/residential equipment such as information technology equipment, professional audio/video/audio-video, professional broadcast receiver equipment, entertainment lighting control equipment, and amusement machines.
CMS	Central Monitoring System
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.
Credit Meter	Gaming machine indicator that displays the number of credits or monetary value available to a patron for wagering.
Critical Memory	Memory locations storing information that is considered vital for the continued proper operation of the gaming machine.
Cryptographic	A method of protecting information and communications through the use of codes, so that only those for whom the information is intended can read and process it.
EMI	Electromagnetic Interference - The physical characteristic of an electronic device to emit electronic noise either into free air, onto the mains power lines, or communication cables.
EPROM	Electrically Programmable Read Only Memory – a storage area which may be filled with data and information, which once written is not modifiable, and which is retained even if there is no power applied to the machine. Modification (erasure) is only possible by the application of an Ultraviolet (UV) light source.
ESD	Electrostatic Discharge - The physical property of being able to create electronic interference to a device by either discharging static electricity onto the surface of the unit (such as from a user), or via a mains power or communication cable (from lightning for example).
Gamble	A game option, such as Double-Up, that may be selected following a win. This refers to player options where some

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	or all of the winnings may be wagered at a minimum of 100% player return – includes multipliers other than evens, e.g., “pick a suit” where four outcomes are offered at 0.25 probability.
Game	A game is a set of rules that a gaming machine follows. Major constituents of a game are rules, artwork (virtual or static and inclusive of game symbols and pay table), winning combinations and game symbol distribution.
Hashing Algorithm	Generally, a function which accepts a variable length data message and produces a fixed length message digest (i.e., hashing algorithm signature). In this Standard, the term ‘hashing algorithm’ referred is the HMAC-SHA1 algorithm.
HMAC	‘Keyed-Hash Message Authentication Code’. Calculated using a cryptographic Hash Algorithm in combination with an input key. (Refer: FIPS PUB 198).
<u>IEC</u>	International Electrotechnical Commission - a UK based international standards organization that prepares and publishes international standards for all electrical, electronic, and related technologies.
<u>IEC 60335-2-82</u>	The IEC’s standard deals with the safety of electric commercial amusement and personal service machines.
<u>IEC 61000-3-2</u>	The IEC’s standard that limits the harmonic currents emission.
<u>IEC 61000-4-2</u>	The IEC’s immunity standard on electrostatic discharge (ESD).
<u>IEC 61000-4-4</u>	The IEC’s immunity standard based on electrical fast transient (EFT) / burst transients.
<u>IEC 61000-4-5</u>	The IEC’s immunity standard power surges from abrupt load switching and faults in the power system, as well as induced lightning transients.
<u>IEC 61000-4-11</u>	The IEC’s Testing and measurement techniques - Voltage dips, short interruptions, and voltage variations immunity tests.
Last Play	The last play is the most recently completed play.
Logic Area	The separately locked area within a gaming machine that houses the electronic components that would significantly influence the gaming outcome.
Master Meter	A meter whose value is reset only when a memory reset is performed. This meter represents the total of all updates since the last memory reset.
Meter	A non-volatile variable, storing gaming machine audit and other information.

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Non-Volatile Memory	A type of storage device that can retain stored information even after power is removed.
PAR	Probability and Accounting Report
Pay table	A term used to describe the mathematical behavior of a game based upon the data from the manufacturer's PAR sheet, inclusive of the return percentage, and reflective of all possible payouts/awards.
PCB	Printed Circuit Board - the piece of board used to connect together electronic components in a certain manner using tracks and holes to route the signals.
Play	A sequence of actions and states in the gaming machine initiated by a player through a wagering of credits and terminated when all credits wagered have been lost or all winnings have been transferred to the gaming machine's total wins meter and the player's credit meter.
PRNG	Pseudo RNG
PSD	Programmable Storage Device - an integrated circuit including SSD, Flash-ROM, RAM, USB thumb drive, Hard Disk, and logic functions on a single chip.
RAID	Redundant Array of Independent Disks - is a storage set up consisting of multiple data storage disks that are linked together to prevent data loss in case of a data storage failure and/or use to increase performance.
RAM	Random Access Memory - Electronic component used for computer workspace and storage of volatile information in a gaming machine.
RAM Reset (RAM Clear)	Process that is used to reset the memory of a gaming machine which configures the gaming machine into a "as new" state.
RFI	Radio Frequency Interference - which affects the operation of an electronic device.
RNG	Random Number Generator - Generates sequence of number or symbols that cannot be reasonably predicted better than by random chance.
ROM	Read Only Memory - Electronic component used for storage of non-volatile information in a gaming machine. This includes programmable ROM and Erasable Programmable ROM.
RTP	Actual RTP - percentage of all wagers that is returned to players as winnings over a specified period of play. Theoretical RTP - expected percentage of wagers that will be returned to players as winnings over an infinite period of play.

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	It is important to note that Actual RTP can differ from Theoretical RTP due to factors such as size of wagers, game pace, time on device, and variability of results.
SHA 1	Secure Hash Algorithm 1 - is a hash function which takes an input and produces a 160-bit or 20-byte hash value known as a message digest – typically rendered as 40 hexadecimal digits
Signature	The result from a mathematical algorithm, including the keyed HMAC-SHA1 algorithm, applied to the entire contents of a Program Storage Device or software file.
Signature Key	An input parameter used in conjunction with a signature algorithm.
SSD	Solid State Drive - It is a kind of flash memory to store data even after power is turned off. SSDs are designed to access data in the same way as traditional hard disk drives (HDDs).
Ticket (Voucher)	A printed or virtual ticket issued by a game associated device which can be redeemed for cash or used to subsequently establish credits on a device.
Ticket-In	A method for inserting a valid printed ticket to get the corresponding credits.
Ticket-Out	A method for redeeming the current available credits by means of printing a ticket.
UL	Underwriters Laboratories - a US based global company specializing in applied safety science solution that provides testing, inspection, certification, and consultations services.
USB	Universal Serial Bus - An industry standard interface that defines the cables, connectors and communications protocols used for connection, communication, and power supply between computers and electronic devices