Gaming Policy and Enforcement Branch (GPEB)

TGS4
Technical Gaming Standards for Electronic Bingo Systems in Gaming Venues

Technical Standards Document (TSD) Version 1.3

BRITISH COLUMBIA

Ministry of Public Safety and Solicitor General
Gaming Policy and Enforcement Branch

3rd Floor, 910 Government Street
P.O. Box 9202 Stn. Prov. Govt.
Victoria, British Columbia, Canada
V8W 9J1

Technical Standards Document (TSD)	
Regulatory Body:	GPEB
Operating Body:	BCLC
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Gaming Policy and Enforcement Branch (GPEB)	

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1 Overview of TSD

1.1 Introduction

1.1.1 General Statement I

The General Statements are as follows:
   a) Before being permitted to operate in the live environment, all Electronic Bingo Systems used in the Province of British Columbia must be tested to the applicable requirements set forth in this Technical Standards Document (TSD).
   b) The British Columbia Lottery Corporation (BCLC) may select an appropriate Accredited Testing Facility (ATF), or other equivalent body, to perform this testing; however, BCLC's selection requires approval from the Gaming Policy and Enforcement Branch (GPEB).
   c) The appointed testing body must provide their evaluation results to BCLC, who in turn must provide these evaluation results to GPEB for review, and where required, subsequent discussion.
   d) Although the appointed testing body may recommend the approval of any Electronic Bingo Systems for use in the Province of British Columbia, the ultimate authority to approve Electronic Bingo Systems rests solely with GPEB. Only GPEB can issue a Certificate of Technical Integrity under **Section 75 of the Gaming Control Act of British Columbia**.

Note: An "Electronic Bingo System" does NOT include, for purposes of this TSD, ancillary electronic equipment used in the conduct of Table Games.

1.1.2 General Statement II

It is the policy of GPEB, in consultation with BCLC, to update this TSD at minimum once annually, to reflect any changes in technology, testing methods, or known cheating methods.

Note: GPEB reserves the right to modify (or selectively apply) the requirements set forth in this TSD as deemed necessary to ensure the integrity of gaming in the Province of British Columbia.

1.1.3 Electronic Bingo Systems Defined

An Electronic Bingo System is a game management system that is primarily tasked to provide logging, searching, and reporting of gaming significant events, collection of financial data, and display and verification of winning cards for Bingo games, or other similar draw games. This TSD is intended to provide guidance toward the certification of the following types of Electronic Bingo Systems:
   a) Manual Draw games using paper Cards;
   b) Electronic Draw games using paper cards;
   c) Manual Draw games using electronic card marking devices;
   d) Electronic Draw games using electronic card marking devices;
   e) Manual Draw games using a combination of paper and electronic card marking devices;
   f) Electronic Draw games using a combination of paper and electronic card marking devices; and
   g) Electronic Draw games using player terminals.

1.1.4 Phases of Certification

GPEB approval of an Electronic Bingo System may be acquired in two phases:
   a) Initial laboratory testing, where BCLC and/or an Accredited Testing Facility (ATF) will test the integrity of the system in a laboratory setting with the equipment assembled; and
   b) On-site verification where the system and configuration set up are tested on the gaming floor prior to implementation.

1.2   Acknowledgment of Other TSDs Reviewed

1.2.1   General Statement

This TSD has been developed by reviewing and using portions of the Gaming Laboratories International (GLI) TSD named 'GLI-22'.

1.3   Purpose of TSD

1.3.1   Purpose

The Purpose of this TSD is as follows:
   a) To eliminate subjective criteria in analyzing and certifying Electronic Bingo System operation.
   b) To test those criteria which impact the credibility and integrity of Electronic Bingo System operation from both the Revenue Collection and Player's play point of view.
   c) To create a TSD that will ensure that Electronic Bingo Systems in gaming venues are fair, secure, auditable, and able to operated correctly.
   d) To recognize that non-gaming testing (such as Electrical Testing) should not be incorporated into this TSD but left to appropriate test laboratories that specialize in that type of testing.
   e) To recognize that except where specifically identified in this TSD, testing is not directed at health or safety matters. These matters are the responsibility of the manufacturer of the equipment.
   f) To construct a TSD that can be easily changed or modified to allow for new technology.
   g) To construct a TSD that does not specify any particular method or technology (e.g.: choice of algorithm for random number generation). The intent is instead to allow a wide range of methods and technologies to be used to comply with this TSD, while at the same time, to encourage new methods and technologies to be developed.

1.3.2   No Limitation of Technology

One should be cautioned that this TSD should not be read in such a way that limits the use of future technology. The TSD should not be interpreted that if the technology is not mentioned, then it is not allowed. As new technology is developed, GPEB, in consultation with BCLC, will review this TSD, make any changes deemed necessary, and incorporate new minimum standards for the new technology.

Note: Although BCLC may recommend that particular changes be made to this TSD, the ultimate authority to approve changes rests solely with GPEB.

1.3.3   Scope of TSD

This TSD will only govern Electronic Bingo System requirements necessary to achieve GPEB certification for the purpose of properly displaying selected balls or numbers, properly verifying and awarding player winnings, and properly accounting for and reporting all financial and game history data as needed to properly audit the system.

1.4   Other TSDs That May Apply

1.4.1   Other TSDs

This TSD covers the minimal requirements of an Electronic Bingo System, and all associated components. The following other TSDs and documents may apply:
   a) TGS1 – Technical Gaming Standards for Electronic Gaming Devices (EGDs) in Gaming Venues;
   b) TGS2 – Technical Gaming Standards for Progressive Gaming Devices in Gaming Venues;
   c) TGS3 – Technical Gaming Standards for On-line Monitoring Systems and Control

Systems (MCSs) in Gaming Venues;
   d) The Criminal Code of Canada; and
   e) The Gaming Control Act of British Columbia.

2 Submission Requirements

2.1   Introduction

2.1.1   General Statement

This section shall govern the types of information that are, or may be required to be submitted by the submitting party in order to have equipment tested to this TSD. Where the information has not been submitted or is not otherwise in the possession of BCLC (together with GPEB) and/or the ATF, the submitting party shall be asked to supply additional information. Failure to supply the information can result in denial in whole or in part of the submission and/or lead to testing delays.

2.1.2   Previous Submission

Where BCLC and/or the ATF has been previously supplied with the information on a previous submission, duplicate documentation is NOT required, provided that the previous information is referred to by the submitting party, and those documents are easily located at BCLC's facilities, GPEB's facilities and/or the ATF's facilities. Every effort shall be made to reduce the redundancy of submission information.

2.2   Prototype (Full Submission) Submissions

2.2.1   General Statement

A Prototype (full submission) submission is a first time submission of a particular piece of hardware or software that has not previously been reviewed by BCLC (together with GPEB) and/or the ATF. For Modifications of previous submissions, including required changes to previously submitted Prototype (full submission) certification, whether certified or pending certification, see **Section 2.7 Submissions of Modifications (Partial Submissions) to a Previously Certified Item**.

Note: The testing of the submission may take place at BCLC's testing facilities, or at the ATF's facilities, or both, at the discretion of GPEB (in consultation with BCLC).

2.2.2   Submission Letter

Each submission shall include a request letter, on company letterhead, dated within one (1) week of the date the submission is received by BCLC (together with GPEB) and/or the ATF. The letter should include the following:
   a) A formal request for certification specifying British Columbia as the jurisdiction for which the device will be approved;
   b) The items requested for certification. In the case of software, the submitting party shall include Identification (ID) numbers and revision levels, if applicable. In the case of proprietary hardware, the submitting party shall indicate the manufacturer, model, and part and revision numbers of the associated components of hardware; and
   c) A contact person who will serve as the main point of contact for engineering questions raised during evaluation of the submission. This may be either the person who signed the letter or another specified contact.

2.3   System Hardware Submission Requirements – Prototype (Full Submission) Certification

2.3.1   Presentation of Equipment to BCLC, GPEB and/or the ATF; Identical Equipment

Each item of gaming equipment supplied by a manufacturer to the field shall be functionally identical to the specimen tested and certified. For example, an interface element supplied as a certified device shall not have different internal wiring, components, firmware, circuit boards, circuit board track cuts or circuit board patch wires from the certified specimen, unless that change is also certified, see also **Section 2.7 Submissions of Modifications (Partial Submissions) to a Previously Certified Item**.

2.3.2   Inventory of Equipment to BCLC, GPEB and/or the ATF

Each submission of hardware shall contain the following:
   a) Server, Database, Front End Controller, and Ancillary Stations to include but not limited to: Cashier Station functionality; Callers Desk/Ball Draw functionality; System Configuration Parameters functionality; and Accounting/Reporting Functionality;
   b) Monitors, keyboards, mouse, printers, etc., to support the items listed above;
   c) A supply of card faces or blank keno ticket stock to facilitate testing; and
   d) Uninterruptible Power Supply (UPS) for critical components.

Note: In an effort to reduce system submission size, monitor and data switches may be used. Additionally, separate software may be housed in the same unit, as long as the functionality is not impaired and the software is identical to the field version.

2.3.3   Accompanying Documentation

All accompanying technical documents, manuals, and schematics shall be submitted. In addition, the following items shall be provided:
   a) If applicable, all UL, CSA, etc. or equivalent certification. This certification information may be supplied at a later date;
   b) Any other proprietary equipment that may be used in the field in conjunction with the Submission, if necessary to test the requirements set forth;
   c) Accompanying software, see also **Section 2.4 System Software Submission Requirements – Prototype (Full Submission) Certification**; and
   d) If the submitting party has specialized equipment and/or software which is needed to test the submitted system, such as load/game simulators or test data files, then the specialized equipment and/or software and all appropriate operation and user manuals for the equipment and/or software shall be included with the submission.

Note: Commercially available products are not required for submission unless omission will impact testing and proper operation of the system.

2.4   System Software Submission Requirements – Prototype (Full Submission) Certification

2.4.1   General Statement

Each submission of software shall contain the following:
   a) Two sets of all Erasable Programmable Read Only Memory (EPROM) devices, Compact Disk Read Only Memory (CD-ROM) devices, or other storage media which contain identical contents. This includes all program executables, system component firmware, bin files, etc., unless other arrangements are made in advance of the submission. Where the BCLC and/or the ATF already have tested a software component, resubmission may not be necessary (pending approval by GPEB);
   b) Source Code, a Link Map and Symbol Table for all primary software executables. In

addition, if requested, explanation of all non-volatile Random Access Memory (RAM) on any system device with the non-volatile RAM locations described;

c) All user manuals in both hard and soft copy format to include a general overview of the system from a component level, software and hardware setup and integration, and system block diagrams and flow charts for the communication program, if required;

d) If not included in the user manuals, a connectivity manual for all associated peripheral devices or remote sales or monitoring units;

e) If not included in the user manuals, provide example reports for each standard report capable of being generated on the system with a formula summary detailing all reporting calculations including data types involved, mathematical operations performed, and field limit;

f) If not included in the user manuals, a list of all supported communication protocols specifying version, if applicable; and

g) If utilizing a software verification algorithm provide a description of the algorithm, theoretical basis of the algorithm, results of any analyses or tests to demonstrate that the algorithm is suitable or the intended application, rules for selection of algorithm coefficients or "seeds", and means of setting the algorithm coefficients or "seeds."

2.5   Software Programming Requirements and Compilation

2.5.1   General Statement

The following items shall be contained within all submitted source code or related modules:
a) Module Name;
b) Brief description of module function; and
c) Edit History, including who modified it, when and why.

2.5.2   Source Code Commented

All source code submitted shall be commented in an informative and useful manner.

2.5.3   Source Code Completeness

All source code submitted shall be correct, complete and able to be compiled.

2.6   Program Identification

2.6.1   Software Requirements

On the primary system software components submitted and subsequently placed in the field, each program shall be uniquely identified and either display version information at all times or utilizing a user accessible function.

2.6.2   Firmware Requirements

On the system firmware submitted and subsequently placed in the field, each program shall be uniquely identified, displaying:
a) Program ID;
b) Manufacturer;
c) Version number;
d) Type and size of medium (requirement can be met by manufacturer stamp); and
e) Location of installation in interface element device, if potentially confusing.

Note: For EPROM based firmware, the identification label shall be placed over the UV window to avoid erasing or alteration of the program.

2.7 Submissions of Modifications (Partial Submissions) to a Previously Certified Item

2.7.1 General Statement

For any update submission (e.g., a revision to an existing hardware or software that is currently under review, certified or has been reviewed and not certified), the following information shall be required to process the submission in addition to the requirements set forth in **Section 2.2.2 Submission Letter**.

All modifications will require review and re-testing to verify compliance with the applicable requirements set forth in this TSD, as per **Section 1.1.1 General Statement I**.

2.7.2 Modification of Hardware

Each hardware submission shall:
   a) Identify the individual items being submitted (including part number);
   b) Supply a complete set of schematics, diagrams, data sheets, etc. describing the modification along with the reason for the change(s) for any manufacturer designed and built component; and
   c) Provide the updated or new hardware, a description and the method of connection to the original system or hardware components.

2.7.3 Modification of System Software Functions or to Correct Software Error

The submitter should use the same requirements as **Section 2.4 System Software Submission Requirements – Prototype (Full Submission) Certification** above, except where the documentation has not changed. In this case, a resubmission of identical documents is not required. However, the submission must include a description of the software change(s) and modules affected, and new source code for the entire program, if applicable.

2.7.4 Software Submission - Modification to Existing or Create New System Functionality

For a system specific submission (e.g., new workstation software), the following information may be required to process the submission:
   a) If new, a complete description of the function, including amendment manual and user documents, and new source code if applicable; and
   b) If modifying, the submission must include a description of the software change(s), modules affected and new source code, if applicable.

2.8 System Security Submission Requirements

2.8.1 General Statement

Where a system requires the use of defined user roles with associated passwords or pin numbers, a default list of all users and passwords or pin numbers must be submitted including a method to access the database. This will allow testing of the permissible access and to ensure no unauthorized access would be allowed for specific areas.

2.9 Joint Venture Submissions

2.9.1 General Statement

A system is considered a joint venture when two or more companies are involved in the manufacturing of one system. Due to the increasing amount of joint venture submissions (more than one supplier involved in a product submission) and to alleviate any confusion to the suppliers, the following procedures must be followed for such submissions (pending approval by GPEB).
   a) One company will prepare and submit the entire submission, even if they are using parts

from other suppliers, and must identify all part numbers of all components. This will be the primary contact for the submission;

b) The company submitting an approval request should do so on their letterhead. BCLC and/or the ATF will delegate an internal file number in this company's name and may bill this company for all costs incurred throughout the evaluation and approval process;

c) The primary contact will be called when questions arise. However, BCLC will work with all parties involved, completing the review.

d) All suppliers who are part of the submission "group" may need to be registered in British Columbia.

e) Upon completion, it is the primary contact company that will receive the approval letter, provided the submission meets the requirements set out in this TSD as well as those requirements set out in any other applicable TSD. The primary contact company may then release copies of the approval letter to the associated manufacturer(s).

2.10 Random Number Generator (RNG) Submission Requirements

2.10.1   General Statement

In some cases, where the system utilizes an electronic Random Number Generator (RNG), the electronic RNG shall be submitted with the prototype (full submission) request. RNGs shall be submitted for certification where:

a) The RNG code has changed or the implementation of the RNG has changed; or

b) Where a previously certified RNG is being implemented on a new hardware platform (i.e. change of microprocessor); or

c) Where a previously certified RNG is generating numbers that are outside the range of numbers previously tested; or

d) The RNG has never been certified before under this TSD. In this case, the RNG will be certified as a part of the overall submission.

2.11 Hardware Requirements for RNG Testing

2.11.1   General Statement

The manufacturer shall submit the device with all boards and associated hardware for testing.

2.11.2   Cable Requirements

The manufacturer shall submit a cable to connect from the device to a Personal Computer (PC)-based computer. This cable will utilize serial type communications and easily attach to a standard PC. If any special attachments or converters are necessary, the submitting party shall supply the equipment.

2.11.3   Specifications for RNG Testing

RNG testing shall be conducted using methodologies that are 1) generally-accepted in the gaming industry, and 2) found to be acceptable to BCLC. These methodologies will also require approval from GPEB.

2.11.4   Additional Requirements

a) Any test program RNG shall be identical to the RNG contained in the game software except for approved changes implemented to speed up the RNG process. GPEB, BCLC and/or the ATF may not allow any of the following changes where it determines such change might affect the data generated by the RNG. It should be noted that production software may have a test mode that contains this imbedded RNG test mode, provided that the machine indicates clearly that it is in said test mode;

b) The RNG test program should NOT require credits in order to play;

c) The RNG test program should NOT award credits;

d) The RNG test program does not have to show the game play. The program can just display a message that states RNG test in progress;

e) The manufacturer shall supply BCLC and/or the ATF with detailed instructions on how to set-up the system for test; and

f) The manufacturer shall supply BCLC and/or the ATF with a detailed description of the RNG algorithm that includes a detailed description on the RNG implementation in their device, including how the initial SEED is generated. In addition, it shall provide the algorithm for reseeding or changing of the seed during game play, if applicable.

3 Electronic Bingo System Requirements

3.1 Electronic Bingo System Definitions

3.1.1 General Statement

The following are commonly used terms in describing the game of Bingo and the play of the game that are used throughout this section.

"Deal" means each separate package or series of packages consisting of one game of instant bingo or book of cards with the same serial number.

"Designator" means an object used in the number selection process, such as a ping pong ball, upon which bingo letters and numbers are imprinted.

"Disposable paper card" means a non-reusable, paper bingo card manufactured with pre-printed numbers.

"Electronic Bingo Card Monitoring Device" (referred to as "EBM" throughout this section) means an electronic device that is used by a bingo player to monitor bingo cards purchased at the time and place of a licensed organization's bingo event, or at a permanent bingo facility. An EBM provides a means for bingo players to input numbers announced by a bingo caller; and compares the numbers entered by the player to the numbers contained on cards previously stored in the electronic memory of the device. An EBM also identifies the winning pattern; and signals only the bingo player when a winning bingo pattern is achieved. Automatically marking numbers on the EBM is permissible unless prohibited by municipal bylaws. An EBM shall not mean or include any device into which coin, currency, or tokens are inserted to activate play.

"Electronic verification" means the verification of bingo by entering the audit number of the winning bingo card into computer equipment which contains pre-programmed software for this purpose.

"Equipment and video systems" includes equipment that facilitates the conduct of Bingo such as ball blowers, flash-boards, TV monitors, cameras, electronic verifiers and replacement parts for such equipment.

"Fixed Base Station" has the same meaning as Player Terminal.

"Audit Number" means the number that is generally displayed at the top right side of a bingo card that identifies the unique pattern of numbers displayed on that card.

"Manufacturer" means a person who modifies, converts, adds to or removes parts from a completed piece of bingo or other gaming equipment.

"Books" means sets of bingo cards assembled in the order of games to be played. This may or may not include specials, winner-take-alls and jackpots.

"Perm Number" means a group of predefined bingo cards, each of which has a card number.

"Player Terminal" means a device or player station that is connected to a central bingo system and allows the player to play the game of electronic bingo.

"Random selection" or "randomly selected" means a process of selecting number designators to produce random numbers during a bingo game in which each designator or number in the remaining population has an equal chance or probability of being selected.

"Series number" means a unique number displayed or printed by the manufacturer on each set of bingo cards or each instant bingo in a deal.

"Session" means a period of time during which one or more bingo games are conducted that begins with the selection of the first ball for the first game and ends after someone wins the last game.

3.2   General Operating Procedures

3.2.1   Game Display

All systems shall utilize a lighted game board or other means to display to the public the drawn balls and the winning pattern of play for the game.

3.2.2   Ball Drawing

The balls shall be drawn one at a time from a machine that mixes the balls or via an approved electronic RNG certified by GPEB for use in the game of Bingo. The operator shall have no discretion over which ball is drawn.

3.2.3   Book Sales

There shall be an easy means to determine the number of books sold.

3.3   Point of Sale or Cashier Station Requirements

3.3.1   General Statement

Each Electronic Bingo System must have a device or facility that provides for the sale of bingo cards and the collection and accounting tools needed to determine all sales initiated through the Electronic Bingo System.

3.3.2   Accounting Requirements

The system must have the capability of recording and printing reports detailing sales and accounting information. This information can include, but is not limited to, price of card faces or books, number of faces or books sold, total sales for both paper and electronic faces, total paid.

3.3.3   Backup Requirements

The system must have a backup and archive utility to allow the operator to save critical data should a system failure occur. This backup can be automatically run after the end of each session or may be a manual process to be run at the operator's desire.

3.3.4   Sales and Accounting Report Requirements

The system shall contain sales and accounting reports detailing all financial transactions on the system. In addition, a log of significant events relating to accounting and sales must be maintained on the system and the operator shall be given the option of printing this log on demand.

3.3.5   Configuration Access Requirements

The interface element setup/configuration menu(s) must not be available unless using an authorized access method.

3.3.6   Sales Adjustments and Corrections

The system shall allow for meter adjustments and sales data corrections, if applicable, through a password controlled audit menu. A log of all accounting changes including the employee name/ID, authorized to make the changes, the date of the change, the time of the change and the detailed items adjusted must be kept on the system. A printout of this audit log must also be available upon demand.

3.3.7   Remote or Portable Sales Stations

The system may have the capability of supporting remote sales units provided that each unit communicates all sales to the main sales station either via radio communications or via direct wiring to the stations. Remote sales terminals may have all of the operational capabilities of the main sales station except that audit functions may only be done at the main station.

3.4   Callers Desk Requirements

3.4.1   General Statement

An Electronic Bingo System may possess a 'Callers Desk' or other means in which the selected balls or numbers get entered into the system for validation purposes. The Callers Desk shall not have the ability to sell or modify sales information.

3.4.2   Ball Draw Information

The Callers desk shall have either an approved ball blower system or an approved electronic RNG; see also **Section 3.7 Electronic RNG Requirements** to determine the order of drawn balls. Each drawn ball shall be announced prior to marking the light board. If the system uses EBM devices, the ball draw information must be entered into the system at the same time as the number is announced. The Callers Desk should have some means of correcting any input errors regarding drawn balls up to the time the game is closed.

3.4.3   Winning Bingo Card Verification

The system shall contain a means in which all card perm numbers or electronic serial numbers are contained within a database for winning card verification. The winning card number or numbers, if more than one card has simultaneous Bingo, shall be entered into the system and the system shall verify that the claim is valid. A printed record of all drawn balls, and each card face that won for each game.

3.5   Server and Database Requirements

3.5.1   General Statement

An Electronic Bingo System will possess a database of all cards in the perm. Modification or changes to card faces shall not be permitted. Access to the database shall be controlled by password authorization or another secure method.

3.5.2   System Clock

An Electronic Bingo System must maintain an internal clock that reflects the current time (24hr format – which is understood by the local date/time format) and date that shall be used to provide for the following:
   a) Time stamping of significant events;
   b) Reference clock for reporting; and
   c) Time stamping of all sales and draw events.

3.5.3   Synchronization Feature

If multiple clocks are supported the system shall have a facility whereby it is able to update all clocks in components.

3.5.4 System Accounting Reporting Requirements

The system or other equipment shall be capable of producing general accounting reports to include the following information:

a) The name of the organization;
b) The game date and total number of cards and packets sold;
c) The sales for regular and package games;
d) All information for special games that would be required to validate a bingo (i.e., Color, special patterns, special cards, free strips, odd/even numbers, etc.);
e) The winner-take-all and bonus computations;
f) Cash due and cash received reconciliation;
g) All other monies received from bingo game;
h) Cash and cheque expenses;
i) The total tax, cash, expenses and deposits and;
j) Other reports as required by BCLC and GPEB.

3.5.5 Game Schedule Reports

A report detailing the game schedule and the type of games being played in the session shall be available to be printed from the system. Changes to the game parameters shall not be allowed once the game has begun.

3.6 Electronic Bingo Card Marking Device (EBM) Requirements (Hand Held Bingo Units)

3.6.1 General Statement

EBM shall not mean or include any device into which coin, currency, or tokens are inserted to activate play.

3.6.2 Bingo Card Limitation

The EBM shall have the ability to limit the number of bingo cards per game.

3.6.3 Clearing of EBM

Each EBM shall be programmed to automatically erase all electronic bingo cards and/or bingo card face numbers stored in device:

a) Upon turning off the device after the last bingo game of the occasion has been played; or
b) By some secondary timing or clearing method.

3.6.4 Card Selection

No EBM may be designed to allow bingo players the ability to design their own bingo cards by choosing, rearranging, or placing numbers on a card.

3.6.5 EBM without a Site System

If the EBM is not used in conjunction with a site system but rather requires an organization to enter bingo card face numbers from disposable paper bingo cards, there must be a method to limit the number of cards loaded into the device. The limit will be established by BCLC, and will require approval from GPEB. Additionally, the system shall have a means of configuring the limitation. A site system shall not be able to engage in any type of sale, void, or reload transaction unless the EBM is connected to and communicating with the site system.

3.6.6 Printing of Bingo Cards

A receipting function for electronic bingo cards must be self contained within the site system and must record and print out on a copy which is given to the player, the device identification number, the date, number of electronic bingo cards purchased or loaded and the total amount charged for the electronic bingo cards.

3.6.7   Printing of Bingo Game Information

A site system shall be able to provide the winning numbers and game patterns required for the entire bingo occasion on a hard copy printout. The printout must be available upon demand at the bingo occasion.

3.6.8   Site System Malfunction

If any malfunction or problem with a site system that could affect the security or integrity of the bingo game, the bingo card monitoring devices, or the site system, is discovered, the system must log and immediately notify operations staff of the malfunction, as soon as possible.

3.6.9   EBM Back-up

It is recommended that regardless of the number of EBMs made available for play; at least one (1) device shall be reserved as a back-up device, in the event a device in play malfunctions.

3.6.10   Bingo Card Verification

Numbers appearing on a bingo card identified by an EBM to be a winning bingo card must be entered into an electronic card verifier.

3.7   Electronic RNG Requirements

3.7.1   RNG Requirements

Where use of an RNG results in the selection of game symbols or production of game outcomes, the selection shall:
   a) Be statistically independent;
   b) Conform to the desired random distribution;
   c) Pass various recognized statistical tests; and
   d) Be unpredictable.

3.7.2   Applied Tests

BCLC and/or the ATF may employ the use of various recognized tests to determine whether or not the random values produced by the RNG pass the desired confidence level of 95%. These tests may include, but need not be necessarily limited to:
   a) Chi-square test;
   b) Equi-distribution (frequency) test;
   c) Gap test;
   d) Overlaps test;
   e) Coupon collector's test;
   f) Permutation test;
   g) Kolmogorov-Smirnov test;
   h) Adjacency criterion tests;
   i) Order statistic test;
   j) Runs tests (patterns of occurrences should not be recurrent);
   k) Interplay correlation test;
   l) Serial correlation test potency and degree of serial correlation (outcomes should be independent of the previous game); and
   m) Tests on subsequences.

3.7.3   Background RNG Activity Requirement

The RNG shall be cycled continuously in the background between games and during game play at a speed that cannot be timed by the player. It is recognized that some time during the game, the RNG may not be cycled when interrupts have suspended game operation. This exception must be kept to a minimum, and will only be approved by GPEB where the suspension of RNG cycling does not represent a threat to the non-predictability of game play.

3.7.4   RNG Seeding

The first seed shall be randomly determined by an uncontrolled event. After every ball draw, there shall be a random change in the RNG process (new seed, random timer, delay, etc.). This will verify the RNG doesn't start at the same value, every time. It is permissible not to use a random seed; however, the manufacturer must ensure that the seed value is secure, and that games will not synchronize.

3.7.5   Ball Drawing Games

The consequences for games depicting balls being drawn from a barrel are as follows:
   a) 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;
   b) The barrel shall not be re-mixed except as provided by the rules of the game depicted; and
   c) As balls are drawn from the barrel, they shall 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 Electronic Bingo System).

3.7.6   Scaling Algorithms

   a) If a random number with a range shorter than that provided by the RNG is required for some purpose within the Electronic Bingo System, the method of re-scaling, (i.e., converting the number to the lower range), is to be designed in such a way that all numbers within the lower range are equally probable.
   b) 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.

3.8   Mechanical RNG Requirements

3.8.1   Mechanical Based RNG Games

Mechanical based RNG games are games that use the laws of physics to generate the outcome of the game. All mechanical based RNG games must meet the requirements of this TSD with the exception of the requirements for electronic RNGs. In addition, mechanical based RNG games must meet the following rules:
   a) BCLC and/or the ATF will test via PC communications multiple iterations to gather enough data to verify the randomness. In addition, the manufacturer may supply live data to assist in this evaluation;
   b) The mechanical pieces must be constructed of materials to prevent decomposition of any component over time (e.g., a ball shall not disintegrate);
   c) The properties of physical items used to choose the selection shall not be altered; and
   d) The player shall 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: Both BCLC and GPEB reserve the right to require replacement parts after a predetermined amount of time. In addition, the device(s) may require periodic inspections to ensure the integrity of the device. Each mechanical based RNG game shall be reviewed (and approved by GPEB) on a case-by-case basis.

3.8.2   Mechanical Ball Mixing Method

A mechanical device that uses air flow for mixing and randomly withdrawing balls to determine the letters and numbers or symbols to be called must be utilized in locations that do not use electronic RNGs to draw the winning balls. This device shall be constructed in the following manner:
   a) It will allow participants full view of the mixing action of the balls; and
   b) The operation cannot be interrupted to change the random placement of the balls at the

exit receptacle of the device, except when the device is shut off.

3.8.3   Bingo Balls

A set of balls, each bearing a unique number, and the letters B, I, N, G, or O provided, that the letters B, I, N, G, O need not appear if the balls are used for speed or hidden face bingo games. The following additional requirements regarding bingo balls must be met:

    a) The entire set of balls shall be available for inspection by the players before a bingo session begins to determine that all are present and in operating condition;

    b) Each numbered ball shall be the same weight as each of the other balls and free from any defects; and

    c) Each set of balls in play must be distinguishable from all other sets of balls in play.

3.8.4   RNG Outcome

There shall be a method to display the RNG outcome for the numbers called at all bingo games. The display must be visible to all players and clearly indicate all numbers that have been called.