



## **STANDARD SERIES**

### **GLI-11:**

# **Gaming Devices in Casinos**

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# CHAPTER 3

## 3.0 SOFTWARE REQUIREMENTS

### 3.1 Introduction

**3.1.1 General Statement.** This section of the document shall set forth the technical requirements for the rules of play of the game and related player displays.

### 3.2 Rules of Play

#### 3.2.1 Display.

- a) Payglass/Video Display. Payglass or video displays shall be clearly identified and shall accurately state the rules of the game and the award that will be paid to the player when the player obtains a specific win.
- b) The payglass or video displays shall clearly indicate whether awards are designated in credits, currency, or some other unit.
- c) The gaming device shall reflect any change in award value, which may occur in the course of play. This may be accomplished with a digital display in a conspicuous location of the gaming device, and the game must clearly indicate as such.
- d) All payable information, rules of play, and help screen information should be able to be accessed by a player, prior to them committing to a bet. This includes unique game features, extended play, free spins, double-up, take-a-risk, auto play, countdown timers, symbol transformations, and community style bonus awards.
- e) Payglass or video displays shall not be certified if the information is inaccurate.
- f) Upcoming Wins. The game shall not advertise ‘upcoming wins,’ for example three (3) times pay coming soon. Notwithstanding the foregoing, a game may display such advertising if:
  - i. It is mathematically demonstrable that an award occurrence is upcoming; and

- ii. If the player is shown a graphical representation in the form of a progress indicator it must accurately depict the current progress towards such an award.
- g) **Bonus Feature Information.** Each game which offers a feature such as free games or a fever mode must display the number of feature games that are remaining, during each game.
- h) **Multiple Decks of Cards.** Any games, which utilize multiple decks of cards, shall alert the player as to the number of card decks in play.

**3.2.2 Information to be Displayed.** A gaming device shall display, or shall have displayed on the glass, the following information to the player at all times the gaming device is available for player input:

- a) The player's current credit balance;
- b) The current bet amount. This is only during the base game or if the player can add to the bet during the game;
- c) All possible winning outcomes, or be available as a menu item or on the help menu;
- d) Win amounts for each possible winning outcome, or be available as a menu or help screen item;
- e) The amount won for the last completed game (until the next game starts or betting options are modified);
- f) The player options selected (e.g., bet amount, lines played) for the last completed game (until the next game starts or a new selection is made);
- g) The denomination being played clearly displayed; and
- h) It is recommended that a disclaimer\* regarding "Malfunction Voids all Pays" (or some equivalent verbiage) be clearly displayed.

\* *NOTE: Should the above disclaimer be used, it is required that this information be permanently affixed to the exterior of the machine and not removable.*

**3.2.3 Multi-Line Games.** The following requirements shall apply to multi-line games:

- a) Each individual line to be played shall be clearly indicated by the gaming device so that the player is in no doubt as to which lines are being bet on (displaying the number of lines bet shall be sufficient to meet this requirement);
- b) The credits bet per line shall be shown (it is acceptable if the bet per line can be calculated from the number of lines bet and the total bet); and
- c) The winning payline(s) shall be clearly discernable to the player (e.g., on a video game it may be accomplished by drawing a line over the symbols on the payline(s) and/or the flashing of winning symbols and line selection box). Where there are wins on multiple lines, each winning payline may be indicated in turn. (This would not apply to electro-mechanical reel games unless technology is used which implements paylines similar to those used on video displays, e.g. backlit reels flashing for each winning payline).

**3.2.4 Game Cycle.** A game is considered complete when the final transfer to the player's credit meter takes place or when all credits wagered are lost. The following are all considered to be part of a single game:

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

### **3.3 Random Number Generator (RNG) Requirements**

#### **3.3.1 Game Selection Process.**

- a) All Combinations and Outcomes Shall Be Available. Each possible permutation or combination of game elements that produces winning or losing game outcomes shall be available for random selection at the initiation of each play, unless otherwise denoted by the game;

- b) No Near Miss. After selection of the game outcome, the gaming device shall not make a variable secondary decision, which affects the result shown to the player. For instance, the random number generator chooses an outcome that the game will be a loser. The game shall not substitute a particular type of loser to show to the player. This would eliminate the possibility of simulating a ‘Near Miss’ scenario where the odds of the top award symbol landing on the payline are limited but frequently appear above or below the payline;
- c) No Corruption from Associated Equipment. A gaming device shall use appropriate protocols to protect the random number generator and random selection process from influence by associated equipment, which may be communicating with the gaming device.

**3.3.2 Random Number Generator Requirements.** The 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.

**3.3.3 Applied Tests.** The test laboratory may employ the use of various recognized tests to determine whether or not the random values produced by the random number generator pass the desired confidence level of 99%. These tests may include, but are not limited to:

- a) Chi-square test;
- b) Equi-distribution (frequency) test;
- c) Gap test;
- d) Overlaps test;
- e) Poker test;
- f) Coupon collector’s test;
- g) Permutation test;

- h) Kolmogorov-Smirnov test;
- i) Adjacency criterion tests;
- j) Order statistic test;
- k) Runs tests (patterns of occurrences should not be recurrent);
- l) Interplay correlation test;
- m) Serial correlation test potency and degree of serial correlation (outcomes should be independent of the previous game);
- n) Tests on subsequences; and
- o) Poisson distribution.

*NOTE: The independent test lab will choose the appropriate tests on a case-by-case basis depending on the RNG under review.*

**3.3.4 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. The test laboratory recognizes that some time during the game, the RNG may not be cycled when interrupts may be suspended. The test laboratory recognizes this but shall find that this exception shall be kept to a minimum.

**3.3.5 RNG Seeding.** The first seed shall be randomly determined by an uncontrolled event. After every game 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. Alternatively, it is permissible not to use a random seed; however, the manufacturer must ensure that games will not synchronize.

**3.3.6 Live Game Correlation.** Unless otherwise denoted on the payglass, where the gaming device plays a game that is recognizable to be a simulation of a live casino game such as Poker, Blackjack, Roulette, etc., the same probabilities associated with the live game shall 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, shall be 1 in 38; the odds of drawing a specific card or cards in Poker shall be the same as in the live game.

**3.3.7 Symbol Probability.** For game types (such as spinning reel games or video spinning reel games), unless otherwise denoted on the payglass, the mathematical probability of a symbol appearing in a position for any game outcome shall be constant.

**3.3.8 Card Games.** The requirements for games depicting cards being drawn from a deck are the following:

- a) At the start of each game/hand, the cards shall be drawn fairly from a randomly-shuffled deck; the replacement cards shall not be drawn until needed, and in accordance with game rules, to allow for multi-deck and depleting decks;
- b) Cards once removed from the deck shall not be returned to the deck except as provided by the rules of the game depicted; and
- c) As cards are removed from the deck they shall 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 gaming device).

*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.*

**3.3.9 Ball Drawing Games.** The requirements for games depicting balls being drawn from a pool (e.g., Keno) 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 pool shall not be re-mixed except as provided by the rules of the game depicted; and
- c) As balls are drawn from the pool, 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 gaming device).

**3.3.10 Scaling Algorithms.**

- a) If a random number with a range shorter than that provided by the RNG is required for some purpose within the gaming device, 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.

**3.3.11 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 this document with the exception of Sections 3.3.4, 3.3.5, and 3.3.10 that dictate the requirements for electronic random number generators. In addition, mechanical-based RNG games must meet the following rules:

- a) 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;
- 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: The laboratory reserves the right to require replacement parts after a pre-determined amount of time for the game to comply with Rule 3.3.11(b) above. In addition, the device(s) may require periodic inspections to ensure the integrity of the device. Each mechanical based RNG game shall be reviewed on a case-by-case basis.*



### 3.4 Payout Percentages, Odds and Non-Cash Awards

**3.4.1 Software Requirements for Percentage Payout.** Each game shall theoretically payout a minimum of seventy-five percent (75%) during the expected lifetime of the game (i.e., progressives, bonus systems, merchandise, etc. shall not be included in the percentage payout if they are external to the game).

*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.*

- a) **Optimum Play Used for Skill Games.** Gaming devices 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.
- b) **Minimum Percentage Requirement Met at All Times.** The minimum percentage requirement of 75% shall be met at all times. The minimum percentage requirement shall be met when playing at the lowest end of a non-linear payable (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 payable 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.
- c) **Double-up or Gamble.** The double-up or gamble options shall have a theoretical return to the player of one hundred percent (100%).

**3.4.2 Multiple Percentages.** For games that offer multiple percentages, please refer to the 'Configuration Settings' requirements in Section 3.13.4 of this document.

**3.4.3 Odds.** The highest single advertised payout on each gaming device shall occur, statistically, at least once in 50,000,000 games. This does not apply to multiple awards won together on the same game play where the aggregate prize is not advertised. This odds rule shall

not apply to games which make it possible for a player to win the highest win, multiple times through the use of free games. This rule does apply to each wager that wins the maximum award. If the highest advertised award can occur within a bonus or free game feature, the odds calculation shall include the odds of obtaining the bonus round including the odds to achieve the top award.

#### **3.4.4 Merchandise Prizes in Lieu of Cash Awards.**

- a) Limitations (annuities – lump sum or the payment plan) on the prize amount of merchandise shall be clearly explained to the player on the game that is offering such a prize.

### **3.5 Bonus Games**

**3.5.1 Bonus Games.** Games that have awards calculated that occur from game play within the base game's cycle (e.g. bonus features, including free games) shall meet the following:

- a) The game shall display clearly to the player which game rules apply to the current game state. These rules shall be made available to the player prior to the start of the bonus game versus during the bonus game;
- b) The game shall clearly display to the player possible win amount ranges, multiplier ranges, etc. that can be obtained from bonus play;
- c) A game which offers a bonus game, other than those that occur randomly, shall display to the player sufficient information to indicate the current status towards the triggering of the next bonus game;
- d) If the game requires obtaining several events/symbols toward a feature, the number of events/symbols needed to trigger the bonus shall be indicated along with the number of events/symbols collected at any point;
- e) The game shall not adjust the likelihood of a bonus occurring, based on the history of prizes obtained in previous games (i.e., games shall not adapt their theoretical return to the player based on past payouts);

- f) If a game's bonus is triggered after accruing a certain number of events/symbols or combination of events/symbols of a different kind over multiple games, the probability of obtaining like events/symbols shall not deteriorate as the game progresses (e.g., for identical events/symbols it is not permitted that the last few events/symbols needed are more difficult to obtain than the previous events/symbols of that kind);
- g) The game shall make it clear to the player that they are in this mode to avoid the possibility of the player walking away from the gaming device not knowing the game is in a bonus mode;
- h) Bonus game awards are part of the game cycle with predetermined award values. Bonus play award contributions to the program payout percentage are calculated consistent with awards of the regular game cycle. Specifically, if the cycle for bonus play awards is different from the base game cycle, then the bonus play awards, occurring within the base game's cycle, will be calculated as part of the game's payout; and
- i) The game shall display the rules of play for the bonus game awards, the rewards associated with each bonus play award, and the character combinations that will result in the specific payouts. For bonus play awards achieved by obtaining specific game results, the progress of the award shall be displayed.

**3.5.2 Player Selection or Interaction in Bonus Games.** All gaming devices which offer a bonus game or extended feature which requires player selection or interaction are prohibited from automatically making selections or initiating games or features unless the gaming device meets the requirements listed immediately below and explains the mechanism for auto-initiation or selection on the device glass or video display.

- a) The patron is presented with a choice and specifically acknowledges his intent to have the gaming device auto-initiate the bonus or extended play feature by means of a button press or other physical/machine interaction.
- b) The bonus or extended feature provides only one choice to the patron i.e., press button to spin wheel. In this case, the device may auto-initiate the bonus or extended feature after a time out period of at least two (2) minutes.

- c) The bonus of extended feature is offered as part of community play that involves two or more patrons and where the delay of an offered selection or game initiation will directly impact the ability for other patrons to continue their bonus or extended feature. Prior to automatically making selections or initiating a community based bonus or feature the patron must be made aware of the time remaining in which they must make their selection or initiate play.

### **3.6 Extra Credits Wagered during Bonus Games**

**3.6.1 General Statement.** If a bonus or feature game requires extra credits to be wagered during the bonus and the game accumulates all winnings (from the trigger and the feature) to a temporary “win” meter (rather than directly to the credit meter), the game shall:

- a) Provide a means where winnings on the temporary meter can be bet (via the credit meter) to allow for instances where the player has an insufficient credit meter balance to complete the feature;
- b) Transfer all credits on the temporary meter to the credit meter upon completion of the feature;
- c) Not exceed the max bet limit, if one is set; and
- d) Provide the player an opportunity NOT to participate.

### **3.7 Mystery Awards**

**3.7.1 General Statement.** It is acceptable for games to offer a “mystery award” (an award that is not tied to any specific symbol combination) however, the game must indicate the maximum amount the player could potentially win. If the minimum amount that could potentially be awarded is not displayed, it will be assumed to be ‘0’. In addition, both a minimum and maximum amount must be displayed for any mystery award if the method to receive the award involves strategy or skill. This would include methods where the value of the payable is used in order to make decisions that could increase the return to the player (e.g., video poker).

## 3.8 Multiple Games on the Gaming Device

**3.8.1 General Statement.** A multi-game is defined as a game which can simultaneously be configured for use with multiple themes and/or multiple pay tables.

**3.8.2 Selection of Game for Display.**

- a) The methodology employed by a player to select a particular game for play on a multi-game gaming device shall be clearly explained to the player on the gaming device, and be easily followed.
- b) The gaming device shall be able to clearly inform the player of all games, their rules and/or the paytables, before the player must commit to playing them.
- c) The player shall at all times be made aware of which game theme has been selected for play and is being played, as applicable.
- d) When multiple game themes are offered for play, the player shall not be forced to play a game by just selecting a game title, unless the game screen clearly indicates the game selection is unchangeable. If not disclosed, the player shall be able to return to the main menu.
- e) It should not be possible to select or start a new game before the current play is completed and all relevant meters have been updated, including features, gamble and other options of the game, unless the action to start a new game terminates the current play in an orderly manner.
- f) The set of games or the payable(s) offered to the player for selection can be changed only by a secure certified method which includes turning on and off games available for play. The rules outlined in ‘Configuration Setting’ of this document shall govern the NV memory clear control requirements for these types of selections. However, for games that keep the previous payable’s (the payable just turned off) data in memory, an NV memory clear is not required.
- g) No changes to the set of games, or to the payable(s) offered to the player for selection are permitted while there are credits on the player’s credit meter or while a game is in progress, notwithstanding specific protocol features which allow such changes to be made in a controlled fashion.