

DRAFT UGANDA STANDARD

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Gaming equipment - Part 2: Requirements for limited payout machines



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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda. UNBS is mandated to co-ordinate the elaboration of standards and is

- (a) a member of International Organisation for Standardisation (ISO) and
- (b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and
- (c) the National Enquiry Point on TBT/SPS Agreements of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of representatives of consumers, traders, academicians, manufacturers, government and other stakeholders.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

Committee membership

The following organisations were represented on the Management Systems' Standards Technical Committee, UNBS/TC 10/SC11, during the development of this standard:

Introduction

The requirements in this part of DUS 1580-2:2017 are supplementary to and do not replace any of the requirements of relevant Acts or supporting Regulations of the legislative authorities (Lotteries Gaming Regulatory Board) in Uganda.

The intention of this part of DUS 1580-2:2017 is to place sufficient controls on software and operations to ensure that wagering is fair, safe, secure, reliable, and auditable. It is not the intention of this standard to unreasonably:

- a) mandate a single solution or method of realizing an objective,
- b) limit technology application of software,
- c) limit creativity and variety of choice,
- d) limit marketability, or
- e) advantage any supplier or manufacturer of software.

Alternative implementations to the requirements contained in this part of DUS 1580-2:2017 shall be considered on a case-by-case basis by the licensing authority (LA).

Situations or considerations arising from evaluation of systems which have not been addressed in this part of DUS 1580-2:2017 (e.g. owing to omissions or the use of new technology) will be resolved at the sole discretion of the LA as part of the approval process.

Gaming Machines - Part 2: Requirements for limited payout machines

1 Scope

This Draft Uganda Standard DUS 1580-2:2017 specifies the general hardware and software requirements and the list of significant events required by the National Lotteries and Gaming Regulatory Board (LGRB) for gaming equipment to be used in venues holding site licenses for limited payout machines. The Lotteries and Gaming Act, 2016 requires that this equipment be attached to a central electronic monitoring system (CEMS), and therefore the requirements of DUS 1580-9:2017 are also applicable.

NOTE Gamble features may be restricted by requirements in legislation.

2 Application

This standard applies among others to all types of gaming machines registered under the Lotteries and Gaming Act, 2016, including workplaces that are outdoors, mobile or remote as specified in the scope of the Lotteries and Gaming Act, 2016.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

The following standards contain provisions which, through reference in this text, constitute provisions of this part of DUS 1580-2:2017. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this part of DUS 1580-2:2017 are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from Uganda National Bureau of Standards.

US IEC 60335-2-82:2002 Household and similar electrical appliances – Safety – Part 2-82: Particular requirements for amusement machines and personal service machines

US IEC 60950-1/IEC 60950-1, Information technology equipment – Safety – Part 1: General requirements.

US/IEC 61000-4-2/IEC 61000-4-2 (SABS IEC 61000-4-2), Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.

US/IEC 61000-4-3/IEC 61000-4-3, Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test.

US/IEC 61000-4-4/IEC 61000-4-4, Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test.

4 Terms and definitions

For the purposes of this standard, the following terms and definitions shall apply.

4.1.1 Approved

approved by the LA

4.1.2 Attract mode

information or graphics that relate to the game or games available on that machine that the GM may display during the GM's idle mode

4.1.3 Autoplay

facility in a GM that automatically plays the next game following the completion of the current game

4.1.4 Banknote acceptor

bill acceptor

bill validator

note acceptor

device that is fitted with photo-optic and other sensors (internal or external to the device) and that is used to accept and validate paper or plastic legal tender or coupons approved in that jurisdiction

4.1.5 Bet

wager amount of coins or credits put at risk at the commencement of a game or during a game

4.1.6 Capping

truncating situation where the amount added to the win meter from a single play within a game is less than either a) the monetary or credit value for the winning combination, or b) the sum of the monetary value or sum of the credit values for the winning combinations, from a single play within a game that is displayed to the player on the paytable.

4.1.7 Cash

coins, banknotes, tokens, magnetic or smart cards or any other legal representation of money in the gaming environment

4.1.8 Cashout

action initiated by a player when redeeming available credits from a GM

NOTE This term is used whether the GM pays credits from the hopper, by electronic transaction or by issuing a ticket.

4.1.9 Central Electronic Monitoring System

central monitoring system

monitoring and control system

host, site data logger and communications interface to each gaming machine and the connections between them

4.1.10 Certification Body

authority appointed to certify all GDs, both hardware and software

4.1.11 Coin Acceptance Device

coin input devices, together with the coin validator, photo-optic sensors (internal or external to the validator) and any additional devices used to accept and validate a coin

4.1.12 Coin Acceptance System

system that comprises the coin acceptance device and the associated software required to validate the physical input of coins and the conversion of these coins into credits

4.1.13 Coin Dispensing Device

device, together with coin storage mechanism (e.g. hopper or tubes), photo-optic and other sensors (internal or external to the device) and any other devices and pathways used to pay out coins to the player

4.1.14 Critical Data

data contained in critical memory as follows:

- a) all auditing meters;
- b) GD/game configuration data;
- c) information that pertains to the last five games (including the current game if incomplete);
- d) software state (the last normal state the GD software was in before interruption);
- e) soft metering information; and
- f) information regarding any significant events.

NOTE Information pertaining to the last five games is only required if applicable to that type of GD.

4.1.15 Critical Memory

memory locations for storing critical data

4.1.16 Error Event

set of operational conditions for a GD that constitutes a deviation from the normal conditions or the conditions specified during a game, during idle mode or during data interchange with another GD

4.1.17 Feature

activity within a game triggered by an outcome within that game

NOTE Any additional free game, free spin of certain reels, or secondary choice necessary to complete a game is considered a feature.

4.1.18 Gamble Feature

feature within a game that is only entered following a win, and which involves the risking of all or part of the results of that win

NOTE Gamble feature bets may incorporate a variety of symbols, player choices, or win chances.

4.1.19 Game

combination of events, including player interaction with the GD, that determine what prize may eventually be won from an amount staked or bet by the player

NOTE 1 Definitions of "game" in legislation take precedence over this definition.

NOTE 2 The game commences when the player

- a) makes a bet from the player's credit meter that is not part of any previous game, or
- b) inserts one or more coins or any form of wager and game play is initiated.

NOTE 3 The game is considered completed when the player

- a) cannot continue play activity without committing additional credits from the credit meter or CAD, and
- b) has no credits at risk.

NOTE 4 The following are all considered to form part of a single game, in other words, the game is not considered to have been completed until all the "parts" have been completed:

- a) games that trigger a free game feature and any subsequent free games;
- b) features occurring or triggered in a single game;
- c) "second screen" bonus feature(s);
- d) games with player choice (e.g. draw poker or blackjack);
- e) games where the rules permit wagering of additional credits, for example blackjack insurance or the second part of a two-part keno game; and
- f) gamble feature (e.g. double-up).

NOTE 5 The game is not considered to be complete until all the appropriate meters for the game have been updated.

4.1.20 Gaming Device

any device manufactured with the intention of being used for gaming purposes, including the monitoring and control system, GMs, host, site data logger or any combination of these, including software

4.1.21 Gaming Machine

gambling machine

slot machine

machine with which the player interacts for the purpose of gaming

For purposes of this standard, Gaming and Gambling may be used interchangeably

NOTE The definitions in the appropriate National legislation take precedence over this definition.

4.1.22 Hopper Dump

CDD dump

hopper count function in the GM whereby the entire contents of the CDD are counted out into the coin tray without affecting the LA revenue calculation

4.1.23 Host

central computer(s) of a monitoring and control system on which the software is loaded, and that is(are) certified by the CA

4.1.24 Idle Mode

state in which a GD is powered up, but is not active in the execution of a game, a test routine, an audit, a calibration, or a data interchange with an external device

4.1.25 Jackpot

award, in excess of the maximum prize as specified on a game's paytable that is available to be won by a player as a result of activity on a GM

4.1.26 legislation

National Legislation that deals with gaming matters and any regulation or rule made in terms of such legislation

4.1.27 Licensing Authority

legal body responsible for issuing and controlling GD approvals in terms of the relevant national legislation

4.1.28 Logic Area

secure enclosure area that houses electronic components that have the potential to influence the operation of the host, the site data logger or the GM

4.1.29 Master reset

intentional memory clear of the RAM and other volatile memory of a GD

4.1.30 Maximum prize

maximum win that is permissible in terms of legislation applicable in that jurisdiction

4.1.31 Maximum stake

maximum bet or wager that is permissible in terms of legislation applicable in that jurisdiction

4.1.32 Memory

locations within the GD for storing electronic information

4.1.33 Metamorphic feature

metamorphic game feature of a game or series of games that is not completely independent of play history

4.1.34 Multigame

more than one game type offered by the gaming software on a single GM, if permitted by the LA

4.1.35 Paytable

list of winning combinations with their associated win amounts, rules of the game and explanations as to how a winning combination may be made up that is, or is capable of being, displayed to the player

4.1.36 Period meter

soft meter meters implemented in software that are used in a similar way to the odometer (e.g. "trip meter") on a car

NOTE These meters are used to record meter values since a given event (e.g. coins and bills in since the last clearance).

4.1.37 Reprogrammable memory device

type of on-chip memory storage device

4.1.38 Return to player

ratio of total winnings to the total turnover, expressed as a percentage

4.1.39 Significant event

set of operational conditions to be recorded by the monitoring and control system for GDs during a game, during idle mode or during data interchange with another GD

4.1.40 Site data logger

on-site or intermediate data collector for a monitoring and control system NOTE Includes data collection units contained within, or as part of, GMs.

4.1.41 Stake

total monetary value of all bets or wagers put at risk to play a single game

4.1.42 Static artwork

artwork that is physically printed on glass, plastics, non-removable stickers, etc., and displayed on the GM to the player

4.1.43 Test laboratory

laboratory whose test results are accepted by the CA

4.1.44 Token

circular elements with an indicated monetary value that might be put into GDs

4.1.45 Tokenization

situation where the insertion of one coin, either gives rise to more than one credit being made available to the player, or where more than one coin is required to be inserted in the CAD for the player to receive one credit

4.1.46 Turnover

handle monetary value of the total of all cash or credits (or both) staked on game play

4.1.47 Win

award prize number of credits or monetary value awarded to the player as a result of a winning combination or combinations at the end of a single play within a game

4.1.48 Winning combination

one or more winning patterns that result in credits being added to:

- a) the total win meter, and
- b) the win display

4.1.49 Winning pattern

set of symbols that participates in a winning combination (including substitution)

4.1.50 Winnings

monetary value of the total of all coin or credits added to the total win meter and the win display during game play as a result of any game outcome according to the game rules, resulting in credits being added to the total win meter and to the win display

NOTE A GM might display this value in credits or monetary value.

5. General requirements**5.1 Documentation**

5.1.1 Each GD model shall have readily available and pertinent operating and service manuals.

5.1.2 The operating manual shall accurately depict the use of the GD in its operating environment, and shall provide sufficient detail and be sufficiently clear in its wording and diagrams to enable the relevant personnel to understand the manual with minimal guidance.

5.1.3 The service manual shall accurately depict the GD that it is intended to cover, and shall provide sufficient detail and be sufficiently clear in its wording and diagrams to enable a competent person to perform repair and maintenance in a way that is conducive to the long-term reliability of the GD.

5.1.4 Software documentation shall include an edit history providing details of all changes to code (what, why, who and when).

5.2 Enclosure construction

5.2.1 The enclosure shall be of a sturdy construction with a locking system that resists the kind of unauthorized entry that the GD is likely to be subjected to in a gaming venue. The enclosure shall be so designed to protect internal components from any external abuse to which the GD is likely to be subjected in a gaming venue.

5.2.2 Areas of the enclosure that are accessible to patrons and staff shall be so constructed and so finished as to comply with the relevant requirements of Uganda Standard.

5.2.3 All protuberances (e.g. buttons and handles) on the enclosure that are accessible to patrons or staff, and all attachments to the enclosure (e.g. labels and identification plates) shall be sufficiently robust to prevent their unauthorized removal.

5.2.4 Door support devices shall be of construction solid enough to prevent sagging of the door and any problems with door sensor alignment.

5.2.5 Spilled liquid shall not be able to enter the logic area, the power supplies, or areas that contain wiring of voltage exceeding 32 V.

5.2.6 Hinge centre pins, if used, shall not be able to be removed without leaving evidence of tampering.

5.3 Enclosure identification

5.3.1 The GD shall have an identification badge that bears the following information permanently affixed to the exterior of the enclosure by the manufacturer in a position that allows it to be read easily after the equipment has been installed:

- a) the name of the manufacturer;
- b) a unique serial number; and
- c) the date of manufacture.

5.3.2 The serial number shall be marked or affixed in a permanent manner onto the interior of the GD enclosure in a position that allows it to be read easily after the equipment has been installed.

5.3.3 Each external key switch of the gaming equipment enclosure, switches and player buttons shall be labelled, either according to its function or to the series of events initiated by its activation. If a key lock initiates some kind of user activity other than simply unlocking a door, then its function shall be labelled (e.g. if a key lock turns one way to enter audit mode, and turns the opposite way to enter cancel credit mode, then both directions shall be labelled accordingly).

5.4 Enclosure security

5.4.1 All of a GD's components that do not form part of the player's input interface (e.g. buttons) shall be stored within one or more secure areas of the GD, with the exception of areas that have access to lighting only. Unauthorized access to a secure area by physical means shall be detectable.

5.4.2 Where holes, gaps or slots exist in the exterior of a secure area, there shall be sufficient protection to ensure that the insertion of foreign objects shall not compromise the security or safety of that secure area.

5.4.3 A secure area shall resist forced entry and shall retain evidence of attempts at such entry.

5.4.4 Access to a locked area "A" shall not be possible from another locked area "B" without the use of a key or other secure access device for locked area "A".

5.5 Access detection systems

5.5.1 All access points shall have access detection sensors.

5.5.2 The door access detection system shall provide a signal to enable the monitoring and control system to interpret whether access to a logic area has occurred, regardless of whether mains power is switched on or off, or whether the GD is on-line or off-line. It shall remain able to detect this event with the mains power off for at least 24 h.

5.5.3 When the door of the GD is shut, it shall not be possible to insert any object into the GD in such a way that the access detection sensor is disabled.

5.5.4 The access detection system shall be secure against attempts to disable it or to interfere with its normal mode of operation. Cable runs and mountings for the logic area access sensors shall be securely protected.

5.5.5 It shall not be possible to create a false alarm door open condition (e.g. by bumping the door).

5.5.6 If the access detection system is disconnected, the gaming equipment shall interpret this action as the door having been opened.

5.5.7 The GM shall deactivate game play upon the opening of a door but may immediately reactivate when the door is closed, unless it has noticed the changing of counters or insertion of coins while this door is open, which is deemed to be interference and precludes automatic reactivation unless the GM was placed in test mode. In such case a significant event message shall be sent and the monitoring and control system shall add the staff card number to the event message. If no card number is available, the message shall be tagged by the monitoring and control system as an unauthorized access.

5.6 Logic areas

5.6.1 Items of electronic componentry that shall be housed in one or more logic areas are:

a) CPUs and other electronic components involved in the operation and calculation of game play (e.g. game controller electronics, and components housing the game or system firmware program storage media);

b) electronics involved in the operation and calculation of game result determination;

- c) electronics involved in the calculation of game display, and components housing display program storage media (passive display equipment exempted);
- d) communication controller electronics, and components housing the communication program storage media; and
- e) all reprogrammable memory devices that affect the game play function of the GD.

5.6.2 Communication, I/O and display interfaces that do not significantly influence the GD's behaviour may be excluded from the logic area.

5.6.3 Logic areas shall be fitted with access detection systems that shall enable the software and the system to detect whether the door to the logic area is open or closed, regardless of whether mains power is switched on or off, or whether the GD is on-line or off-line. It shall remain able to detect this event with the mains power off for at least 24 hours.

5.6.4 If the logic door is opened more than once while the GD is off-line or powered off, the GD shall treat this as a single entry.

5.6.5 There shall be a facility for storing a logic door open event for at least 14 days.

5.6.6 Provision shall be made on the logic door such that, if the LA requires it, a physical seal can be fitted which would be broken if the logic area was accessed.

5.6.7 It shall not be possible (without a detailed technical knowledge of the machine) to reset the logic area door open state (without detection) when the logic door is open (e.g. the access detection system shall not be able to be tampered with or replaced without leaving evidence that this has occurred).

5.6.8 It shall not be possible to insert a device into the logic area (without detection or without leaving evidence of tampering) that shall disable the door open sensor of the logic area when the door is shut.

5.6.9 If the logic area consists of a board with no door as such, as the entire board can be removed and accessed, the security requirements for the logic doors extend to logic units (i.e. removal of the board is equivalent to opening the door).

5.6.10 It shall not be possible to reset the logic area door open state, by either hardware or software means, if the logic door is still open.

5.6.11 The logic area shall either be located inside another secure area of the GD or, if not, shall possess two means of physically securing the area. These may be locks or seals (or both) as acceptable to the LA.

5.6.12 It shall not be possible to access the data bus, address bus, or control lines of any of the above-mentioned circuit boards without gaining access to a logic area.

6 Electrical requirements

6.1 Enclosure wiring

6.1.1 All connectors and wires shall be easily identifiable, both in the GD itself and on the circuit diagrams in the manuals.

6.1.2 The GD (and any associated equipment as determined by legislation) shall comply with the compulsory Uganda standards for safety of electrical and electronic equipment.

6.2 Electromagnetic compatibility

6.2.1 Electromagnetic interference

The GD shall comply with the requirements for class A equipment.

NOTE This requirement is subject to the requirements of the NEMA and Uganda Communications Commission (UCC) relating to EMI emissions causing interference with other equipment.

6.2.2 Electromagnetic immunity

When the GD is tested in accordance with the procedure given in US/IEC 61000-4-3, at severity level 2, at an electric field strength of 3 V/m, and over the frequency range 80 MHz to 1,0 GHz, it shall not divert from normal operation by the application of EMI.

6.2.3 Magnetic immunity

6.2.3.1 Immunity to alternating magnetic field at mains frequency

A GD shall not have its security properties changed by the application of a magnetic interference level to the GD. When tested in accordance with US/IEC 61000-4-8, the GD shall withstand a magnetic field that alternates at mains frequency and that has an amplitude of 1 A/m. The GD shall exhibit a capacity to recover or reset and complete any interrupted play without loss or corruption of any control or data information associated with the GD.

6.2.3.2 Immunity to impulse magnetic field

A GD shall not have its security properties changed by the application of a magnetic interference level to the GD. When tested in accordance with US/IEC 61000-4-9, the GD shall withstand an impulse magnetic field strength of 100 A/m (peak) and shall exhibit a capacity to recover or reset and complete any interrupted play without loss or corruption of any control or data information associated with the GD.

6.2.4 Temporary electrostatic disruption

The GD may show temporary disruption when subjected to a significant electrostatic discharge that exceeds the electrostatic discharge for the human body, but, when tested in accordance with US/IEC ~~SANS~~ 61000-4-2, at a level of 8 kV for air discharge and 4 kV for contact discharge:

- a) it shall exhibit a capacity to recover or reset and complete any interrupted play without loss or corruption of any control or data information associated with the GD; and
- b) there shall be no abnormal payout from a CDD.

6.2.5 Fast transient voltage

The GD shall employ sufficient power supply filtering to prevent disruption to the device during the application of the following fast transient voltages (rise time: 5 ns, duration: 50 ns) in accordance with US/IEC 61000-4-4:

- a) to the a.c. power lines of the power supply: 2,5 kV; and
- b) to the I/O lines: 1 kV.

The GD shall exhibit a capacity to recover or reset and complete any interrupted play without loss or corruption of any control or data information associated with the GD.

6.2.6 Surge voltage

The GD shall employ sufficient power supply filtering to prevent disruption when tested in accordance with US IEC 61000-4-5. When a surge voltage (rise time: 1,2 μ s, duration: 50 μ s) of 2 kV is applied to the a.c. power lines of the power supply, the GD shall exhibit a capacity to recover or reset and complete any interrupted play without loss or corruption of any control or data information associated with the GD.

6.2.7 Long-term voltage level change test

GDs shall operate normally during voltage changes within the legislated supply variations with which utility companies are required to comply (typically 10 % above and 10 % below the nominal 230 V). When tested in accordance with the following procedures, the GD shall show the capacity to recover or reset and to complete any interrupted play without loss or corruption of any control or data information associated with the GD:

- a) Connect the gaming equipment to a variable voltage power supply. Set the supply voltage to 1,10 times the rated value and operate the gaming equipment for 15 min. Check for compliance.
- b) Repeat the test with the supply voltage set to 0,90 times the rated value. Check for compliance.

6.2.8 Surges and sags of voltage

The GD shall employ sufficient power supply filtering to prevent disruption to the device in the event of surges or sags in the mains supply of 20 % above and 20 % below the nominal supply voltage.

When tested in accordance with the following procedures, the GD shall exhibit a capacity to recover or reset and complete any interrupted play or data collection without loss or corruption of any control or data information associated with the GD:

- a) Connect the GD to a variable voltage power supply. Set the supply voltage to the rated value. Operate the gaming equipment for 15 min.
- b) Increase the supply voltage rapidly (i.e. within 0.5 s) to 1.20 times the rated voltage, maintain for 5 s and return rapidly to the rated voltage.
- c) Reduce the supply voltage rapidly to 0.80 times the rated value, maintain for 5 s and return rapidly to the rated voltage.

NOTE It is acceptable for the GD to reset, provided that no damage to the equipment or loss or corruption of the data is experienced.

6.3 Power supply

6.3.1 All ratings of fuses shall be clearly stated on or near the fuse holder, and switches on the power supply shall clearly indicate in a permanent manner the on and off positions.

6.3.2 The GD shall be able to operate from a 230 V, 50 Hz main power source, which might deviate 10 % above and below nominal voltage and 1 % above and below nominal frequency.

6.3.3 Where a GD enclosure contains more than one power switch, each switch shall be so marked in a permanent manner to indicate clearly to which board or component it applies.

7 Computer and peripheral hardware requirements

7.1 Random access memory

7.1.1 GD RAM data storage shall be capable of reliably preserving its memory contents for at least 14 d with the mains power switched off.

When the battery is at or below its 14d capacity limit, the GD shall automatically generate a type 4 significant event message to the monitoring and control system and disable itself. It shall not be possible to reset the GD until the battery capacity has increased above the 14 d capacity limit, either by recharging or replacement of the battery. If a rechargeable battery is used, the power source shall be capable of recharging the battery to its full capacity within 24 h.

NOTE General significant event messages such as "tilt" are not acceptable.

7.1.2 RAM clears of the GD shall not be possible except by accessing the logic area in which the RAM is housed.

7.1.3 In a GD, batteries shall be secured and connected to the board(s) that contain RAM such that the batteries cannot be easily disconnected.

7.2 Critical memory requirements

7.2.1 Manufacturers shall ensure that critical data are recorded in at least two physically separate and distinct hardware devices (which may be of the same type), either within the GD or the local data logger (or both). This critical data record shall be retained on these devices until such time that at least the following data have been successfully transmitted to the monitoring and control system:

- a) all auditing meters;
- b) current credits;
- c) GD/game configuration data (e.g. GM address, denomination); and
- d) significant event information.

7.2.2 These devices shall be capable of being reliably updated at every critical memory change.

7.3 Program memory storage requirements

7.3.1 All ROMs (e.g. EPROMs, CD-ROMs and PLDs) shall be clearly marked to identify the software and the revision level of the information stored in the devices. This shall be the same version and revision level as that which the LA, based on the certification provided by the CA, has approved.

7.3.2 All EPROMs (and PLDs that have erasure windows) shall be fitted with covers over their erasure windows.

7.3.3 EPROMs that contain any settings or programs that have the potential to cause the GD to fail to comply with this part of US/IEC 1718 or with legislation shall not be contained within the GD. This includes EPROMs that have a range of parameters that are used for setting up the device.

7.4 Programmable logical elements

All programmable logic elements that incorporate read-inhibit fuses shall be programmed to prevent unauthorized reading or copying of these elements.

7.5 Circuit boards

Patch wires and track cuts may be present, but shall be documented in the service manual in an appropriate manner.

7.6 Switches and jumpers

7.6.1 If switches or jumpers that have the potential to cause the GD not to comply with this part of DUS 1580-1:2015 or with legislation, are present, then setting them in a manner that would result in noncompliance

shall cause the GD to enter "Tilt" mode, which in turn shall be signalled to the monitoring and control system. As long as the switch or jumper is set in this manner, it shall not be possible to reset the GD.

7.6.2 All switches and jumpers that have the potential to affect the communications or operational characteristics of the GD shall be documented for evaluation by the TL.

7.7 Communication

7.7.1 Where multiple GDs communicate over a single multi-drop transmission medium, each GD shall operate at an accurate and consistent baud rate, which shall ensure consistently accurate and error free communication (over and above the error checking and correction requirement).

7.7.2 Gaming equipment communication interfaces shall comply with US IEC 60950-1.

7.7.3 Ports for communication cabling shall be clearly and permanently labelled according to their function.

7.7.4 Ports for communication cabling (other than external ports used exclusively for auditing) shall be located within a secure area to prevent unauthorized access to the ports and to the attached cables.

7.7.5 The connection or interaction of a GD with a monitoring and control system shall not affect the function of the GD or affect the game in any way, other than to:

- a) disable the GD or game under the appropriate, approved circumstances, e.g. such as when offline to the next point in the monitoring and control system, and
- b) introduce small delays (unperceivable to the player) in the duration of the game, so as to facilitate communication with the monitoring and control system.

NOTE The general nature of the embedded processor usually found in GDs, sometime require a momentarily "hold off" of the next round of communication from the GD to the monitoring and control system owing to the sequencing/timing of communications to the monitoring and control system by a multitude of connected GDs.

7.8 Video monitors and touch screens

Where fitted, video monitors shall comply with US/IEC 60950-1.

7.9 Printers (if applicable)

7.9.1 If a GD is equipped with a printer, the printer shall be located in a secure area other than the logic area.

7.9.2 The printer paper shall be easily replaced without any need to access the logic area of the GD. Instructions for the loading of printer paper shall be given in the operating manual.

7.9.3 The software shall register and react to any printer fault conditions and shall allow the machine to complete the printing of the current ticket and then pause printing and display appropriate on-screen messages.

8 Transaction system requirements

8.1 Coin acceptance systems

8.1.1 Coin comparators shall not be permitted in a limited payout GM.

8.1.2 Each coin inserted shall register the actual Shilling value and cents value or the number of credits on the player's credit meter or bet meter. If registered directly as credits, the conversion rate shall be clearly stated or be easily discernible from the GD.

8.1.3 During periods when the gaming equipment is inoperable for any reason, all coins shall either be prevented from being inserted, or be rejected.

8.1.4 The coin input system shall have means by which it can detect or logically deduce (or both) when potential cheating is in progress.

8.1.5 In games where tokenization is used, each valid coin inserted shall register a number of credits that are clearly stated on the machine artwork, video or other form of information display.

8.1.6 The CAS shall be able to:

- a) not have its coin path easily altered from the outside of the GD without leaving evidence of

physical modification,

- b) deliver an accepted coin to the correct area of the gaming equipment,
- c) credit the customer's credit balance with the appropriate rand and cents value or number of credits for each accepted coin, and to return all other coins to the coin tray, and
- d) detect and prevent attempted fraud.

8.1.7 The software shall direct coins to either the CDD or to the coin drop box. The "CDD full" detector shall be continually monitored to determine whether a change in diverter status is required. If the state of the detector changes, the diverter shall operate as soon as possible after the state change without causing a disruption of coin flow, or creating a coin jam.

8.1.8 Diverter operations shall be dependent only on CDD sensor status, not software counters. If a software counter is used, it shall be used in conjunction with a mechanical sensor, which shall override the software counter.

8.1.9 Coin validation shall be electronically based and be so designed as to ensure that each coin inserted and accepted as valid by the GD is added to the credit meter and that it updates all appropriate meters.

8.2 Coin dispensing devices

8.2.1 The CDD shall have detection devices to enable the GD to interpret and act upon conditions when the CDD is empty or when the CDD malfunctions.

8.2.2 The CDD shall be resistant to manipulation such as by the insertion of foreign objects into the output path.

8.2.3 If a GD can be operated with the use of coins and is fitted with a CDD, it shall be located in a suitably secured area within the GD.

8.2.4 If the GD does not issue clear instructions on the steps necessary either to perform a CDD refill or to reset the fault when a "CDD jam/empty" error message or equivalent wording is displayed, these instructions shall be clearly set out in the operator manual.

8.2.5 If power to the CDD is removed, the CDD should not dispense extra coins. If additional coins are dispensed, this shall only be acceptable as long as this extra payout is not reflected on the GD's meters, and therefore does not affect the collection of taxes.

8.2.6 A GD shall not permit a cashout to be performed during any of the following conditions:

- a) during game play;
- b) while the GD is in demonstration, test or audit mode; and
- c) while the GD is in a fault condition that requires manual activation.

NOTE Manual reactivation implies that the GD is reactivated for game play before the cashout is permitted.

8.2.7 If the value of the prize, when added to the player's current credits, exceeds the "maximum credit" setting in the GD, the value of the prize shall be dispensed directly from the CDD or a handpay shall be initiated.

8.2.8 The design and construction materials of a CDD shall be of an acceptable quality and the CDD shall require no adjustments for at least the manufacturer's recommended maintenance period.

8.3 Bill acceptor system

8.3.1 The banknote acceptor device shall perform a self-test at each power up. In the event of a self-test failure, the banknote acceptor shall automatically disable itself (i.e. enter banknote reject state) until the error state has been cleared.

8.3.2 If burning materials enter a banknote acceptor, the only degradation permitted is for the acceptor to reject all banknotes. Entering a state where either incorrect banknotes are accepted, or correct banknotes are accepted but not credited to the customer, is not acceptable.

8.3.3 If liquids are spilled into a banknote acceptor, the only degradation permitted is for the acceptor to reject all banknotes. Entering a state where either incorrect banknotes are accepted, or correct banknotes are accepted but not credited to the customer, is not acceptable.

8.3.4 Any interconnecting cable or plug (or both) relative to the banknote acceptor shall have some form of strain relief. Knots in the cables when passing through holes in the cabinet or housing are not an acceptable means for achieving such strain relief.

8.3.5 Interconnecting cables from the banknote acceptor device to the GD shall not be exposed external to the GD or readily accessible to unauthorized staff.

8.3.6 The banknote storage area (e.g. receptacle) shall be attached to the GD in such a manner that it cannot be easily removed by physical force. It may be located within the GD or attached to the base on which the GD is positioned.

NOTE The relevant jurisdiction may grant dispensation for this requirement if it can be demonstrated that an external banknote acceptor has at least the same degree of security as one located inside the GD. Areas of security that should be examined when considering such a dispensation are:

- a) physical strength of the attached banknote acceptor device; and
- b) position and type of fixings (e.g. screws, nuts, and bolts).

8.3.7 The designated path which banknotes traverse and associated handling devices shall be designed so that they resist jams and do not impair travel during insertion, acceptance, depositing or expulsion of banknotes.

8.3.8 The designated path which banknotes traverse and associated handling devices shall be of solid construction.

8.3.9 Any access to the banknote acceptor components shall disable the GD from game play until such time as the access has been cleared.

8.3.10 Any GD that has both a coin and a banknote acceptor is required to include a number of security features as follows:

- a) access to the coin drop box shall not give access to the banknote storage area;
- b) access to the banknote storage area shall not give access to the coin drop box; and
- c) the GD shall be able to cater for simultaneous input of banknotes and coins.

NOTE The rejection of either or both are acceptable options.

8.3.11 All points in the banknote path shall be easily accessible to allow for inspection and clearance by service personnel once valid access is gained to the area in which the banknote acceptor is housed. Actions intended to be carried out by persons other than licensed technicians shall not require the use of tools.

8.3.12 The banknote acceptor shall be easily removed for inspection by service personnel.

8.3.13 Access to banknote acceptor components and banknote storage areas shall be secured by means of key lock. Access doors for both areas shall be fitted with "door open/close" sensors (use of the main door sensor for access to banknote acceptor components is acceptable).

8.3.14 A GD that contains a banknote acceptor device shall maintain sufficient metering to be able to report the following:

- a) the total monetary value of banknotes accepted (banknote money in);
- b) the number or value of banknotes accepted for each banknote denomination; and
- c) the individual rand value of each of the last five banknotes accepted.

NOTE These meters are master meters, i.e. they should only be cleared on master reset of the GD.

8.3.15 A GD with a banknote acceptor installed shall comply with all of the hardware orientated requirements of this part of DUS 1580-2:2017, including specifically electrical safety and radio interference regulations. GDs which have been previously approved to which banknote acceptors are to be added, shall be retested for compliance with these requirements. Where previous test reports have been supplied, new certification shall be obtained with a GD submitted for test installed with the banknote acceptor and all other modifications. For example, specific tests that may require additional testing before re-certification are:

- a) electrostatic discharge,
- b) power surges,
- c) radio frequency interference, and
- d) EMI.

8.3.16 Any access required to clear a banknote jam shall not give access to the banknote storage area, except if the jam occurs inside the banknote storage area.

8.3.17 The keys that open the locks on the banknote storage door shall be different from the standard outer door or banknote outer door. They may be the same as the coin drop box door keys.

8.3.18 The banknote acceptor device shall have a banknote storage area (e.g. receptacle) full sensor. This shall be indicated on the GD. The banknote acceptor shall disable itself when full but game play may continue.

8.4 Bill validator system

8.4.1 It shall not be possible to successfully disable any validation feature and thus register any counterfeit banknote as a valid banknote.

8.4.2 Acceptor devices shall incorporate sophisticated detection methods to validate banknotes by suitable evaluation methods (e.g. magnetic, ink colour and density).

8.4.3 Banknote acceptors shall be factory set only; it shall not be possible to access or conduct maintenance or adjustments in the field, other than a) the selection of banknotes and limits, or b) changing of approved EPROMs or downloading of approved software.

The adjustment of the tolerance level for accepting banknotes of varying quality, or the alteration of any of the possible checking procedures is prohibited in the field. If a banknote acceptor has multiple tolerance levels, the ability to switch to lower levels shall be disabled.

8.4.4 If the banknote acceptor only accepts banknotes in a particular direction, orientation or with a particular side facing up, there shall be sufficient instructions on the GD artwork to clearly indicate this to the patrons. A label with a symbolic sign of the banknote orientation attached near the banknote entry point is considered to be the best method of complying with this requirement.

8.4.5 The GD may have a facility where the banknote acceptor operation can be disabled/enabled by means of an action not available to the player, for example, audit mode or GD cabinet access. In the instance of the banknote acceptor being disabled the GD can still be played using coin input.

8.4.6 A GD shall not register credits as the result of banknote input until the banknote has passed the point where it is possible to be rejected by the acceptor or to be withdrawn.

8.4.7 All invalid banknotes shall be rejected and returned to the player.

8.4.8 Under no circumstances may credits be lost if banknotes are input during game play.

8.4.9 All acceptance devices shall be able to detect the entry of valid banknotes and provide a method to enable the GD software to interpret and act appropriately upon a valid or invalid input (e.g. insertion of counterfeit banknotes).

8.4.10 The GD shall be able to detect a banknote jam that has occurred.

8.4.11 A banknote acceptor device shall be implemented with a means to enable or disable particular value banknotes. The procedure for setting acceptable banknote values shall be by means of a command from the system or access to a secure area of the GD. If permanent artwork is used to display the acceptable denominations, the latter method, which requires attending to each GD, is preferred.

8.4.12 The acceptance device(s) shall be electronically based and configured to ensure that it only accepts valid banknotes of legal tender or coupons approved for that jurisdiction and rejects all others.

8.4.13 An acceptance device shall include a mechanism which prohibits the input of any banknotes, or alternatively, rejects all banknotes entered, during periods when the GD is inoperable or deactivated for any reason.

8.4.14 The GD, if configured for a banknote acceptor device, shall not activate the banknote acceptor if any part of the banknote acceptor that relates to the validation process, or to delivery of the banknote to the storage area, is missing.

8.4.15 All accepted banknotes shall be deposited into the secure banknote storage area.

8.4.16 A banknote acceptor receptacle full condition need not disable the GD but shall disable banknote input.

8.4.17 In the case of GDs that support banknote acceptors that implicitly implement tokenization of the GD, the following requirements apply to this tokenization aspect:

a) each valid banknote inserted shall register the actual rand value or the correct number of credits for the current game. If registered directly as credits, the conversion rate shall be clearly stated on the GD; and

b) the GDs shall ensure that all banknotes accepted shall correctly increment the player's balance (GD or account as the case may be) and relevant meters in all circumstances. This includes but is not limited to cases of power failure, door open, coin tilt, audit mode entry or any other form of deactivation of the GD.

8.4.18 The GD software shall incorporate a facility which shall automatically disable the banknote acceptor once the credit balance of the GD or account, if appropriate, exceeds the limit set in the legislation expressed in rand. This limit shall not be able to be

a) exceeded, or

b) disabled.

This Shillings level may only be set, or changed, by either a down-loadable parameter from the system or by accessing the logic area of the GD. This level shall be displayed to the patron in the following form or similar:

"Notes not accepted if credits over Shs XXX,XX are registered".

NOTE This information may be displayed as physical artwork.

8.4.19 If banknote input messages received from the banknote acceptor are to be maintained in the GD's memory for a period of time without being added to the player's credit balance, the storage of these messages shall be maintained in, and comply with the critical memory requirements. The GD shall be able to recover these messages whenever it restarts, especially after a power failure, or observation of a partial memory corruption.

8.4.20 The banknote acceptor device shall employ a reliable means of transmitting credit values to the GD. Pulse stream interface or serial communication without error detection and correction are not considered to be reliable communication methods.

8.4.21 The banknote input system shall be constructed in a manner that protects against vandalism, abuse or fraudulent activity. As a guide the following might be tested:

- a) ability to prevent manipulation by the insertion of foreign objects into the banknote input system;
- b) ability to prevent easy alteration to the banknote path from the exterior of the GD without leaving evidence of physical modification of the device; and
- c) ability to deliver a banknote to the banknote storage area (e.g. receptacle).

8.4.22 An alarm shall be raised for any of the following banknote acceptor specific conditions, unless done by staff authorized to do so and in accordance with an approved procedure:

- a) opening of the banknote acceptor area outer door (if separate from the GD main door); or
- b) opening of the banknote storage area door.

8.5 Electronic funds transfer

8.5.1 If cards that employ a form of electronic storage of data are to be used, the TL shall be satisfied with all aspects of security. Some of the major concerns are:

- a) prevention of illegal or accidental alteration of data;
- b) protection from loss of data;
- c) recovery of information relating to damaged or lost cards;
- d) accuracy of read/write operations;
- e) protection from fraudulent duplication of card information or credit balances;
- f) maintenance of all electronic fund transactions in a system log;
- g) recovery of all electronic funds transaction after failure of the system; and
- h) correct updating to the storage media and to the system of all electronic funds transactions.

8.5.2 If cards are used for gaming against a player account, no bet may exceed the available balance of an account.

8.5.3 The GD card reader shall not accept an illicit card or a card that is not authorized for use.

8.6 Credit redemption

8.6.1 If a patron attempts to collect available credits, and the total coin value of those credits is less than the maximum CDD pay amount, the GD shall dispense the equivalent value in coins from the CDD.

8.6.2 If a player attempts to collect available credits, and the total coin value of those credits exceeds the maximum CDD pay amount, or if after a CDD pay the patron attempts to collect any residual credits (e.g. in a tokenized game), the GD shall either:

- a) generate a validated ticket for cash redemption, or
- b) initiate a funds transfer to an appropriate player account, or
- c) automatically lock up and go into a handpay or cancel credit, whereby the player is given the option either to receive a cancelled credit or to cancel the cancel credit and play out the remaining credits.

8.6.3 Whenever credits are redeemed by a player, the number of credits paid out shall be clearly displayed (collect display) and shall be correspondingly removed from the credit display. In addition the monetary value of the amount redeemed may be displayed.

8.6.4 When there are "odd credits", or residual credits (i.e. less than the CDD base coin) in the player balance and a collect is attempted on a GD with a CDD, the GD shall pay out the balance as if it were a "large credit balance" (e.g. by cash ticket or cancelled credit) instead of from the CDD.

Alternatively, if a GD does not have this function, or if this function is disabled, there shall be a clear message on the GD in a prominent position, and in a font large enough to be easily read at a distance of three meters, that states that "This gaming machine does not pay out any credit amount less than <value>" (insert appropriate value in the message), or equivalent wording.

8.7 Cashout by printed ticket

8.7.1 A valid ticket shall contain the following information:

- a) the name of the licensed venue;
- b) the unique GD identification number;
- c) the current date in the prescribed format;
- d) the time of day in the prescribed format;
- e) the value of the credit in numbers and words;
- f) the unique identifying number of the ticket voucher; and
- g) the validation (checksum) number or bar code; note that the validation number computation method shall be evaluated by the TL and certified by the CA.

8.7.2 Bar codes or other form of machine readable markings on a voucher shall have enough redundancy and error checking to ensure that 99,9 % of all misreads are flagged as an error.

8.7.3 Ticket voucher printing, as a method of credit redemption, is only permissible where the GD is linked to a site data logger which allows validation of printed tickets.

8.7.4 A ticket request shall be rejected by the system if the device that generates the ticket security feature is not able to issue such a feature and the system shall initiate the appropriate error handling procedure.

NOTE A security feature includes any mark, attribute or element (e.g. a ticket number) that is added or attached to the ticket in order to allow the ticket to be validated.

9 Software requirements

9.1 Source code

9.1.1 General

9.1.1.1 The following shall appear in all source code modules:

- a) module name;
- b) version number;
- c) revision number; and
- d) description of functions performed.

9.1.1.2 So as not to complicate the validation of software, all individual device-specific information (e.g. GD identification number or address, venue name and touch screen calibration) and all device group specific information (e.g. jackpot configuration/parameters) shall be stored separately from any common information (i.e. common to all GDs of a particular type).

NOTE The intention here is that it should be possible to easily verify game software. Venue and other location-specific information, date of compilation, etc, that may be included on the game software storage

device (e.g. EPROM or CD) make it impossible to obtain a signature that is common to all devices.

9.1.1.3 Each GD shall have a function or program that displays the current software version(s) installed on the device.

9.1.2 Control and upgrade

9.1.2.1 Software media shall be clearly labelled, and shall contain sufficient information to identify the version and modification level. The identification used is at the discretion of the supplier but shall strictly follow the supplier's identification system as detailed in the supplier's software configuration control procedures.

9.1.2.2 Superseded approved versions of programs may be held on the storage media. However, it shall be possible to clearly identify which files belong to which version of the program.

9.1.2.3 The method of loading programs to the storage media (e.g. disk file transfer or down-line load) shall be certified by the CA.

9.1.3 Verification

9.1.3.1 All program source codes for GMs shall be made available for examination by the TL.

9.1.3.2 The party that submits software shall provide the wherewithal to demonstrate, or otherwise prove to the satisfaction of the TL, that the source code supplied compiles to the same executable code as contained in the firmware program store of the GD submitted for certification.

9.1.3.3 When compiled, all source code supplied to the TL shall generate object code that is exactly the same as that installed in the GD.

9.1.3.4 If redundant sections of code exist in the program, the supplier shall provide an indication of the areas of code which are redundant.

NOTE One way of achieving this goal is to use compiler directives that omit sections of code (e.g. if a particular compiler option is set or not set).

9.2 Critical memory requirements

9.2.1 Critical memory

Critical memory shall store all data that are considered vital to the continued operation of the GD.

This shall, at a minimum, include:

- a) all auditing meters;
- b) current credits;
- c) GD/game configuration data;
- d) information that pertains to the last five games (including the current game if incomplete);
- e) software state (the last normal state the GD software was in before interruption); and
- f) significant event information currently stored in RAM.

9.2.2 Maintenance

9.2.2.1 To cater for disruptions that occur during the update process of critical memory, at any point in time during an update there shall exist sufficient information that allows the software to fully cater for such disruptions (e.g. the software shall be able to identify the state of each copy of critical memory and recover from the most appropriate good copy to complete the update in each case of a disruption).

9.2.2.2 The result of the critical memory validation shall be stored and kept always up to date (i.e. shall be updated after every instance of critical memory change).

9.2.2.3 A validity check of critical data memory shall be undertaken at least before a game play.

9.2.2.4 When updating meters in critical memory, the software shall ensure that errors in one logical copy of the meters are not propagated through to other good copies.

9.2.3 Detection of corruption

9.2.3.1 Any failure of a validity check shall be classed as either

- a) recoverable memory corruption, if at least one copy of critical memory is established to be

good, or

b) unrecoverable memory corruption.

9.2.3.2 A validity check of GD critical memory shall be undertaken at least after every restart of the device or transaction of significance (e.g. logic door closed, door closed, parameter change or reconfiguration). After a device restart (e.g. power off and on), the device shall complete its validity check of the critical memory area and then perform a comparison check of all good logical copies of critical memory.

9.2.4 Recovery

9.2.4.1 If the GD is so designed that after an uncorrectable memory corruption it is possible to view all logical copies of meters, the GD shall highlight which of these figures are expected to be good as opposed to those that might be corrupted.

9.2.4.2 An unrecoverable memory corruption shall result in a RAM error.

9.2.4.3 If an unrecoverable memory corruption occurs, it shall require a master reset.

9.2.4.4 If validity checking of critical memory information fails, and data memory remains operational, the software could recover critical memory information in order to continue game play.

This option has the following implications:

a) All logical copies of critical memory shall be recreated using the good logical critical memory as a source.

b) The device shall verify that the recreation of the critical memory was successful before attempting to identify any permanent physical memory failure. If such permanent memory failure is determined, the device shall enter the unrecoverable memory corruption sequence.

9.3 Program memory storage

9.3.1 Labelling

All program storage media shall be uniquely labelled, identifying the following:

- a) program name (and shell name, if applicable);
- b) name of manufacturer;
- c) development number or variation;
- d) version number;
- e) type and size of media; and (if applicable)
- f) location in GD (if critical, e.g. socket position 3 on PCB).

9.3.2 WORM memory

9.3.2.1 A WORM (e.g. CD-ROM) used as a program or fixed data storage device shall be written such that only the actual program and data required are written to the WORM.

9.3.2.2 The operational software shall provide an integrity check method to verify that there are no additional or missing program or data records/files on the WORM.

9.3.2.3 There shall be an ability to conduct an integrity check independent of the device's operational software to verify that there are no additional or missing program or data records/files on the WORM (e.g. inserting a CD-ROM in another PC which then conducts a full signature check and directory search check over the CD-ROM space).

9.3.2.4 The method of changing to different versions of the program, including reversion to old versions shall be certified by the CA.

9.3.3 Reprogrammable memory

9.3.3.1 If permitted by the LA, the downloading of program data to reprogrammable memory program storage devices by means of the monitoring and control system shall be protected from unauthorized reading, erasure or copying.

9.3.3.2 If the downloading of programs into a reprogrammable memory device by means of the monitoring and control system is permitted by the LA, the method of doing so and of verifying such programs shall be evaluated by the TL and certified by the CA.

9.3.3.3 If a reprogrammable memory device is irreversibly configured at the hardware level as a read-only device (e.g. the write line is cut off), it shall be treated for all purposes as an EPROM.

9.3.3.4 A reprogrammable memory program storage device shall be protected from unauthorized modification. Modification shall only be permitted once the TL and the CA or the LA (or both) are satisfied with the appropriate security measures (e.g. if a high voltage chip that allows modification of the reprogrammable memory devices is installed on the PCB). The method of securing the reprogrammable storage device shall be verified by the TL and certified by the CA on a case-by-case basis.

9.3.3.5 Before the termination of any programming operation on reprogrammable memory, each byte programmed shall be verified by a program comparison controlled by the programming device.

9.3.3.6 Only the actual program and fixed data required shall be written to the reprogrammable memory device.

9.3.3.7 The use of jumpers or similar devices can be used to enable/disable erasure/writing to reprogrammable memory provided there is a feedback signal to the software so that the setting of the jumper position can be recorded or appropriately acted upon. If a jumper or switch is set to "Write", then the GD shall not be able to enter "Play" mode. These jumpers shall be located within the logic area of the GD.

9.3.3.8 All reprogrammable memory devices shall be housed in a secure area.

9.3.4 Read/write storage

9.3.4.1 A read/write storage device (e.g. disk or tape) used for storage of program or fixed data shall be written in such a way that only the actual program and fixed data required by the program are written to the storage device.

9.3.4.2 The operational software shall provide an integrity check method to verify that there are no additional or missing program or fixed data records/files on the storage device.

9.3.4.3 There shall be an ability to conduct an integrity check independent of the device's operational software to verify that there are no additional or missing program or data records/files on the storage device.

9.3.4.4 All methods of integrity check shall have the ability to identify files/records that contain variable data and exclude them from the signature calculation.

9.3.5 ROM program storage

All unused areas of ROM shall be written with the inverse of the erased state, which for most EPROMs are zero bits (00 hex), rather than one bits (FF hex).

9.3.6 Verification

9.3.6.1 All non-critical memory RAM shall be checked for corruption at each power up.

9.3.6.2 All devices that contain program memory or critical memory shall be validated by software.

This validation may include self-checking by specific devices with internal programs. Critical memory storage shall be maintained by a methodology that enables errors to be identified and acted upon. This methodology may involve signatures, or checksums, or partial checksums, or multiple copies, or timestamps or the effective use of validity codes (or any combination of these).

RAM and program storage device space that is not critical to GD security need not be validated.

9.3.6.3 The CA shall certify the method of signature checking used, which shall include:

- a) a secure means of signature verification of all software resident on certain processor boards associated with a GD;
- b) self-checking methods used by programmable coin mechanisms, banknote acceptors, smart card readers and intelligent displays; and
- c) if the signature requirement is to be met by the self-checking method, evidence provided by the supplier of the device that a self-check has been performed.

The details of the checks performed shall also be provided to the CA for approval.

9.3.6.4 Memory that does not change dynamically (e.g. EPROM) shall be validated by the CEMS at least every time the hardware is reset (e.g. on power on), the software is reset (where this is possible) or after a type 4 significant event.

9.3.6.5 If a validity check fails, the software shall act in accordance with the requirements for error event handling.

9.3.6.6 A signature algorithm shall detect at least 99,995 % of all possible data errors.

9.3.6.7 The integrity of the operation of the device shall be protected from nefarious or accidental use of the unused portions of the program memory storage media.

9.3.6.8 The initial value of the CRC register is not an acceptable seed.

9.3.6.9 The following principles apply to signature seeding:

- a) the seed information shall be at least 15 bits in length; and
- b) the seed information shall influence the behaviour of the algorithm in a non-trivial way.

9.3.6.10 Signature algorithm seeds (or more generally "algorithm coefficients") shall be supplied by the initiator of the signature request at the time of activation.

9.4 Random number selection process

9.4.1 General

9.4.1.1 The method of random number generation is not mandated. A pseudo-random number generating algorithm, a dice shaker, a selector of keno balls, or a roulette wheel, etc., can all be acceptable RNGs where these comply with the CA requirements.

9.4.1.2 If a software-based RNG is used, the choice of algorithm is at the discretion of the supplier of equipment.

9.4.1.3 If, for any reason, the background RNG activity is interrupted (e.g. GD power down), it shall not be possible for the next input variable(s) for the RNG to be duplicated (i.e. in different GDs). The method of generating the next input variables under these circumstances shall be evaluated by the TL and certified by the CA.

9.4.1.4 RNG tests that might be applied include the following:

- a) the chi-square test;
- b) the equi-distribution (frequency) test;
- c) the gap test;
- d) the poker test;
- e) the coupon collector's test;
- f) the permutation test;
- g) the run test (patterns of occurrences shall not be recurrent);
- h) the spectral test;
- i) the serial correlation test potency and degree of serial correlation (outcomes shall be independent from the previous game); and
- j) a test on subsequences.

9.4.2 Requirements

Game software shall generate random symbols from an RNG that uses a mapping algorithm. The fundamental requirement is that the use of an RNG shall result in the selection of game symbols or the production of game outcomes that can be proven to ensure that

- a) the output of the symbols from the RNG is not predictable,
- b) any outcomes derived from the RNG are uniformly distributed,
- c) any mappings to convert random numbers into game symbols are linear, and the distribution of the mapped symbols is identical to the distribution of the unmapped random number from which they were derived,
- d) the mapped random number sequence shall demonstrate that they are statistically random when subject to the same statistical tests for randomness specified for the base RNG, and
- e) the game outcomes which are derived from either a combination of mapped symbols or directly from the unmapped random numbers shall have the same distribution and probability of occurrence as the game that the machine implements. In particular, poker games shall have the same first hand distribution and probability as hands dealt from a randomly shuffled deck of cards; spinning reel games shall have the same outcome probabilities and outcome distribution as the physical model upon which the game is based, and so on.

9.4.3 Background RNG activity

9.4.3.1 The mapping of numbers directly from the RNG output or through a scaling algorithm shall not influence a symbol to occur with a probability not equal to its statistical expectation.

9.4.3.2 If a random number with a range shorter than that provided by the RNG is required for some purpose within the GD, the method of re-scaling, i.e. converting the number to the lower range, shall be so designed that all numbers within the lower range are equally probable. Following a low probability game outcome (e.g. a jackpot win, major prize win, or a particular graphic game result presentation), where that game outcome is represented by only one RNG value or a small number of RNG values, it is important that subsequent game play on that machine is unpredictable.

That is, the machine does not subsequently go through one defined sequence of game outcomes, or one of only a few possible sequences of game outcomes. In such implementations the period of the RNG shall be much greater than its range.

9.4.3.3 Requirements for background RNG activity are as follows:

- a) the RNG shall be cycled continuously between games; and
- b) when a game feature is initiated, random numbers for that feature shall be selected from the RNG.

NOTE The game software does not determine the outcome of a play (critical to the game result) or gamble feature until after all player options that pertain to the play or gamble feature have been made.

9.4.3.4 Seeding of the RNG is subject to the following requirements:

- a) the method of seed generation shall ensure that the same sequence of random numbers is never used in more than one device at the same time;
- b) the "next" game outcome is not able to be predicted; and
- c) seeding and re-seeding shall be kept to an absolute minimum.

9.4.3.5 If a particular random number selected is outside the range of equi-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.

9.5 Information display

9.5.1 Display methodology

9.5.1.1 External displays employed in communicating the results of games shall be certified on a case-by-case basis by the CA.

9.5.1.2 The method of display of information, including game outcome, shall be certified by the CA.

9.5.1.3 Symbols of virtual reel games (video) shall appear to the player in the same arrangement as per the reel strips. The order of the reel's symbols displayed to the player shall not be manipulated or rearranged.

9.5.2 Recovery

In the event of a non-destructive fault or failure, deactivation or interruption, the GD shall be able to recover with no loss to the player or of critical data to the monitoring and control system.

9.5.3 Last game information

9.5.3.1 All GMs shall be capable of storing and displaying last game data for at least the five most recently played games.

9.5.3.2 The following information on the last game played (the game before the current game) shall be retrievable:

- a) the type of game played;
- b) the award table used;
- c) display card values, reels in position, or other game status information;
- d) the total number of credits or monetary value at the start of the game (less credits bet);
- e) the total number of credits or monetary value played;
- f) the player choices (if any) involved in the game outcome;
- g) the total number of credits or monetary value associated with the award that result from the last play (win);
- h) the total number of credits or monetary value added after the last game;
- i) the total number of credits or monetary value collected or cancelled after the last game; and
- j) a display of the result of feature games following the last game display.

9.5.3.3 In the case of a stepper motor GD, this means spinning the reels to the final resting point at the completion of the game and illuminating or flashing any lights or other indicators that were illuminated or flashing at the end of that game. The wheels, lights and display shall be returned to their original states when the viewing of the last game replay is completed.

9.5.3.4 In the case of spinning reel games, the GD shall display at least the final resting place of the reels, the options (play lines or number of coins selected (or both)) and an indication of winnings, in a way similar to that originally shown to the player.

9.5.3.5 In the case of keno and bingo games, all of the balls drawn, the selections made by the player and the final result shall be displayed in a way similar to that originally shown to the player.

9.5.3.6 In the case of card games, all cards dealt in a game shall be shown on the screen. In the case of poker or any other game with a hold/discard strategy it is necessary to show the symbols/cards held and those discarded.

9.6 Prescribed display formats

9.6.1 If dates and times are displayed, they shall be displayed in a consistent format.

9.6.2 The only acceptable all-numeric date format is dd-mm-yyyy.

9.6.3 Only 24-hour time formats shall be acceptable.

9.6.4 Field separators within times shall be colons (:) or full stops (.). Time of day shall be given as East African standard time.

9.7 Data communication

9.7.1 Communication failure

9.7.1.1 If there is a failure of a communication link between the GD and the next point in the monitoring system (i.e. the inability to send or, where applicable, to receive messages to/from the monitoring and control system) then, when communication is restored, the GD shall check whether the logic door has been opened and if this is the case, it shall remain deactivated until manual reactivation. If the logic door has not been opened, the operator may program the equipment to reactivate automatically. The GD shall also send a significant event message as soon as possible after reactivation, but before any game can be played.

9.7.1.2 If the GM is unable to send messages to the monitoring and control system then the GM may complete the current game and permit cashout but shall then disable further game play until able to forward these messages to the monitoring and control system.

9.7.1.3 All GDs shall be able to handle the following range of failures without loss of data:

- a) failure of central computer LAN interfaces;
- b) failure of the central LAN;
- c) failure of central data communication interface devices;

- d) failure of single data communication interface;
- e) high data communication error rates on line;
- f) a foreign or additional device placed on a LAN;
- g) a foreign or additional device placed between LAN bridges, communication controllers, or on data communication lines between sites;
- h) single data communication port failure on remote controller (if any);
- i) LAN failure on regional or local controller (if any);
- j) LAN failure on cashier terminal (if any); and
- k) data communication interface failure on a GD.

9.7.2 Active daily period

If the site data logger instructs the GM to disable (e.g. at the end of an active daily period) during game play, the GM shall complete the current game (including any feature games). Before immediately disabling itself. If there are any credits remaining on the player's credit display, the machine shall allow the player to collect those credits (i.e. shall permit a cashout).

9.8 Metering – Audit meters and displays

9.8.1 Unless otherwise specified, the meter displays may be in either credits or in monetary values (i.e. rands and cents) as long as the units used are clearly shown near to the meter or display. Alternative wording for the meter name might be approved by the LA on a case-by-case basis.

9.8.2 The "total bet" meter is defined as the total value of all credits bet.

It is a required soft meter in audit mode and shall be labelled "Total Bet". It shall, in addition, be recorded by the monitoring and control system.

In the case of multigame GMs this meter is also required and a separate value shall be maintained for each configured game on the GM.

9.8.3 The "total win" meter is defined as the total value of all credits won.

It is a required soft meter in audit mode and shall be labelled "Total Win". It shall be recorded by the monitoring and control system.

In the case of multigame GMs this meter is also required and shall be maintained for each configured game on the GM.

9.8.4 The "total coin box drop" meter is defined as the total value of coins or tokens to the coin box drop of the GD.

It is a required soft meter in audit mode and shall be labelled "Coin Box Drop". It shall be recorded by the monitoring and control system.

An additional period meter (soft meter) is required in audit mode, to be reset following each clearance of the coin drop storage area.

9.8.5 The "total bill drop" meter is defined as the total value of all bills entered into the bill acceptor connected to the GD.

It is a required soft meter in audit mode and shall be labelled "Total Bill Drop". It shall be recorded by the monitoring and control system.

An additional period meter (soft meter) is required in audit mode, to be reset following each clearance of the bill storage area.

9.8.6 The "total games played" meter is defined as the total number of games started and completed on the GD. The units shall be in games.

It is a required soft meter in audit mode and shall be labelled "Total Games Played". It shall be recorded by the monitoring and control system.

In the case of multigame GMs this meter is also required and shall be maintained for each configured game on the GM.

9.8.7 The "total handpay" meter is defined as the total value of all handpays, including handpays less than one coin or token, handpays greater than the CCD limit, and any printed tickets and vouchers.

It is a required soft meter in audit mode and shall be labelled "Handpays". It shall be recorded by the monitoring and control system.

9.8.8 The "total cash in" meter is defined as the total value of all cash entered into the GD (including amounts transferred from a card in a cashless environment).

It is a required soft meter in audit mode and shall be labelled "Total Cash In". It shall be recorded by the monitoring and control system.

9.8.9 The "total cashout" meter is defined as the total value of all cash paid out of the GD (including handpays, printed tickets and vouchers and amounts transferred to a card in a cashless environment).

It is a required soft meter in audit mode and shall be labelled "Total Cash Out". It shall be recorded by the monitoring and control system.

9.8.10 The "total cashless in" meter is defined as the total value of all credits transferred from a card to a GD in a cashless environment.

If the GD has cashless functionality, this is a required soft meter in audit mode and shall be labelled "Total Cashless In". (If the GD is not cashless, this meter is not required). It shall be recorded by the monitoring and control system.

9.8.11 The "total cashless out" meter is defined as the total value of all credits transferred to a card from a GD in a cashless environment.

If the GD has cashless functionality, this is a required soft meter in audit mode and shall be labelled "Total Cashless Out". If the GD is not cashless, this meter is not required. It shall be recorded by the monitoring and control system.

9.8.12 The "last five bills in " display shall enable the GD to display, in audit mode, the rand value of each of the last five bills entered into the bill acceptor. The bills shall be listed in the order they were entered, with the most recently entered bill listed first.

9.8.13 A meter or display shall be updated and recorded by the monitoring and control system as the event occurs. All meters shall be added to, not incremented with the exception of coin-handling meters (i.e. coin-in and coin-out meters), which may be either added to or incremented. The term "added to" indicates the fetching of the current value from memory, conducting an arithmetic add operation and storage in memory.

9.8.14 When a meter, of any type, reaches its maximum value, it shall automatically revert (i.e. "wrap round") to zero and subsequently continue counting (from zero) in the normal way.

9.8.15 Gaming equipment shall have access to a function that enables the display of all metered information retained by the gaming equipment. It is not mandatory that metering information be displayed on the device from which the information originates. The information may be displayed on an external device or on a computer (or on both) to which the GD has communicated such information.

9.9 Metering – Player displays

9.9.1 A GD shall be able to display the following information to the player (as applicable to either "cashless" or "non-cashless" environments). Note that this does not prevent more than one piece of information being presented on the same display unit, provided that the associated artwork is not deemed to be misleading, as evaluated by the CA or LA.

9.9.2 The "credit display" shall display the current number of credits available to the player under the heading "Credits". This display shall be updated immediately after each bet is made and at the end of the game when it shall be increased by the value displayed by the "Win" display. It is acceptable to additionally display the rand value if desired.

9.9.3 The "bet display" shall display the cumulative total number of credits bet by the player during the current game to the player under the heading "Bet". This display shall be updated at the start of each game. It is acceptable to additionally display the equivalent rand value if desired.

9.9.4 The "win display" shall display the (cumulative) number of credits won for each win won by the player during a single game (and therefore the prize that has been won at the completion of each game) to the player under the heading "Win". This display shall be updated at the occurrence of each new win, and at the start of each game. It is acceptable to additionally display the equivalent rand value if desired.

9.9.5 The "collect display" shall display the number of credits collected from the GD by the player under the heading "Collect" or "Paid". This display shall be updated each time the player collects credits from the GD (whether by CDD, handpay, printed ticket or voucher, or cashless card) and at the start of each game. It is permissible to display, in addition to the credit amount, the equivalent rand value, if desired.

9.9.6 Player displays may be incremented or decremented (e.g. stepped) to the value of the actual meter for visual effect. However, the internal storage of these displays shall be immediately added to (not incremented or decremented).

9.9.7 The number of credits collected shall be subtracted from the player's credit display.

9.9.8 The value of the win display shall only be added to the player's credit display.

9.9.9 The player's credit display shall always be prominently displayed in all modes except audit, configuration and test modes. During game play in second screen bonus features, the player's credit amount does not need to be displayed, provided that the player is not required to bet additional credits during the feature.

9.9.10 The player's credit display shall have sufficient digits to allow the display of at least twice the credit value of the maximum prize. Tokenization and denomination configurable parameter options shall not permit credit values that are greater than the above to be displayed.

9.9.11 Whenever credits are bet (e.g. commencement of game, additional wagers during a game) the number of credits bet shall be immediately subtracted from the player's credit display and displayed on the bet display.

9.9.12 It is mandatory for a multigame GD to show the monetary value of the player's available credits on the game select screen. The monetary value of the player's available credits may also be shown on each game play screen in addition to the player's available credits for that game. This requirement is optional for a single game machine.

9.9.13 If the current rand amount is not an even multiple of the tokenization factor for a game or if the credit amount has a fractional component, the credits displayed for that game may be displayed and played as a truncated amount (i.e. fractional part removed). However, the fractional credit information shall be made available to the player when the truncated credit balance is zero or on the game select screen.

9.9.14 At least the following displays shall be able to be shown separately for each game offered on a multigame:

- a) total of all credits bet; and
- b) total of all credits won.

9.9.15 Prize determination shall

- a) be clearly specified on the exterior of the device, or easily accessible to the player, and
- b) be exclusively a consequence of the outcome of a computer based RNG in conjunction with the prevailing payout table and rules of the game.

9.9.16 There shall be a game selection screen where the full amount of the player's credit balance is displayed either in rand and cents or in credits.

9.9.17 Only credits taken as wins by the player or automatically taken across by the GD shall be added to the "Win" meter.

9.9.18 When residual credits are played off, credits bet shall be added to the "Turnover" meter.

9.9.19 When residual credits are played off, and if any credits are won, the value of the win shall be added to the "Win" meter and shall either

- a) increment the player's credit meter, or
- b) be automatically dispensed, and the value of the coin(s) added to the "Coins Out" meter.

9.9.20 The value of every prize (at end of game) shall be added to the credit display.

9.9.21 Amounts bet on a gamble feature shall not be added to the "Turnover" meter.

9.10 Metering – Labelling

All non-mandatory, retrievable electronic statistics or other information shall be suitably labelled.

10 Operational requirements

10.1 Access to restricted features

Access to the following restricted features of gaming equipment shall be regulated by at least a key switch, or by access to the inside of the machine cabinet:

- a) auditing information;
- b) statistical information;
- c) test functions; and
- d) any other features deemed by the LA to be restricted.

10.2 Set-up – Device configuration

10.2.1 Configuration of variables

A variable required to be set during device configuration or set-up shall be able to be set only once per valid memory clear or able to be changed by a secure method certified by the CA.

A GD shall not be able to be operated unless all configuration variables are set.

A device may be configured remotely or by direct access by means of an approved mechanism.

If memory becomes corrupted, a GD shall not assume default values and recommence gaming operation unless the assumed values have been configured by an approved mechanism.

10.2.2 Device enrolment

The unique GD monitoring and control system address shall only be able to be configured in a GD during the set-up mode.

If a GD is not capable of supporting a game configuration parameter as sent from the monitoring and control system (i.e. if the GD does not operate in accordance with this part of SANS 1718 when configured in such a way), the GD shall not accept that parameter.

There shall be no configurable parameters on a GD, whether set manually or set by the monitoring and control system, that are not certified by the CA and approved by the LA.

10.2.3 Reconfiguration

10.2.3.1 The GD may be reconfigured to modify the following parameters, but only by a secure approved method:

- a) the mapping of random numbers to cards or symbols;
- b) the game or sets of games approved for play;
- c) denomination and tokenization; and
- d) the paytable.

10.2.3.2 All configuration settings required for the proper operation of the GD shall be entered before the GD can enter "Play" mode. If all configuration settings required have not been entered, the GD shall detect this condition and remain disabled.

10.3 System security

10.3.1 The set of games offered to the patron for selection, or their paytables, may be changed only by a secure approved method. No changes to the set of games offered to the patron for selection (or to their paytables) are permitted while there are credits on the player's credit meter or while a game is in progress.

NOTE The intention is to prevent any modification to the selection of games offered, or to their paytables, as the result of player history. The player may switch between any games offered without terminating the session.

10.3.2 Gaming equipment shall disable all player inputs and suspend all gaming functions while any of its secure area doors are opened or remain open.

10.3.3 Gaming equipment shall not have any functions or parameters adjustable by or through any separate computer, input device or input codes, except for the following:

- a) the adjustment of features that are wholly cosmetic (i.e. that do not affect functionality in any way);
- b) the downloading in an authorized manner of any software, data or operational parameter; and
- c) an approved configuration (set-up) mode.

10.3.4 In general, the reactivation of a GM that has been deactivated shall require manual intervention by the gaming venue operator or the system operator. The following exceptions apply:

- a) If a door open event occurs other than a logic door open, the GM may reactivate automatically when the door is eventually closed.
- b) If the PIN retry limit is exceeded for a player's account card, the GM shall remain deactivated until the card is removed.

c) If the power supply to a GM fails, the GM is deactivated as a matter of course. It is permitted for the GM to automatically reactivate itself unless it determines that the logic door(s) has(have) been opened while the power was down, in which case the GM shall remain deactivated until manually reactivated.

NOTE 1 Such reactivation should only occur after the LA audit procedures have been satisfactorily completed.

NOTE 2 The venue operator may choose to require manual reactivation in both cases.

d) If a GM is automatically deactivated at the end of the venue's current session it is permissible for the monitoring and control system to automatically reactivate the GM when the next permitted session starts.

e) If the GM is deactivated after losing communication with its site data logger, it may reactivate as soon as communication is restored, unless its logic door(s) has been opened while communication was lost.

10.3.5 If a GM loses communication with its site data logger, the GM shall disable itself.

10.3.6 Where a GD is unable to operate without the loss of any information (e.g. metering, transactions or significant events) it shall immediately disable any further game play.

10.3.7 If a significant event has not already been logged (by the system or the GD) when deactivation occurs, the GD shall ensure that such an event is reported to the system as soon as possible.

10.4 Master reset

10.4.1 Following the initiation of a master reset procedure (using an approved RAM clear method), the game program shall execute a routine which initializes each and every bit in RAM to the default state.

10.4.2 There shall be no provision for an easily accessible "master reset" button/switch to reset the meters or other areas of electronically stored data (or both). RAM clears shall only be undertaken by accessing the logic area of the device that contains the critical RAM.

10.4.3 The default reel position or game display after a master reset shall not be a winning combination on any selectable line. The default game display upon entering game play mode shall also be a non-winning game.

NOTE The selection of a specific "default" combination that is displayed after every reset is acceptable, as long as it is a non-winning combination (i.e. it need not be selected at random).

10.4.4 A configuration setting that is required to be entered during set-up mode immediately following a master reset shall not be able to be changed after the machine leaves set-up mode.

10.5 Door open procedures

The following procedures shall be performed on the occurrence of any door open:

- a) any software state prior to door opening shall be saved;
- b) any game play shall be saved in its current incomplete condition;
- c) if mechanical reels are spinning prior to the door opening, the reels shall continue spinning after the door is closed;

NOTE There should not be a false impression created that the game achieved a result while the door was open, or just prior to the door being opened;

- d) credit input shall be disabled (may be re-enabled for the duration of a credit input test or CDD test);
- e) the machine shall clearly indicate that the door has opened and game play is not possible;
- f) if in CDD payout, the CDD shall be turned off and the brake applied (may be re-enabled for the duration of a CDD test);
- g) all player inputs that can affect a play in progress shall be disabled (unless used in door open/test mode);
- h) cashout of any kind to players shall be disabled; and
- i) a door open shall cause an identifiable alarm to be sounded for at least 1,5 s.

10.6 Door close procedures

Except for logic area access, when all doors are closed the software shall return to the condition prior to when the first door open state occurred. This means that

- a) a message or other indication stating that the door has closed, or other indication (i.e. such as the disappearance of a message or indication stating that the door was opened) shall be displayed; this may be for a preset period or until the next game play,
- b) any relevant player inputs shall be re-enabled,
- c) the alarm shall be turned off, and
- d) any incomplete game play when the event occurred shall recommence from the beginning of the play or from the point at which interruption occurred and conclude normally, using the data that were saved previously.

10.7 Audit mode

10.7.1 It shall always be possible to enter audit mode when the GD is in idle mode.

10.7.2 The device shall not be playable while auditing information is being displayed on the device.

10.7.3 It is not mandatory that auditing information be displayed on the device from which the information originates. The information may be displayed on an external device or on a computer (or on both) to which the GD has communicated such information.

10.7.4 It is preferred that all non-game specific player displays (e.g. credit display, win display, bet display and collect display) are displayed in the same position for all games.

10.7.5 Audit mode shall include as a minimum, the following items:

- a) display of all electronic meter and display information;
- b) last game replay;
- c) display of GM identification (i.e. the identification number that uniquely identifies the GM to the monitoring and control system); and
- d) display of software/game identification.

10.8 Demonstration mode

10.8.1 Demonstration mode (where permitted by the LA) may only be entered into by means of an approved secure method evaluated by the TL and certified by the CA, and only while:

- a) the main door is open, and
- b) the GD is on-line to a site data logger.

10.8.2 While the GD is operating in the demonstration mode, there shall be clear notification that the GD is in that mode (e.g. by tower light signal or on-screen message) and the main door of the GD shall be open at all times.

10.8.3 If soft meters are incremented in the demonstration mode, such credits shall be automatically cancelled upon the change of the GD from demonstration mode to game-play mode.

10.8.4 A GD in demonstration mode shall not be capable of being used as an off-line GD. Some suggested implementations which might help prevent such illegal activity are:

- a) do not allow coins to be entered into the GD (i.e. lockout) except in accordance with approved coin test procedures;
- b) do not allow any coins out for credits in the GD except in accordance with approved CDD test procedures;
- c) provide a spot on a touch screen or interpret a button (e.g. service) that shall credit the GM with a number of coins (e.g. 100);
- d) if a "ticket" cashout is allowed, the ticket that is printed shall be clearly marked as a non-valid ticket including a non-valid serial number (e.g. all zeroes or nines); and
- e) if the main door is closed, the GD shall immediately exit demonstration mode and return to game-play mode.

10.9 Idle mode

10.9.1 While the GD is in idle mode, if there are credits showing on the credit display, the following shall remain on view until the next play:

- a) The bet display for the last play.

- b) The final reel stop positions, card values, etc. for the last game play.
- c) The win display from the last play (unless a payout has occurred since completion of the last game play, and the "win" display has been used as a "collect" display).
- d) If a payout has occurred since the completion of the last game play, the collect display that represents the payout shall be displayed. If multiple payouts have occurred since the last play, the collect display of the last payout only shall be displayed. Additionally, the cumulative payout amount may be displayed.

10.9.2 Multigame GDs may have a "Game select" mode entered from "Idle" mode where the above information is not required to be displayed. If "Game select" mode is entered, it is necessary to display all of the information above when the same game is selected again (except as in 9.9.1(d) above).

10.10 Test/service mode

10.10.1 While the GD is operating in the test mode, there shall be clear notification that the GD is in that mode (e.g. by tower light signal or on-screen message).

10.10.2 Opening the main cabinet door of the GD may automatically place the GD in a service or test mode. A test/diagnostics mode may also be entered by means of an appropriate instruction from an attendant during an "Audit" mode access.

10.10.3 If there are any test-mode states which cannot be automatically cancelled by closing the door (e.g. if it is first necessary to manually set a switch), or exit from the "Audit" mode (if that was the method of entry to the "Test" mode), the action necessary shall be indicated on the machine and in the relevant manuals.

10.10.4 Test games, if implemented, shall:

- a) not increment any meters (other than a temporary on-screen credit display);
- b) only be available after entering a specific test game mode within door open mode; and
- c) be clearly indicated as not in normal game play mode.

10.10.5 The following information shall be accessible in test mode if not available in audit mode:

- a) revision number for game (and if applicable, base) software in the machine;
- b) set-up/configuration data; and
- c) expected RTP.

10.10.6 If a CDD test is implemented that does not require the door securing access to the CDD to be opened, no meters that are used to calculate revenue shall be affected.

10.10.7 If a "coin in" validation test is provided, the following conditions shall be met:

- a) the number of coins accepted as valid by the CAD shall be displayed;
- b) the number of coins that pass coin direction sensors shall be displayed; and
- c) no meters shall be affected.

NOTE Alternative implementations such as providing indicators of the line status (jammed, activated, faulty, etc.) of the validator outputs and diverter outputs are acceptable if at least the same level of diagnostics is achieved.

10.10.8 Coins shall not be capable of being paid out other than

- a) by normal play unless in CDD test mode, or
- b) by a CDD dump function.

10.10.9 If there is a possibility that credits can be obtained whilst the machine is in test mode, those credits shall be automatically cancelled when the door is closed and shall not be credited to the meters.

10.10.10 When the GD is in test, demo or service mode, the current play-mode status of the game, including player's credit, shall be preserved.

10.10.11 Where the possibility exists to obtain credits whilst the door is open for any purpose (e.g. coin-in test) including the service mode, such credits shall be automatically cancelled when the door is closed and shall not be credited to any meters.

10.11 Power save mode

10.11.1 If a GD has a "Power save" mode it shall only be activated when the GD has been idle for a period of time not less than 5 min, or when the GD is in a disabled state.

For the purposes of this subclause, a GD shall be defined as being "idle" if, for the nominated duration, it

- a) does not have any key switch activated (e.g. accessing "Audit" mode);
- b) does not have any door open;
- c) has no credits on the player prize display yet to be transferred to the player's credit display;
- d) has not had any coins or banknotes input;
- e) has not had its touch screen touched;
- f) has not had any button pressed;
- g) does not have any fault condition; or
- h) does not have any electronic funds transfer or credit transfer to or from the GD pending.

NOTE 1 Power save mode should be capable of being enabled or disabled by staff by means of set-up mode,

or by means of the monitoring system (if applicable).

NOTE 2 Power save mode may be activated manually (i.e. by means of an auxiliary power switch or key switch) and in this case the conditions listed above are void.

10.11.2 While in "Power save" mode, power may be removed from the coin diverter, incandescent display, monitor and all fluorescent lights. Critical security functions of the GD shall still be performed.

10.11.3 The GD shall exit from "Power save" mode and return to the normal display mode immediately upon it ceasing to be "idle" (if not using a manual power save implementation).

10.12 Mechanical reels and wheels

10.12.1 Microprocessor-controlled reels (e.g. stepper motor reels) shall re-spin automatically to the last legally obtained play-mode result when the play mode is re-entered (e.g. the main door is closed, power is restored, audit mode is exited, or a fault condition cleared).

10.12.2 Reel bounce and float shall be prevented when stopping each spinning reel.

10.12.3 Each microprocessor-controlled reel shall spin at least one revolution per play unless stopped by player intervention as provided for in the rules of the game.

10.12.4 A reel/wheel assembly shall be so designed that the spin of each reel is not obstructed by any other component.

10.12.5 Microprocessor-controlled reels shall be monitored to detect malfunctions such as a reel that is jammed, or is not spinning freely, or has failed to stop or any attempt to manipulate their final resting position.

10.12.6 The control of electromechanically controlled display devices, such as spinning wheels and roulette wheels, shall be sufficient to enable the system to detect a malfunction or an attempt to interfere with the correct operation of that device. This may also be achieved by a last game recall facility.

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

10.12.8 Reel assemblies shall be so constructed that winning symbol combinations match up with the pay lines.

10.13 Video displays

10.13.1 An attract mode may be used, as long as the information required while in idle mode is displayed after the attract mode has completed its cycle.

10.13.2 If the display is overwritten by the paytable, on restoration of the game screen the same display that shows the winning combination resulting from the last game played, shall be suitably highlighted.

10.13.3 Screen save functions are subject to the following constraints:

- a) any screen save function shall only be activated when there are no credits on the machine;
- b) if a fault condition exists on the machine when the program enters the screen save function, the nature of the fault shall be displayed, otherwise the machine shall exit the screen save; and
- c) the screen save mode shall cease upon the occurrence of any of the following:
 - 1) the activation of an input device;
 - 2) any door opening; or

3) an error event condition.

10.13.4 Touch screens, if used, shall comply with the following:

- a) touch screens, which are accessed by the general public, shall be resistant to scratching from conditions likely to occur during normal use;
- b) touch screens shall be accurate, and once calibrated shall maintain that accuracy for at least the manufacturers recommended maintenance period;
- c) touch screens shall be installed/designed such that static build-up is minimized to a level that ensures no humanly perceptible static is discharged through a grounded patron that touches the screen;
- d) GDs that employ touch screens shall have a recalibrating facility that may be either manual or automatic, but in any case shall not require access to a logic area;
- e) touch screen selected input shall always be interpreted accurately and acted upon in accordance with the description of the choice (indicated on the screen) made by the player;
- f) if the opening of the GD door is found to affect touch screen calibration and recalibration is carried out with the door open, there shall be in place means to ensure that the recalibration is correct when the door is closed (e.g. two sets of calibrations one for door open and one for door closed);
- g) touch screen button icons shall be sufficiently separated to reduce chances of the wrong icon being selected due to incorrect calibration or parallax errors; and
- h) all buttons and touch points shall be documented for evaluation by the TL and certification by the CA.

10.14 Electronic funds transfer system

A GM shall retain a card used for cashless gaming within the card reading device, once inserted, except if an amount debited from the card is placed directly on the credit meter and no further transactions are required from the card (e.g. updating of account balance or credit out). The GM shall not release the card until one of the following conditions are met:

- a) a player has requested a collect of remaining credits and all updating of account records or information (or both) has been successfully completed;
- b) a player has a zero credit balance and all updating of account records or information (or both) has been successfully completed;
- c) an invalid card event condition has been cleared by an approved method; or
- d) power or communications failure (except that, if conditions (a) and (b) above are met, the GM may release the card after successfully completing the updating of account records or information, or both).

10.15 Player input

10.15.1 The player's selected input shall be interpreted correctly and acted upon in accordance with the description of the choice as indicated on the labelling artwork or display.

10.15.2 A GD shall not be affected by the simultaneous or sequential activation of the various inputs.

10.15.3 In regard to multi-line games, each additional line that is brought into play by the wagering of a further credit or credits shall be clearly so indicated by the game that the player is in no doubt as to which lines are in play.

10.15.4 In the case of multi-line games, the winning play line(s) shall be clearly highlighted to the player. This may be accomplished by drawing a line over the symbols on the play line(s) or flashing of winning symbols and line selection box (or both). Where there are wins on multiple lines, alternative indication (e.g. alternate flashing of winning patterns) may be given.

11 Game design requirements

11.1 General

11.1.1 Games that have a component of strategic skill (e.g. draw poker and blackjack) shall comply with the following requirements:

- a) the player return for a typical strategy, based upon the information available to the player in the game rules, shall not be less than the RTP;
- b) any strategy advice or automatic holds shall be fair and not misleading to the player and shall not represent a poor choice;
- c) the player shall be able to override the automatic hold; and
- d) the automatic hold strategy shall be used in calculating the game's RTP.

11.1.2 The presentation of mapped symbols or artwork shall not alter or be modified during play, except in cases of animation during a play or as a part of the game rules, which shall be clearly described on the artwork, otherwise this constitutes a different game.

12.1.3 A machine shall not have any faults present, or be in any test, metering, door open or lockup mode, etc., for a game to commence.

10.1.4 Games that involve player physical dexterity (e.g. hand/eye coordination) shall return at least the minimum RTP without adaptive strategies. For example, the size of a target area shall be independent of results previously achieved.

11.1.5 Progressive jackpots are not permitted.

10.1.6 Gamble features that place an amount won by the player at risk (e.g. double-up) are not permitted.

11.1.7 Credits bet may come from the credits that the player has available to bet or from the number of coins inserted.

11.1.8 The game may not be considered to be completed until all the appropriate meters for the game have been updated. It is permissible to update the credit meter before the completion of play provided that critical memory is updated when the credit meter is updated.

11.1.9 If multigames are permitted by the LA, there shall be a method available so that it is possible to disable and enable individual games on multigame GMs. If it is not possible to accomplish individual game enable and disable, the entire machine shall be capable of being enabled or disabled.

11.2 Rules

A game shall follow a constant set of rules and shall at no time deviate from those rules. A rule change constitutes a different game, although variations to the maximum number of credits bet per game or lines per game (or both) are permitted. This requirement does not preclude implementations of games with multiple parts or features provided that the rules are clear to the player.

11.3 Game fairness objectives

11.3.1 Each time a game element (base, primary, feature, bonus or free) is played, there shall be a chance of obtaining any of the results displayed on the appropriate payable of that game.

11.3.2 Events of chance within the games shall be independent of (i.e. not correlated with) any other events within the game or any other events within previous games, except as provided by the rules of the game (e.g. for metamorphic games).

11.3.3 The intent of the objectives is to ensure that, where applicable, the probability distribution of each event within a game is as it

- a) appears to the player,
- b) is represented to the player, and
- c) could reasonably be inferred by the player.

NOTE This requirement does not prohibit the use of virtual reels.

11.3.4 GDs shall not cheat, mislead or unfairly disadvantage players.

11.3.5 The player shall be informed when a deck(s) of cards is(are) shuffled.

11.3.6 Game fairness objectives for games such as horse/car/animal racing, golf/football and virtual reality shall be assessed on a case-by-case basis applying the general game fairness objectives specified earlier in this part of DUS 1580-2:2016.

11.3.7 Capping of awards shall not be permitted.

11.4 Result-determination methodologies

11.4.1 In the case of any GD, result determination for each individual play within a game shall

- a) be for all attainable combinations of the mapped symbol set (except for random awards);
- b) be clearly specified on the exterior of the gaming equipment (or in a way readily available to the player and clearly apparent);
- c) be a consequence of one of the result determination methodologies described in this part of DUS 1580-2:2016 and approved by the LA;
- d) have a theoretical RTP not less than that specified in legislation; and
- e) ensure that the maximum prize is not greater than that specified in legislation.

11.4.2 If a game's theoretical return cannot be reasonably calculated, the manufacturer shall provide the TL with sufficient documentation that will allow the TL to determine an approximate theoretical RTP which shall be not less than the minimum RTP specified in the legislation.

11.4.3 The minimum RTP shall be met when playing at the lowest end of a non-linear paytable (e.g. if a game is continuously played at a minimum bet level for its total game cycle and the theoretical RTP is lower than the minimum RTP specified in the legislation, then the game is unacceptable). This example also extends to games such as keno where the continuous playing of any spot combination results in a theoretical RTP lower than the minimum RTP specified in legislation.

11.4.4 The result in game play can be determined in the following ways:

a) pure chance;

b) pure chance plus skill where the skill element is supported by hold and selection strategies;
and

c) pure chance plus skill where the skill element involves eye/hand coordination.

11.4.5 The GD shall not have any means of manipulation that can affect the probabilities of random event outcomes during game play.

11.4.6 Events of chance within games shall not be influenced, affected, controlled or determined by anything other than (in conjunction with the prevailing payout table) numerical values obtained in an approved way from the certified RNG.

11.4.7 If the player's skill can influence the final outcome of the game, the game shall provide appropriate strategies for selection and holding of elements of the game (reels, cards, etc.) which, if followed exactly, shall ensure that the theoretical minimum RTP shall be not less than that defined in the appropriate legislation.

11.4.8 If the player's eye/hand coordination skill can influence the final outcome of the game, the pure chance of the game shall have a theoretical minimum RTP not less than that defined in the appropriate legislation and the skill element shall not cause the theoretical RTP to be reduced.

11.4.9 At the start of each game play, the method by which all random behaviour is derived during the game shall be fully determined and frozen.

11.5 Game features

11.5.1 If a feature activity is provided in which the player has to wager credits, the player shall be given a choice whether to enter the feature activity or not. A player who elects not to enter the feature activity shall be positioned at the beginning of the base game.

11.5.2 A game may offer random awards, provided that the award value complies with that specified by legislation.

11.5.3 Initial entry to a feature activity shall be conditional upon an immediately preceding occurrence of a winning event in the primary game.

11.6 Metamorphic features

11.6.1 Where allowed by the LA, features that are not completely independent of play history (i.e. that are metamorphic) shall:

- a) display clearly to the player which game rules apply to the current game state,
- b) display to the player sufficient information to indicate the current status towards the triggering of the next metamorphosis of the game (e.g. if the game collects tokens towards a feature, the number of tokens missing or the total number required to trigger the metamorphosis shall be indicated along with the number of tokens collected at that point),
- c) not adjust the likelihood of a metamorphosis will occur, based on the history of prizes obtained in previous games (i.e. games shall not adapt their theoretical RTP based on past payouts), and
- d) not be misleading. If a game's metamorphosis is triggered after accruing a certain number of tokens or combination of tokens of different kinds, the probability of obtaining such tokens shall not deteriorate as the game progresses (e.g. for identical tokens the last few tokens needed shall not be more difficult to obtain than the previous tokens of that kind).

11.6.2 The game's player return over the cycle of both the metamorphic and non-metamorphic part of the game shall conform to the minimum RTP as specified by legislation.

11.6.3 Any accumulated metamorphic game tokens shall not be lost during a full reconfiguration if the game that includes the tokens is still available after the full reconfiguration.

11.6.4 The maximum stake wagered and prize paid out by the game over the cycle of both the metamorphic and non-metamorphic parts of the game shall not exceed that specified in legislation.

11.6.5 If a metamorphic feature game requires extra credits to be wagered and the game accumulates all winnings (from the trigger and the feature) to a player win display (rather than directly to the player's credit display), the game shall

- a) provide a means where winnings on the player win display can be bet (by means of the credit display) to allow for instances where the player has an insufficient credit balance to complete the feature, and
- b) transfer all credits on the player win display to the player credit display upon completion of the feature.

11.6.6 If features of a metamorphic game require extra credits to be wagered, the game's theoretical RTP during the feature shall not be less than the return of the base game.

11.6.7 If the player is allowed to wager at less than the available optimum strategy during a metamorphic game feature, the manufacturer shall provide evidence that this option shall not reduce the overall player return for that game below the minimum theoretical RTP as specified by legislation.

11.7 Card games

The consequences for games that depict cards being drawn from a pack are the following:

- a) at the start of each game/hand, cards shall be drawn fairly from a randomly shuffled pack that consists of the full set of cards applicable to the game depicted;

- b) cards once removed from the pack shall not be returned to the pack except as provided by the rules of the game depicted;
- c) the pack shall not be reshuffled except as provided by the rules of the game depicted;
- d) as cards are removed from the pack they shall be immediately used as directed by the rules of the game (i.e. they shall not be discarded owing to adaptive behaviour by the GD); and
- e) it is permitted to reshuffle the remainder of the deck between draws during a single game.

11.8 Ball-drawing games

The consequences for games that depict balls being drawn from a barrel (e.g. bingo) are as follows:

- a) at the start of each game only balls applicable to the game shall be depicted;
- b) balls once removed from the barrel shall not be returned to the barrel except as provided by the rules of the game depicted;
- c) the barrel shall not be remixed except as provided by the rules of the game depicted; and
- d) as balls are drawn from the barrel they shall be immediately used as directed by the rules of the game (i.e. they shall not be discarded owing to adaptive behaviour by the GD).

11.9 Roulette wheel, spinning reels, dice rolling, coin tossing games

In the case of games that depict or involve either

- a) the spinning of reels (such as "slot machines" or "poker machines"),
- b) the spinning of wheels (such as roulette),
- c) the rolling of dice,
- d) the tossing of coins, or
- e) other similar depictions,

the following requirements shall apply:

- a) if virtual reels that map to physical reels are used, each of the reel stops of the virtual reel strip shall have the same probability of occurring (i.e. if the virtual reel consists of n positions, the probability of occurrence of each position shall be $1/n$). Symbols of the physical reel shall appear to the player in the same arrangement as would the corresponding symbols of the virtual reel (i.e. it shall not be possible to determine by observing the symbols displayed on the machine that the physical reels are used instead of virtual reels). This observation extends to all symbols visible to the player. Accordingly, mapped symbols shall have identical sequences of preceding and following symbols (if these symbols are visible to the player) on both the physical and virtual reel strip;
- b) the behaviour of each reel/wheel/die/coin etc., shall be independent of (i.e. uncorrelated with) all other reels/wheels/dice/coins etc.;
- c) the behaviour of each reel/wheel/die/coin etc., shall be independent of (i.e. uncorrelated with) its previous behaviour; and
- d) for each wheel/dice/coin, etc. depicted, the probability of any one face appearing shall be as for the actual physical device (e.g. $1/20$ for a 20 wheel; $1/6$ for a 6 faced dice; and $1/2$ for a coin).

11.10 Maximum prize

The maximum aggregate prize paid out by a GD shall be as specified in legislation and shall be displayed on the GD.

11.11 Maximum stake

The maximum aggregate stake shall be as specified in legislation and shall be displayed on the GD.

11.12 Game play

11.12.1 Game initiation

11.12.1.1 A GD shall only initiate game play

- a) after credits have been registered, and
- b) after the player has nominated the number of credits to bet on that game, and
- c) after the player presses a "play" button (or similar input, e.g. a touch screen), or
- d) after the player has inserted the maximum bet.

NOTE Where the above is combined, such as "auto-play" buttons, or where pressing the "play" button causes a default number of credits to be selected, such facilities should be acceptable, provided that these functions are clearly explained in game instructions (e.g. on button artwork).

11.12.1.2 If an autoplay mode is incorporated, it shall be possible to turn this mode on or off at any time during game play.

11.12.2 Multigame machines

11.12.2.1 The methodology employed by a patron to select and discard a particular game for play on a multigame GD shall be clearly explained to the patron on the GD, and be easily followed. The GD shall clearly inform the patron of all games available at that time and offer them for selection.

11.12.2.2 It shall not be possible to start a new game before the current play is completed and all relevant meters and displays have been updated (including features and other options of the game) unless the action to start a new game terminates the current play in an orderly manner.

11.12.2.3 Machines that offer multiple games shall at all times indicate to the player which game has been selected for play or is being played. The player shall not be forced to play a game just by selecting that game.

11.12.3 Tokenization

11.12.3.1 Devices that implement tokenization shall ensure that if a sequence of higher value coins is entered, no credits shall be lost even if there is a power failure of the gaming equipment before all of the credits are incremented to the player's balance.

11.12.3.2 Tokenization parameters shall either be hard-coded, or be able to be configured during the configuration of the GD.

11.12.3.3 Tokenization and denomination configurable parameter options shall never allow the maximum stake or maximum prize values set by legislation to be exceeded.

11.13 Feature games

11.13.1 In all cases, except for gamble features, the number of credits bet on feature games shall be added to the total bet meter regardless of whether they are bet from the credits won in the base game or not, and shall be subtracted from the player's credit display.

11.13.2 If a base game can be followed by feature games, the credits won at the end of each feature shall be added to the player's win display and to the total win meter.

12 Artwork requirements

12.1 General

12.1.1 This clause is mainly applicable to spinning reel games. However, some parts of this clause are also applicable to draw poker, bingo, and other game types. The rules given apply to reel strips (physical or video), belly panel and top panel artwork (physical or video implementation) and, to a limited extent, to screen/display artwork. The layout of the reels display window is not specified.

12.1.2 Reel strips shall have a reel number.

12.1.3 The manufacturer's logos or copyright messages may be visible, but in a discreet manner.

12.1.4 By making a submission to a jurisdiction for evaluation, the manufacturer, supplier and operator of gaming equipment indemnifies the relevant jurisdiction, its duly appointed testing agents, the government of the jurisdiction and the state of any claim by any party for breach of copyright, trademark, or registered name or design which may arise from the distribution of literature (such as rules of play) or operation of approved gaming equipment.

12.1.5 Artwork graphics shall not in any way or form be indecent or offensive.

12.1.6 These requirements refer to all forms of artwork (i.e. anything that appears on the top panel, belly panel, buttons, on the area surrounding the display, and on the display itself). The combination of all relevant messages appearing anywhere on the artwork shall comply with these requirements.

12.1.7 The artwork requirements apply equally to artwork displayed in physical form and in virtual form (e.g. on a video display, as a holograph image and on an LED or similar display).

12.1.8 Where both multiplier instructions and tabulated prizes are displayed on artwork, there shall be no confusion possible as to whether the multiplier applies to the tabulated prizes or not.

12.1.9 The outcome of each game shall be displayed for a reasonable length of time.

12.1.10 If any game instructions are on the video screen only, they shall be accessible and visible without the need for credits to be inserted or staked. This requirement does not apply during game play except where specific instructions might be required to proceed to the next stage of the game.

12.1.11 If the artwork contains game instructions specifying a top award, it shall be possible to win this amount from a single game (including features or other game options). For example, if the artwork states that Ug Shs 1,000,000 is the top award for a game it shall be possible to win Ug Shs 1,000,000 on that game.

12.1.12 The functions of all buttons (in normal game mode) shall be clearly indicated, preferably on the button itself.

12.1.13 Customized artwork that makes use of stickers shall use stickers that do not shrink or peel with time or heat. Where possible, stickers shall be applied on the back of the artwork glass, to avoid intentional removal. Stickers applied to other parts of the GD shall not be easily removed.

Stickers shall comply with the part number requirement, however, where size limitations occur, the part number may be affixed to the sticker backing or surroundings.

12.1.14 If different versions of the artwork require a cut-out or a window (e.g. a card reader), each modification shall be approved separately.

12.1.15 The name of the game being played shall be clearly visible to the player.

12.1.16 The denomination of the machine shall be clearly visible at all times, preferably near the coin slot. If the machine uses tokens or tokenization, the number of credits registered for each token or coin respectively shall also be displayed.

12.1.17 All game instructions shall be in English and both grammatically and syntactically sound.

Exceptions may be acceptable on a case-by-case basis.

12.1.18 In the Western culture, the assumed direction of instructions is from left to right and from top to bottom. These directions shall be used as much as possible. Considerable breach of this common rule shall make the artwork unsuitable.

12.1.19 All game instructions on the artwork shall be easily interpreted, clearly visible, not ambiguous, and sufficient to explain all game rules. Common sense rules shall apply. Game play and device usage instructions shall be stated unambiguously and shall not be misleading to the player.

12.1.20 There shall be sufficient game instructions to allow a player to determine the correctness of prizes awarded. If random prizes are offered the maximum value obtainable from the random prize shall be indicated. If the value of the random prize depends on credits wagered this shall be stated.

12.1.21 All statements on the artwork shall be true. The pay scale on the artwork shall correspond to the pay scale used in the mathematical treatise.

12.1.22 The display of the result of a game outcome shall not be misleading or deceptive to the player (e.g. it shall not improperly indicate a near miss).

12.1.23 Initial player selection options shall be described (e.g. selection of a runner in a horse race shall identify name, number and expected payout).

12.1.24 Player selection options once the game has commenced shall be clearly shown on the screen.

12.1.25 The winning amount for each separate wager and total winning amount shall be displayed on the screen.

12.1.26 All artwork supplied shall be clearly marked with a part number unique to that manufacturer and with the name or logo of the manufacturer. Successive versions of the commercial quality artwork shall have different part numbers, if applicable.

12.1.27 All occurrences of the scattered symbols should be labelled with the word "scatters" (or an equivalent) where they appear on the artwork panel.

12.1.28 Upon a win, all pay lines shall be clearly indicated. If it is possible to bet more than 5 lines, then upon a win for video machines, the pay lines shall be indicated in a manner such that all pay lines can be clearly identified by the player.

12.2 Game-specific artwork

12.2.1 Card games

In the case of card games, the following apply:

- a) It shall be clearly stated if more than one deck of cards is used in the game.
- b) The artwork shall clearly state if the rules of the game do not shuffle the deck after every game. In this instance, the artwork shall indicate when shuffles actually do occur.
- c) As a minimum the player shall be able to view a tabulated display of the paytable that shows all winning hands and their payouts when no game is in progress.

12.2.2 Blackjack

In the case of blackjack, the following apply:

- a) Insurance rules shall be clearly explained if insurance is available.
- b) Pair-split rules shall be explained. Areas to be addressed are the following:
 - 1) split aces have only one card dealt to each ace, if this is the game rule;
 - 2) further splits, if available; and
 - 3) double-down after splits, if available.
- c) Double-down rules shall be clearly explained including limitations of which totals may allow a double down to be selected.
- d) The current total of all hands, including the dealer's total, shall be displayed during and at the end of the game. The term "Bust" or the equivalent may be used to indicate a hand whose total has exceeded 21.
- e) Dealer play rules shall be clearly explained including special treatment of a soft 17 count, if any.
- f) Any limits on the number of cards that may be drawn by player or dealer (or both) shall be explained including winners declared (if any) when the limit is reached (e.g. five under wins).
- g) Surrender rules shall be explained, if any exist.
- h) If the player loses on "dealer push" this shall be clearly explained.
- i) Deal rules used shall be clearly explained.
- j) Winning hands shall be clearly labelled as to the win category, e.g. "blackjack", "six under" or "push".

k) If pair splits have occurred, the results for each hand shall be shown (total points, resultant win or loss category, amount won, amount wagered).

l) Special rules, if any, shall be clearly explained.

m) All player options that are available at any point in time shall be shown on the artwork.

12.2.3 Poker

In the case of poker, the following apply:

a) The artwork shall provide clear indication if stud poker rules apply. Draw poker is assumed if nothing is stated.

b) The artwork shall provide a definition of winning combinations outside the scope of standard poker, for example royal flush without wild cards, four of a kind, "jacks or better", and four deuces (when deuces are wild).

c) Wild card rules shall be clearly explained, for example jokers wild or deuces wild.

d) Held and non-held cards, including recommended holds (if implemented), in draw poker or the equivalents shall be clearly marked on the screen, and the method for changing holds clearly displayed to the player.

e) Winning hands shall be clearly labelled as to the win category, for example "full house".

f) All special rules outside the scope of common poker shall be clearly explained.

g) When player options outside the scope of common poker are currently available, they shall be clearly explained on the artwork.

12.2.4 Simulated races

This subclause refers to games with simulated races with animals (e.g. horses), vehicles (e.g. motor bikes) and humans (e.g. 100 m dash), etc. The following shall apply:

a) All participants in the race shall have characteristics that make it unique in appearance (e.g. number, jockey colours).

b) The result of the race shall be clearly obvious and not open to misinterpretation.

c) If prizes are to be paid for combinations that involve runners other than just the first place finisher, the order of the place getters that can be involved with these prizes shall be clearly shown on the screen (e.g. result 8-4-7).

d) Each meaningful result position shall be available for display in all last game replays.

e) The rules for alternative wagering options, for example quinella, and the expected payouts shall be clearly explained on the artwork.

12.2.5 Scratch tickets

This subclause refers to games that simulate a lottery scratch tickets or similar. The following shall apply:

a) a precise definition of which player options shall be taken to complete the game, shall be shown on the artwork;

b) details of how payouts are won and their amounts shall be shown on the artwork, for example three matching scratched symbols win that prize; and

c) all rules for symbols that may substitute in winning patterns shall be displayed on the artwork.

12.2.6 Roulette

If standard roulette is simulated, the following rules apply (variations shall be considered on a case-by-case basis):

a) Each "zero" used shall be uniquely labelled (e.g. "0", "00", "000").

b) The simulated roulette wheel shall be in the identical format as a standard casino wheel (including colours of landing locations and position of numbers) with the exception of the position of "zeroes" if more than one exist, in which case the "zeroes" may be placed arbitrarily.

c) A scorecard or description of all available wagers and their payouts shall be accessible by the player while not in game play.

d) The method of selecting individual wagers shall be explained by the artwork.

e) The wager(s) already selected by the player shall be displayed on the screen.

f) The simulated ball spin shall result in a location that unambiguously determines the winning number.

12.2.7 Dice

This subclause refers to standard dice games. Variations shall be considered on a case-by-case basis. The following shall apply.

a) Each face shall clearly show the number of spots.

b) Simulated die shall be of the same layout as standard die (e.g. the 1 and 6, 2 and 5, and 3 and 4, respectively shall be on opposite faces).

c) It shall be obvious, after each die has been thrown, which side is face up.

d) The result of each die shall be clearly visible or displayed.

e) There shall be a description of each wagering option available on the artwork. For example, the craps wagers "field" and "hardway" shall be clearly explained.

f) All possible wagering options available and obtainable at any point in time shall be displayed on the artwork.

12.3 Awards layout

12.3.1 The awards for the winning combinations of each symbol shall be placed in an area that visually belongs to the symbol. This can be achieved with appropriate boxing. The symbol shall preferably be placed on the left-hand side of the award scale.

12.3.2 The number of symbols that is required to appear in the reels display window in order to trigger each award, shall be indicated. These numbers shall line up with the awards in order to avoid any ambiguity as to which award corresponds to which number. The use of pointers is also encouraged.

12.3.3 If some symbols share the same pay scale, they shall be placed in an area that visually belongs to the pay scale. This may be achieved with appropriate framing or boxing. The group of symbols shall be associated with its award, and shall not invade the area that visually belongs to some other group of symbols if this could cause ambiguities.

12.3.4 If the awards for multiple credits staked are tabulated, the number of credits bet required for each award shall be placed above (preferably) or underneath the awards' scale. Each such number shall have associated with it the word "credits" or an equivalent. Common tabulations shall display the number of credits bet as column headings and the number of symbols required as row headings.

12.3.5 Games that can be tokenized shall have all award references in credits and not in coins.

12.3.6 The nature of all awards shall be clearly indicated. If some awards are in cash whilst others are in credits, this shall be stated.

12.4 Positioning, size, colour and shape

12.4.1 If game instructions refer to a particular symbol, preference shall be given to the use of the actual symbol rather than a description of the symbol. For example, game instructions such as "when a pair of sunglasses occurs " shall become "when <sunglasses symbol> occurs ... ".

12.4.2 Game instructions that belong to only one symbol or to a group of symbols shall be clearly associated with the symbol or group of symbols. This may be achieved with appropriate framing or boxing. Additional wording such as "these symbols" may also be used.

12.4.3 Symbols that are not characters or numbers shall maintain the same shape throughout all artwork.

12.4.4 Game instructions shall be printed in a colour that contrasts with the background colour.

For example, red print on a black background is hard to read for some people, and is not acceptable.

12.4.5 Game instructions that refer to all symbols or awards shall read "all" (or an equivalent). If some symbols or awards are excluded from these instructions, this shall be indicated with wording such as "except" (or an equivalent).

12.5 Winning patterns

12.5.1 This subclause refers to spinning reel variations with draw poker characteristics where the player may hold one or more reels for a second chance to improve the hand. The artwork shall address the following:

- a) held and non-held reels, including recommended reels, shall be clearly marked on the screen at all times;
- b) the method for changing holds shall be clearly displayed to the player;
- c) if the player is required to wager additional credits to participate in the hold reels phase of the game, this shall be stated; and
- d) display that the player is able to hold or release reels.

12.5.2 All winning combinations relevant to the particular point in time of a game, shall either be clearly displayed or shall be accessible. All non-defined combinations are assumed to be non-winning.

12.5.3 The trigger combination(s) and all other conditions that have to occur in order to trigger a feature, shall be specified unambiguously. The action of the game when feature trigger patterns occur during the feature (e.g. free games) shall be clearly stated on the artwork (e.g. further triggers, bonus payout or no further trigger (or both)).

12.5.4 If generic winning patterns (graphical representation of how the symbols of the same kind shall appear) are only represented graphically (without the aid of a verbalized explanation), they shall be supplemented with numbers to indicate how many correct symbols each pattern corresponds to; except that unusual winning patterns (e.g. X_X_x_X_X), where numbers shall not be displayed and the pattern shall be positioned in proximity to the prize.

12.5.5 Winning patterns that are not "left to right" or "right to left" or "any", shall be clearly explained, preferably with pictorial representations.

12.5.6 If it is possible to bet on multiple possible lines and it is not clearly obvious which reel positions are part of each of the possible lines, the additional lines shall be clearly displayed on the artwork, and appropriately labelled. The additional lines shall either be shown on static artwork or be available for display on a help or paytable screen or permanently displayed on all game play screens in a location separate from the actual reels. This requirement applies to all standard five reel games where lines greater than five shall be schematized on the artwork and appropriately labelled.

12.5.7 This subclause refers to games, such as keno and bingo, where balls are drawn from a simulated cage or the equivalent and a player tries to pick in advance which of these balls are selected. The following shall apply:

- a) The player shall be able to view or access a tabulated display of the scorecard that shows all winning payouts when no game is in progress.
- b) Any special rules that are outside the standard games of keno shall be clearly explained.
- c) All of the player's selections shall be clearly identified on the screen.
- d) The balls drawn shall be clearly identified on the screen.
- e) The game shall highlight balls drawn that match the player's selections (i.e. "hits").
- f) Special hits, if any, shall be clearly identified.
- g) The screen shall provide clear indication of how many spots were selected and how many hits occurred.
- h) Rules for purchase of additional features of the game, if any, shall be explained.
- i) The artwork shall clearly state how the player makes or changes selections. Areas to be addressed are:

- 1) how individual numbers are picked,
- 2) how individual numbers are cleared, and
- 3) how all selections are cleared.

12.5.8 The artwork shall explain all rules relative to free games. Areas relative to free games that shall be addressed in addition to the general requirements above are:

- a) additional payouts for non-winners during the free game sequences, if any, shall be displayed on the artwork. A clear indication if this payout shall be multiplied by credits staked per line or the total credits staked shall be given;
- b) any multipliers for prizes, special prizes, substitutes and other special rules during free games, shall be displayed on the artwork;
- c) a clear display of an accumulated win amount is required during each stage of the free games if the GD does not directly add wins to the credit meter;
- d) if more than one free game is offered, the number of free games that has occurred or the number that remains (or the total number) shall be displayed; and
- e) appropriate game instructions defining the number of possible lines and credits per line that are wagered during the free games.

12.5.9 The prizes for the winning patterns of each symbol shall be placed in an area that visually belongs to the symbol. This can be achieved with appropriate boxing or framing. The symbol or group of symbols shall be associated with its prize, and shall not invade the area that visually belongs to some other group of symbols if this could cause ambiguities.

The number of symbols required to appear in the reels display window, in order to trigger each prize, shall be indicated. These numbers shall line up with the prizes in order to avoid any ambiguity as to which prize corresponds to which number.

12.5.10 Card faces shall clearly display the card value (e.g. it shall be obvious which is a jack and which is a queen). Card faces shall clearly indicate the suite. The colour of the hearts and diamonds suites shall be red, clubs and spades shall be black. Jokers shall be easily distinguishable from all other cards.

12.5.11 This subclause refers to metamorphic games where the player still "pays" for the S2quence game(s). The following shall apply:

- a) all instructions for the game including the differences between the main game and the metamorphic game shall be stated (e.g. <character> appearing anywhere in window pay the original prize that started the feature);
- b) there shall be a statement that the number of lines or number of credits wagered (or both) during the metamorphic sequence may not exceed the wager of the game or games that triggered the feature, if that is the rule of the feature;

c) any special prizes, substitutes, multipliers or similar rules during the metamorphic sequence shall be clearly stated on the artwork; and

d) if the metamorphic sequence consist of more than one feature game, the number of games in the metamorphic sequence that have occurred or the number that remains (or the total number) shall be displayed.

12.5.12 This subclause refers to games where one or more bonus prizes may be paid to the player during the feature sequence. Generally, bonus prizes are awarded as a result of some second (or subsequent) screen animation. The following shall apply:

a) Criteria for entry to further bonus features as well as the initial entry shall be clearly stated.

b) All instructions and player choices for the bonus feature shall be clearly stated.

c) A display of total amounts won shall be available at the end of each stage of the game including on second screen animations. This shall include display of bonus prizes won to date in multiple sequence bonus features.

d) If bonus prizes are multiplied, the artwork shall clearly state whether they are multiplied by credits

12.5.13 The artwork shall appropriately state that all wins occur on selected lit lines (and "except scatters", if applicable) or equivalent.

12.5.14 The scattered symbol shall be clearly labelled with the word "scatters" on first occurrence in the game instructions. Further occurrences of the scattered symbol in the game instructions do not require further labelling.

12.5.15 The winning combinations and pays for scatters shall be explicitly stated or displayed.

12.5.16 The following requirements apply for artwork for games where one or more reels are automatically "held" for one or more "re-spins":

a) The rules for the criteria for the re-spin and which reel positions are held shall be clear and without possible misinterpretation. Examples of areas that shall be addressed are:

1) which reels shall be held, for example first two reels;

2) whether held reels occur on winning or non-winning patterns;

3) the specific line where the trigger combination shall occur, if any (e.g. "on the centre line"), or scattered if that is the actual requirement of the game; and

4) if a partial number of reels (e.g. 2, 3 or 4 reels) are held for some criteria, it shall be clearly stated what happens when the criteria form part of a larger pattern (e.g. what happens when all 5 reels comply with said requirement).

b) If the trigger is a winning pattern and the pattern does not pay during re-spins, this shall be clearly stated on the artwork.

c) The rules for extensions or termination of the re-spin sequences including additional held reels, for example, improvements to the original held combination(s), shall be clearly explained on the artwork.

12.5.17 In the case of games with rules that allow for the accumulation of tokens to qualify for a feature or multiple feature to be triggered or game metamorphosis, the artwork shall clearly show:

- a) the definition of the event that leads to the accumulation of tokens;
- b) a description of how many tokens are accumulated with each occurrence of the event;
- c) a description of how many tokens are required to trigger the feature;
- d) an indication of how many tokens are currently accumulated;
- e) if sub-tokens accumulate to tokens, a description of the number of sub-tokens needed to accumulate a token and the number of sub-tokens and tokens currently accumulated;
- f) if the accumulation of tokens may lead to free games, the number of possible lines and credits per line that shall be wagered during the free games; and
- g) game rules when further tokens are not accumulated during the feature sequence for events which normally would qualify to earn tokens.

12.6 Artwork wording

12.6.1 Conventions used in the wording of this subclause

12.6.1.1 Some of the wording of this subclause is only relevant to reel games.

12.6.1.2 Because of the large variety of statements that can be constructed, only examples of a particular kind of statement are covered. For example, if one statement includes references to scatters such as "except scatters", such references can be extended to a number of other statements. The reader is responsible for identifying such situations and constructing appropriate variations. Also, for some statements, opposite statements exist. These opposites are not specified. For example, if the instructions say "No free games can be triggered during free games", the opposite statement would read "Additional free games can be triggered during free games".

12.6.1.3 Game instructions relative to triggers of feature games are also not specified, nor are other game instructions that do not vary between different games for the same manufacturer.

12.6.1.4 Not all the words used during features are included, since they might only be relevant for specific games.

12.6.1.5 Some of these statements are very general and shall be read in conjunction with some other, more specific statements in order to describe the rules of the game accurately.

12.6.1.6 Combinations of many of the statements are possible, but are not discussed.

12.6.1.7 All rules that relate to the game shall be able to be clearly displayed to the player.

12.6.1.8 The artwork shall clearly state the rules for payments of prizes where multiple wins are possible. The following shall be addressed:

- a) A description of what patterns shall be paid when a pay line may be interpreted to have more than one individual winning pattern.

b) Where the game supports multiple pay lines, a message that indicates wins on different pay lines are added or the equivalent shall be displayed.

c) Where the game supports scatters, a message that indicates that scattered wins are added to pay line wins or equivalent, shall be displayed if this forms part of the rules of the game.

d) Treatment of coinciding scattered wins with respect to other possible scattered wins shall be clearly stated. For example, if both Pink Elephants and Red Frogs pay as scattered symbols and Purple Clovers substitute for both scattered symbols, the artwork shall state whether combinations of these scattered symbols pay all possible prizes or only the highest prize.

e) Where mixed symbol prizes are paid, the treatment of prizes that may be interpreted to be both mixed and straight winners shall be described.

12.6.1.9 In games that permit multiple credits to be wagered on selected lit lines, the artwork shall either clearly state that the win(s) for each selected lit line shall be multiplied by the number of credits wagered on that line or show a tabulation of all possible wagers and their payouts.

12.6.2 Examples of general statements in artwork

12.6.2.1 "Win XXX credits on a lit/pay line"

This indicates the maximum award that can be won for a single winning pattern. The total award awarded as a result of a play could exceed the XXX award, since a variety of awards can be won on different pay lines.

12.6.2.2 "All wins to credit meter"

All credits won are added to the credit meter.

12.6.2.3 "Play 1 to XXX lines" or "Bet 1 to XXX credits per line" or "Play up to XXX credits" or "To start the game, press one of the XXX buttons"

The button that starts a game (bet per line button or number of lines bet button) is specified, to avoid confusion. The maximum number of credits that can be bet is also displayed. If some of the above instructions are obvious from the artwork displayed in the button panel or video screen, some of the wording in the above statement can be omitted.

12.6.3 Examples of general mandatory statements

12.6.3.1 "Malfunction voids all pays and plays"

Credits accumulated as a result of a failure of the GD to function in the way in which it was designed and intended to function, are not valid and therefore shall not be paid.

12.6.3.2 "All wins shown in credits"

The GD only shows wins in credits.

12.6.4 Examples of coinciding wins statements

12.6.4.1 "Coinciding wins are added"

Each symbol can be used only once for interpreting individual paying patterns. When two or more paying patterns are awarded, none of the symbols can participate in both winning combinations,

except when the substitute symbol substitutes multiple times (see XXXX). If a winning combination consists entirely of substituting symbols, generally only the highest award is awarded, i.e. the award for the substituting symbols, or the award for the combination with the substituted symbols, whichever is the higher (except scatters). Other special cases that do not behave according to the above definition are clearly defined by additional wording.

11.6.4.2 "Coinciding wins on different lit/pay lines are added"

Wins that occur on each chosen line are added to the wins meter.

11.6.4.3 "Highest win only on each/any one lit/pay line" or "Highest win only" or "Highest pay line win only paid" or "Highest win only, except scatters"

Only the highest award is awarded on each lit line.

If scatters are added, an appropriate combination of game instructions shall be used.

12.6.5 Examples of statements regarding features

12.6.5.1 "Each of the non-winning lit lines during free games pays X credits multiplied by credits staked per line, including when scattered wins occur" Any non-winning chosen line pays X credits, including when a scattered win occurs on that chosen line.

11.6.5.2 "Non-winning combinations that occur on centre line during free games pay X credits multiplied by the number of credits staked, including when scattered wins occur"

Any non-winning centre-line combination pays X credits, multiplied by credits staked, including the case when a scattered win occurs.

11.6.5.3 "During free spins, the initial win is not repeated"

If the reels held during the free spins represent a winning combination and if such a combination is improved as a result of a free spin, the original combination is not paid again. Only if the initial combination is improved shall an award be paid.

12.6.5.4 "During free games all wins are doubled"

Any win that occurs during the free games is at double the scheduled prize. If some prizes are offered only during free games, such prizes are also multiplied by two when occurring. If prizes that are offered only during free games are already doubled, a statement excludes them from the above game instruction.

NOTE The word "doubled" can be substituted with any other multiplier.

12.6.5.5 "Free games cannot be won again during the feature"

Free games can be triggered only during normal play. If a free game trigger occurs during the free game series, and a special prize is awarded in place of the series of free games, this is specified with an appropriate statement on the artwork.

NOTE This is only one of the many statements that regulate triggers of free games. Because these rules are

game specific more cases are not discussed, but should be treated on a case-by-case basis.

12.6.5.6 "During free spins, the initial win is repeated each time no bigger win occurs" If the reels held during the free spins represent a winning combination and if such a combination is not improved as a result of a free spin, the award of the win that started the feature is awarded again.

12.6.6 Example of statements regarding scatters

"Scattered awards added to lit lines/centre line wins" or "Scattered wins are always added to pay line wins" or "Coinciding scattered wins are added to pay line wins". Scattered awards are always added to wins that occur on the chosen lines even if they occur on the same line as some other win.

NOTE The statement "coinciding scattered wins added" is not acceptable.

12.6.7 Examples of statements regarding substitutes

12.6.7.1 The artwork shall state all rules relative to substitutes that participate in scattered wins.

The following shall be addressed:

a) if applicable, the artwork shall specifically state when the term "substitutes for all symbols" is used but the substitute does not participate in scattered wins (e.g. <sub> substitutes for all symbols except scattered <scatter symbol>);

b) the artwork shall state payout rules for coinciding wins when there are multiple scattered win symbols and substitutes participate, including the situation where one or more scattered symbols may not appear; and

c) these requirements also apply to any change of substitutes, if this occurs.

12.6.7.2 If there is a feature where a symbol may substitute in a winning pattern when the symbol is not on a pay line, this shall be clearly specified on the artwork.

12.6.7.3 The artwork shall clearly state if the game provides for a change of substitutes, (e.g. during free games) and any special conditions that may apply.

12.6.7.4 If the game provides for extra pays or if multipliers apply when substitutes participate in winning patterns, a clear explanation shall be provided.

12.6.7.5 If the game provides for multipliers to apply when substitutes participate in winning patterns, the multiplication factor or a tabulation of all prizes with possible multipliers shall be displayed.

12.6.7.6 If extra pays or multipliers apply when substitutes participate in winning patterns, the handling of winning patterns where multiple substitutes participate shall be clearly explained.

12.6.7.7 A substitute symbol acts like a wild card in a card game.

12.6.7.8 "X substitutes for A, B, C ..."

Only the symbols indicated are substituted. If more than one substitute symbol exists, the range of symbols that are substituted by each substitute is specified.

12.6.7.9 "Each symbol can participate only once in any pay line win" When substitute symbols are used, to clarify the fact that the substitute symbol pays only in the highest paying pattern, wording to this effect shall be used. Also to avoid confusion when any paying pattern is used, such wording is desirable.

12.6.7.10 "X substitutes for all symbols and for all scattered pays at the same time" If a game offers two or more scattered symbols which are substituted by the symbol X, this wording explains that X substitutes up to a number of times: once in a pay line winning pattern, and once for each scattered symbol. Scattered symbols are substituted even when none of the scattered symbols appear on the display.

12.6.7.11 "If one or more X substitute in a winning pattern the prize for that winning pattern is doubled. Doubled prizes are shown in the coloured column." The substitute symbol X doubles the prize of a winning pattern in which it substitutes. Prizes for winning patterns for the symbol X are not doubled as the symbol X does not substitute for itself. If the symbol X also doubles the prizes for scatters, this is indicated on the artwork with appropriate additional wording.

NOTE The word double can be substituted by any other multiplier.

12.6.7.12 "X substitutes for all symbols, including scatters"

The symbol X substitutes a number of times concurrently: once for any non-scattered symbol and once for a scattered symbol. If X can substitute in two different winning combinations of non-scattered symbols, it substitutes only in the highest paying one. If X substitutes several times on each line, including for non-scattered symbols, this is stated on the artwork. The symbol X always substitutes for scatters even if no scattered symbols are displayed. If X is substituting, it does not pay for its own winning combinations, except when it is substituting for scatters.

11.6.7.13 "X Substitutes for all symbols [Optional: Including or Except Scatters]"

The symbol X may substitute in any winning pattern in replacement for a symbol required by that pattern (e.g. queen/substitute/queen, the substitute qualifies as a queen to make three queens).

Unless the optional "except scatters", or the equivalent, is used, the substitute participates in scattered wins. Further qualification may be required to clarify circumstances of games with coinciding wins rules.

12.6.7.14 "X substitutes for all symbols except A, B, C .."

The symbol X substitutes for every symbol except the symbols as indicated. If more than one substitute symbol exists, the range of symbols that are excluded by each substitute is specified.

12.6.7.15 "Every X that substitutes in a win combination multiplies the award for that combination by XX"

The award of the combinations is multiplied by XX for each substituting symbol.

12.6.7.16 "If one or more X substitute in a win combination, the award for that combination is doubled. Doubled awards are shown in the coloured column" The substitute symbol X doubles the award of a combination in which it substitutes. Awards for winning combinations for the symbol X are not doubled because the symbol X does not substitute for itself. If the symbol X also doubles the awards for scatters, this is indicated on the artwork.

12.6.7.17 "X substitutes for all symbols, including centre line and both scattered pays all at the same time" or "X substitutes for all symbols and both centre line and scattered pays at the same time" If a game offers two scattered symbols that are substituted by the symbol X, this wording explains that X substitutes up to three times: once in a centre-line combination, and once for each scattered symbol. Scattered symbols are substituted even when none of the scattered symbols appear on the display.

12.6.7.18 "X substitutes for all symbols and X can be shared multiple times when substituting"

The symbol X can be used as a substitute as many times as required to complete winning combinations if at least one symbol of the winning combination is displayed. If no symbols of a winning combination other than X are displayed, then X does not substitute, but it pays for its own winning combination. If X is substituting, it does not pay for its own winning combinations, except when it is substituting for scatters. X always substitutes for scatters.

12.6.7.19 "Every X that substitutes in a winning pattern multiplies the prize for that winning pattern by XX."

The prize of the winning pattern is multiplied by XX for each substituting symbol.

12.6.8 Examples of statements regarding tabulation

12.6.8.1 "The award for one credit staked is multiplied by the number of credits staked (per line)"

If the pay scale for one credit is tabulated only for a few possible number of credits staked, the partial tabulation acts as the sample or guideline. To obtain an award that is not covered in the tabulation, the award for one credit staked is multiplied by the number of credits staked. Wording such as "Wins multiplied by credits staked" is not appropriate if partial tabulation exists because it does not state which awards are multiplied.

If partial tabulation exists, the artwork shall clearly indicate that the prize for one credit (or other appropriate bet) staked is multiplied by the number of credits bet (per line). Alternate game instructions shall ensure that it is not possible to incorrectly assume that the tabulated prizes are further multiplied by credits bet.

12.6.8.2 "Credits Bet" or "Total Credits Bet"

Used on multi-line games to distinguish between total credits wagered on a game and credits bet per line.

12.6.8.3 "Credits bet per line"

If wins for different credits bet per line are tabulated, the heading of the columns of the tabulation indicates that the awards are for credits bet per line.

12.6.8.4 "All wins multiplied by credits staked" or "All wins multiplied by credits staked per line"

This wording shall only be used if the pay scale for one credit bet is displayed and the full tabulation of the award scales for additional credits bet is not displayed. If a full award scale tabulation for any number of credits bet is already displayed, the above statement shall also say "As indicated".

12.6.8.5 "These wins multiplied by credits staked (per line)" or "Scattered pays are multiplied by the total number of credits staked"

The wins that visually belong to the above statement are multiplied by the number of credits staked. If some wins are excluded from the above statement, these game instructions are appropriately modified.

12.6.8.6 "Credits"

If wins are multiplied by the total number of credits staked, the heading of the columns of the tabulation indicate the number of credits required for each award.

12.6.9 Examples of statements regarding winning lines

11.6.9.1 "All wins on lit/bet lines only" (viewed in conjunction with a scatters statement)

All wins (except scatters) are paid only when the combination appears on a selected lit line.

12.6.9.2 "All wins on centre line, except scatters" or "Centre line pays only" (viewed in conjunction with a scatters statement) or "All wins on centre line only" (viewed in conjunction with a scatters statement).

Scattered wins can appear on any line according to the specified winning pattern. Other combinations are only paid on the centre line.

12.6.10 Examples of statements regarding winning patterns

12.6.10.1 "Of a kind"

When many symbols share the same award scale, the wording "Of a kind" shall be positioned immediately above, beneath or beside the number of symbols required to complete a winning combination. The wording "Of a kind" is preferable to "Of a kind pays", to avoid a possible misinterpretation of an award with the numbers that indicate the winning pattern.

12.6.10.2 "All pays left to right only, including scatters"

For example, for a five-reel machine, all awards are awarded for combinations of one, two, three or four of a kind from left to right, or for five of a kind.

11.6.10.3 "All pays left to right and/or right to left, including scatters"

Awards may be awarded for combinations of one, two, three or four of a kind in a sequence from either side, or for five of a kind.

12.6.10.4 "All pays left to right, except scatters"

The winning patterns for scatters are specified separately.

12.6.10.5 "All pays left to right and right to left, except scatters"

The winning patterns for scatters are specified separately.

12.6.10.6 "Mixed:<symbol X> or <symbol Y> or <symbol Z> mixed"

Any combination of the symbols X, Y, Z that appear on the pay line (or scattered if the symbols are scatters) and according to the specified paying pattern shall win the indicated award.

NOTE This is defined as occurring when two or more winning patterns of a distinct kind are displayed.

If prizes can be awarded for mixed or grouped symbols, the artwork shall clearly specify the grouping of the symbols either by placing the symbols in an area that clearly belongs to the pay scale and labelled with the term "mixed" (or the equivalent) or by using a descriptive term that clearly defines the grouping. Care shall be taken with such phrases as "Mixed Bars" or "Mixed Fruit" to ensure that there can be no misinterpretation.

12.6.10.7 "All pays for two or more adjacent symbols, except scatters"

The winning patterns for scatters are specified separately.

12.6.10.8 "All pays for two or more adjacent symbols, including scatters"

Awards may be awarded for combinations of two, three or four of a kind beside each other on a line, or for five of a kind on a line.

13 Significant events requirements

13.1 General

13.1.1 Where this part of DUS 1580-2:2016 states that the system shall detect and record significant events, a particular implementation is not implied. As long as the CA can be assured that these events are detected and reported, the method that is used to do so is of little concern. However, if it is stated in this part of DUS 1580-2:2016 that the GD shall detect and record an event, the GD shall be programmed to create the event response internally, pass it to the host of the system as soon as possible and, where required, deactivate game play.

13.1.2 This clause provides a summary of the significant events that are specified by the CA or LA. In the case of each significant event, the type of event (relative to requirements for deactivation and reactivation) is indicated. Each of the significant events shall be tested during the formal acceptance tests.

In the following list, four types of significant event are defined:

- a) type 1: information only (no deactivation);
- b) type 2: events that lead to automatic deactivation but also allow for immediate automatic reactivation when the problem is solved (e.g. authorized door open);
- c) type 3: events that lead to automatic deactivation and require manual reactivation; and
- d) type 4: events that lead to automatic deactivation and require manual reactivation, but only after the LA audit procedures have been followed. These procedures might involve approval for reactivation, or the approval could be withheld until physical inspection by an LA inspector is completed.

To some significant events a suffix "/R" is appended, which means that the event has to be reported by the system in the daily Type 4 Events Report. Note that not all events with this description are type 4 events.

By definition, all type 4 events shall be reported.

NOTE The phrase "manual reactivation" is understood to include closing of the logic door or turning of a reset key.

13.1.3 Significant events other than type 1 that occur on a GD shall cause a clearly displayed message that an event has occurred and, unless otherwise indicated, shall also result in the following:

- a) all player inputs shall be disabled, including coin and banknote input;
- b) an identifiable alarm shall be activated, which may be either a tower light, or a sound of at least 1,5 s duration (or both);
- c) any game result shall be saved; the reels or video display shall not display a false game outcome; and
- d) if the GD was in CDD payout, the CDD shall be turned off and the brake applied.

13.1.4 The following actions shall be performed, if possible, on clearing of the fault on a GD:

- a) any messages shall be removed;
- b) any relevant player inputs shall be re-enabled;
- c) the alarm shall be turned off; and
- d) any game play when the fault event occurred shall recommence from the beginning of the play or from the point at which the interruption occurred and conclude normally, using the data that were saved previously.

13.1.5 Generic significant events are applicable to all GDs controlled by the system. All generic significant events shall be detected and notified as soon as possible, but before any game can be played.

13.1.6 All GD fault conditions shall activate an alarm, which shall include either a tower light or sound (or both).

13.1.7 To assist with service and fault diagnosis, the nature of the event shall be displayed.

13.2 GD/Terminal events

13.2.1 Configuration change (type 4)

Change of denomination, switches or jumpers, etc.

The GD shall detect and report any configuration changes made to the device (even if the power is off when this occurs or the GD is not able to communicate with the system) and pass it to the system before game play is reactivated.

13.2.2 Master reset (type 4)

Intentional memory clear of the RAM and other volatile memory of a GD has occurred.

13.2.3 Error detected in hardware or software (type 4)

Failure of internal test.

It is understood that failure of some test(s) means that the GD cannot function, in which case it shall disable itself immediately.

NOTE Excludes hardware input devices that do not influence the game results.

13.2.4 Logic area access (type 4)

Opening of the logic area door.

The GD shall detect the opening of the logic area door (or access to the logic area).

13.2.5 Logic area closed (type 1)

A sensor registers that a logic door has been closed.

13.2.6 Power on (type 1)

Power is successfully restored and the device can operate.

13.2.7 Enter test/audit mode (type 2)

If the GD has a test mode or special staff/audit mode, a significant event shall be signalled when such mode is entered.

13.2.8 Exit test/audit mode (type 2)

If the GD has a test mode or special staff/audit mode, a significant event shall be signalled when such mode is exited.

13.2.9 Coin jam (type 2)

Sensors in the coin path shall indicate when a coin is jamming the path.

13.2.10 CDD empty/malfunction (type 2)

13.2.11 "CDD runaway", "coin out tilt" or "extra coin(s) paid" (type 2)

One or more coins are improperly paid by the CDD.

13.2.12 General enclosure access (type 2)

Opening of outer enclosure door, excluding the drop box door.

This message shall be sent by the GM if it has noticed any interference, such as the changing of counters or insertion of coins, while this door is open. When the message is sent, the monitoring and control system shall add the staff card number to the event message. If no card number is available, the message shall be tagged as an unauthorized access by the monitoring and control system.

13.2.13 Drop box door open (type 1)

Opening of drop box door.

When the message is sent, the monitoring and control system shall add the staff card number to the event message. If no card number is available, the message shall be tagged by the monitoring and control system as an unauthorized access.

13.2.14 Enclosure door closed (type 2)

A sensor registers that a door has been closed.

1.2.15 Cancel credit (type 2)

Any incident of a manual cancel credit (e.g. due to book/handpay) shall indicate a significant event.

The value of the credits shall be included in the significant event report.

13.2.16 Low memory back-up battery (type 4)

The voltage that is produced by the battery or another device for maintaining the contents of RAM is approaching a level below which the memory cannot be maintained for a minimum of 14 d without mains power and data might be lost or corrupted.

13.2.17 Coin interference (type 2/R)

External interference with a coin/token acceptor or validator.

This refers to coin yo-yo, stringing, etc.

13.2.18 Reel error (type 2)

A reel position does not agree with software control.

13.2.19 Collect credit (type 1)

Cashout that exceeds the limit specified by legislation.

NOTE This significant event is not specified in South African legislation at present, but may be required later.

13.2.20 Banknote receptacle is removed (if the banknote storage area uses a receptacle) (type 2)

The GD shall automatically disable itself, after reporting the event to the monitoring and control system.

13.2.21 Banknote storage area access (type 2)

This message is sent by the GM when the banknote storage area is accessed.

When the message is sent, the monitoring and control system shall add the staff card number to the event message. If no card number is available, the message shall be tagged as an unauthorized access by the monitoring and control system.

NOTE This message is intended for use only with GMs where the banknote storage area is external to the main enclosure.

13.2.22 Banknote acceptor mechanism is disconnected (type 1)

13.2.23 Software validation or signature failure (type 4)

It is assumed that modification or unauthorized reading (or both) of the contents of the restricted components of the GD or loading of unapproved software (or both) could have occurred.

The GD shall be manually reactivated, after the LA audit procedures (if any) are satisfied.

13.2.24 Game play deactivated (type 3)

Deactivation of game play.

If a significant event has not already been logged (by the system or the GD) when deactivation occurs, the GD shall ensure that such an event is reported to the system as soon as possible. If the GD receives instruction to deactivate from any other part of the monitoring system, it shall deactivate immediately after reporting this deactivation, and shall not reactivate until it is instructed to do so by the system.

13.2.25 Game play activated (type 1)

Activation includes reactivation of game play.

Activation and deactivation at normal commencement and conclusion of business require the generation of significant events so that the monitoring system can identify that the GD status has changed. This does not mean that the system shall send a separate message to the central controller of the system for each one of these events. The system may send a message that indicates change of status of several items of the GD as long as the status change events all occur within a period set by legislation.

13.2.26 Enter Demonstration Mode (type 2/R)

Where demonstration mode is permitted by legislation, and the GD enters this mode, it shall create and transmit a type 2/R event.

13.2.27 Exit Demonstration Mode (type 2/R)

Where demonstration mode is permitted by legislation, and the GD exits this mode, it shall create and transmit a type 2/R event.

13.2.28 Credit limit exceeded (type 1/R)

Machine credit that exceeds the limit specified in legislation.

Only the first occurrence during a particular customer's session shall be sent.

13.2.29 Maximum Prize win (type 1/R)

Winning of a prize that equals the limit specified by legislation.

13.2.30 Printer failure (type 2)

The software shall register and react to any printer fault conditions, and shall allow the machine to complete the printing of the current ticket and then pause printing and display an appropriate onscreen

message until the problem has been solved and rectified.

13.3 Player/staff cards (if applicable)

13.3.1 Unauthorized card (type 1/R)

Use of a stolen or unauthorized staff machine card or player card.

The GD card reader shall not accept an illicit card or a card that is not authorized for use at that specific time.

13.3.2 Unauthorized staff PIN (type 1/R)

Incorrect PIN entered three times consecutively with a staff machine card.

The system shall ensure that the card is blocked from any further use.

NOTE It is not necessary to disable the GD or the player interface.

13.3.3 Unauthorized player PIN (type 1) Incorrect PIN entered three times consecutively with a player card.

The system shall ensure that the card is blocked from any further use.

NOTE It is not necessary to disable the GD or the player interface.

13.4 Banknote acceptance (if applicable)

Banknote reject state (type 1)

The GD shall report banknote reject events to the monitoring and control system.

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

The use of the UNBS Certification Mark is governed by the Standards Act, and the Regulations made thereunder. This mark can be used only by those licensed under the certification mark scheme operated by the Uganda National Bureau of Standards and in conjunction with the relevant Uganda Standard. The presence of this mark on a product or in relation to a product is an assurance that the goods comply with the requirements of that standard under a system of supervision, control and testing in accordance with the certification mark scheme of the Uganda National Bureau of Standards. UNBS marked products are continually checked by UNBS for conformity to that standard.

Further particulars of the terms and conditions of licensing may be obtained from the Director, Uganda National Bureau of Standards.



