TECHNICAL STANDARDS

FOR

ELECTRONIC SHUFFLERS

(SINGAPORE)

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Preface

The purpose of this document is to establish the system requirements for the design and operation of shufflers in the gaming industry in Singapore and to guide testing and certification bodies on the areas for technical compliance on the shufflers.

The intent of this document is to ensure the shufflers operate in a manner that is:-

a. Honest;
b. Secure;
c. Reliable; and
d. Auditable.

It is not the intent of this document to:-

a. Mandate a single solution or method to realise an objective;
b. Limit technology application to gaming equipment;
c. Limit creativity and variety of choice;
d. Limit any supplier or manufacturer of equipment;
e. Preclude research and development into new technologies or innovative ideas.

As far as possible, this document specifies what the minimum technical standards for shufflers are instead of how these standards should be met, and does not mandate a particular solution or method as the means to realise these standards.

Casino Regulatory Authority of Singapore (the "Authority") is the regulatory authority that supervises and regulates the activities of casinos in Singapore. Casino operators are required to be licensed by law and their shufflers must comply with these technical standards as part of their licensing requirements.

Where applicable, the provisions in the Casino Control Act (Cap. 33A) and its subsidiary legislation shall take precedence over these technical standards.

This document would be reviewed on an ongoing basis to take into account the evolution of systems security and development of other casino related technologies that may require technical regulation.

Comments on this document can be forwarded to:

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1. INTRODUCTION

1.1 Purpose

1.1.1 The purposes of these technical standards are to:-

a. Create technical standards that would ensure that the operation of shufflers in casinos in Singapore is secure, reliable and auditable;

b. Establish the minimum integrity standards for shufflers;

c. Construct technical standards that are technology neutral wherever feasible; and

d. Construct technical standards that do not specify or approve any particular method or algorithm. The intent being to allow a wide range of methods to be used to conform to these standards as long as the methods are secure, reliable and consistent with the best practices of the day for the relevant technologies.

1.2 Scope

1.2.1 The scope of these technical standards covers the minimum standards required in the operation of a shuffler so that security, reliability and integrity of gaming equipment is achieved.

1.2.2 In these technical standards, a shuffler is defined as an electronic utility product that has the capability to rearrange the playing cards to completely eradicate any prior pattern(s) introduced to the playing cards.

1.3 Terminology

1.3.1 The following terminology used in this document is to be interpreted as follows:-

a. Shall: The guideline defined is a mandatory requirement, and therefore must be complied with;

b. Should: The guideline defined is a recommended requirement. Non-compliance shall be documented and approved by the Authority. Where appropriate, compensating controls shall be implemented; and

c. May: The guideline defined is an optional requirement. The implementation of this guideline is determined by the operator's environmental requirements.

1.4 Definition of Terms

[This section is intentionally left blank.]

1.5 Testing

1.5.1 Testing of the shufflers by recognised testing laboratories shall be aimed at determining compliance with these technical standards. Areas of non-compliance shall be reported in the test/certification report. Where, in the opinion of the testing/certification laboratory, these technical standards are insufficient, inappropriate or not pertinent to the design and operation of the shufflers, the laboratory shall seek direction and further clarification from the Authority before proceeding to testing/certification.

1.6 Consistency of Interpretation

1.6.1 The Authority recognises that these technical standards may be subject to different interpretation by manufacturers, casino operators and testing/certification laboratories. As such, any feedback on interpretation of any provision of these technical standards should be directed to the Authority for clarification.

2. FEATURE REQUIREMENTS

2.1 Equipment Identification

2.1.1 The shuffler shall be identifiable, at minimum, with the following information:-

a. The name of manufacturer;

b. A unique serial number;

c. The model number; and

d. The date of manufacture.

2.2 Basic Functionality

2.2.1 The shuffler shall have the ability to grip the playing cards and shall not leave any marking that may assist, help or otherwise aid any person to predict or project the outcome of a game.

2.2.2 The shuffler shall be secured to preclude the possibility of viewing of cards being shuffled.

2.2.3 During shuffling, the shuffler shall have mechanisms and controls to prevent the tampering of any playing card loaded to the shuffler.

2.3 Equipment Integrity

2.3.1 There shall be mechanisms in place to detect the opening of shuffler during operation, upon which the shuffling and dealing processes shall stop.

2.3.2 Any change in the password access shall be made by authorised personnel.

2.4 Storage Memory Requirements

2.4.1 Programme files, including the RNG algorithm, shall be stored in:-

a. Non-alterable memory devices;

b. Memory devices with the implementation of write protection; or

c. Memory devices with sufficient proprietary controls and mechanisms set in place by manufacturer to restrict modification access.

2.4.2 Every shuffler shall contain a proven and robust mechanism which has the capability to internally authenticate the programme files and/or support files have not been corrupted or altered prior to use or loading. Such mechanism shall prevent further operation of the shuffler if unexpected data or inconsistencies are found.

2.5 Card Checking Integrity

2.5.1 If the shuffler is capable of recognising rank and suit, it shall:-

a. Ensure 99.99% accuracy in its card recognition technology;

b. Not provide real time information that can be used to aid in the projecting of the outcome of the game, tracking of the cards played and cards remaining to be played, analyzing the probability of the occurrence of an event relating to the game, or analyzing the strategy for playing or betting to be used in the game; and

c. Have Role Based Access Control to restrict access to the history of game(s) played.

2.5.2 If the shuffler is capable of card counting, it shall ensure 99.99% accuracy in the counting mechanism.

2.6 Dealing Requirements

2.6.1 If the shuffler is capable of hand formation, it shall ensure the correct number of playing cards per hand.

2.7 Display Requirements

2.7.1 In the event of error, the shuffler shall cease operation and there shall be an appropriate indicator to notify the casino personnel. If an LCD screen is present, a message describing the type of error shall be displayed.

2.8 Randomness Requirements

2.8.1 The shuffler shall be designed to completely eradicate any pattern(s) introduced to the playing cards.

2.8.2 If the shuffler has dealing capability, it shall ensure all hands dealt are random.

2.9 Random Number Generator (RNG)

2.9.1 The use of a RNG shall result in shuffling outcomes that are proven, via the application of recognised statistical tests, to be:-

a. Statistically independent;

b. Uniformly distributed over their range; and

c. Unpredictable.

Background RNG Activity Requirement

2.9.2 The RNG shall be cycled continuously between shuffles.

RNG Seeding

2.9.3 The method of seed generation shall ensure that:-

a. The same sequence of random numbers is never used in more than one shuffler at the same time;

b. The shuffle is not predictable; and

c. The seeding and re-seeding shall be randomly determined and shall not be under operator control.

Range Requirement

2.9.4 The range of values produced by the RNG shall be adequate to provide sufficient precision and flexibility required by the mechanical implementation of the shuffler.

Scaling

2.9.5 Numbers generated from the RNG must be scaled down to usable values required by the mechanical implementation of the shuffler, while maintaining the randomness of the number sequence over the new range.