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# eclipse

COMPLIANCE TESTING

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**777**

## Random Number Generator Report

<b>Report issued to</b>	Sean O'Hagan, Chief Executive Officer Tap50:50 Event Consultants Ltd. 808 King Street Saskatoon, Saskatchewan S7K0N7 CANADA
<b>Date of issue</b>	October 9, 2015
<b>Gaming System Manufacturer Contact Details</b>	Tap50:50 Event Consultants Ltd. 808 King Street Saskatoon, Saskatchewan S7K0N7 CANADA
<b>Gaming System Details</b>	Tap50:50 Random Number Generator
<b>eclipse Compliance Testing Report Reference Information</b>	Detailed review and analysis of the <i>Tap50:50 Random Number Generator</i> for a lower limit range (1 – 400), developed by Tap50:50 Event Consultants Ltd.
<b>Report Number</b>	NA-TAP50E-2783-RN

### 1. INTRODUCTION

eclipse Compliance Testing has evaluated the *Tap50:50 Random Number Generator* (RNG) developed by Tap50:50 Event Consultants Ltd. Our evaluation of the RNG was conducted for compliance with industry standards and jurisdictional requirements. This document outlines our findings and conclusions of the performance of the RNG, and compliance with the document titled **GLI-31: Electronic Raffle Systems 1.1** issued on July 24, 2015. Specifically, the following section of the aforementioned technical standard has been reviewed:

- **Chapter 4 - 4.0 Random Number Generator Requirements.**

### 2. TESTING PROCEDURE

To perform our analysis of the RNG to be utilized for selecting numbers for lower limit drawings, eclipse Compliance Testing worked with the staff of Tap50:50 Event Consultants Ltd., to collect fourteen (14) RNG data files.

For our tests, each RNG data file consisted of 4,000 numbers drawn from a pool of 400 numbers, ranging from 1 to 400, with replacement. This data was analyzed to determine if the *Tap50:50 RNG* meets the 99% confidence level of the following statistical tests for randomness:

- Chi-Squared Analysis
- Runs Test
- Serial Correlation (Game-to-Game Correlation)

#### Chi-Squared Analysis

The Chi-Squared Analysis was conducted to ascertain the frequency of occurrence for each number selected. Chi-Squared statistics were generated that compared actual with expected frequency of each number. For each number, Chi-Squared statistics were computed as a function of the difference between observed frequency of occurrence, as produced by the RNG, and the expected frequency of occurrence.

Chi-Squared statistics for each data file were within acceptable limits at a 99% confidence level. Thus, this RNG passes the Chi-Squared Analysis test.

#### Runs Test

The Runs Test is a measure of determining if any cyclical patterns exist in the analyzed data. A run is defined as a series of values which are either all above or all below the mean value of the data set. A Runs Test was performed that captured the total number of runs above and below the mean value of the data for each data file. A Z-statistic for each data file was then calculated. This number was then compared to expected values.

The resulting Z-statistics were within limits at the 99% confidence level. Thus, this RNG passes the Runs Test.

#### Serial Correlation Test

The Serial Correlation Test is a measure of determining if the numbers selected in one draw have any influence on the numbers selected in another draw outcome. The correlation coefficients of numbers between draws were measured.

This RNG attained acceptable Serial Correlation Test results to meet the 99% confidence level criteria for the Serial Correlation Test. Thus, this RNG passes the Serial Correlation Test.

### **3. SOFTWARE IDENTIFICATION INFORMATION**

The RNG is comprised of various files which are stored on an online database. These files, which are responsible for the operation of the *Tap50:50* RNG, have been identified as follows:

File Name	Bytes	FileCheck CRC-32
* BI_RN_STATE.txt	483	ADFC9273
LS_Draw.txt	145	574C199D
* LS_EVENTS_RN_STATE.txt	128	F3E6680B
* RNG.txt	367	765766D3
RNG_SID_SEQ.txt	152	9E945272
RN_STATE_SEQ.txt	154	A3EE41C5
* SFMT.txt	7,909	DB6B72F8
* TWISTER.txt	602	F01FBE2F

\* Denotes files which, upon download from the online database, must be converted into a text format before signatures are obtained. Files that are downloaded will have a file extension of “.sql”. This file extension must be changed to “.txt”, which will change the file format to text. Signatures can then be obtained and verified to the **FileCheck** CRC32 values listed above.

The remaining files, which comprise the *Tap 50:50* RNG, are files that must be created as text files before signatures are obtained. The following should be performed to create the required text files:

- Open a text editor such as Notepad (found on all Microsoft-based computers);
- Gain access to the online database using credentials obtained from the manufacturer, Tap50:50 Event Consultants Ltd;
- After gaining access to the online database, navigate to the location of the remaining desired RNG Program files, which are listed in the table above;
- Open the file, highlight and copy the displayed text within the file selected;
- Paste the copied text into the text editor and save the file in a “.txt” file format;
- When the text has been saved in a text format, the files can be signature and verified to the **FileCheck** CRC32 values listed above.

The **FileCheck** program calculates a CRC32 value. This value is a unique “signature” for the files examined. The previously listed **FileCheck** CRC32 values will be obtained provided the files remain the same as tested. Should these files be altered in any way the **FileCheck** CRC32 values will change. A copy of the **FileCheck** program may be obtained free of charge through our website, [www.eclipsetesting.com](http://www.eclipsetesting.com).

## 4. CONCLUSION

Based upon our analysis of the *Tap50:50* RNG, developed by Tap50:50 Event Consultants Ltd., we have determined that this RNG satisfies the 99% confidence level of the Chi-Square Analysis, Runs Test, and Game-to-Game Correlation Test. Based upon our evaluation, we hereby recommend approval of this *Tap50:50* Random Number Generator for use with drawings with lower limits.

If you should have any questions or require any additional information, please feel free to contact our office.

Sincerely,



Nick Farley

*President*

AP  
NF/sc  
Attachments

**APPENDIX**

**RNG Analysis Results for the  
Tap50:50 Event Consultants Ltd  
*Tap50:50* Random Number Generator  
Lower Limit Drawings**

**Tap 50:50 RNG Test Results (1 – 400)**  
**Lower Limit Drawings**

October 9, 2015

**Pool Range: 1 – 400**

Acceptable Values

Chi Square 329.9939 to 475.5153  
 Correlation Coefficient -0.0476724 to 0.0471722  
 Z -2.580 to 2.580

<u>File 1 Calculated Values</u> Chi Square Value = 422.4 Correlation Coefficient = 0.0455518 Z = -1.0734125	<u>File 2 Calculated Values</u> Chi Square Value = 391.6 Correlation Coefficient = 0.0068310 Z = -0.5539934
<u>File 3 Calculated Values</u> Chi Square Value = 385.4 Correlation Coefficient = 0.0032318 Z = -0.1086974	<u>File 4 Calculated Values</u> Chi Square Value = 414.2 Correlation Coefficient = -0.0065884 Z = 0.3120740
<u>File 5 Calculated Values</u> Chi Square Value = 409.8 Correlation Coefficient = 0.0191546 Z = -1.7576062	<u>File 6 Calculated Values</u> Chi Square Value = 418.8 Correlation Coefficient = 0.0024301 Z = 0.8180521
<u>File 7 Calculated Values</u> Chi Square Value = 421.6 Correlation Coefficient = 0.0113040 Z = 0.0555153	<u>File 8 Calculated Values</u> Chi Square Value = 395.4 Correlation Coefficient = -0.0037549 Z = -0.0140849
<u>File 9 Calculated Values</u> Chi Square Value = 429.0 Correlation Coefficient = -0.0043156 Z = 0.7912083	<u>File 10 Calculated Values</u> Chi Square Value = 379.6 Correlation Coefficient = 0.0307797 Z = -1.0457137
<u>File 11 Calculated Values</u> Chi Square Value = 408.8 Correlation Coefficient = 0.0193267 Z = -1.1088172	<u>File 12 Calculated Values</u> Chi Square Value = 380.8 Correlation Coefficient = 0.0242032 Z = -1.7002901
<u>File 13 Calculated Values</u> Chi Square Value = 405.0 Correlation Coefficient = 0.0037903 Z = 0.5197961	<u>File 14 Calculated Values</u> Chi Square Value = 372.2 Correlation Coefficient = 0.0134839 Z = -0.8856561