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RvA Registration Number of Accreditation applicable to this Report:	
Testing	L372
Certification	C577

Worldwide Locations

World Headquarters
Lakewood, New Jersey

International Offices
GLI Africa
GLI Asia
GLI Australia Pty Ltd
GLI Austria GmbH
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GLI South America

U.S. Regional Offices
Colorado
Nevada

Report Type	Evaluation and Certification
Report Date	16 June 2021
Issuing Laboratory	GLI Europe B.V.
Evaluating Laboratory	GLI Europe B.V.
Recipient	Playtech Software Limited Mid-City Place 71 High Holborn London WC1V 6EA
Tested against Requirements	Gaming Act (2018:1138) Lottery Inspectorate's Regulation and General Guidelines on the technical requirements and accreditation of bodies performing the inspection, testing and certification of gaming activities (LIFS 2018_8) Guidance on the Lottery Inspectorate's Regulation and General Guidelines on the technical requirements and accreditation of bodies performing the inspection, testing and certification of gaming activities (LIFS 2018:8) and on Articles 1 and 4 of the Lottery Inspectorate's Regulation and General Guidelines on the State lottery and lotteries for public purposes (LIFS 2018:4).
Jurisdiction	Sweden iGaming
Manufacturer	Playtech Software Limited Mid-City Place 71 High Holborn London WC1V 6EA
Submitter	Playtech Software Limited Mid-City Place 71 High Holborn London WC1V 6EA
Product Name	**Playtech Poker RNG version 16.4.0.89** **Playtech Poker RNG version 16.6.11.17**
Description of the Product Tested	**ABSTRACTGAMERULES.CLASS, AbstractRngClientSession.class, BitUtils.class ComPortOptionHandler.class, DECK.CLASS, DriverManager$1.class DriverManager.class, FrequencyAnalyzer.class, GameServerSession.class IRandomConsumer.class, IRngDriver.class, NoiseBufferHelper.class PtTelnetClient.class, RandomBatch.class, RandomBuffer$1.class RandomBuffer$2.class, RandomBuffer.class, RandomProvider.class RandomXImpl.class, RandomXWrapper.class RandomY.class, REALSHUFFLER.CLASS, ReverseTelnetDriver.class ReverseTelnetInterface.class, RngDriver.class, RngDriverException.class RngServer.class, SG100Driver.class** As requested per submitter's letter received 28 April 2021.
Evaluation Period	29 April 2021 / 14 June 2021
Internal Reference	RN-400-PVI-21-02-556
Result	Pass (See Comments and Conditions on the following pages)
Internal methods used reference	Random Number Generator (RNG) Analysis WI-MA-006, PC-TC-001

Technical Evaluation authorized by:

Martin Britton
Managing Director

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

The intent of this report is to indicate that **Gaming Laboratories International, LLC** (GLI) has completed its evaluation of the PLAYTECH POKER random number generator (RNG), versions 16.4.0.89 and 16.6.11.17, provided by PLAYTECH SOFTWARE LIMITED.

SECTION I — SCOPE OF TESTING

PLAYTECH SOFTWARE LIMITED submitted the required materials to GLI in order to conduct a random number generator analysis on the PLAYTECH POKER RNG. The scope of this analysis was limited to software verification, source code review, and data analysis. The RNG was tested for its ability to randomly produce outcomes for the Poker games.

The PLAYTECH POKER RNG was evaluated against the RNG-specific requirements of the following technical standard:

- Gaming Act (2018:1138)
- Lottery Inspectorate's Regulation and General Guidelines on the technical requirements and accreditation of bodies performing the inspection, testing and certification of gaming activities (LIFS 2018_8)
- Guidance on the Lottery Inspectorate's Regulation and General Guidelines on the technical requirements and accreditation of bodies performing the inspection, testing and certification of gaming activities (LIFS 2018:8) and on Articles 1 and 4 of the Lottery Inspectorate's Regulation and General Guidelines on the State lottery and lotteries for public purposes (LIFS 2018:4).

The software being certified herein is a cryptographically strong RNG (CSRNG) without background cycling. CSRNGs do not need to implement background cycling to improve their unpredictability and resistance to attack. As a consequence, they meet and exceed the intent of traditional background cycling requirements, but through mechanisms other than background cycling.

SECTION II — SOFTWARE VERIFICATION

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.4.0.89 are as follows:

File	Version	Type	Signature
ABSTRACTGAMERULES.CLASS	16.4.0.89	Kobe4	2UF3
		MD5	97A2AB11B394FAC3DC5BAF5B68B95EA5
		SHA-1	D049A8D37116381B698F2E2A80F74E931EAC4D23
		Kobe40	FAC3F0UH9F1F905325671APA127020U028H45P72
		CDCK	C4EC
AbstractRngClientSession.class	16.4.0.89	Kobe4	73PF
		MD5	BA39C4DE2665FD3CDAC42576153A8ADD
		SHA-1	701DFF10AD8AE4F8F664A0D5F3EB79827B57B2F1
		Kobe40	551F30099PPH390PF06P062H606U50110A9P36PC
		CDCK	18FD

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE VERIFICATION

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.4.0.89 are as follows (continued):

File	Version	Type	Signature
BitUtils.class	16.4.0.89	Kobe4	0HP2
		MD5	D087F556D1FB3B940BE2404E26E9338E
		SHA-1	68BC68C5EF4B6313D469F1AEA3BF2DFC712AB68F
		Kobe40	P0U705943267P7FC653PUU1FC51P0042U1716230
		CDCK	80CE
ComPortOptionHandler.class	16.4.0.89	Kobe4	14CU
		MD5	D5282AC4CF54446E1D7A398233E20114
		SHA-1	4BF125F617E311A2B37F9A3483334EACFB62FB5D
		Kobe40	F169F308UA481U059666P43F79523HAFP45801A1
		CDCK	3536
DECK.CLASS	16.4.0.89	Kobe4	0HU8
		MD5	1C694A2AADD696503A750FD19C221B61
		SHA-1	AC77B318898562EEBDA830CFCAFF9D0F9A4D8362
		Kobe40	H8C16UFC29930A79F10H8AU3F0P9438H66CA0423
		CDCK	F622
DriverManager$1.class	16.4.0.89	Kobe4	4P6C
		MD5	8B3AC5F76EDD1B02AF78302E86B43AC2
		SHA-1	29D6191DA4394440E91863265FE86BF92A7EE464
		Kobe40	628778H1A1U2PF6FPF9U63P4621C88F4C53PC938
		CDCK	8810
DriverManager.class	16.4.0.89	Kobe4	C8A8
		MD5	E232E5A1D8E57994FCA5F958308A00BE
		SHA-1	72BEBA31578F74E21F9569BDC097C04A8B362223
		Kobe40	C0FP139FP7AUAH48C3AU4PHP6H678AF41HA0HUC0
		CDCK	37DF
FrequencyAnalyzer.class	16.4.0.89	Kobe4	9A67
		MD5	58A36FBA6F799FE3094E375FB313C3A9
		SHA-1	8013D639EF46A4E5BD904DDFEB80D721E0E782DC
		Kobe40	18CUP0F1A586HU833C66PHC8PU48CCH7A52192A3
		CDCK	F7A9

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE VERIFICATION

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.4.0.89 are as follows (continued):

File	Version	Type	Signature
GameServerSession.class	16.4.0.89	Kobe4	P126
		MD5	01E8864DA057413A1CEA8C91234ED5DC
		SHA-1	96678F102AD74FA9B004287E4A14D6D13B9E12C9
		Kobe40	AH5333FP9965F5940HP26F1UUC0318C4667UH9P0
		CDCK	2706
IRandomConsumer.class	16.4.0.89	Kobe4	3P35
		MD5	CDD6FE973B196F229B3A6D45820DD53F
		SHA-1	BD02A93B0B43496F53CA7C2B169DF4FEBAA28B28
		Kobe40	6441PAA434C53P5882F8864691338UF14A8U989P
		CDCK	298E
IRngDriver.class	16.4.0.89	Kobe4	320A
		MD5	D021A0216ECDBE59B5A1FF46A506F998
		SHA-1	178809EB7A6E2699BEFD1684EE51660543483AF1
		Kobe40	119F5PU22H3UUF774358PPHFFC792H181UPCC24P
		CDCK	966A
NoiseBufferHelper.class	16.4.0.89	Kobe4	3108
		MD5	F44CB1365738F1A029EB5F4D04349DD9
		SHA-1	78F396B5A809996795440A0CF1BCE0481DDCD6C6
		Kobe40	16U327FU2CH7083F946U1C71PHP8144F7UP8F97U
		CDCK	C866
PtTelnetClient.class	16.4.0.89	Kobe4	659P
		MD5	A4EC9D5EDFA0AC27AA2927B6AFC1F8C5
		SHA-1	D45FB9D4AA0C6D7E0AFE2A89FFD31EDAAFE24CA7
		Kobe40	H8P17U08P9H1034388C6P4UC90C619CC105UFA67
		CDCK	67BA
RandomBatch.class	16.4.0.89	Kobe4	6526
		MD5	6B9498C7124E73AEC01E02955D1E119A
		SHA-1	C051D26E7D14129C24229C59BAC513EBE95397AC
		Kobe40	AAH84AUP4415AC988HU42P0C8P012F8F7HF37P25
		CDCK	4824

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE VERIFICATION

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.4.0.89 are as follows (continued):

File	Version	Type	Signature
RandomBuffer$1.class	16.4.0.89	Kobe4	8P62
		MD5	CE9D10236FC3FA67B82B30AAE378B254
		SHA-1	31CCADE05DC8466CD5A66D9BE7E08C2A4687E764
		Kobe40	8256F9AHC5P902H13178CFAC45588HHF7H3PUP8A
		CDCK	4154
RandomBuffer$2.class	16.4.0.89	Kobe4	688F
		MD5	E813CA001865B50049FDBD5F40DB593D
		SHA-1	CCA9F5BEEA9932E3785AD35502B6D6198FEF831D
		Kobe40	82P98H63C31U0UHP0439UH08HAUU0CP1F79HP49U
		CDCK	2D11
RandomBuffer.class	16.4.0.89	Kobe4	5UHH
		MD5	332BF6824A5C4431BEF91F4E756E69CB
		SHA-1	2A1EB458EBA180455491BF99FA2E19254583379E
		Kobe40	UFF6704H100044869U6905F6AFPH33F4FCP23H42
		CDCK	64FB
RandomProvider.class	16.4.0.89	Kobe4	U9F8
		MD5	07BC530684D2D4942E9A43E6916AF125
		SHA-1	E906B50CF21DC9DF876705287E1D03835B1A01C0
		Kobe40	1A24FH839C900H404118H12H2U005C0996PCFH08
		CDCK	BE81
RandomXImpl.class	16.4.0.89	Kobe4	UF7C
		MD5	51A8B008669A2FE6740BD0AB3F5949C9
		SHA-1	990A6638A9C1F8159D0F88F5B28E146F67F016A6
		Kobe40	P5HPPC51F5P07A895F178792HHUCCF49543426C8
		CDCK	C1E1
RandomXWrapper.class	16.4.0.89	Kobe4	152H
		MD5	234C81176515817FDDC5B15F8BF3C221
		SHA-1	04B111D943D101E6FFC4152FC28BE64AA2BEF590
		Kobe40	4HH9UU4C7U890P15U18AF99H030550F4A19F6UCF
		CDCK	E517

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE VERIFICATION

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.4.0.89 are as follows (continued):

File	Version	Type	Signature
RandomY.class	16.4.0.89	Kobe4	FH1U
		MD5	099807166DFADD105F07F88FB6B9EA53
		SHA-1	2C6866450C634CA457C7379B039D1EF30E025DDF
		Kobe40	H638H1A03212H070P67782AHCAPC95FF9AC019UA
		CDCK	C232
REALSHUFFLER.CLASS	16.4.0.89	Kobe4	95PA
		MD5	3F5D35FEB35FF445D931D55AF8020642
		SHA-1	D8A26416CF77C1C5FB672561244B2AB413180895
		Kobe40	75020A112P18UUH7113HU7A1U82U86H9311FA9H5
		CDCK	1974
ReverseTelnetDriver.class	16.4.0.89	Kobe4	9830
		MD5	468A3CB246898BA1EAC4F9722D7E6ED8
		SHA-1	965CFD2831865B47148FB72AC8EA713E8BC21A66
		Kobe40	2970PF3U9UFC53CH3PU15PU8361782U9H4083UU2
		CDCK	64E2
ReverseTelnetInterface.class	16.4.0.89	Kobe4	3CH0
		MD5	48C5F1E8F81A5059DCE330B364FB13A0
		SHA-1	B4916A8082B6CA713E88E6BC88C54543BB350F24
		Kobe40	8749H68PFF36A3C71P552UUP485FP098AA65P7CU
		CDCK	BD98
RngDriver.class	16.4.0.89	Kobe4	4232
		MD5	0041B0DF8354C130C52CABBF8F252917
		SHA-1	EA3554408E5CCC7E62D4D1648A77193B205D12EF
		Kobe40	7UA0974A0F49AH18P3PA3F010F591C73C237FC2A
		CDCK	5080
RngDriverException.class	16.4.0.89	Kobe4	3PA4
		MD5	D0BCE660F890AEDCF1A757594DB0AA95
		SHA-1	B6359F2B897BB87EC003724A7F854A474166E806
		Kobe40	CH7FC75C47PP9PFAPA56289CU82C6394FHA8UC61
		CDCK	A1C1

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE VERIFICATION

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.4.0.89 are as follows (continued):

File	Version	Type	Signature
RngServer.class	16.4.0.89	Kobe4	1UAU
		MD5	85537AD174BE53F5B8A45A88450C1CC6
		SHA-1	915392A8B6ED68C1483E3497214F6B30272ED99C
		Kobe40	108A7P60C629460829C1H5F59H1UAPP8P6U0A319
		CDCK	63DD
SG100Driver.class	16.4.0.89	Kobe4	H2C4
		MD5	9530ADDE1B52F832FCA5F4F694553A2C
		SHA-1	4AC229D882AA587BA11F326BE9B1F5791DCEC864
		Kobe40	759612263H9F157CPHA15AF5CP2U68C884U96561
		CDCK	72AF

Table 1. Digital Signatures

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.6.11.17 are as follows (continued):

File	Version	Type	Signature
ABSTRACTGAMERULES.CLASS	16.6.11.17	Kobe4	2UF3
		MD5	97A2AB11B394FAC3DC5BAF5B68B95EA5
		SHA-1	D049A8D37116381B698F2E2A80F74E931EAC4D23
		Kobe40	FAC3F0UH9F1F905325671APA127020U028H45P72
		CDCK	C4EC
AbstractRngClientSession.class	16.6.11.17	Kobe4	73PF
		MD5	BA39C4DE2665FD3CDAC42576153A8ADD
		SHA-1	701DFF10AD8AE4F8F664A0D5F3EB79827B57B2F1
		Kobe40	551F30099PPH390PF06P062H606U50110A9P36PC
		CDCK	18FD
BitUtils.class	16.6.11.17	Kobe4	0HP2
		MD5	D087F556D1FB3B940BE2404E26E9338E
		SHA-1	68BC68C5EF4B6313D469F1AEA3BF2DFC712AB68F
		Kobe40	P0U705943267P7FC653PUU1FC51P0042U1716230
		CDCK	80CE

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE Verification

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.6.11.17 are as follows (continued):

File	Version	Type	Signature
ComPortOptionHandler.class	16.6.11.17	Kobe4	14CU
		MD5	D5282AC4CF54446E1D7A398233E20114
		SHA-1	4BF125F617E311A2B37F9A3483334EACFB62FB5D
		Kobe40	F169F308UA481U059666P43F79523HAFP45801A1
		CDCK	3536
DECK.CLASS	16.6.11.17	Kobe4	0HU8
		MD5	1C694A2AADD696503A750FD19C221B61
		SHA-1	AC77B318898562EEBDA830CFCAFF9D0F9A4D8362
		Kobe40	H8C16UFC29930A79F10H8AU3F0P9438H66CA0423
		CDCK	F622
DriverManager$1.class	16.6.11.17	Kobe4	4P6C
		MD5	8B3AC5F76EDD1B02AF78302E86B43AC2
		SHA-1	29D6191DA4394440E91863265FE86BF92A7EE464
		Kobe40	628778H1A1U2PF6FPF9U63P4621C88F4C53PC938
		CDCK	8810
DriverManager.class	16.6.11.17	Kobe4	C8A8
		MD5	E232E5A1D8E57994FCA5F958308A00BE
		SHA-1	72BEBA31578F74E21F9569BDC097C04A8B362223
		Kobe40	C0FP139FP7AUAH48C3AU4PHP6H678AF41HA0HUC0
		CDCK	37DF
FrequencyAnalyzer.class	16.6.11.17	Kobe4	9A67
		MD5	58A36FBA6F799FE3094E375FB313C3A9
		SHA-1	8013D639EF46A4E5BD904DDFEB80D721E0E782DC
		Kobe40	18CUP0F1A586HU833C66PHC8PU48CCH7A52192A3
		CDCK	F7A9
GameServerSession.class	16.6.11.17	Kobe4	P126
		MD5	01E8864DA057413A1CEA8C91234ED5DC
		SHA-1	96678F102AD74FA9B004287E4A14D6D13B9E12C9
		Kobe40	AH5333FP9965F5940HP26F1UUC0318C4667UH9P0
		CDCK	2706

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE Verification

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.6.11.17 are as follows (continued):

File	Version	Type	Signature
IRandomConsumer.class	16.6.11.17	Kobe4	3P35
		MD5	CDD6FE973B196F229B3A6D45820DD53F
		SHA-1	BD02A93B0B43496F53CA7C2B169DF4FEBAA28B28
		Kobe40	6441PAA434C53P5882F8864691338UF14A8U989P
		CDCK	298E
IRngDriver.class	16.6.11.17	Kobe4	320A
		MD5	D021A0216ECDBE59B5A1FF46A506F998
		SHA-1	178809EB7A6E2699BEFD1684EE51660543483AF1
		Kobe40	119F5PU22H3UUF774358PPHFFC792H181UPCC24P
		CDCK	966A
NoiseBufferHelper.class	16.6.11.17	Kobe4	3108
		MD5	F44CB1365738F1A029EB5F4D04349DD9
		SHA-1	78F396B5A809996795440A0CF1BCE0481DDCD6C6
		Kobe40	16U327FU2CH7083F946U1C71PHP8144F7UP8F97U
		CDCK	C866
PtTelnetClient.class	16.6.11.17	Kobe4	659P
		MD5	A4EC9D5EDFA0AC27AA2927B6AFC1F8C5
		SHA-1	D45FB9D4AA0C6D7E0AFE2A89FFD31EDAAFE24CA7
		Kobe40	H8P17U08P9H1034388C6P4UC90C619CC105UFA67
		CDCK	67BA
RandomBatch.class	16.6.11.17	Kobe4	6526
		MD5	6B9498C7124E73AEC01E02955D1E119A
		SHA-1	C051D26E7D14129C24229C59BAC513EBE95397AC
		Kobe40	AAH84AUP4415AC988HU42P0C8P012F8F7HF37P25
		CDCK	4824
RandomBuffer$1.class	16.6.11.17	Kobe4	8P62
		MD5	CE9D10236FC3FA67B82B30AAE378B254
		SHA-1	31CCADE05DC8466CD5A66D9BE7E08C2A4687E764
		Kobe40	8256F9AHC5P902H13178CFAC45588HHF7H3PUP8A
		CDCK	4154

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE Verification

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.6.11.17 are as follows (continued):

File	Version	Type	Signature
RandomBuffer$2.class	16.6.11.17	Kobe4	688F
		MD5	E813CA001865B50049FDBD5F40DB593D
		SHA-1	CCA9F5BEEA9932E3785AD35502B6D6198FEF831D
		Kobe40	82P98H63C31U0UHP0439UH08HAUU0CP1F79HP49U
		CDCK	2D11
RandomBuffer.class	16.6.11.17	Kobe4	5UHH
		MD5	332BF6824A5C4431BEF91F4E756E69CB
		SHA-1	2A1EB458EBA180455491BF99FA2E19254583379E
		Kobe40	UFF6704H100044869U6905F6AFPH33F4FCP23H42
		CDCK	64FB
RandomProvider.class	16.6.11.17	Kobe4	U9F8
		MD5	07BC530684D2D4942E9A43E6916AF125
		SHA-1	E906B50CF21DC9DF876705287E1D03835B1A01C0
		Kobe40	1A24FH839C900H404118H12H2U005C0996PCFH08
		CDCK	BE81
RandomXImpl.class	16.6.11.17	Kobe4	UF7C
		MD5	51A8B008669A2FE6740BD0AB3F5949C9
		SHA-1	990A6638A9C1F8159D0F88F5B28E146F67F016A6
		Kobe40	P5HPPC51F5P07A895F178792HHUCCF49543426C8
		CDCK	C1E1
RandomXWrapper.class	16.6.11.17	Kobe4	152H
		MD5	234C81176515817FDDC5B15F8BF3C221
		SHA-1	04B111D943D101E6FFC4152FC28BE64AA2BEF590
		Kobe40	4HH9UU4C7U890P15U18AF99H030550F4A19F6UCF
		CDCK	E517
RandomY.class	16.6.11.17	Kobe4	FH1U
		MD5	099807166DFADD105F07F88FB6B9EA53
		SHA-1	2C6866450C634CA457C7379B039D1EF30E025DDF
		Kobe40	H638H1A03212H070P67782AHCAPC95FF9AC019UA
		CDCK	C232

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE Verification

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.6.11.17 are as follows (continued):

File	Version	Type	Signature
REALSHUFFLER.CLASS	16.6.11.17	Kobe4	95PA
		MD5	3F5D35FEB35FF445D931D55AF8020642
		SHA-1	D8A26416CF77C1C5FB672561244B2AB413180895
		Kobe40	75020A112P18UUH7113HU7A1U82U86H9311FA9H5
		CDCK	1974
ReverseTelnetDriver.class	16.6.11.17	Kobe4	9830
		MD5	468A3CB246898BA1EAC4F9722D7E6ED8
		SHA-1	965CFD2831865B47148FB72AC8EA713E8BC21A66
		Kobe40	2970PF3U9UFC53CH3PU15PU8361782U9H4083UU2
		CDCK	64E2
ReverseTelnetInterface.class	16.6.11.17	Kobe4	3CH0
		MD5	48C5F1E8F81A5059DCE330B364FB13A0
		SHA-1	B4916A8082B6CA713E88E6BC88C54543BB350F24
		Kobe40	8749H68PFF36A3C71P552UUP485FP098AA65P7CU
		CDCK	BD98
RngDriver.class	16.6.11.17	Kobe4	4232
		MD5	0041B0DF8354C130C52CABBF8F252917
		SHA-1	EA3554408E5CCC7E62D4D1648A77193B205D12EF
		Kobe40	7UA0974A0F49AH18P3PA3F010F591C73C237FC2A
		CDCK	5080
RngDriverException.class	16.6.11.17	Kobe4	3PA4
		MD5	D0BCE660F890AEDCF1A757594DB0AA95
		SHA-1	B6359F2B897BB87EC003724A7F854A474166E806
		Kobe40	CH7FC75C47PP9PFAPA56289CU82C6394FHA8UC61
		CDCK	A1C1
RngServer.class	16.6.11.17	Kobe4	1UAU
		MD5	85537AD174BE53F5B8A45A88450C1CC6
		SHA-1	915392A8B6ED68C1483E3497214F6B30272ED99C
		Kobe40	108A7P60C629460829C1H5F59H1UAPP8P6U0A319
		CDCK	63DD

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION II — SOFTWARE Verification

Verify+ by Kobetron™ signatures for the PLAYTECH POKER RNG, version 16.6.11.17 are as follows (continued):

File	Version	Type	Signature
SG100Driver.class	16.6.11.17	Kobe4	H2C4
		MD5	9530ADDE1B52F832FCA5F4F694553A2C
		SHA-1	4AC229D882AA587BA11F326BE9B1F5791DCEC864
		Kobe40	759612263H9F157CPHA15AF5CP2U68C884U96561
		CDCK	72AF

Table 2. Digital Signatures

SECTION III — SOURCE CODE REVIEW

PLAYTECH SOFTWARE LIMITED submitted appropriate documentation and PARTIAL source code which pertains to the generation of random numbers. GLI reviewed the source code provided by tracing the path of the RNG application from the initiation of the draw to the selected output of random numbers. GLI inspected the source code, where practicable, in an attempt to find any undisclosed switches or parameters having a possible influence on randomness and fair play. GLI assessed the ability of the RNG to produce all numbers within the desired range.

Please note:

- The Playtech Poker RNG versions 16.4.0.89 and 16.6.11.17 make use of SG100 hardware devices as a source of random entropy. Such a device uses quantum physics as a source of entropy for the algorithm that produce the final numbers. The specific SG100 devices used by GLI to collect RNG test data are not distinguishable in the field. It is the responsibility for Playtech to assure that the SG100's provided to the jurisdiction for use in conducting drawings are functioning correctly and in the same manner as the ones made accessible to GLI to gather test data.
- Please note that a single SG100 hardware device was used for RNG testing purposes. Clearly, GLI cannot test each SG100 manufactured and therefore cannot attest to the randomness of each manufactured SG100 device for its particular application. However, it should be expected that each SG100 is designed using a defined specification that ensures comparable design attributes.

SECTION IV — DATA ANALYSIS

The game configuration and parameters for the data obtained and tested are listed in Table 3. GLI performed a data format check on each data set listed in order to confirm that the game parameters were correctly represented in the data analyzed.

GLI conducted a statistical analysis of sufficient scope to test the RNG, as described in Table 3. The selection of test cases took into account broad coverage of range sizes and selections.

A set of numbers is said to be drawn *with replacement* if a number can be selected multiple times within the same draw. A set of numbers is said to be drawn *without replacement* if a number can only be selected once within the same draw.

RANDOMNESS REPORT FOR THE PLAYTECH POKER RNG

SECTION IV — DATA ANALYSIS

Data Set	Range	Positions	Replacement	Draws
General Certification – without replacements	Up to and including 416	Up to and including 416	No	①
General Certification – with replacements	Up to and including 726	From 3 up to and including 9	Yes	①
General Certification –Single Outcomes	Up to and including 10,000	1	N/A	①

Table 2. Game Parameters

① Different test cases were used for statistical testing while taking into account broad coverage of the RNG parameters listed.

In addition to final outcome data, GLI tested raw outcomes consisting of binary output from the main RNG algorithm prior to the application of any scaling algorithms.

For a summary of the statistical tests applied to each data set, see *Appendix A*. For a description of the overall test methodology and a description of each test used, see *Appendix B*.

Overall, the RNG passed the battery of tests for each configuration at the 95%, 98%, and 99% confidence levels.

SECTION V — SUMMARY

Overall Evaluation of the Random Number Generator

GLI's conclusion based upon the tests applied to the PLAYTECH POKER RNG data is that this random number generator has exhibited random behavior and is suitable for the applications as described herein. If a game utilizes a different range or a different number of selections from those listed in Table 3, the RNG should be resubmitted to test that set of parameters.

APPENDIX A: Statistical Test Summary

					Test Names													
Data Set	**Range**	**Positions**	**Replacement**	**Draws**	**Runs**	**Serial Corr.**	**Interplay Corr.**	**Adj. Max-Min**	**Adj. High-Low**	**Adj. Blocks**	**Coupon**	**Duplicates**	**Overlaps**	**Permutation**	**Tot. Dist.**	**Tot. Dist. by Pos.**	**Count of Counts**	**Diehard**
General Certification – without replacements	Up to and including 416	Up to and including 416	No	①	X	X	X	X	X	X	X	X	X	X	X	X	X	
General Certification – with replacements	Up to and including 726	From 3 up to and including 9	Yes	①	X	X	X	X	X		X	X	X		X	X	X	
General Certification – Single Outcomes	Up to and including 10,000	1	N/A	①	X	X											X	
Binary data	Not Applicable																	X

Table A 1. Tests Applied

① Different test cases were used for statistical testing while taking into account broad coverage of the RNG parameters

APPENDIX B: Test Descriptions

B.1 **Definitions.** The following terms apply to the below test descriptions. Randomness Device or Random Number Generator (RNG) output may be collected multiple numbers at a time. Each set of numbers is called a draw. Each individual number has a particular order within the *draw*. This is referred to as the number *position*.

B.2 **Distribution Comparisons.** Many of the tests compare an observed numerical distribution with an expected distribution. Unless otherwise specified, this is done by means of a statistical chi-square goodness-of-fit test. The value chi-square is computed in the standard way. If k is a possible value, o_k is the observed count of that value, and e_k is the expected count:

$$\chi^2 = \sum_k \frac{(o_k - e_k)^2}{e_k}$$

In the case where expected counts are too small for accurate use of the above formula, values are 'binned' together to ensure an appropriate minimum expected count. The resultant value for chi-square is compared against the distribution for the appropriate number of degrees of freedom. Unusually high (distribution mismatch) or unusually low (insufficient randomness) chi-square values can be causes for data failure.

B.3 **Meta-testing**. Evaluation of groups of *p*-values may include a meta-test for extremity of high or low *p*-values, a meta-test for frequency of high or low *p*-values, and a meta-test for uniformity of *p*-values, as appropriate.

B.4 **Confidence Level**. The statistical tests conducted by GLI are done at a particular *confidence level*. Common confidence levels used include 95%, 98%, and 99%, depending on jurisdictional requirements, and intended use of the RNG. High confidence level testing has low risk of mistakenly failing a good RNG, but higher risk of passing a bad RNG. Lower confidence level testing has increased power of detecting bad RNGs, while also increasing the risk of false failures of good RNGs. Specifically, the confidence level represents the probability that an ideal source of randomness would pass the testing. If an RNG passes statistical tests at a given confidence level, passage at all *higher* confidence levels is implied.

B.5 **Tests**. Some tests are only applicable to certain types of data. Some tests may be applied only to a portion of the data. Some tests may require that the data be parsed, binned, or otherwise transformed, as necessitated by data format.

APPENDIX B: Test Descriptions

Adjacency Blocks:

For each draw, the data is first sorted. Then the amount of contiguous blocks of numbers is counted. These statistics are then compared against the expected. For example, if a draw consists of the numbers

$$1, 5, 4, 2, 6, 9$$

the data would be sorted and separated into blocks. The resulting statistic would be 3.

Adjacency High-Low:

For each draw, the number of local extrema ('highs' and 'lows') in the data is recorded and compared with the expected distribution. These are also referred to as 'turning points. For example, if a draw consists of the numbers

$$1, 3, 5, 7, 2, 9$$

there would be one local maximum (7) and one local minimum (2). The resulting statistic would be 2.

Adjacency Max-Min:

For each draw, the difference between the maximum and minimum values is calculated and recorded. This is compared with the expected theoretical distribution. For example, if a draw consists of the numbers

$$2, 3, 6, 7, 4$$

the resulting statistic would be 5, the difference between the maximum value (7) and the minimum value (2).

Count of Counts:

The Count of Counts test first counts the occurrences of each value in each position of the data. These counts are then tallied and compared with the expected distribution of counts for the draw size and range of values.

Coupon Collector's:

The Coupon Collector's Test is applied positionally. The data is parsed until all possible values have been observed, then the number of values checked is recorded and the count is restarted. This is compared with the expected distribution. For example, if the set of all possible values is {0, 1, 2} and the first position of each draw is

$$1, 0, 1, 0, 2, 0, 1, 2, \ldots$$

then all values are observed in the first position by the fifth draw. All values are then observed within the next 3 draws, so the first two statistics for the first position would be 5 and 3.

APPENDIX B: Test Descriptions

DieHard:

The DieHard Battery of Tests is a standard assessment of the randomness in raw outcomes generated from an RNG. The collection, designed by George Marsaglia, tests for a variety of patterns in the individual binary bits of RNG output. GLI uses a custom implementation to conduct DieHard testing.

Duplicates:

The Duplicates Test counts the number of times a draw is exactly duplicated in the data. In the case that a particular draw is repeated more than twice, every possible way to generate a duplicate is counted. This is compared against the theoretical distribution to verify that the number of duplicate draws falls within expected bounds. For example, consider the dataset consisting of the following draws of two numbers each.

$$a)\ 1,3$$
$$b)\ 4,1$$
$$c)\ 1,3$$
$$d)\ 1,3$$
$$e)\ 4,1$$
$$f)\ 3,1$$

The duplicate pairs are (*a,c*), (*a, d*), (*c, d*), and (*b, e*), for a total of 4 duplicates. *(f)* is not counted as a duplicate since the draw must match in order as well as values.

Interplay Correlation:

The Interplay Correlation Test measures statistical correlation between different positions of the same draw. For each pair of positions, statistical correlation is calculated as in the Serial Correlation Test. In the case of without replacement data, an adjustment is made to account for the expected resulting negative correlation.

Overlaps:

The Overlaps Test compares consecutive draws for overlapping values. The number of overlapping values is recorded for each pair of draws. This observed distribution of overlaps is then compared against the expected distribution. For example, if the following draws are observed consecutively,

$$a)\ 1,4,5,6$$
$$b)\ 4,1,7,6$$

the number of overlaps would be 3, representing the values 1, 4, and 6.

Permutation:
The Permutation Test is a test applicable to data that represents a reordering of numbers. Each draw can be considered as a permutation of the original ordering. Every permutation can be decomposed into disjoint cycles, which represent the possible positions a number would occupy if the same permutation is applied repeatedly. For each draw, three statistics are collected based on the cycle decomposition:

The number of cycles.
The size of the smallest cycle.
The size of the largest cycle.

Each of these statistics generates a distribution of observations which are compared with their respective expected distributions. For example, if the following draw were observed as a reordering of the numbers from 1 to 6,

$$1,3,5,4,2,6$$

the cyclic decomposition would be (1)(2 3 5)(4)(6). 1, 4, and 6 remain in their original positions, so they form their own cycles. The values 2, 3, and 5 are shuffled, so they form a single cycle together. The total number of cycles is 4, the smallest cycle has size 1, and the largest cycle has size 3

APPENDIX B: Test Descriptions

Runs:

The Wald-Wolfowitz Runs Test is applied to each position within the draw. A center is established, typically the data median, and the number of 'runs' above and below the center are tallied. Values exactly equal to the center are discarded. This is compared to the expected distribution, which depends on the number of values above and below the center. For example, if the numbers drawn at a particular position were

$$2, 3, 1, 5, 4, 7, 3, 2, 3, 2, 3, 2, 6, 7, 3, 5$$

and the established center were the data median of 3, the data would be parsed for runs above 3 and runs below 3.

$$\underbrace{2, 3, 1}, \overbrace{5, 4, 7, 3}, \underbrace{2, 3, 2, 3, 2}, \overbrace{6, 7, 3, 5}$$

This would be counted as 4 runs.

Serial Correlation:

The Serial Correlation Test measures statistical correlation between consecutive draws of the same position. For each position, the sample Pearson correlation coefficient is calculated. If *X* represents the first number, and *Y* the number that follows, then the coefficient is

$$r = \frac{cov(X, Y)}{s_X s_Y}$$

where *s* denotes the sample standard deviation. The coefficients are used to generate a *p*-value for each position.

Total Distribution:

The Total Distribution Test is a simple tally of all observed values throughout the data. This is compared with the expected distribution. Typically, the expected distribution is a uniform distribution. In the case of unequal weighting of values, an appropriate discrete distribution is used.

Total Distribution by Position:

The Total Distribution by Position Test tallies the observed distribution of values for each position within the draw. Each of these distributions is then compared with the expected.

Jurisdictional Requirements

Chapter 13 – Functional requirements for random number generators		Determination	Result/Explanation
§ 1	The results of a random number generator shall be random, statistically independent, reflect a correct standard deviation and reflect the correct probability distribution.	PASS	This is result of the source code review and data analysis performed.
	The result from a random number generator shall not be predictable without knowledge of the algorithm's use, its implementation, and seed values.	PASS	This is result of the source code review and data analysis performed.
	Several statistical tests can be used to ensure the results of a random number generator. The Diehard battery of tests (Marsaglia) and the NIST battery of tests (National Institute of Standards and Technology – Statistical Test Suite) are two tests that can be used.	PASS	This is result of the source code review and data analysis performed.
§ 2	Reference to an established and accepted algorithm and any software code and conversion procedure for random number generator shall be documented.	N/A	This is a hardware RNG
	If a random number generator is built into the software, this programme code, together with comments and documentation, should be able to be reported.	N/A	This is a hardware RNG
	The algorithm on which a random number generator is based must be published in an internationally recognised publication. The outcome of tests that may be relevant to random number generators are, for example, the X2 test (chi-square test), serial correlation test and runs test. The licensee must allow verification of the defined paytable by allowing the accredited testing body or the Gaming Inspectorate to review the software, sheets, logs, check lists or other paytable documentation.	N/A	This is a hardware RNG
§ 3	The random number generator must be able to handle the maximum load determined.	PASS	This is result of the source code review and data analysis performed.
§ 4	Features that do not generate game outcomes, but which depend on random elements shall be based on the random number generator results.	N/A	RNG Evaluation only
	Such features may include, for example, a random game or the positioning at a poker table in a poker tournament.	N/A	RNG Evaluation only
§ 5	The outcomes from a random number generator shall reflect the correct standard deviation and the correct probability distribution.	PASS	This is result of the source code review and data analysis performed.
	The random number generator's output of numbers, symbols or events must correspond to the game rules established for the game in question.	N/A	RNG Evaluation only
	If the random number is converted to, for example, cards, there should be four aces, four kings, etc. in a normal card deck if the game in question uses a normal card deck.	N/A	RNG Evaluation only
§ 6	The random number generator's calculations should be consistent with events logged in the game system.	N/A	RNG Evaluation only
§ 7	If, according to the game rules, a sequence of outcomes from a random number generator is determined in advance, new sequences may only be created if so, stated in the game rules.		
§ 8	Unless otherwise stated in the game rules, the outcome of a random number generator must always be independent of events in the current game or of previous games.	N/A	RNG Evaluation only

Jurisdictional Requirements

Chapter 13 – Functional requirements for random number generators		Determination	Result/Explanation
	Drawing devices without a random number generator		
§ 9	The results of a drawing device shall be random, statistically independent, reflect the correct standard deviation and the correct probability distribution.	N/A	Not a drawing device
	The outcome of tests that may be relevant to random number generators are, for example, the X2 test (chi-square test), serial correlation test and runs test.	N/A	Not a drawing device
§10	A free-standing drawing device without a random number generator shall be locked and access to it restricted.		
	Drawing devices in live casino games		
§11	Drawing devices in live casino games shall be monitored and logged.	N/A	Not a drawing device
	From the logged material it shall be clear that the game rules are complied with.		
	Logging shall include logging date and time.	N/A	Not a drawing device
§12	Premises used for live casino games, including the associated facilities, shall be subject to physical access control.		
	At a minimum, the segregation of access for persons with different occupational functions shall be in place.		
	Dealers, floor managers, managers and monitoring staff are examples of different types of employees that shall be categorised into different access groups.		
Chapter 16. Technical requirements		**Determination**	**Result/Explanation**
§ 5	A licensee shall, unless the gaming authority decides otherwise, retain all information on the operation of the gaming system for at least five years.	N/A	RNG Evaluation only