RGS EVALUATION TESTING REPORT

Compliance testing report

Game: Spectra (Game Platform: 5.0.0)

HTML5 (Desktop & Mobile) release 1.0.6

RNG: 3.5.0

Reference regulation:

UK Gambling Commission - *Remote gambling and software technical standards*, July 2015

August 26th, 2016

QUINEL M Limited
Marina Court, Flat 8, Triq Giuseppe Cali', XBX 1421 Ta'Xbiex - Malta
info@quinel.com.mt

INTRODUCTION

The findings reported in this summary are the results of a broader set of documents and testing activities results archived in Quinel M's facilities. It is intended that the requester declares that:

- Any Hardware provided or described for analysis and testing is configured identically to hardware in commercial use
- Game software/ function provided for the testing and code review is declared by the customer to have the same behaviour to the software/code in commercial use
- Functionality made by the software in automatic test mode has a realistic behaviour

and that

- all the files and modules,
- the database schemas and all the specific programming resources,
- all the parameters contained into any databases and/or configuration file

that have been subject to the audit process guarantee the same behaviour of what is going to be published/deployed according to this audit results.

The Recipient, by accepting and using this Report, declares to be aware and accept unconditionally all the terms and conditions set forth. If the Applicant and/or the Recipient does not agree on the terms and conditions set forth, Quinel M Ltd reserves the right to cancel the certification provided with this Report, it follows therefore that the Recipient must immediately return all copies to Quinel M Ltd of this Report and cannot use them nor refer to.

Any copy of this test reports and calibration certificates must also include the page number and total number of pages.

Copy of this test report must not be reproduced except in full, without written approval of the laboratory.

A) Audit ID

J16080108_G003_Spectra_1.0.6_rev. 1

B) Reference regulation

UK Gambling Commission - *Remote gambling and software technical standards*, July 2015

C) Test methods

QIVI001 – Visual inspection
QISI001 – Software source inspection method
QIMT001 – Mathematical analysis
QIAF001 – Accounting functionalities

D) Auditor / Test lab

Quinel M. LTD
Marina Court, Flat 8,
Triq Giuseppe Cali',
XBX 1421 Ta'Xbiex - Malta
info@quinel.com.mt

E) Audit subject / Scope

Description:
Compliance of the following test items (games):

Games (video slot games)

Test Item	*Game Name*	*Version (plus SVN revision)*	*Interface*
G003	Spectra	Client release: 1.0.6 RNG: 3.5.0; Game Platform: 5.0.0	HTML5 (Desktop & Mobile)

Receipt date:
10/06/2016 – first submission for testing against UKGC regulation as per Section (B)

Inspection date:
22/08/2016 - 26/08/2016 (against UKGC current regulation as per Section (B))

Note 1: Compliance of the RNG used by the test items was certified through report with ID "MDI_02-08_J16030078_RNG_rev.1_UK" issued and signed by Quinel M. LTD, dated March 31st, 2016.

F) Requester

Thunderkick Malta LTD
Level 5, The Mall Complex,
Floriana, Malta

G) Owner/Producer of the system/software

Tabrake AB
EKBACKSVÄGEN 59 A
184 32 Åkersberga
Stockholms län - Sweden

H) Companies and organizations involved in the process

Producer(s): Ref. to Section G)

Requester: Ref. to Section F)

Licensee/Operator: N.A.

I) Individuals involved in the process

On the Requester side: Mr. Sven Grip, Mr. Stéphane Redon, Mr. Johnny Aspelin, Mr. Daniel Gjörwell, Ms. Jeanette Karlsson.

On the Producer(s) / Integrator(s) side: same as for Requester

On the Licensee/Operator side: N.A.

J) Processes, rules and parameters of the games / Limitation of use

Rules of the games/test items are reported with details into Annex III.
Game(s) / Test item(s) use(s) Jackpot: N
Here follows the theoretical pay-out of the test item(s):

Test Item	*Test Item / Game name*	*Theor. RTP [%]*
G003	Spectra	96.4

K) Specifications of the gaming system

Both games (server side logic) and platform are developed entirely with the Java Language.

Game was provided through the following URLs on a QA environment:
- http://game.thunderkick.com:9090/static/games/quinel_spectra.html (player's interface)

- https://qa-int-backoffice.thunderkick.com (Back office / Admin interface)
- http://ext-qa-gameservice.thunderkick.com (Runtime game configuration)

The QA environment used for RNG testing relies on a Linux environment hosted by Amazon's cloud services and runs on Oracle Java JDK 1.7.0_09, Apache Tomcat application server 7.0.42

Live environment is reachable at the following IPs (primary site, secondary site omitted):

Game traffic:	37.114.73.113
API:	37.114.73.114
Back office	37.114.73.115
Firewall	37.114.73.120

Live environment servers are running Linux "Ubuntu 12.04.5 LT; Precise Pangolin", with Oracle Java JDK 1.7.0_51, Apache Tomcat application server 7.0.50.

Simulation environment for game testing used a virtualized server with the same Linux distribution "Ubuntu 12.04.5 LT; Precise Pangolin" with Oracle Java JDK 1.7.0_76 – no application server was required.

The difference between the Java JDK is negligible considered the change log and that the source code inspection couldn't find any specific binding to those releases nor dependencies on system APIs. Same considerations apply with regards to differences between QA and Live environment

The simulation tool verified ('gp-game-s1-simulation-5.0.0-RELEASE.jar') extracts the configurations for the games from a repository synchronized with the live production environment and uses the same Java archives subject to deployment.

L) Critical modules

Refer to the entire contents of Section P)

M)Evaluation performed

The test evaluation, required by the Requested, was completed against the "*Remote gambling and software technical standard" (chapter 3)* - July 2015, to meet the requirements listed in the current "*Testing strategy for compliance with remote gambling and software technical standards*"

Refer to the Annex I for a full detailed list of requirements tested.
Refer to the Annex II for the simulation details.

N) Testing activities applied

- Mathematical calculation of the Payout
- Fairness of the game and associated rules
- Requirements of the player's interface
- Source code inspection
- Simulation and inspection for verification of the actual RTP

O) Additional information

None

P) Product Tested

The tests were performed on the files listed below.

SHA1	Critical	Type (Game)	Test item	File name
f3239657818ec7de913684798788cfafad87e557	Yes	Configuration	G003	gp-game-s1-g6.json
d5e01a5f41deae3b63b46b2ccb7125278e3ebc29	Yes	RNG (*)	N.A.	gp-rng\...\MersenneTwister32.java
ea8940a1cd7d561eb944c42f101ddfcd7cce2ec7	Yes	RNG (*)	N.A.	gp-rng-api\...\RandomNumberGenerator.java
921ae901073c9399078ba917a2c24611d8e45c6e	No	Simulator	G003	gp-game-s1-simulation-5.0.0-RELEASE.jar
ebee96f868d53251022c512fbd31d002059f1832	Yes	Game logic	G003	gp-game-s1-g6-core-5.0.0-RELEASE.jar
f2dcd4e8ed46eb5653d99ff54f60c4e4047ad4ec	Yes	RNG	All	rng-implementation\gp-rng-3.5.0-RELEASE.jar
ea01386be069745202580bd50c3de32c33f3553f	Yes	RNG	All	rng-interface\gp-rng-api-3.5.0-RELEASE.jar

(*) RNG main source code files.

Q) CERTIFICATION

Job ID: J16080108_G003
Date: August 26th, 2016
Requester: Thunderkick Malta LTD
Level 5, The Mall Complex,
Floriana, Malta

Total Number of Pages: **26**

QUINEL M LTD certifies that the games / test items identified at section E)

G003: Spectra	1.0.6	HTML5 (Desktop & Mobile) Game Platform: 5.0.0 RNG: 3.5.0

comply with the "UK Gambling Commission - *Remote gambling and software technical standards*, July 2015" reference standard based on the current "*Testing strategy for compliance with remote gambling and software technical standards*".

Refer to the Annex reports for the full list of requirements satisfied.

R) CONDITIONS

None.

S) CONCLUSIONS

The games / test items identified at section E) are compliant with the above mentioned technical standards when integrated with the RNG certified and identified into compliance Report ID "MDI_02-08_J16030078_RNG_rev.1_UK" issued and signed by Quinel M. Ltd, dated March 31st, 2016

Date: August 26th, 2016
Signed:

Matteo Ferrarini – Laboratory Technical Director
Chief Operation Officer (QUINEL M)

ANNEX I – REQUIREMENTS SATISFIED

Definitions

Compensated games or events
Games or virtual events that adjust the likelihood of winning outcomes occurring based on previous payouts or intake. Sometimes referred to as adaptive behaviour or percentage compensation.
Game
A game of chance as defined in section 6(2) of the Act
Instant lottery
A lottery in which the draw takes place before any of the tickets in the lottery are offered for sale.
Mapping
Is the process of selecting an outcome using the result from a Random Number Generator (RNG). For example, the result from a RNG is mapped to a reel strip symbol.
Lottery
As described by section 14 of the Act.
Lottery ticket
As described by section 253 of the Act and a reference in this document to a lottery ticket includes: • a lottery ticket which is sent by post following entry by means of remote communication • a message sent or displayed to a person electronically in a manner which enables him to (a) retain the message electronically or (b) print it.
Non-commercial society
As described by section 19 of the Act.
Peer-to-peer gambling
A type of gambling where customers gamble against each other rather than against the house. For example, equal chance gaming such as poker or peer-to-peer betting through betting exchanges.
Progressive or progressive jackpot
An incremental prize that increases as a result of contributions from the monies staked within a game from pre-set base value.
Random Number Generator (RNG)
Refers to any item of hardware or software which is used to generate random numbers with the intended property of statistical randomness.
Restricted display device
A device such as a mobile phone or personal digital assistant which has limited space on which to display information, when used to access gambling facilities that the operator intends a customer to use by means of such a device.
Scaling
Scaling is the process used to convert the output from a RNG into the format required to produce a result for a particular gambling product. To illustrate, an RNG may produce a result of between 1 and 100,000 but these possible outcomes need to be scaled to the potential game outcomes of, for example, between 1 – 52 (i.e. to correspond to a standard pack of cards).
Seeding
Refers to the process used to determine the initial state of the RNG.
Subscription lottery
A series of lotteries (other than instant lotteries) promoted on behalf of the same non-commercial society

or local authority in respect of which participants pay for participation in one or more future lotteries by regular subscription over a fixed or indefinite period.
Telephone gambling
Gambling which takes place via a telephone, without the use of visual displays, by interaction with a customer service agent or an automated system, such as intelligent voice recognition systems or touch tone.
Virtual
As described by s353(3) of the Act. Virtual event and virtual game are to be construed accordingly.

Unless differently specified, the results are related to all the test items.

Requirements			Result
RTS	**Aim**	**Req.**	**PASS / FAIL / N.A.**
RTS 1	To provide customers with easily accessible information about their current balances	**A**	N.A.
		B	N.A.
RTS 2	To enable the customer to understand the value and content of their transactions.	**A**	**PASS** (strictly limited to the game UI).
		B	**PASS** (strictly limited to the game UI).
RTS 3	To enable customers to make informed decisions about whether to gamble based on their chances of winning, the way the game, lottery or event works, the prizes or payouts on offer and the current state of multi-state games or events.	**A**	**PASS** (strictly limited to the game UI).
		B	**PASS** (strictly limited to the game UI).
		C	**PASS** (strictly limited to the game UI).
		D	**PASS** (strictly limited to the game UI).
RTS 4	To reduce the risk that customers are unfairly disadvantaged by technical factors that may affect speed of response, where response time has a significant impact on the likelihood of winning.	**A**	**PASS** (strictly limited to the game UI).
RTS 5	To ensure that the gambling system implements the operator's rules, game rules and betting rules as they are described to the customer.	**A**	**PASS**
RTS 6	To minimise the risk that customers are misled about the likelihood of winning due to the behaviour of play-for-fun games.	**A**	**PASS**
RTS 7	To ensure that games and other virtual events operate fairly.	**A**	N.A. (ref. to RNG report)
		B	**PASS**
		C	**PASS**
		D	**PASS**
		E	**PASS**
RTS 8	To ensure that the customer is still in control of the gambling where auto-play functionality is provided.	**A**	**PASS**
RTS 9	To minimise the risk that auto-play functionality disadvantages a customer or that autoplay or other strategy advice is misleading.	**A**	N.A.
RTS 10	To ensure that customers are treated fairly in the event of interrupted play or betting and that they are aware of how they will be treated if interruptions occur.	**A**	**PASS** (strictly limited to the game UI using a simulated session).
		B	**PASS** (strictly limited to the game UI using a simulated session).
RTS 11	To reduce the risk that cheating or collusion by players unfairly disadvantages another player.	**A**	N.A.
RTS 12	To provide customers with facilities that may assist them in sticking to their personal budgets for gambling with the operator.	**A**	N.A.
		B	N.A.

Requirements			Result
RTS	**Aim**	**Req.**	**PASS / FAIL / N.A.**
RTS 13	To provide customers with facilities to assist them to keep track of the time they spend gambling.	**A**	**PASS** (strictly limited to the game UI).
RTS 14	To ensure that products are designed responsibly and to minimise the likelihood that they exploit or encourage problem gambling behaviour.	**A**	**PASS**

Requirements			Result
IPA	**Aim**	**Req.**	**PASS / FAIL / N.A.**
IPA 1	To provide customers with facilities that enable them to review previous gambling and account transactions.	**A**	N.A.
IPA 2	To inform customers who choose to use third party user-interfaces that they may not receive full information about their gambles.	**A**	N.A.
IPA 3	To make the customer aware that they may not have the latest information available when betting on live events, and that they may be at a disadvantage to operators or other customers who have more up-to-date information.	**A**	N.A.
IPA 4	To make customers in peer-to-peer(s) gambling aware that they may be gambling against a software program (designed to automatically participate in gambling within certain parameters), rather than another (human) participant. This software is sometimes referred to as a robot or bot.	**A**	N.A.
		B	N.A.
IPA 5	To make the customer aware that they may be at a disadvantage due to technical characteristics, such as slower network connections or lower end user device performance, if they are participating in a time-critical form of gambling (where the customer's speed of interaction influences their chance of winning).	**A**	N.A.
IPA 6	To inform customers about the operator's policies with regard to service interruptions and how they are likely to be treated if interruption occurs so that they may make an informed decision about whether to gamble and in what way.	**A**	N.A.
IPA 7	To inform customers about the risks posed by collusion/cheating and to deter individuals from attempting to cheat.	**A**	N.A.

ANNEX II– simulation details for game compliance

A) Environment used / Setup information

Simulation and verification of the correspondence of the files certified vs file deployed was completed following the information at Section K) of the compliance report.

Test and Live environment are equivalent and it was verified that the relevant deployed files on both setups are the same.

B) Simulation outcomes

Test Item	*Test Item / Game name*	*Theor. RTP [%]*	*Real RTP [%]*	*No. spins*	*Absolute probability deviation*	*Result*
G003	Spectra	96.4	96.35	917M	-0.05%	PASS

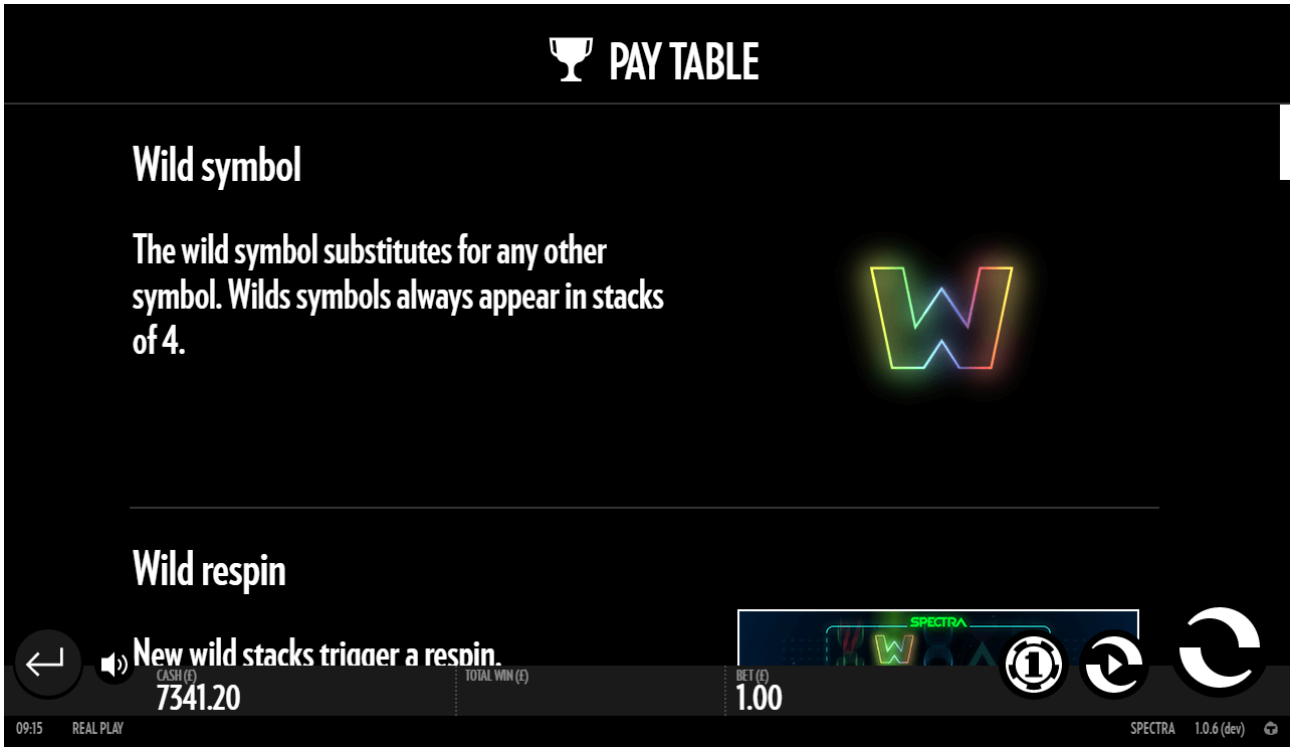
Test Item	*Test Item / Game name*	*Sha1of simulation results log file*
G003	Spectra	6a6345be5057a5b16d98deb81d95ddd938418583 *gsf-s1.7z

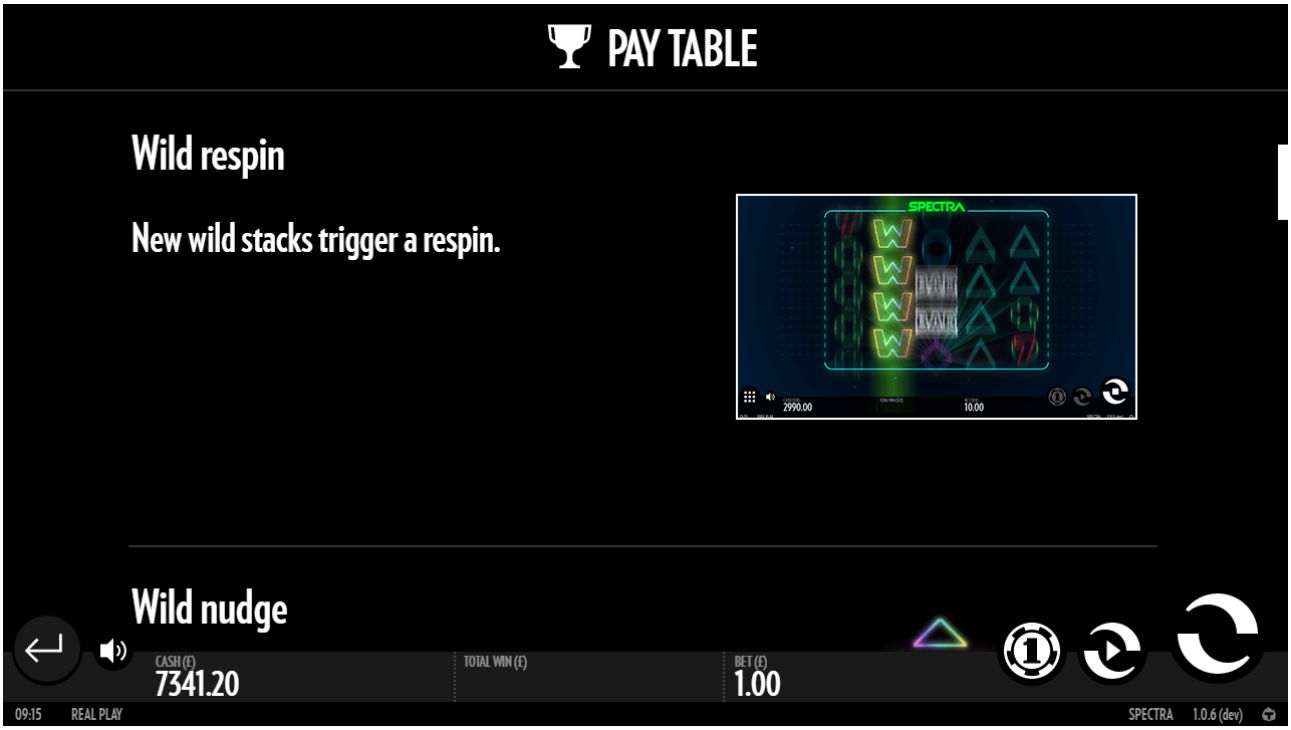
ANNEX III – Game rules and Paytables

Processes, rules and parameters of the games

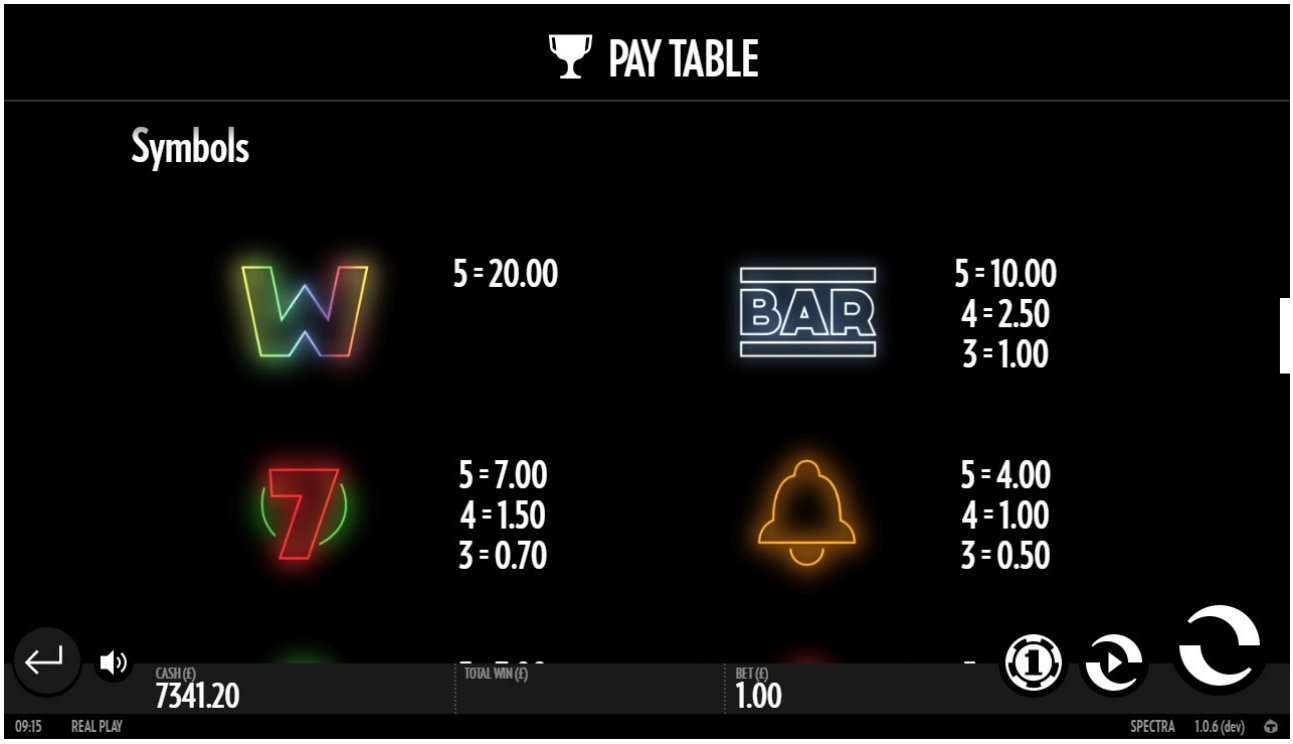
G003: Spectra

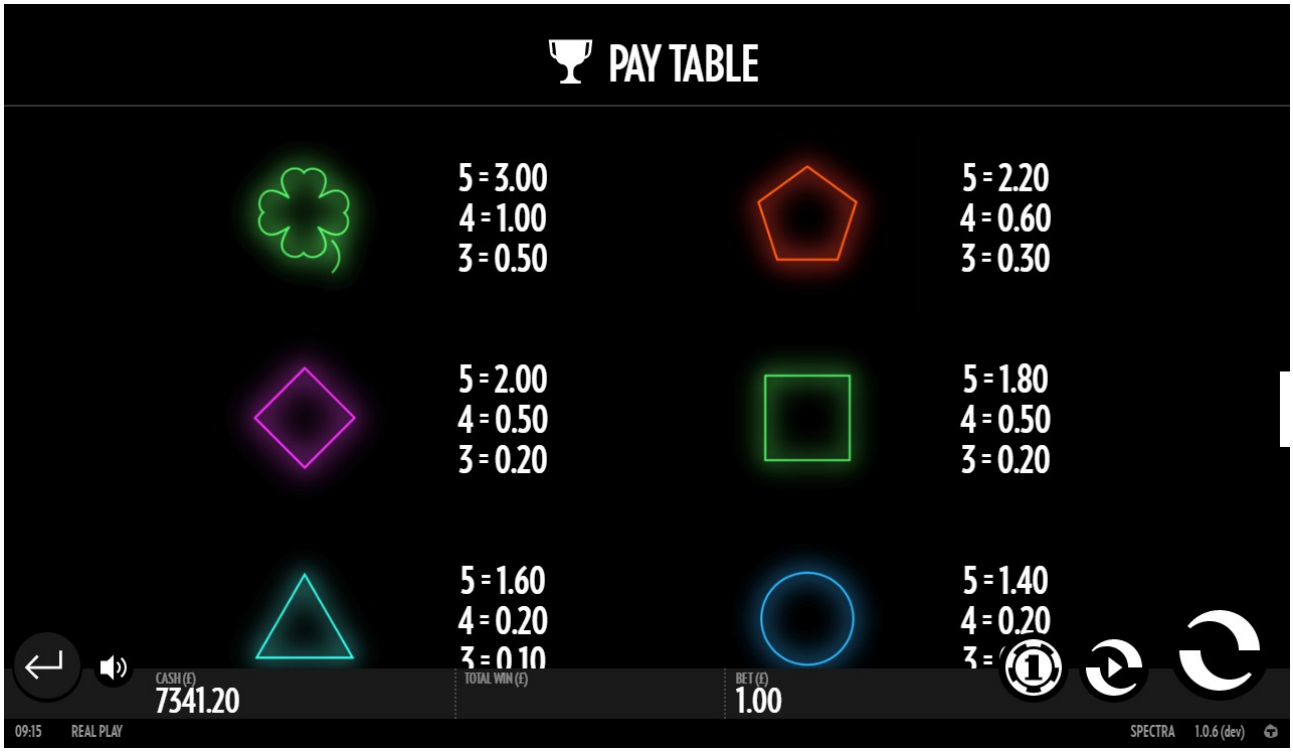
Desktop:

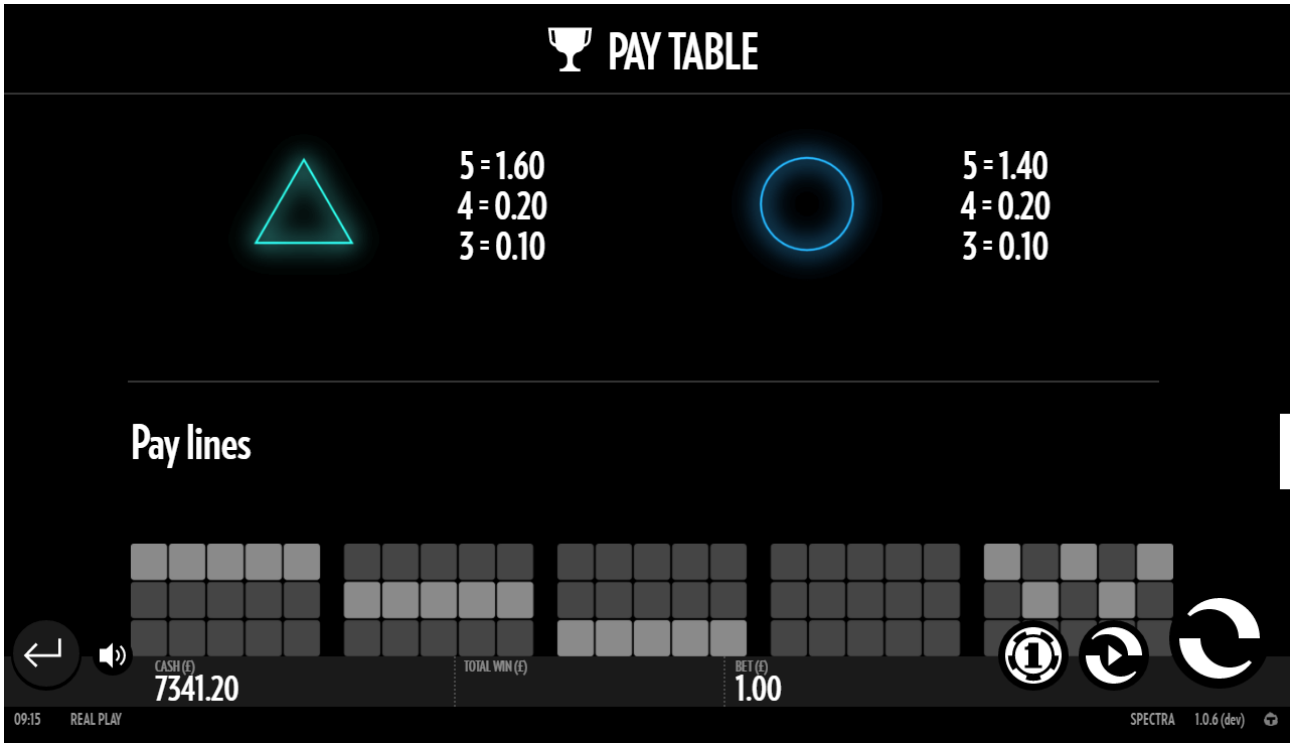

PAY TABLE
Wild symbol
The wild symbol substitutes for any other symbol. Wilds symbols always appear in stacks of 4.
Wild respin
New wild stacks trigger a respin.
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:15
REAL PLAY
SPECTRA
1.0.6 (dev)

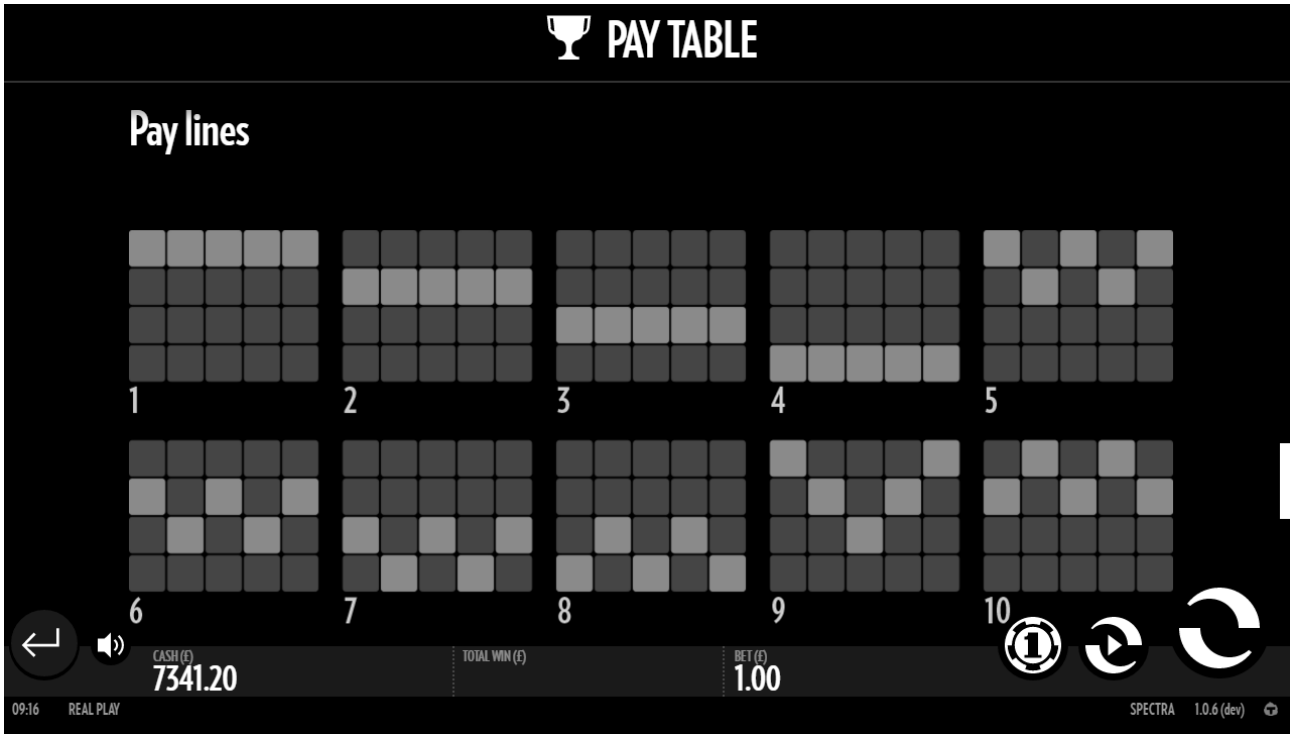

PAY TABLE
Wild respin
New wild stacks trigger a respin.
SPECTRA
Wild nudge
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:15
REAL PLAY
SPECTRA
1.0.6 (dev)

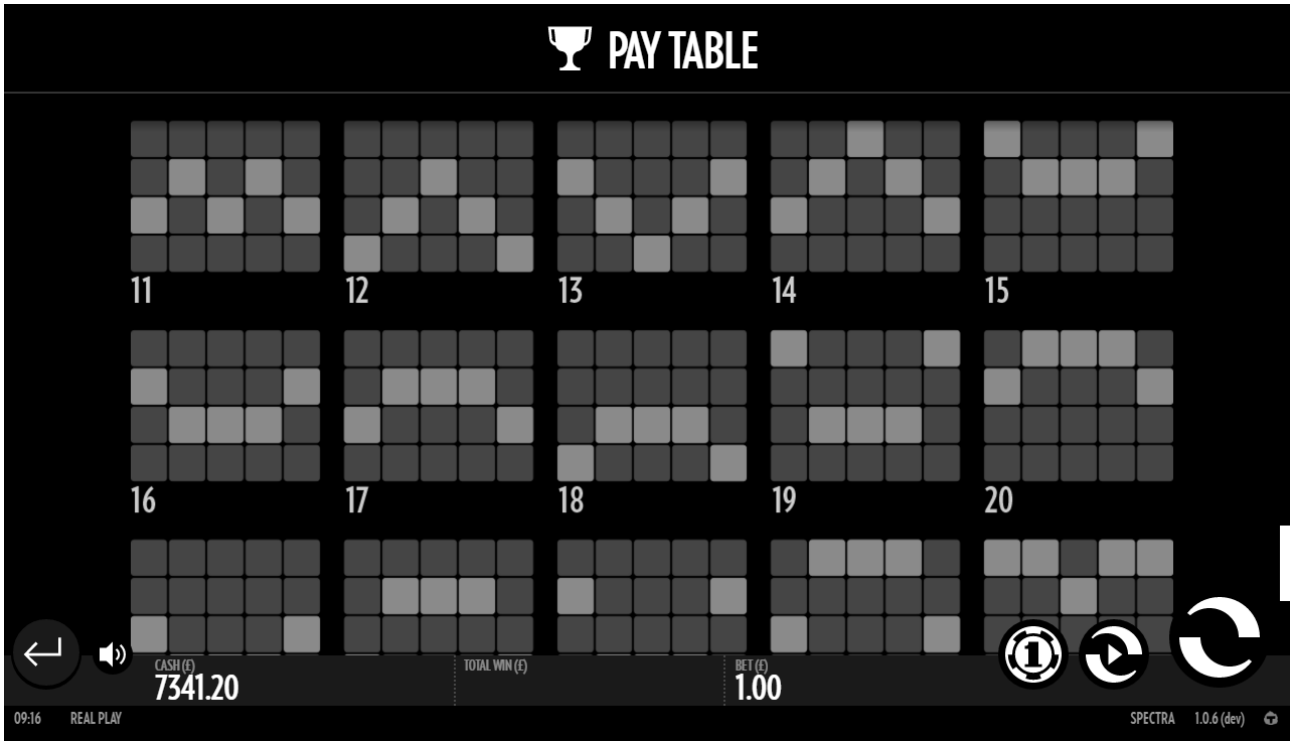
PAY TABLE
Wild nudge
During each respin the wild stacks will nudge towards the center of the reels.
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:15
REAL PLAY
SPECTRA
1.0.6 (dev)

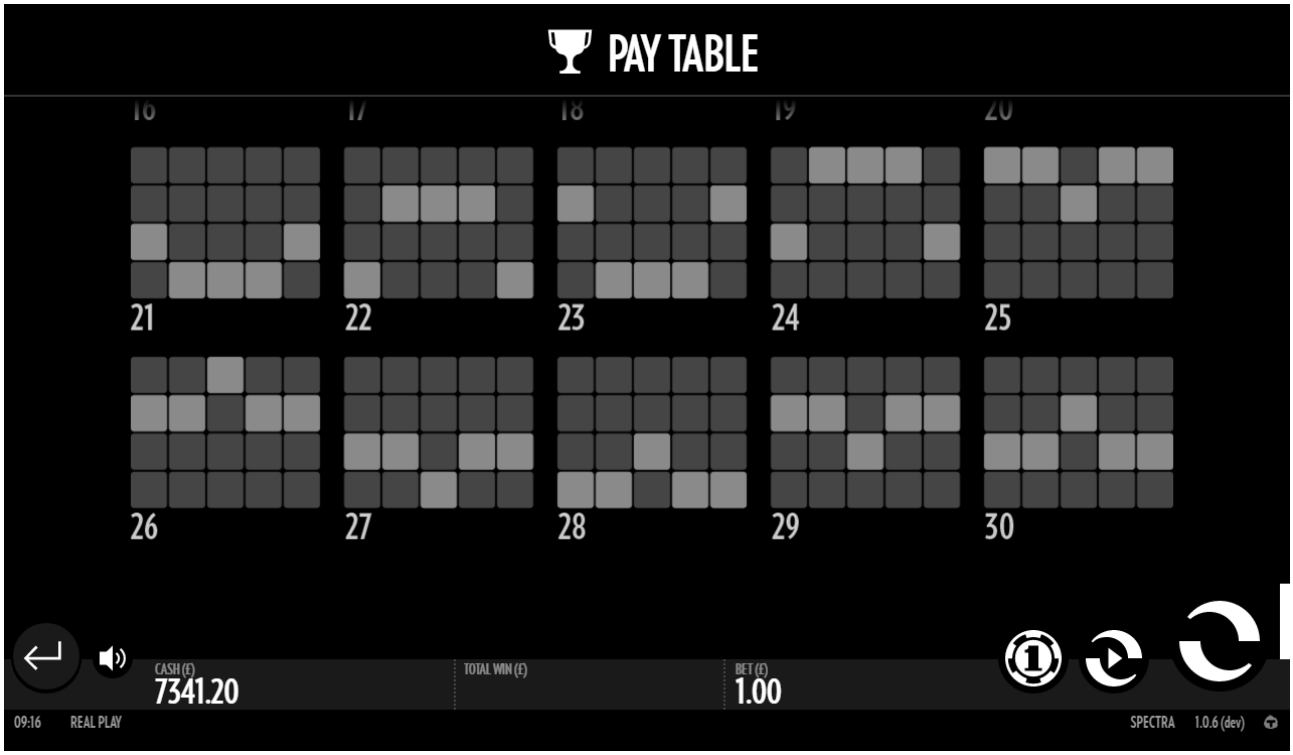

PAY TABLE
Symbols
5 = 20.00
BAR
5 = 10.00
4 = 2.50
3 = 1.00
5 = 7.00
4 = 1.50
3 = 0.70
5 = 4.00
4 = 1.00
3 = 0.50
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:15
REAL PLAY
SPECTRA
1.0.6 (dev)


PAY TABLE
5 = 3.00
4 = 1.00
3 = 0.50
5 = 2.20
4 = 0.60
3 = 0.30
5 = 2.00
4 = 0.50
3 = 0.20
5 = 1.80
4 = 0.50
3 = 0.20
5 = 1.60
4 = 0.20
3 = 0.10
5 = 1.40
4 = 0.20
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:15
REAL PLAY
SPECTRA
1.0.6 (dev)

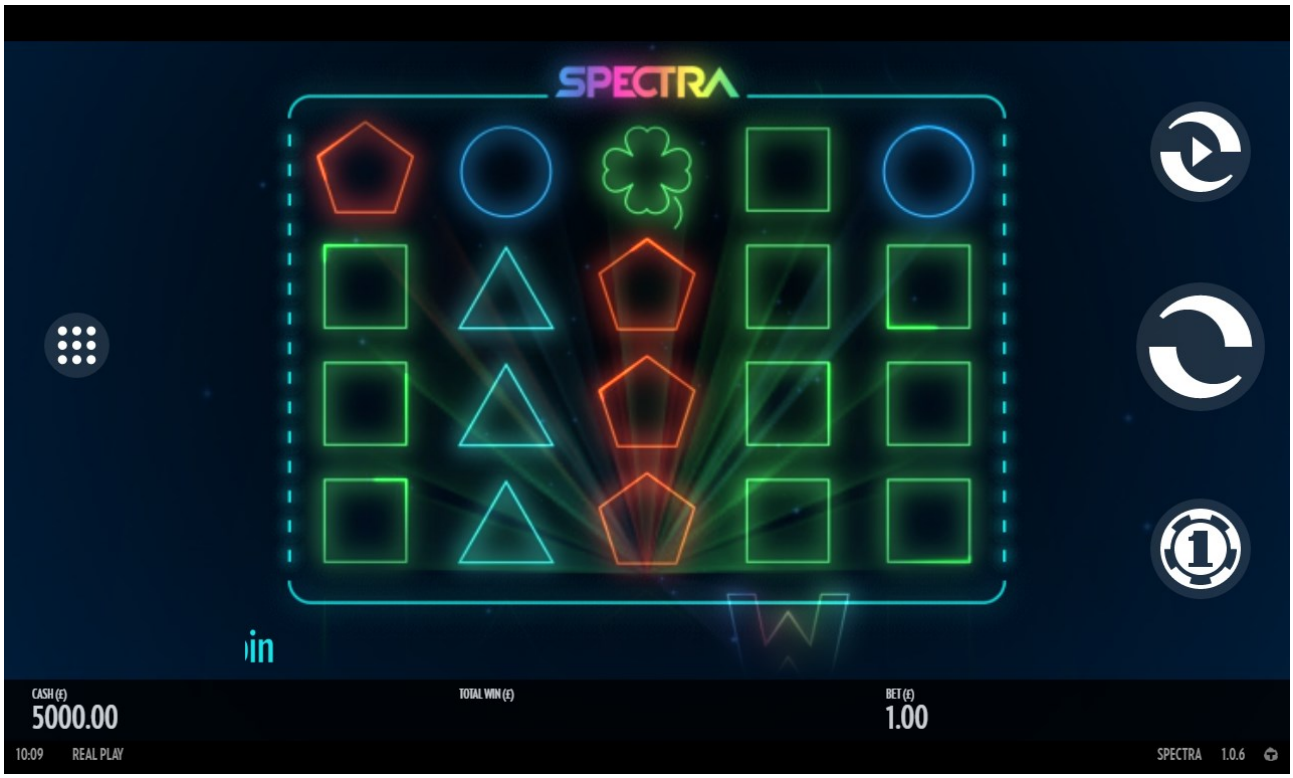

PAY TABLE
5 = 1.60
4 = 0.20
3 = 0.10
5 = 1.40
4 = 0.20
3 = 0.10
Pay lines
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:15
REAL PLAY
SPECTRA
1.0.6 (dev)

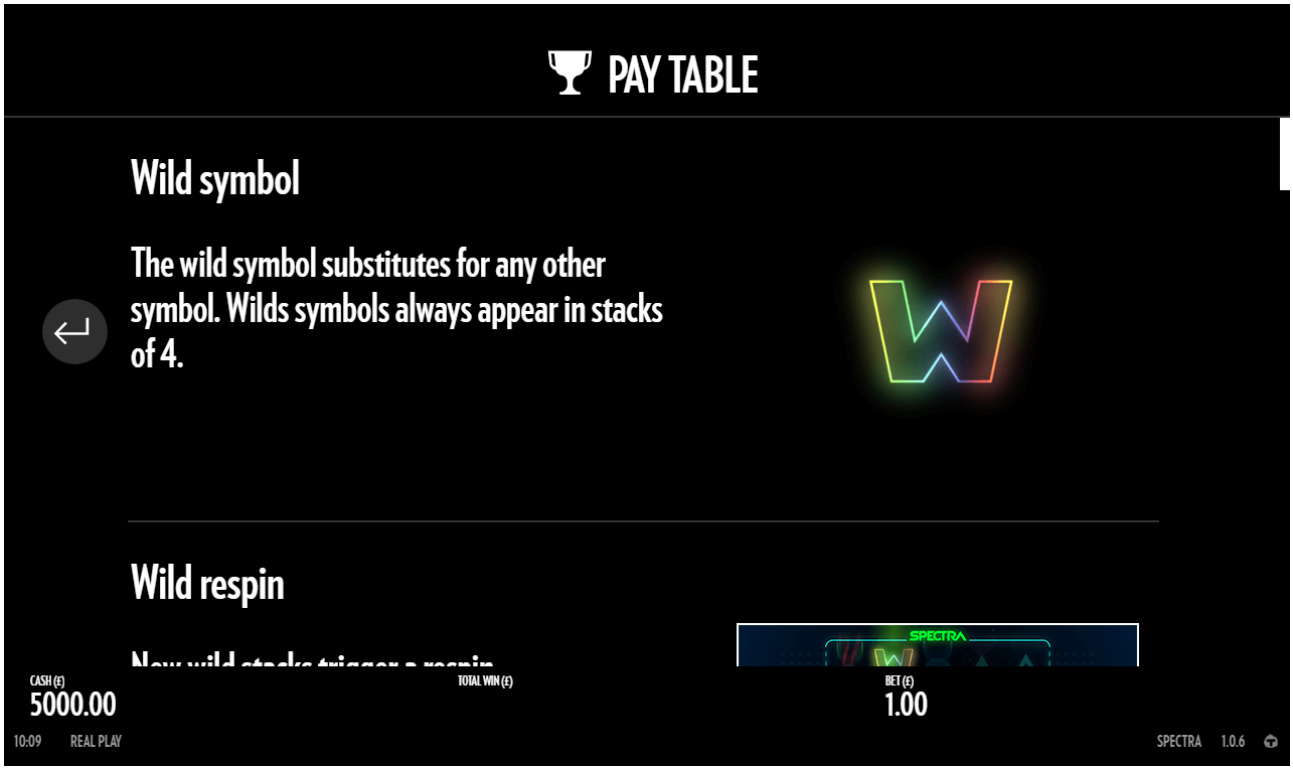

PAY TABLE
Pay lines
1
2
3
4
5
6
7
8
9
10
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:16
REAL PLAY
SPECTRA
1.0.6 (dev)


PAY TABLE
11
12
13
14
15
16
17
18
19
20
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:16
REAL PLAY
SPECTRA
1.0.6 (dev)


PAY TABLE
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
CASH (£)
7341.20
TOTAL WIN (£)
BET (£)
1.00
09:16
REAL PLAY
SPECTRA
1.0.6 (dev)

Mobile:


SPECTRA
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:09
REAL PLAY
SPECTRA
1.0.6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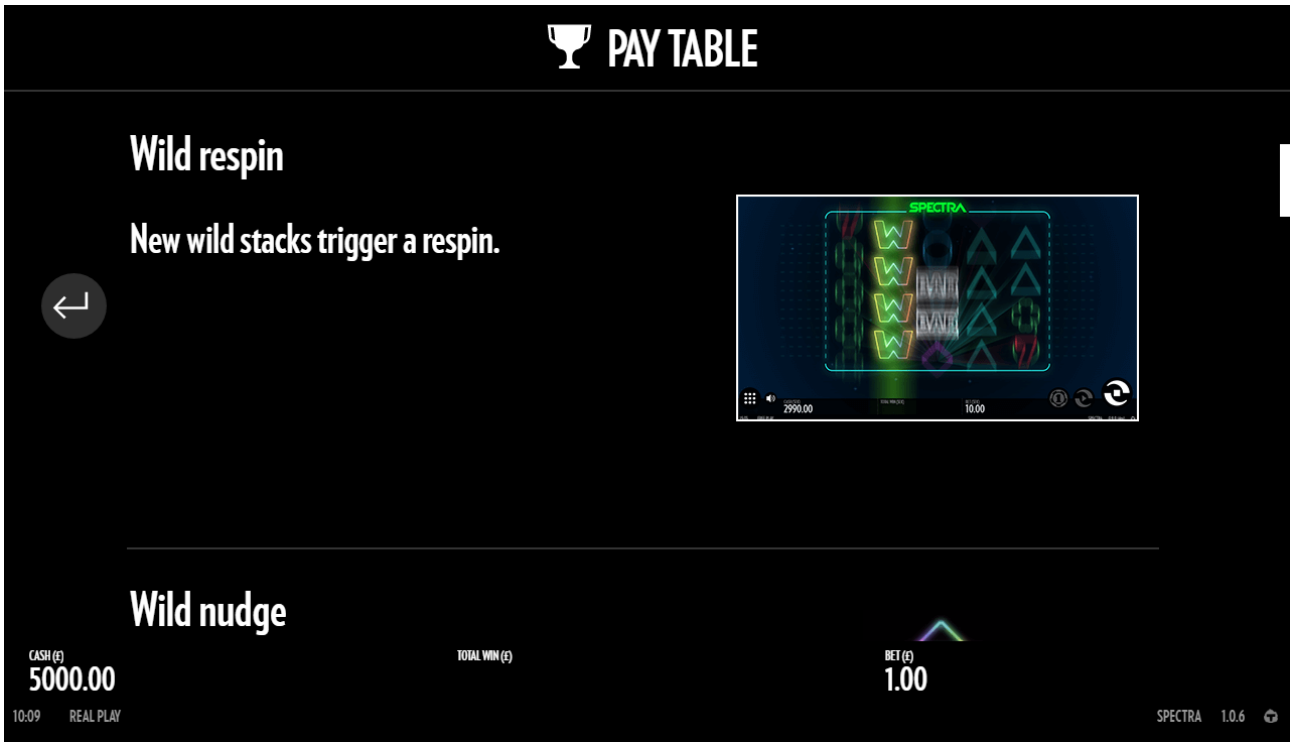
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SPECTRA
Wild nudge
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:09
REAL PLAY
SPECTRA
1.0.6

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5000.00
TOTAL WIN (£)
BET (£)
1.00
10:09
REAL PLAY
SPECTRA
1.0.6

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Symbols
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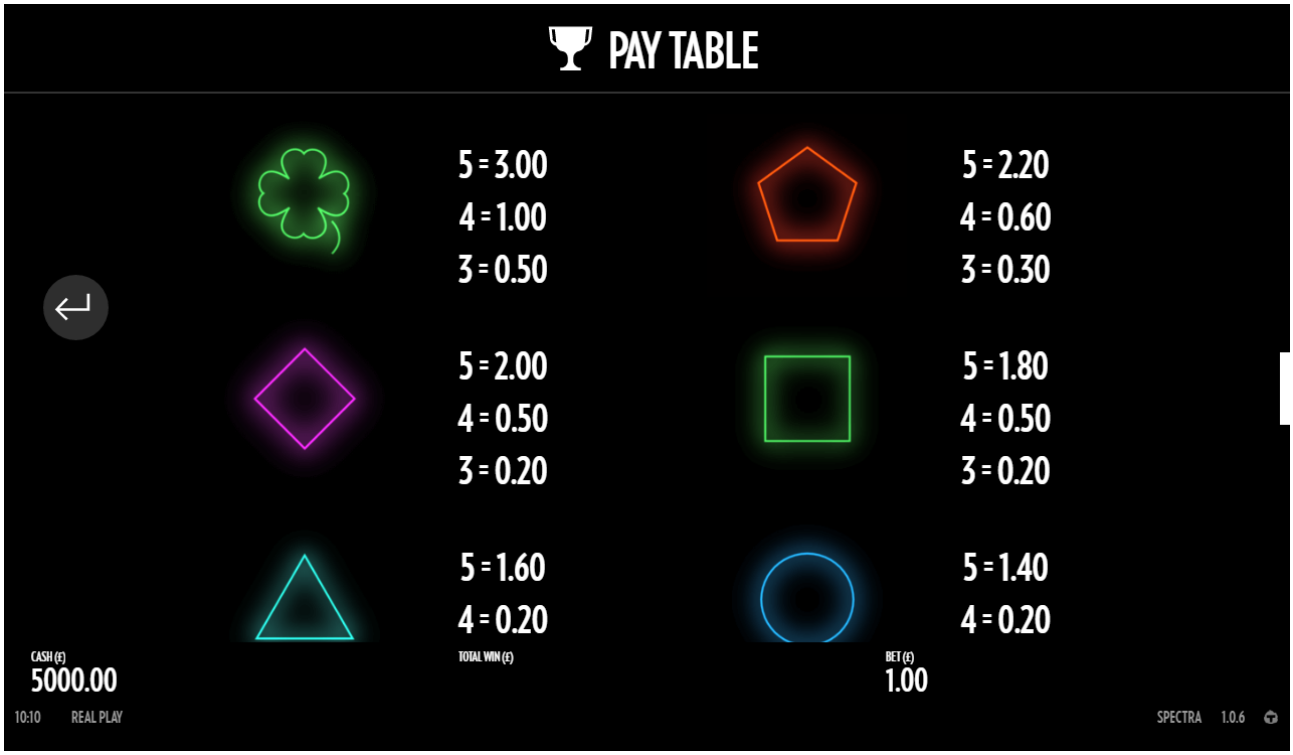
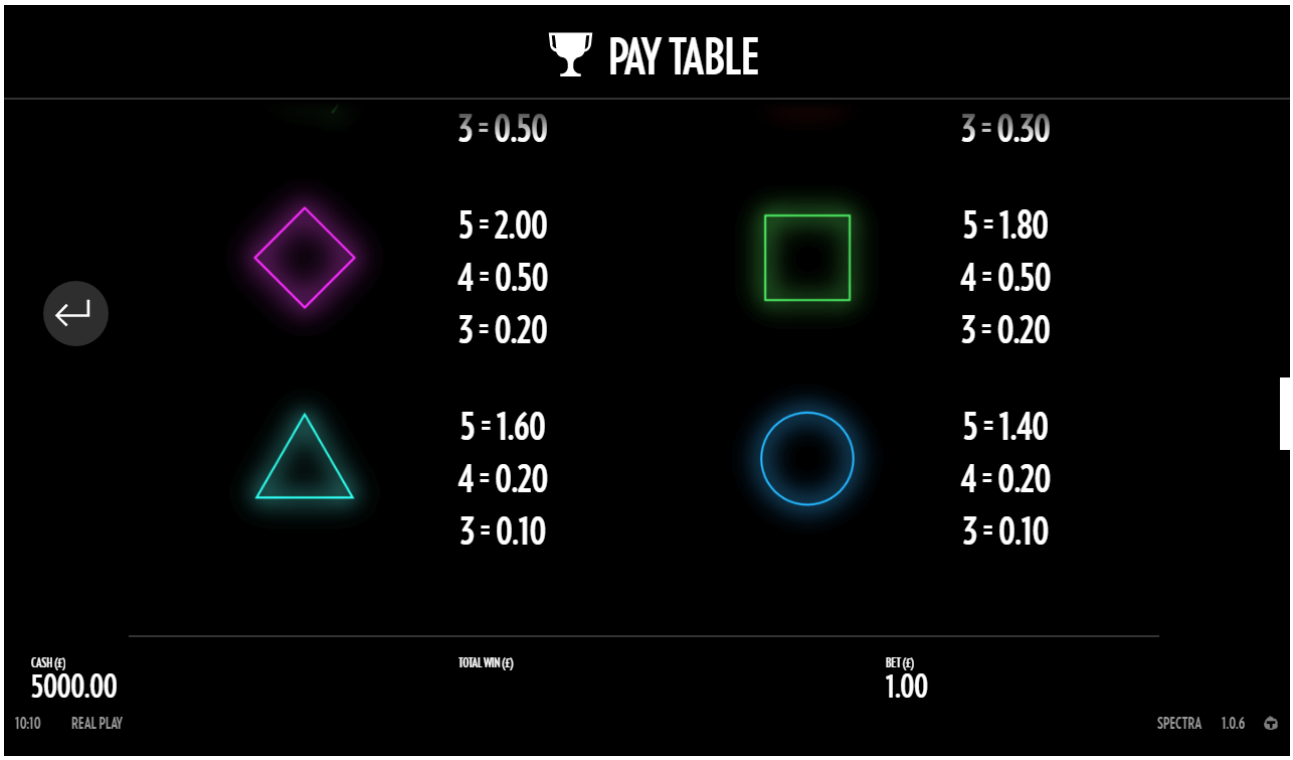
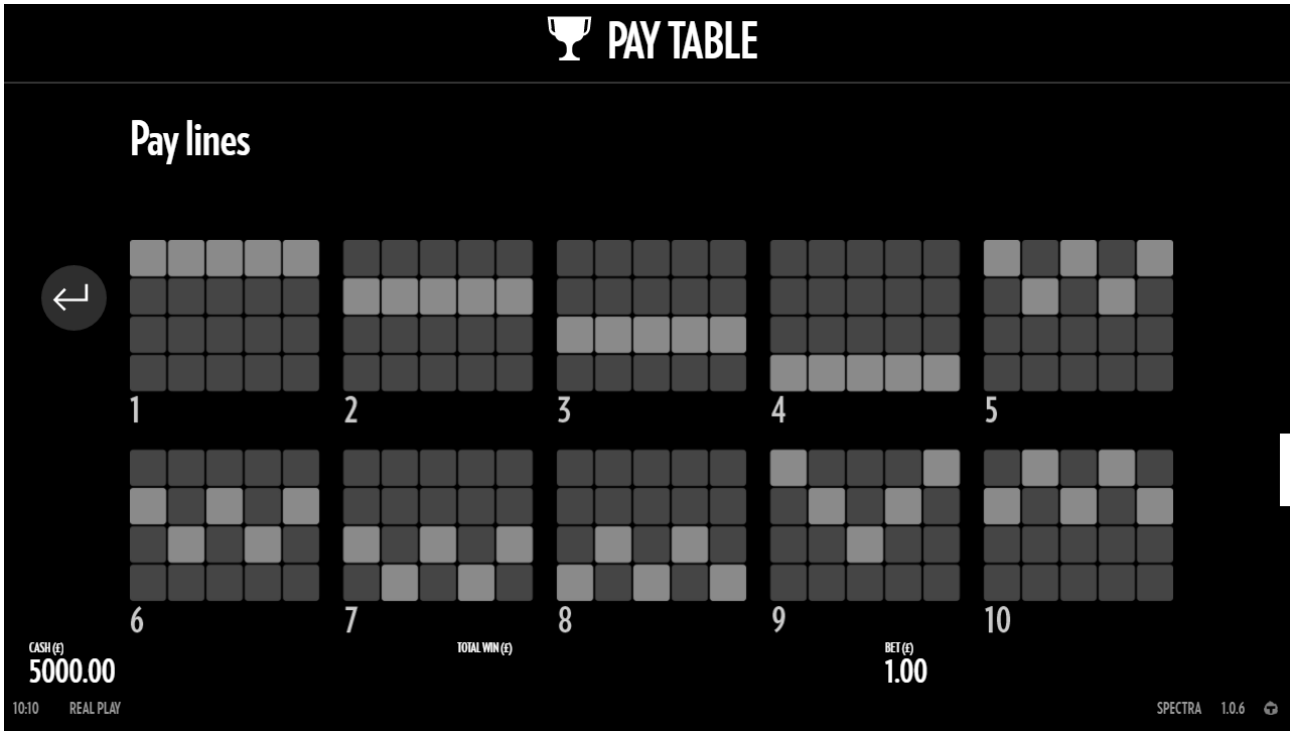
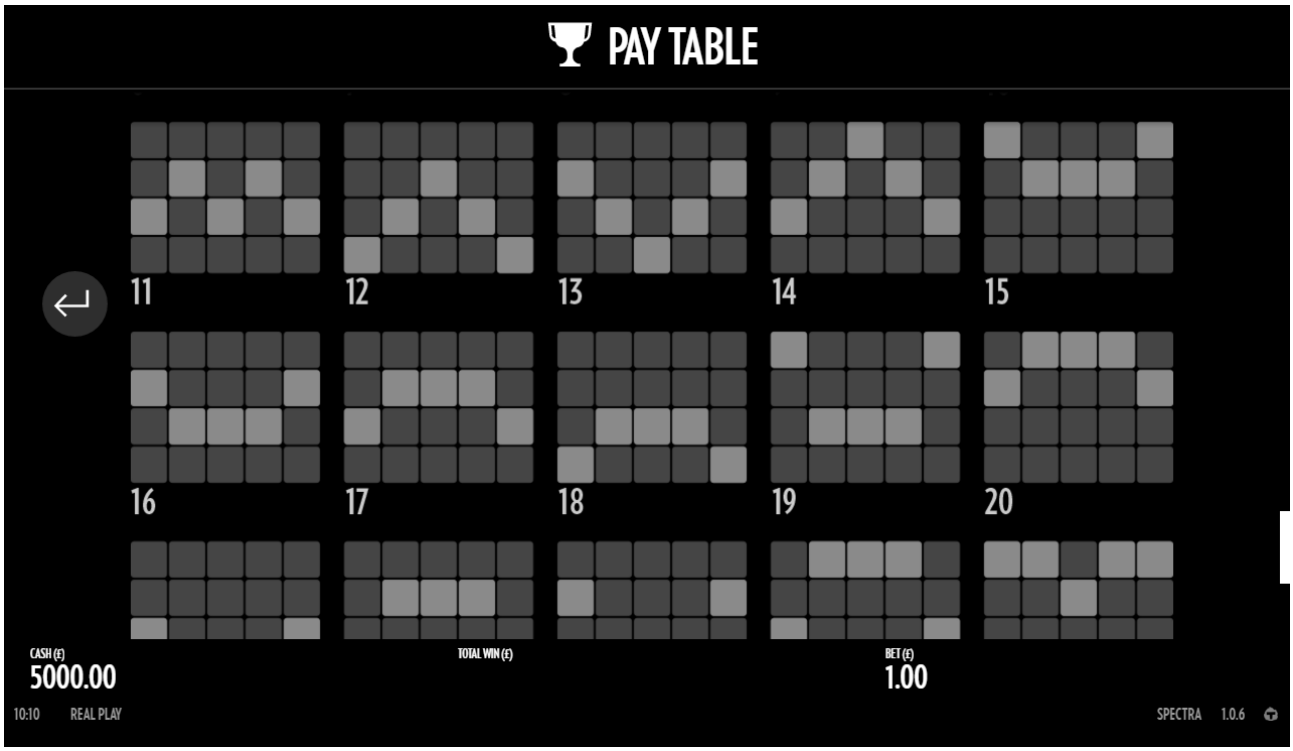
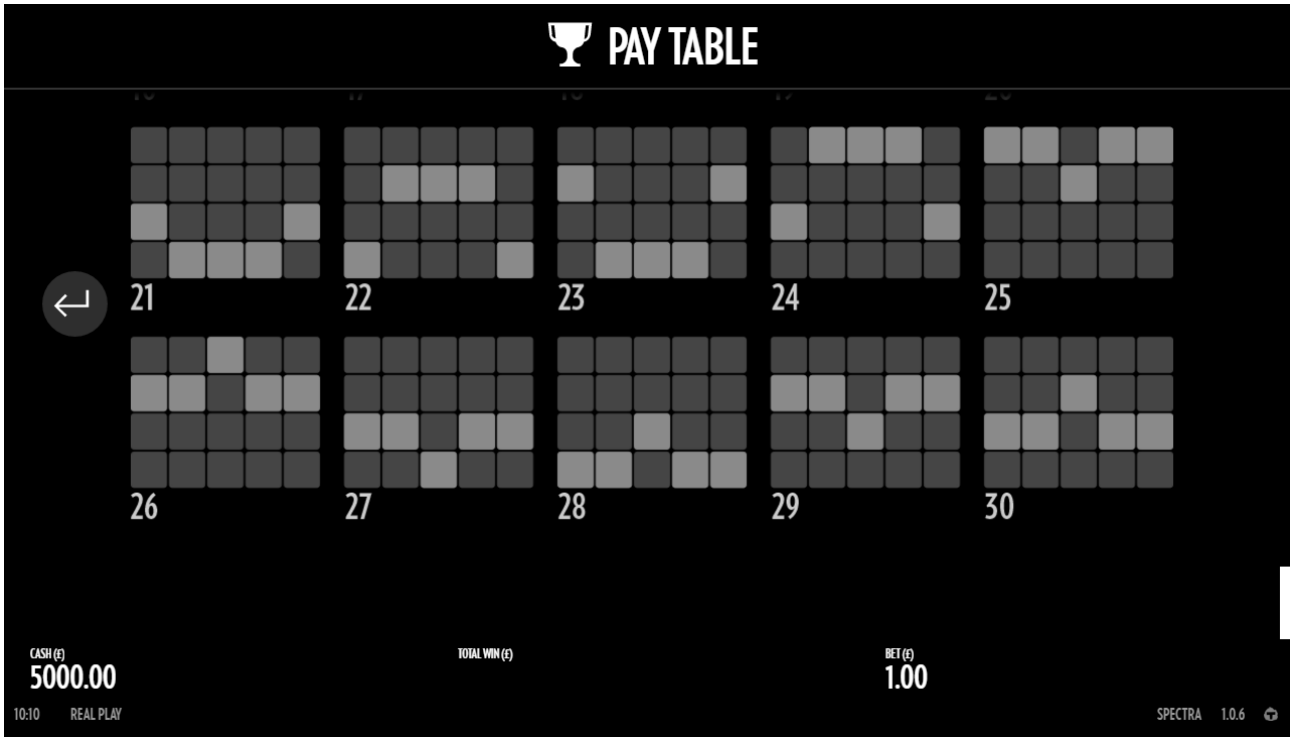
BAR
5 = 10.00
4 = 2.50
3 = 1.00
5 = 7.00
4 = 1.50
3 = 0.70
5 = 4.00
4 = 1.00
3 = 0.50
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:10
REAL PLAY
SPECTRA
1.0.6


PAY TABLE
5 = 3.00
4 = 1.00
3 = 0.50
5 = 2.20
4 = 0.60
3 = 0.30
5 = 2.00
4 = 0.50
3 = 0.20
5 = 1.80
4 = 0.50
3 = 0.20
5 = 1.60
4 = 0.20
5 = 1.40
4 = 0.20
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:10
REAL PLAY
SPECTRA 1.0.6

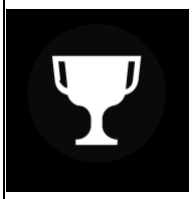

PAY TABLE
3 = 0.50
3 = 0.30
5 = 2.00
4 = 0.50
3 = 0.20
5 = 1.80
4 = 0.50
3 = 0.20
5 = 1.60
4 = 0.20
3 = 0.10
5 = 1.40
4 = 0.20
3 = 0.10
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:10
REAL PLAY
SPECTRA 1.0.6

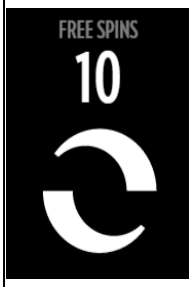
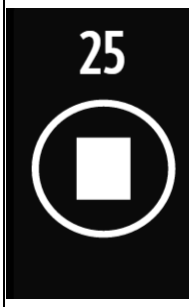

PAY TABLE
Pay lines
1
2
3
4
5
6
7
8
9
10
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:10
REAL PLAY
SPECTRA 1.0.6


PAY TABLE
11
12
13
14
15
16
17
18
19
20
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:10
REAL PLAY
SPECTRA 1.0.6


PAY TABLE
21
22
23
24
25
26
27
28
29
30
CASH (£)
5000.00
TOTAL WIN (£)
BET (£)
1.00
10:10
REAL PLAY
SPECTRA
1.0.6

Game Rules (8/24/2016)

Button	Function
	Click to start a game round. On desktop you may also press the space bar on your keyboard.
	Display bet settings.
	Display autoplay settings.
	Display game rules.
	Display paytable.
	Skip presentation.
	Toggles the sound on and off.

	Exit game.
	Exit current screen.
	Start feature (e.g Free Spins).
	Stop auto play session.

Note: The **Spectra** video slot is referred to as Spectra, The Game or Game.

1. Spectra is a video slot with 5 reels and 30 pay lines. The game features stacked and nudging wild symbols and respins. The theoretical return to player is 96.4%.

2. A game round is started with the action button and plays the game with the selected bet level.

3. No bets can be altered during a game round.

4. Auto play plays the game automatically for the number of game rounds selected in the auto play page.

5. The appearance of 1 or more new wild stacks on or directly adjacent to a pay line triggers a respin. During each respin the wild stacks nudge 1 symbol position vertically towards the center of the reels.

6. All game payout and win combinations are paid out according to the pay table.

7. Only the highest win per pay line is paid out, if in sequence from leftmost to right and in combinations according to the pay table.

8. All pay line wins during a game round are added and presented at the end of the game round.

9. All wins are presented and paid out in the selected currency.

10. A wild symbol substitutes for any other symbol.

11. In the event of game malfunction all affected bets and pays are rendered void.

END
OF
COMPLIANCE
REPORT