

Applicant.....: Kopen Electrical Co., Ltd.
Address: 2/F, G-H Winner Factory Building, 55 Hung To Road, Kwun Tong, Kowloon, HongKong

Manufacturer and Factory.....: Dongguan Jinxia Kopen Electrical Mfy Co., Ltd.
Address.....: Jinxia Hexi Industrial Estate, Changgan, Dongguan, Guangdong, China

Test object / Model.....: Lithium-ion Battery / ICR18650-26F

Test specifications / Test standard.....: ST/SG/AC.10/11/Rev.6/Section 38.3
Test procedure.....: SGS-CSTC

Test Report Form No.....: UN_BATT_201407

Test Report Form(s) Originator.....: SGS-CSTC

Master TRF.....: Dated 2014-07


Purpose of examination.....: Commission Test

Summary of testing.....: The sample(s) tested complies with the requirements of ST/SG/AC.10/11/Rev.6 Section 38.3 UNITED NATIONS "Recommendations on the transport of dangerous goods" Manual of test and Criteria ST/SG/AC.10/11/Rev.6 Section 38.3

Remark: None


 Rocky Wang
 Project Reviewer
 Safety Laboratory




 Sunny Guan
 Project Engineer

This document is issued by the Company subject to its General Conditions of Service printed overleaf, -available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

1. Function / Description:

Lithium-ion Battery

2. Ratings:

Model	ICR18650-26F
Rated Voltage	: 3,7 V d.c.
Rated Capacity	2600 mAh
Charging Voltage	4,2 V
Discharge cut-off voltage	2,75 V
Maximum charge current	2600 mA
Maximum discharge current	5200 mA

Remark: Cell has the same charging and discharging specification with pack

Test information:

Possible test case verdicts:

- test case does not apply to the test object:	N/A (Not Applicable)
- test object does meet the requirement:	P (Pass)
- test object does not meet the requirement:	F (Fail)

The tests were done in the Electrical Safety Laboratory of SGS-CSTC in Shenzhen.

Test item was received on 2017-03-15

Tests were performed from 2017-03-15 to 2017-03-31

Ambient temp.: 20 °C ± 5 °C

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

3. Test result:

ST/SG/AC.10/11/Rev.5/Section 38.3/Amend.2			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4	Procedure		P
38.3.4.1	Test T.1: Altitude simulation		P
	Test procedure: Test cells and batteries shall be stored at a pressure of 11,6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C).		P
	Requirement: Cells and batteries Mass loss limit: ≤ 0,1%;		P
	Open circuit voltage changed not less than 90%, the requirement relating to voltage is not applicable to test cells and batteries at full discharged states.		P
	No leakage, no venting, no disassembly, no rupture and no fire.		P

This document is issued by the Company subject to its General Conditions of Service printed overleaf, -available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

38.3.4.2	Test T.2: Thermal test		P
	Test procedure: Test cells and batteries are to be stored for at least six hours at a test temperature equal to 75 ± 2 °C, followed by storage for at least six hours at a test temperature equal to -40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.		P
	Requirement: Cells and batteries Mass loss limit: $\leq 0,1\%$		P
	Open circuit voltage changed not less than 90%, the requirement relating to voltage is not applicable to test cells and batteries at full discharged states.		P
	No leakage, no venting, no disassembly, no rupture and no fire.		P
38.3.4.3	Test T.3: Vibration		P
	Test procedure: Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of $1 g_n$ is maintained until 18 Hz is reached. The amplitude is then maintained at 0,8 mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of $8 g_n$ occurs (approximately 50Hz). A peak acceleration of $8 g_n$ is then maintained until the frequency is increased to 200 Hz		P
	Requirement: Cells and batteries Mass loss limit: $\leq 0,1\%$		P
	Open circuit voltage changed not less than 90%, the requirement relating to voltage is not applicable to test cells and batteries at full discharged states.		P
	No leakage, no venting, no disassembly, no rupture and no fire.		P
38.3.4	Test T.4: Shock		P

This document is issued by the Company subject to its General Conditions of Service printed overleaf, -available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

	<p>Test procedure: Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150 gn and pulse duration of 6 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. However, large cells and large batteries shall be subjected to a half-sine or peak acceleration of 50 gn and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the positive direction followed by the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.</p>		P
	<p>Requirement: Cells and batteries Mass loss limit: $\leq 0,1\%$</p>		P
	<p>Open circuit voltage changed not less than 90%, the requirement relating to voltage is not applicable to test cells and batteries at full discharged states.</p>		P
	<p>No leakage, no venting, no disassembly, no rupture and no fire.</p>		P
38.3.4.5	<p>Test T.5: External short circuit</p>		P
	<p>Test procedure: The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57 ± 2 °C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0,1 ohm at 57 ± 4 °C. If this assessment is not Feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57 ± 4 °C, The cell or battery must be observed for a further six hour for the test to be concluded, or in the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below the value.</p>		P
	<p>Requirement: Cell's or batteries' external temperature not exceed 170 °C.</p>		P
	<p>No disassembly, no rupture and no fire within six hours.</p>		P

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

38.3.4.6	Test T.6: Impact / Crush		P
	Test procedure 1: Impact The sample cell or component cell is to be placed on a flat smooth surface.		P
	A 15.8 mm \pm 0.1mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample.		P
	A 9.1 kg \pm 0.1 kg mass is to be dropped from a height of 61 \pm 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.		P
	The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15,8 mm \pm 0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.		P
	Test procedure 2: Crush A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1,5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.		N/A
	(a) The applied force reaches 13 kN \pm 0.78 kN; or		N/A
	(b) The voltage of the cell drops by at least 100 mV; or		N/A
	(c) The cell is deformed by 50% or more of its original thickness.		N/A
	Requirement: Cell's or batteries' external temperature not exceed 170 °C.		P
38.3.4.7	No disassembly, no rupture and no fire within six hours.		P
	Test T.7: Overcharge		P
38.3.4.7	Test procedure: The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:		P

This document is issued by the Company subject to its General Conditions of Service printed overleaf, -available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

	(a) When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V.		P
	(b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.		P
	Requirement: No disassembly, no rupture and no fire within seven days.		P
38.3.4.8	Test T.8: Force discharge		P
	Test procedure: Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.		P
	The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).		P
	Requirement: No disassembly, no rupture and no fire within seven days.		P

This document is issued by the Company subject to its General Conditions of Service printed overleaf, -available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

T1 to T5 test data

Sample No.	Mass prior to test		After Test T.1 Altitude simulation		After Test T.2 Thermal test		After Test T.3 Vibration		After Test T.4 Shock/		T.5 External short circuit /
	Mass (g)	OCV (V)	Mass loss	Charge ratio (%)	Mass loss	Charge ratio (%)	Mass loss	Charge ratio (%)	Mass loss	Charge ratio (%)	Temp (°C)
#1	47,708	4,194	0,002	99,95	0,006	99,43	0,000	100,00	0,000	100,00	58,4
#2	47,623	4,196	0,000	99,86	0,006	99,50	0,000	100,00	0,000	100,00	58,0
#3	47,795	4,196	0,002	99,90	0,006	99,43	0,000	100,00	0,000	100,00	58,4
#4	47,604	4,196	0,000	99,88	0,008	99,45	0,000	100,00	0,000	100,00	58,1
#5	47,727	4,196	0,002	99,90	0,006	99,45	0,000	100,00	0,000	100,00	57,9
#6	47,536	4,196	0,002	99,90	0,004	99,31	0,000	100,00	0,000	100,00	58,2
#7	47,768	4,195	0,002	99,88	0,006	99,28	0,000	100,00	0,000	100,00	58,6
#8	47,688	4,196	0,000	99,88	0,008	99,40	0,000	100,00	0,000	100,00	58,3
#9	47,790	4,194	0,002	99,90	0,006	99,47	0,000	100,00	0,000	100,00	58,0
#10	47,666	4,196	0,000	99,88	0,006	99,33	0,000	100,00	0,000	100,00	58,5

T6 test data

Sample No.	#11	#12	#13	#14	#15
Mass prior to test-OCV (V)	3,890	3,885	3,889	3,884	3,886
Maximum case temperature rise T, (°C)	119,2	28,6	32,7	108,4	29,7

T7 test data

Sample No.	#1	#2	#3	#4	#36	#37	#38	#39
Mass prior to test-OCV (V)	4,167	4,169	4,168	4,168	4,196	4,196	4,196	4,196

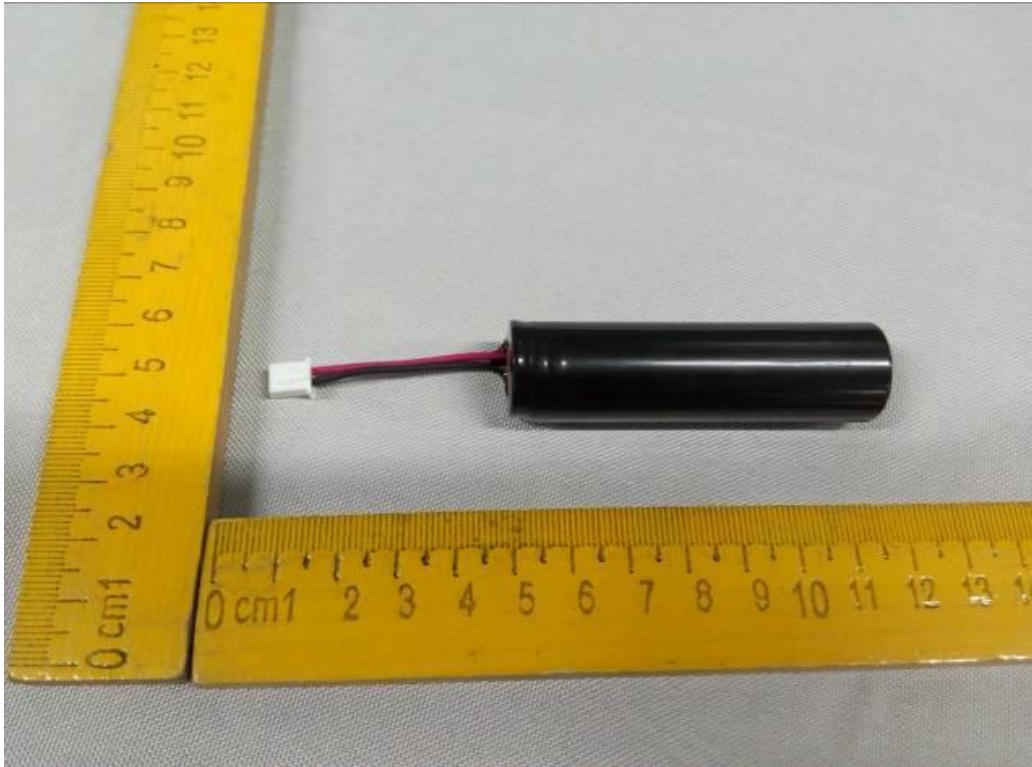
T8 test data

Sample No.	#16	#17	#18	#19	#20	#21	#22	#23	#24	#25
Mass prior to test-OCV (V)	3,356	3,350	3,357	3,350	3,348	3,351	3,355	3,359	3,344	3,360
Sample No.	#26	#27	#28	#29	#30	#31	#32	#33	#34	#35
Mass prior to test-OCV (V)	3,350	3,355	3,367	3,358	3,360	3,359	3,351	3,355	3,360	3,354

This document is issued by the Company subject to its General Conditions of Service printed overleaf, -available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

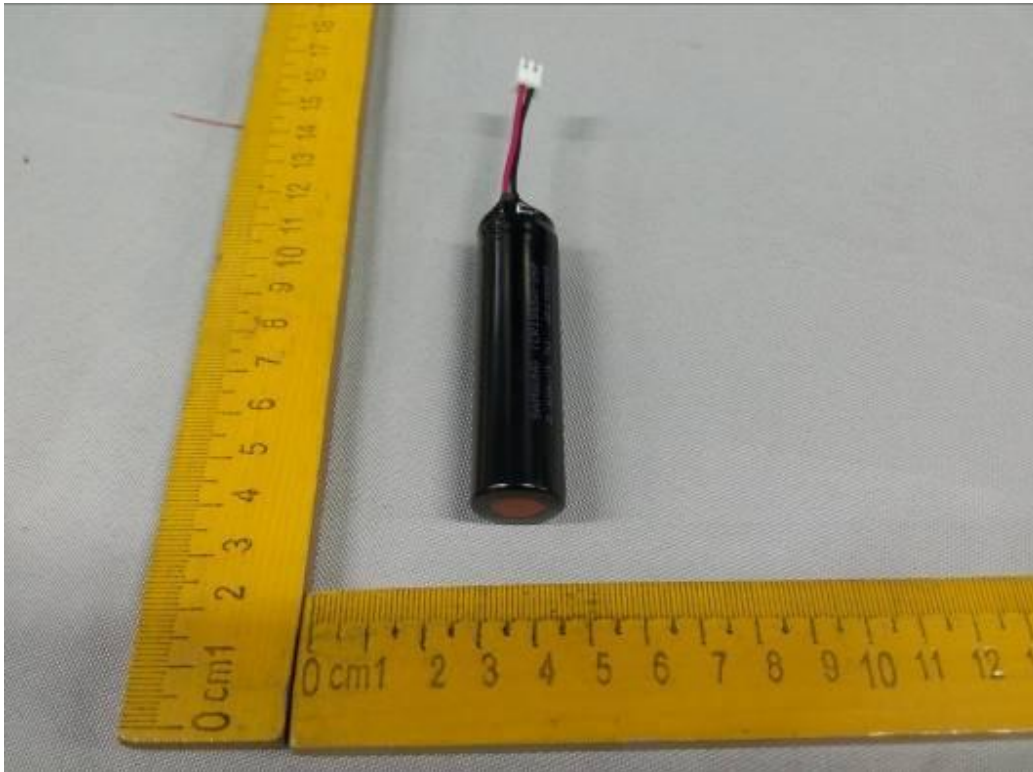
Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com

Attachment: Sample photos



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com



--- End of Report ---

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755)83071443, or email: CN.Doccheck@sgs.com