

检测报告 TEST REPORT

报告编号 (Report No.) :UTS25080257M

报告日期 (Report Date) : 2025/09/01

委托单位/Client : 滨州双峰石墨密封材料有限公司
BINZHOU DOUBLE PEAKS GRAPHITE SEALING MATERIAL Co., LTD.
地址/Address : 山东省滨州市渤海五路 744 号
NO.744 5TH BOHAI ROAD BINZHOU SHANDONG CHINA

以下样品信息由申请人提供及确认:

The sample(s) information below is/are provided and confirmed by client:

样品名称/Sample Name : 柔性石墨板/Flexible graphite plate
规格/型号/批号 : δ 0.3mm (出厂编号/Manufacturing No. : 20250814)
Type/Model/Batch No. 密度/Density 1.0g/cm³
接样日期/Receiving Date : 2025/08/19



签
Approved 樊建红 授权签字人

审 核
Reviewed by 张传水

编 制
Prepared by 金颖

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结果总结/Summary of Result(s):

序号 No.	项目 Item(s)	标准要求 Standard requirements	测试结果 Test result	判定 Determine	备注 Remarks
1	厚度/Thickness	(0.3±0.02)mm	0.30	符合/PASS	JB/T7758.2-2003
2	密度/Density	(1.0±0.05)g/cm ³	1.01	符合/PASS	JB/T9141.1-2013
3	灰分/Residue on ignition tolerance	≤0.5%	0.21	符合/PASS	JB/T9141.5-2020
4	碳含量/Carbon content	≥99.5%	99.74	符合/PASS	JB/T9141.6-2020
5	热失重/Thermal weight loss (450℃、600℃、700℃)	450℃: ≤0.5%	0.04	符合/PASS	JB/T9141.7-2013
		600℃: ≤1.0%	0.92	符合/PASS	JB/T9141.7-2013
		700℃: ≤12%	6.71	符合/PASS	JB/T9141.7-2013
6	拉伸强度/Tensile strength	≥4.5MPa	4.73	符合/PASS	JB/T9141.2-2013
7	硫含量/Sulfur content	≤200mg/kg	49.15	符合/PASS	JB/T7758.3-2005
8	游离态氯含量/Free chlorine content	≤30mg/kg	N.D.	符合/PASS	ASTM F1277-95
9	游离态氟含量/Free fluorine content	≤50mg/kg	N.D.	符合/PASS	ASTM F1277-95
10	总卤素含量/Total halogen content	≤200mg/kg	N.D.	符合/PASS	EN14582: 2016
11	压缩率/Compression ratio	≥41%	52.1	符合/PASS	JB/T9141.4-2013
	回弹率/Rate of rebound	≥12%	19.0	符合/PASS	JB/T9141.4-2013

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一、厚度/Thickness

1、测试标准/Test Standard

JB/T 7758.2-2005

2、测试日期/Test Date

2025/08/26-2025/08/27

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
数显游标卡尺 Digital display vernier caliper	M-1-610	2025/09/13

4、测试条件/Test Conditions

状态调节/State adjustment : (23±2)℃, (50±5)%RH, 24 h

5、测试结果/Test Result(s)

单位/Unit: mm

1-1-A	1-1-B	1-1-C	1-1-D	1-1-E	平均值 Average	判定限值 Judgment limit	判定 Determine
0.30	0.30	0.30	0.30	0.30	0.30	0.3±0.02	符合/PASS

备注/Remark: 判定限值依客户要求。/The prescribed limit(s) is/are according to client's requirement.

二、密度/Density tolerance

1、测试标准/Test Standard

JB/T9141.1-2013

2、测试日期/Test Date

2025/08/26-2025/08/27

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
电子天平 Electronic Balance	CD-1-063	2025/11/20
数显游标卡尺 Digital display vernier caliper	M-1-610	2025/09/13

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4、测试条件/Test Condition

状态调节/Status adjustment : (23±2) °C, (50±5) %RH, 24 h

5、测试结果/Test Result(s)

单位/Unit: g/cm³

1-2-A	1-2-B	1-2-C	1-2-D	1-2-E	平均值 Average	判定依据 Judgment Basis	判定 Determine
0.983	1.05	1.01	1.03	0.994	1.01	1.0±0.05	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

三、灰分/Residue on ignition tolerance

1、测试标准/Test standard

JB/T9141.5-2020

2、测试日期/Test Date

2025/08/23-2025/08/24

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
马弗炉 Muffle furnace	C-1-056	2025/09/26
电子天平 Electronic scales	CD-1-063	2025/11/20

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4、测试条件/Test Condition

状态调节/Status adjustment : (23±2) °C, (50±5) %RH, 24 h

测试方法/Test method : ①将制备好的试样,放入 105~110℃的干燥箱中烘 1h 后取出,放在干燥器中冷却 30 min。
②在已灼烧至恒重的瓷皿中,准确称取 1g 干燥过的试样,准确至±0.0002 g。
③把盛有试样的瓷皿放入马弗炉内,炉门不宜关严,在 800℃下灼烧至无黑色斑点为止。
④从炉内取出瓷皿,在空气中冷却 5~10min,然后放入干燥器中冷却至室温,称重。
⑤把瓷皿放回马弗炉中,继续灼烧 30min,按④步骤称重,如此重复进行,直至两次称量值的误差小于 0.0005g 为止,用最后一次结果进行计算。
/① Put the prepared sample into the drying oven at 105~110℃ for 1h, then take it out and cool it in the dryer for 30 min.
②In a porcelain dish that has been burned to constant weight, accurately weigh 1g of dried sample to ± 0.0002g.
③Put the porcelain dish containing the sample into the Maffu furnace. The furnace door should not be closed tightly and burned at 800℃ until there is no black spot.
④Take out the porcelain dish from the furnace, cool it in the air for 5~10min, and then put it into the dryer to cool to room temperature, and weigh it.
⑤ Put the porcelain dish back into the Maffu furnace, continue to burn for 30min, weigh according to the steps of ④, and repeat until the error of the two weighing values is less than 0.0005g, and use the last result for calculation.

5、测试结果/Test Result(s)

单位/Unit:%

1-3-A	1-3-B	1-3-C	平均值 Average	判定依据 Judgment Basis	判定 Determine
0.22	0.21	0.21	0.21	≤0.5	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

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四、碳含量/Carbon content

1、测试标准/Test standard

JB/T9141.6-2020

2、测试日期/Test Date

2025/08/23-2025/08/24

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
马弗炉/Muffle furnace	C-1-056	2025/09/26
电子天平/Electronic scales	CD-1-063	2025/11/20

4、测试条件/Test Condition

状态调节/Status adjustment : (23±2) °C, (50±5) %RH, 24 h

测试方法/Test method : 称取(1~1.2)g 试样, 精确至 0.2mg, 平铺于预先在 800℃灼烧至恒重的双盖瓷坩埚中, 盖上双盖。将坩埚置于坩埚架上, 迅速送入(400±10)℃箱式电阻炉中。当坩埚架接触炉膛时, 开始计时, 同时关严炉门。灼烧 10min, 取出, 冷却(1~2)min, 移入干燥器中冷却至室温, 称重, 精确至 0.2mg。试样放入炉中后, 在 3min 内炉温应升到规定温度, 否则试验无效。/Weigh (1~1.2)g sample, accurate to 0.2mg, and lay it on the double cover porcelain crucible which has been burned to constant weight at 800℃ in advance, and cover with double cover. The crucible is placed on the crucible rack and quickly fed into the box resistance furnace at (400±10)℃. When the crucible frame contacts the furnace, the timing starts and the furnace door is closed. Burn for 10min, take out, cool (1~2)min, transfer to a desiccator and cool to room temperature, weigh, accurate to 0.2mg. After the sample is placed in the furnace, the furnace temperature should rise to the specified temperature within 3min, otherwise the test is invalid.

固定碳含量/Fixed carbon content $\omega_c=100\%-(\omega_v+\omega_a)$ 其中/Among:

挥发分/Volatile matter $\omega_v=\frac{m_0-m_1}{m_0-m} \times 100\%$

灰分 ω_a 详见灰分测试/Ash ω_a are detailed in the Ash test

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5、测试结果/Test Result(s)

单位/Unit: %

1-4-A	1-4-B	1-4-C	平均值 Average	判定依据 Judgment Basis	判定 Determine
99.75	99.73	99.75	99.74	≥99.5	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

五、热失重/Thermal weight loss

1、测试标准/Test standard

JB/T9141.7-2013

2、测试日期/Test Date

2025/08/22-2025/08/26

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
马弗炉/Muffle furnace	C-1-056	2025/09/26
电子天平/Electronic scales	CD-1-063	2025/11/20

4、测试条件/Test Condition

状态调节/Status adjustment : (23±2) °C, (50±5) %RH, 24 h

测试方法/Test method : 称取(1~1.2)g(精确至 0.0001g)试样, 平铺在预先在 800℃的马弗炉中灼烧至恒重的瓷方舟中, 置入 450℃的马弗炉中, 关闭炉门灼烧 1h, 冷却 (1~2)min, 移入干燥器中冷却至室温, 称重。/(1~1.2)g(accurate to 0.0001g) of samples were weighed, and the samples were laid flat in a porcelain ark that was burned to constant weight in a muffle furnace at 800℃, placed in a muffle furnace at 450℃, the furnace door was closed and burned for 1h, cooled for (1~2)min, transferred to a desiccator and cooled to room temperature, and weighed.

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测试方法/Test method (600℃) : 称取(1~1.2)g(精确至 0.0001g)试样,平铺在预先在 800℃的马弗炉中灼烧至恒重的瓷方舟中, 置入 600℃的马弗炉中, 关闭炉门灼烧 1h, 冷却 (1~2)min, 移入干燥器中冷却至室温, 称重。/(1~1.2)g(accurate to 0.0001g) of samples were weighed, and the samples were laid flat in a porcelain ark that was burned to constant weight in a muffle furnace at 800℃, placed in a muffle furnace at 600℃, the furnace door was closed and burned for 1h, cooled for (1~2)min, transferred to a desiccator and cooled to room temperature, and weighed.

测试方法/Test method (700℃) : 称取(1~1.2)g(精确至 0.0001g)试样,平铺在预先在 800℃的马弗炉中灼烧至恒重的瓷方舟中, 置入 700℃的马弗炉中, 关闭炉门灼烧 1h, 冷却 (1~2)min, 移入干燥器中冷却至室温, 称重。/(1~1.2)g(accurate to 0.0001g) of samples were weighed, and the samples were laid flat in a porcelain ark that was burned to constant weight in a muffle furnace at 800℃, placed in a muffle furnace at 700℃, the furnace door was closed and burned for 1h, cooled for (1~2)min, transferred to a desiccator and cooled to room temperature, and weighed.

5、测试结果/Test Result(s)
5.1 450℃

单位/Unit:%

1-5-A	1-5-B	1-5-C	平均值 Average	判定依据 Judgment Basis	判定 Determine
0.04	0.06	0.04	0.04	≤0.5	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

5.2 600℃

单位/Unit:%

1-5-D	1-5-E	1-5-F	平均值 Average	判定依据 Judgment Basis	判定 Determine
0.98	0.88	0.91	0.92	≤1.0	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

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5.3 700℃

单位/Unit:%

1-5-G	1-5-H	1-5-I	平均值 Average	判定依据 Judgment Basis	判定 Determine
5.64	7.52	6.96	6.71	≤12	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

六、拉伸强度/Tensile strength

1、测试标准/Test standard

JB/T9141.2-2013

2、测试日期/Test Date

2025/08/26-2025/08/27

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
万能试验机 Universal testing machine	M-1-005	2026/04/27
数显游标卡尺 Digital display vernier caliper	M-1-610	2025/09/13

4、测试条件/Test Condition

状态调节/Status adjustment : (23±2)℃, (50±5)%RH, 24 h

速度/Speed : 5 mm/min

标距/Gauge length : 50 mm

试样类型/Sample type : 长条/A long strip (100*20)mm

5、测试结果/Test Result(s)

单位/Unit: MPa

1-6-A	1-6-B	1-6-C	1-6-D	1-6-E	平均值 Average	判定依据 Judgment Basis	判定 Determine
4.65	4.86	4.80	4.80	4.53	4.73	≥4.5	符合/PASS

备注/Remark: 判定限值依客户要求。/Decision limit depends on customer requirement.

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七、硫含量/Sulfur content

1、测试标准/Test Standard

JB/T 7758.3-2005

2、测试日期/Test Date

2025/08/20-2025/08/25

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备型号 Equipment Type	校准有效期 Calibration Period of Validity
微库仑硫氯测定仪 Microcoulometric sulfur and chlorine analyzer	ZYLL-1100	2025/10/10

4、测试条件/Test Condition

环境温度/Ambient temperature : 25 °C

环境湿度/Ambient humidity : 50%RH

5、测试结果/Test Result(s)

样品编号 Sample No.	单位 Unit	检测结果 Test Result	判定依据 Judgment Basis	判定 Determine
1-7	mg/kg	49.15	≤200	符合/PASS

备注/Remarks: N.D. =未检出<检出限 检出限=1mg/kg
N.D. = not detected <detection limit detection limit = 1mg/kg

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八、游离态氯含量/Free chlorine content

1、测试标准/Test Standard

ASTM F1277-95

2、测试日期/Test Date

2025/08/20-2025/08/25

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备型号 Equipment Type	校准有效期 Calibration Period of Validity
自动电位滴定仪 Automatic potential titrator	916	2026/05/25
离子电极 Ion electrode	/	/

4、测试条件/Test Condition

环境温度/Ambient temperature : 25 °C

环境湿度/Ambient humidity : 50%RH

5、测试结果/Test Result(s)

样品编号 Sample No.	单位 Unit	检测结果 Test Result	判定依据 Judgment Basis	判定 Determine
1-8	mg/kg	N.D.	≤30	符合/PASS

备注/Remarks: N.D. =未检出<检出限 检出限=1mg/kg
N.D. = not detected <detection limit detection limit = 1mg/kg

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九、游离态氟含量/Free fluorine content

1、测试标准/Test Standard

ASTM F1277-95

2、测试日期/Test Date

2025/08/20-2025/08/25

3、测试仪器/Test Equipment

设备名称 Test Equipment	设备型号 Equipment Type	校准有效期 Calibration Period of Validity
自动电位滴定仪 Automatic potential titrator	916	2026/05/25
离子电极 Ion electrode	/	/

4、测试条件/Test Condition

环境温度/Ambient temperature : 25 ℃

环境湿度/Ambient humidity : 50%RH

5、测试结果/Test Result(s)

样品编号 Sample No.	单位 Unit	检测结果 Test Result	判定依据 Judgment Basis	判定 Determine
1-9	mg/kg	N.D.	≤50	符合/PASS

备注/Remarks: N.D. =未检出<检出限 检出限=1mg/kg
N.D. = not detected <detection limit detection limit = 1mg/kg

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十、总卤素含量/Total halogen content

1、测试标准/Test Standard(s)

EN 14582:2016

2、测试日期/Test Date(s)

2025/08/22

3、测试设备/Test Equipment(s)

设备名称 Equipment Name	设备编号 Equipment Number	校准有效期 Calibration Period of Validity
离子色谱仪 IC	E-1-1038	2026/11/21

4、测试结果/Test Result(s)

检测项目 Test Items	方法检测限 MDL (mg/kg)	检测结果 Results (mg/kg)	限值* Limits (mg/kg)
氟/Fluorine (F)	30	N.D.	---
氯/Chlorine (Cl)	30	N.D.	---
溴/Bromine (Br)	30	N.D.	---
碘/Iodine (I)	30	N.D.	---
总计/Total	---	N.D.	≤200

注意/Remark : *报告中述及的限值根据客户要求。/The Limits are based on the customer requirements.

备注 1) “---” = 未明确规定/Not Regulated.

/Note : 2) N.D. = 未检出, 小于方法检测限/Not detected, less than MDL.

 3) 参考 EN 14582: 2016, 采用离子色谱法(IC)进行检测。

 With reference to EN 14582: 2016, analysis was performed by IC.

检测部位描述/TEST PART DESCRIPTION: 非金属/Non-metal

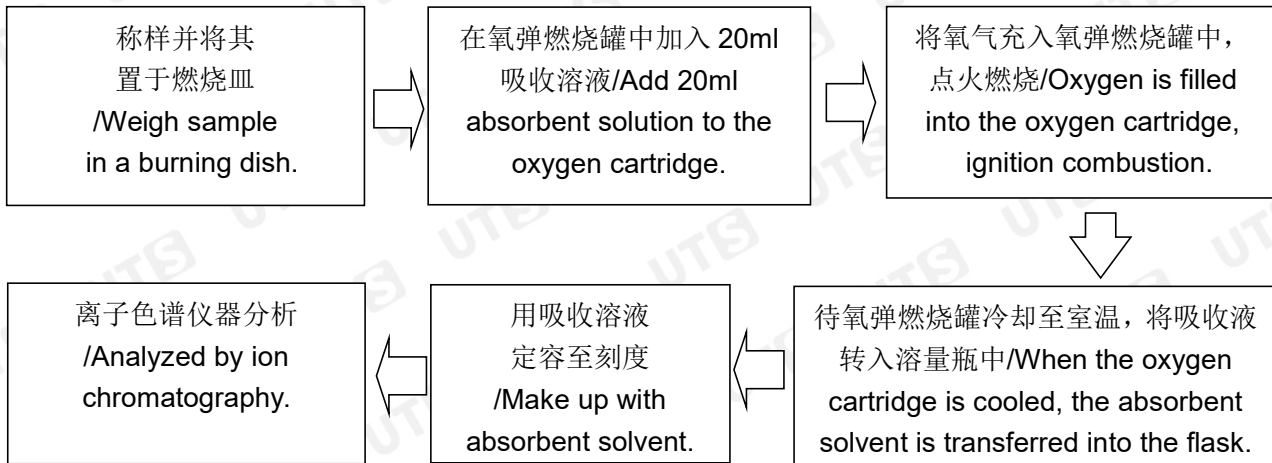
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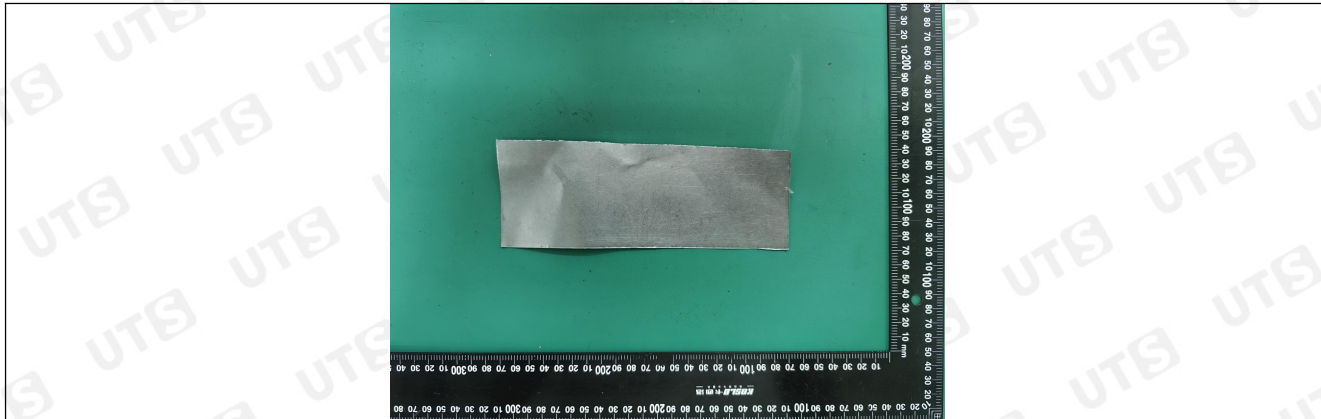
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检测流程图/FLOW CHART



5、样品照片/Sample photo(s)



十一、压缩率&回弹率/Compression ratio&Rate of rebound

1、测试标准/Test Standard

JB/T9141.4-2013

2、测试日期/Test Date

2025/08/26-2025/08/27

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3、测试仪器/Test Equipment

设备名称 Test Equipment	设备型号 Equipment Type	校准有效期 Calibration Period of Validity
万能试验机 Universal testing machine	M-1-005	2026/04/27
橡胶测厚仪 Rubber thickness gauge	M-1-526	2025/11/20

4、测试条件/Test Condition

状态调节/Status adjustment : (23±5)℃, (50±5)%RH, 24h

试样尺寸/Specimen size : 50*50mm

测试方法/Test method : 将试样放入砧座和压头之间,使载荷通过压头轴线,匀速施加 22.2 N(包括压头和压杆自重)的初载荷,维持 15 s 后记录试样的厚度 t_0 ; 而后在 10s 内匀速加上 1090N 的主载荷(至总载荷 1112N),维持 60s 后记录试样在总载荷下的厚度 t_1 ,卸掉主载荷,60s 后记录试样回到初载荷下的厚度 t_2 。/The sample was placed between the anute and the indenter, so that the load passed through the axis of the indenter, and the initial load of 22.2N (including the white weight of the indenter and the pressure rod) was applied at a uniform speed. After maintaining for 15 s, the thickness of the sample t_0 was recorded. Then, the main load of 1090N (to the total load of 1112N) was added at a constant speed within 10s. After maintaining for 60s, the thickness t_1 of the sample under the total load was recorded. After unloading the main load, the thickness t_2 of the sample under the initial load was recorded for 60s.

5、测试结果/Test Result(s)

5.1 压缩率/Compression ratio

单位/Unit: %

1-12-A	1-12-B	1-12-C	1-12-D	1-12-E	平均值 Average	判定依据 Judgment Basis	判定 Determine
49.1	47.8	53.0	54.8	55.9	52.1	≥41	符合/PASS

备注/Remark: 判定限值依客户要求。/The prescribed limit(s) is/are according to client's requirement.

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5.2 回弹率/Rate of rebound

单位/Unit: %

1-12-F	1-12-G	1-12-H	1-12-I	1-12-J	平均值 Average	判定依据 Judgment Basis	判定 Determine
18.7	17.6	22.1	19.1	17.3	19.0	≥12	符合/PASS

备注/Remark: 判定限值依客户要求。/The prescribed limit(s) is/are according to client’ s requirement.

.....报告结束/End of Report.....

本报告中结果仅作为科研、教学或内部质量控制之用。

Test results in this report are only used for scientific research, teaching and internal quality control.