

验证报告

编号: TAOEC2300672002

日期: 2023年03月02日 第1页,共7页

客户名称: 锦州凯美能源有限公司
客户地址: 中国辽宁省锦州市凌河区锦义街141号
样品名称: 叠片型超级电容器
以上样品及信息由客户提供。

SGS工作编号: QP23-000597 - QD
样品接收日期: 2023年02月09日
验证周期: 2023年02月09日 - 2023年02月17日
验证要求: 参考欧盟RoHS指令2011/65/EU的修正指令(EU) 2015/863。
验证方法: 请参见后续页。
验证结果: 请参见后续页。

检测结果总结

检测项目	结论
欧盟RoHS指令2011/65/EU附录II修正指令(EU) 2015/863- 铅, 汞, 镉, 六价铬, 多溴联苯(PBBs), 多溴二苯醚(PBDEs), 邻苯二甲酸二丁酯 (DBP), 邻苯二甲酸丁苄酯(BBP), 邻苯二甲酸二(2-乙基己基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP)	符合

通标标准技术服务(青岛)有限公司
授权签名

Wang Bo, Claire 王渤
批准签署人

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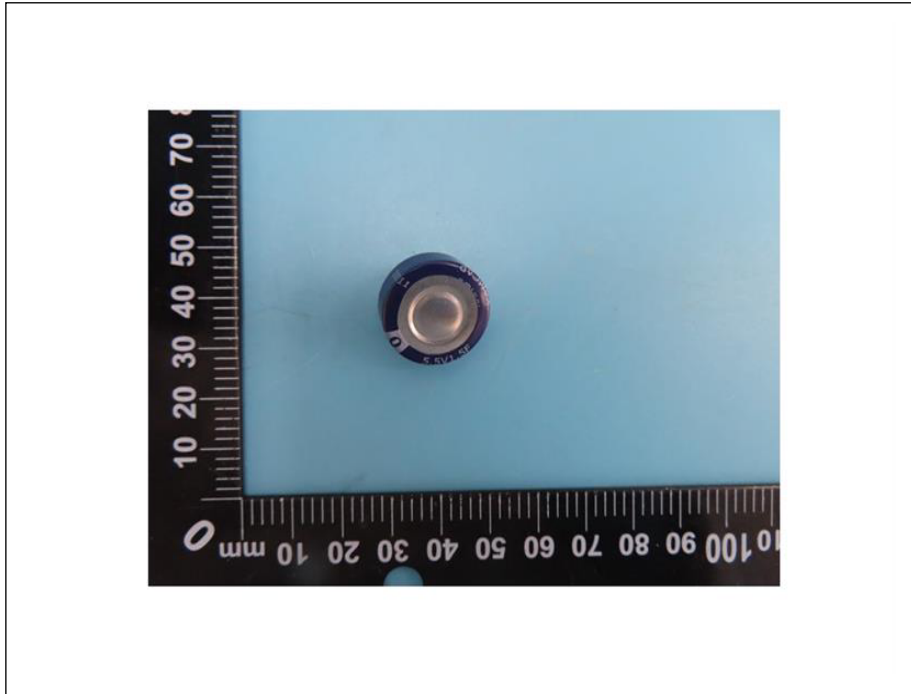
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样品照片



验证方法:

1. 参考IEC 62321-2:2021, 拆分申请者提供的成品。
2. 参考IEC 62321-1:2013, 仅对本报告照片中标识的样品进行了下列测试分析。
 - (1) 参考IEC 62321-3-1: 2013, 用能量色散型X射线荧光分析仪器进行筛选。
 - (2) 湿法化学检测方法: 参考IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-1:2015, IEC 62321-7-2:2017, ISO 17075-1:2017, IEC 62321-6:2015和IEC 62321-8:2017, 采用ICP-OES, AAS, UV-Vis和GC-MS进行分析。

验证部件外观描述:

样品序号	样品编号	SGS 样品ID	样品描述
SN1	A1	TAO23-006720.001	蓝色塑料
SN2	A2	TAO23-006720.002	银色金属
SN3	A3	TAO23-006720.003	银色金属
SN4	A4	TAO23-006720.004	银色金属
SN5	A5	TAO23-006720.005	银色金属
SN6	A6	TAO23-006720.006	银色金属
SN7	A7	TAO23-006720.007	白色塑料



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样品序号	样品编号	SGS 样品ID	样品描述
SN8	A8	TAO23-006720.008	银色金属
SN9	A9	TAO23-006720.009	棕色塑料
SN10	A10	TAO23-006720.010	银色金属
SN11	A11	TAO23-006720.011	白色纸
SN12	A12	TAO23-006720.012	黑色固体

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验证结果:

(除特别标注, 单位均为: mg/kg)

检测项目	A1	A2	A3	A4	A5	A6	A7	A8
Pb	BL	BL	BL	BL	BL	BL	BL	BL
Cd	BL	BL	BL	BL	BL	BL	BL	BL
Hg	BL	BL	BL	BL	BL	BL	BL	BL
Cr(VI)▼	BL	ND	BL	BL	BL	ND	BL	ND
PBBs	BL	---	---	---	---	---	BL	---
PBDEs	BL	---	---	---	---	---	BL	---
DBP	BL	---	---	---	---	---	BL	---
BBP	BL	---	---	---	---	---	BL	---
DEHP	BL	---	---	---	---	---	BL	---
DIBP	BL	---	---	---	---	---	BL	---
结论	符合	符合	符合	符合	符合	符合	符合	符合

检测项目	A9	A10	A11	A12
Pb	BL	BL	BL	BL
Cd	BL	BL	BL	BL
Hg	BL	BL	BL	BL
Cr(VI)▼	BL	ND	BL	BL
PBBs	BL	---	BL	BL
PBDEs	BL	---	BL	BL
DBP	BL	---	BL	BL
BBP	BL	---	BL	BL
DEHP	BL	---	BL	BL
DIBP	BL	---	BL	BL
结论	符合	符合	符合	符合



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备注:

(1) X 射线荧光光谱法(XRF)筛选结果说明:

(a) 下表为 IEC62321-3-1: 2013 附录 A 不同基体材料中以 mg/kg 表示的筛选元素限值:

元素	聚合物	金属	复合材料
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (150+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Br	$BL \leq (300-3\sigma) < X$	不适用	$BL \leq (250-3\sigma) < X$
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$

(b) 现行法规限制的最大允许值是对 PBB/PBDE 和 Cr(VI) 而不是对 Br 和 Cr 的, 而 XRF 测定的是 Br 和 Cr。如果元素 Br 和或 Cr 的定量结果均高于限值(Br 计算基于在常见物质中 PBB/PBDE 的组成的理论计算), 则样品的筛选结果为“不确定”。

(c) EDXRF 的结果用于初步筛选, LOD=检出限, BL=低于限值, OL=超出限值, IN (符号“X”标记的区域)=不确定, 需要进一步研究, 我们建议客户用更精确的化学检测方法测试样品, 如用 ICP-OES 测试 Cd/Pb/Hg; 用 UV-Vis 测试 Cr(VI); 用 GC-MS 测试 PBBs/PBDEs。

(d) 对于复合材料, EDXRF 筛选测试 RoHS 元素所得数据可能与样品中实际含量不同。

(2) 邻苯二甲酸酯(PHTH)筛分结果只作初步筛选, 如果测试结果超出下表所规定的警戒范围, 我们采用更精确的化学检测方法测试样品, 用 GC-MS 测试 DBP、BBP、DEHP 和 DIBP (单位: mg/kg)。

测试项目	CAS No.	聚合物/复合材料
邻苯二甲酸二丁酯 (DBP)	84-74-2	$BL \leq 600 < X$
邻苯二甲酸丁苄酯 (BBP)	85-68-7	$BL \leq 600 < X$
邻苯二甲酸二(2-乙基己基)酯 (DEHP)	117-81-7	$BL \leq 600 < X$
邻苯二甲酸二异丁酯 (DIBP)	84-69-5	$BL \leq 600 < X$

(3) 化学检测方法结果说明

(a) mg/kg = 0.0001%, MDL=方法检测限, ND =未检出(低于 MDL), --- =不适用。

(b) 化学检测方法的表达单位和方法检测限

测试项目	Pb	Cd	Hg	DBP	BBP	DEHP	DIBP
单位	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
方法检测限	10	10	10	100	100	100	100

任何一种 PBBs 和 PBDEs 的方法检测限是 100mg/kg:

聚合物, 复合材料和皮革样品中 Cr(VI)的方法检测限是 10mg/kg。

金属样品中 Cr(VI)的方法检测限是 0.10μg/cm²。



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(c) ▼ = 金属样品中

- a. 当六价铬的浓度高于 $0.13\mu\text{g}/\text{cm}^2$ 时, 样品为阳性, 即含有六价铬;
- b. 当六价铬的浓度为 ND (低于 $0.10\mu\text{g}/\text{cm}^2$) 时, 样品为阴性, 即未检测到六价铬;
- c. 当六价铬的浓度介于 $0.10\mu\text{g}/\text{cm}^2$ 与 $0.13\mu\text{g}/\text{cm}^2$ 之间时, 无法直接判定是否检测到六价铬, 因不同个体的样品表面差异可能会影响测定结果;

由于未获知样品的存储条件和生产日期, 样品的六价铬测试结果仅能代表测试时样品含六价铬的状态。

(4) RoHS 指令中限制物质及均质材料中最大允许浓度值: Cd: 0.01%, Pb/Hg/Cr(VI)/PBBs/PBDEs /DEHP/DBP/BBP/DIBP: 0.1%, 限值引用自 RoHS 指令(EU) 2015/863。

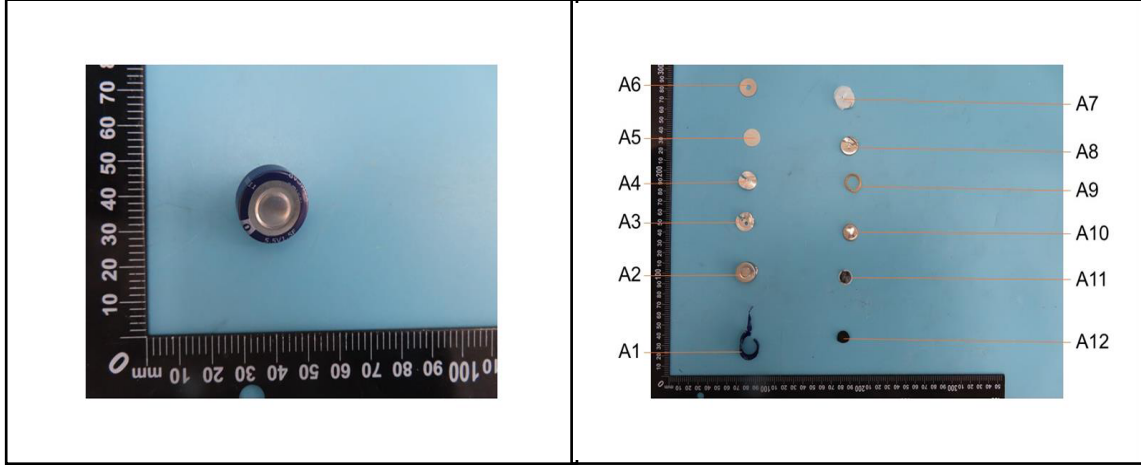
(5) IEC 62321 系列等同于 EN 62321 系列。

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