



承 认 书

PRODUCT SPECIFICATION

No:HW18090401

| | |
|-------------------|--------------|
| 客 户：深圳市立创电子商务有限公司 | 日 期：2018-9-4 |
| CUSTOMER: | DATE: |

品名： 铝电解电容器

PATNAME: Aluminum Electrolytic Capacitors

型号/规格： LF - 25V-47 μ F 5 \times 11

| |
|-------------|
| 用户承认 User |
| Approved by |

注：ROHS 指令 (2011/65/EC) 已对应完毕
对此承认书确认后，在用户承认栏注明确认印，返传一份与敝公司

常州华威电子有限公司

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|-----------------|----------------|-----------------|
| 拟 制 Prepared | 审 核 Checked | 批 准 Approved |
| | | |



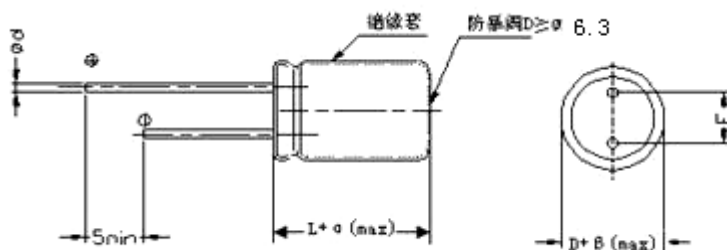
文件内容修改历史记录
RECORD OF REVISION

| 生效版本 REV. NO. | 变更原因 REASON | 修改内容 CONTENTS | 承认时间 DATE OF APPROVAL | 拟制 CHECKED | 备注 REMARKS |
|------------------|----------------|------------------|--------------------------|---------------|---------------|
| 1 | | 新版发行 | 2018-9-4 | 夏露 | |
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一、范围 Scope

LF TYPE (Radial)

二、外形图及尺寸表 Case size table



| | | | | | | | | |
|--------|-----|-----|----------|-----|------|-----|-----|----|
| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 |
| F±0.5 | 2.0 | 2.5 | 3.5 | 5.0 | | 7.5 | | 10 |
| d±0.05 | 0.5 | | 0.5, 0.6 | | 0.6 | | 0.8 | |

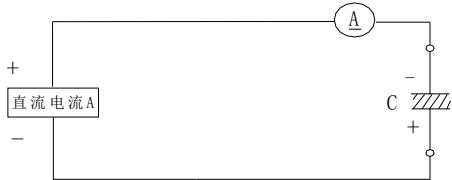
| | | |
|---|-------------------|---|
| α | (L<20) -0.5~ +1.5 | (L≥20) -0.5~ +2.0 当 Φ≥19, -0.5~ +3.0 |
| β | (D<20) 0.5 | (D≥20) 1.0 |

三、技术性能 Specifications

| 项目 Item | 特性 Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|------------------------------|--------------------|------|------|------|------|------|-----|-----|-----|---------------|------|------|------|------|------|------|------|------|--------------------|-----|-----|-----|-----|-----|---------------|------|------|------|------|------|
| 使用温度范围 Operating temperature range | -40 ~ +105℃ | -25 ~ +105℃ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 额定电压范围 Rated working voltage | 6.3 ~ 100V | 160 ~ 450V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 标称电容量范围 Capacitance | 1~ 15000µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 标称电容量允许偏差 Capacitance tolerance | ±20% (120Hz, +20℃) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 漏电流 Leakage current | I≤0.02CV (µA)或 4µA 2分钟 (at +20℃, after 2minutes) 取较大者(Whichever is greater) | I≤0.03CV (µA) 1分钟 (1 minute) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 损耗角正切值 Dissipation Factor (tg δ) (+20℃, 120Hz) | <table border="1"> <tr> <td>U_R (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>tgδ</td> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> </tr> </table> <table border="1"> <tr> <td>U_R (V)</td> <td>160</td> <td>200</td> <td>250</td> <td>400</td> <td>450</td> </tr> <tr> <td>tgδ</td> <td>0.20</td> <td>0.20</td> <td>0.20</td> <td>0.25</td> <td>0.25</td> </tr> </table> <p>容量大于 1000µF 者, 每增加 1000µF, 其损耗角正切值增加 0.02</p> | | U _R (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | tgδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.08 | U _R (V) | 160 | 200 | 250 | 400 | 450 | tgδ | 0.20 | 0.20 | 0.20 | 0.25 | 0.25 |
| U _R (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | | | | | |
| tgδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.08 | | | | | | | | | | | | | | | | | | | | | | | | |
| U _R (V) | 160 | 200 | 250 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| tgδ | 0.20 | 0.20 | 0.20 | 0.25 | 0.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 温度特性 Temperature Characteristics (Impedance ratio at 120Hz) | <table border="1"> <tr> <td>U_R (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>Z-40℃ / Z+20℃</td> <td>5</td> <td>5</td> <td>5</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> </tr> </table> <table border="1"> <tr> <td>U_R (V)</td> <td>160</td> <td>200</td> <td>250</td> <td>400</td> <td>450</td> </tr> <tr> <td>Z-25℃ / Z+20℃</td> <td>4</td> <td>4</td> <td>5</td> <td>5</td> <td>5</td> </tr> </table> | | U _R (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | Z-40℃ / Z+20℃ | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | U _R (V) | 160 | 200 | 250 | 400 | 450 | Z-25℃ / Z+20℃ | 4 | 4 | 5 | 5 | 5 |
| U _R (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | | | | | |
| Z-40℃ / Z+20℃ | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| U _R (V) | 160 | 200 | 250 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z-25℃ / Z+20℃ | 4 | 4 | 5 | 5 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 浪涌电压 Surge voltage | <table border="1"> <tr> <td>W.V</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> <td>160</td> <td>200</td> <td>250</td> <td>400</td> <td>450</td> </tr> <tr> <td>S.V.</td> <td>8</td> <td>13</td> <td>20</td> <td>32</td> <td>44</td> <td>63</td> <td>79</td> <td>125</td> <td>200</td> <td>250</td> <td>300</td> <td>450</td> <td>500</td> </tr> </table> | | W.V | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 400 | 450 | S.V. | 8 | 13 | 20 | 32 | 44 | 63 | 79 | 125 | 200 | 250 | 300 | 450 | 500 | | |
| W.V | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 400 | 450 | | | | | | | | | | | | | | | | | | | |
| S.V. | 8 | 13 | 20 | 32 | 44 | 63 | 79 | 125 | 200 | 250 | 300 | 450 | 500 | | | | | | | | | | | | | | | | | | | |

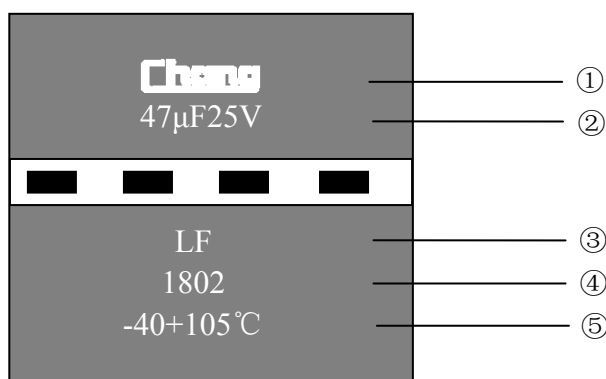
四、试验方法及要求 Tests

| No | 项目 Item | 试验条件 Test Conditions | 性能要求 Requirements | | | | | | | | | |
|----------|--------------------------------------|---|---|---|-----|-----|----------|-----|----|----|--|--|
| 1 | 浪涌电压 Surge Voltage | 温度 15~35℃, 充电 30 秒, 放电 5 分 30 秒, 共循环 1000 次。 At 15~35℃, 1000 cycles of 30s on and 330s off. | 无可见损伤 No visible damage | | | | | | | | | |
| | | | Δ | ±15%初始测量值以内 | | | | | | | | |
| | | | C/C | ±15%Initial measured value | | | | | | | | |
| | | | tg δ | ≤初始规定值 Initial specified value | | | | | | | | |
| | | | I | ≤初始规定值 Initial specified value | | | | | | | | |
| 2 | 耐久性 Load Life | +105℃额定电压 1000 小时, 恢复 16 小时后: After applying rated voltage 1000 hours at 105℃and then resumed 16 hours. | Δ | ±20%初始测量值以内 | | | | | | | | |
| | | | C/C | ±20%Initial measured value | | | | | | | | |
| | | | tg δ | ≤200%初始规定值 2times Initial specified value | | | | | | | | |
| | | | I | ≤初始规定值 Initial specified value | | | | | | | | |
| 3 | 高温贮存 Shelf Life | +105℃, 1000 小时, 恢复 16 小时后: After storage for 1000 hours at +105℃ then resumed 16 hours | Δ | ±20%初始测量值以内 | | | | | | | | |
| | | | C/C | ±20%Initial measured value | | | | | | | | |
| | | | tg δ | ≤200%初始规定值 2times Initial specified value | | | | | | | | |
| | | | I | ≤200%初始规定值 2times Initial specified value | | | | | | | | |
| 4 | 抗拉强度 Tension Strength | IEC 60384 – 4 试验 Ua: 10 秒 <table border="1" style="margin-left: 20px;"> <tr> <td>d (mm)</td> <td>0.5</td> <td>0.6</td> <td>0.8</td> </tr> <tr> <td>load(N)</td> <td>5</td> <td>10</td> <td>10</td> </tr> </table> IEC 60384 – 4 Test Ua: 10S | d (mm) | 0.5 | 0.6 | 0.8 | load(N) | 5 | 10 | 10 | 电容及端子没有损伤 Performance of capacitor shall not have changed and leads shall be undamaged. | |
| d (mm) | 0.5 | 0.6 | 0.8 | | | | | | | | | |
| load(N) | 5 | 10 | 10 | | | | | | | | | |
| 5 | 折弯强度 Bending strength | 将电容器垂直固定在夹具上, 以电容由垂直向水平方向作 90°旋转, 再旋转至垂直方向, 共 2 次 With the capacitor in a vertical position apply the load specified axially to each lead.The capacitor 90° in the opposite direction and back the original position. repeat two times.Total 2 <table border="1" style="margin-left: 20px;"> <tr> <td>d (mm)</td> <td>0.5</td> <td>0.6</td> <td>0.8</td> </tr> <tr> <td>load(N)</td> <td>2.5</td> <td>5</td> <td>5</td> </tr> </table> | d (mm) | 0.5 | 0.6 | 0.8 | load(N) | 2.5 | 5 | 5 | 电容及端子没有损伤 Performance of capacitor shall not have changed and leads shall be undamaged. | |
| d (mm) | 0.5 | 0.6 | 0.8 | | | | | | | | | |
| load(N) | 2.5 | 5 | 5 | | | | | | | | | |
| 6 | 可焊性 Solder ability | IEC 60384 – 4 试验 Ta: 焊料槽温度为 245±5℃, 浸渍深度占整个引出线的 95%, 浸渍持续时间为 2±0.5 秒。 IEC 60384-4 Test Ta: Tank temperature : 245±5℃; Impregnating depth: ≥95% of the total lead wire; Impregnating time: 2±0.5s. | 引出端的良好镀层, 焊料自由流动, 引出端湿润。焊料覆盖率≥95% The lead wire is coated by tin and wet; Impregnating coverage rate≥95% | | | | | | | | | |
| 7 | 耐焊接热 Resistance to soldering heat | IEC 60384-4 试验 Tb 方法 1A: 焊料槽温度为 260±5℃时间为 10 秒; 或者焊料槽温度为 380±10℃, 浸渍持续时间为 3 秒, 浸渍深度距离电容本体: 1.5~2.0mm。 IEC 60384-4 Test Ta: Tank temperature: 260±5℃ for 10seconds; Tank temperature: 380±10℃ for 3seconds The distance from the surface of the dipping liquid to the capacitor: 1.5~2.0mm. | 无可见损伤, 标志清晰, 无电解液泄漏。 No visible damage; marking legible, There shall be no leakage of electrolyte. | | | | | | | | | |
| | | | Δ C/C | ≤±10%初始测试值 ≤±10% of Initial measured value | | | | | | | | |
| | | | Tg δ | ≤初始规定值 Initial specified value | | | | | | | | |
| | | | I | ≤初始规定值 Initial specified value | | | | | | | | |

| 8 | 稳态湿热 Stable Humidity | IEC 60384-4 试验 Ca: +40℃, 湿度 90~95%, 不施加电压 21 天, IEC 60384 -4 Test Ca:21 days at 40℃ ,RH 90 to 95 %,no voltage applied. | 无可见损伤和电解液漏出, 且标志清晰 No visible damage; no leakage of electrolyte; marking legible. | | | | | | | |
|---|----------------------------------|--|--|--|---------------------|--------------------|--------------|---|--------------|----|
| | | | $\Delta C/C$ | $\leq \pm 20\%$ 初始测试值 $\leq \pm 20\%$ Initial measured value. | | | | | | |
| | | | tg δ | $\leq 120\%$ 初始规定值 1.2 Initial specified value | | | | | | |
| | | | I | $\leq 120\%$ 初始规定值 1.2 Initial specified value | | | | | | |
| 9 | 耐振性 Resistance t vibration | IEC 60384 -4 试验 Fc: 频率范围 10~55Hz, 频率变化 10Hz~55Hz~10Hz 约为一分钟内, 振幅为 1.5mm, 持续时间为 3×2 小时。 IEC 60384 -4 Test Fc : Frequency:10~55Hz,Sweep rate: 10Hz~55Hz~10Hz in about 1 minute;Amplitude:1.5mm;3 direction,2hours per direction. | 无可见损伤和电解液漏出, 且标志清晰。 No visible damage ; no leakage of electrolyte; marking legible. | | | | | | | |
| 10 | 防爆阀测试 Safety vent | <p>直流反向电压法 DC Inverse voltage</p>  <p>Ⓐ 直流电流表 C: 试验电容器</p> <table border="1" data-bbox="395 1126 916 1281"> <thead> <tr> <th>标称外形直径 Diameter /mm</th> <th>直流电流 DC Current /A</th> </tr> </thead> <tbody> <tr> <td>22.4 以下 less</td> <td>1</td> </tr> <tr> <td>22.4 以上 more</td> <td>10</td> </tr> </tbody> </table> | | | 标称外形直径 Diameter /mm | 直流电流 DC Current /A | 22.4 以下 less | 1 | 22.4 以上 more | 10 |
| | | 标称外形直径 Diameter /mm | 直流电流 DC Current /A | | | | | | | |
| | | 22.4 以下 less | 1 | | | | | | | |
| 22.4 以上 more | 10 | | | | | | | | | |
| <p>(1) 不允许出现爆炸和着火 (Not appear detonate and be on fire)</p> <p>(2) 防爆装置要打开, 不允许从封口卷边处释放气体 (Vent should be opened, the gas not be allowed be set free from rubber)</p> <p>(3) 不允许出现电容器外壳和芯子飞溅的危险状态 (the case and the pistil of the capacitor can't be splashed)</p> <p>在试验中如果试验时间经历 30 分钟后不释放气体, 则可认为合格 (It's is not eligible if the vent can't be open when the test be lasted out for 30 minutes.)</p> | | | | | | | | | | |



五、标志 Marking



| 序号 No. | 项目 Item |
|--------|-----------------------------|
| 1 | 商标 Brand |
| 2 | 产品规格 Products specification |
| 3 | 产品型号 Products type |
| 4 | 生产周期 D.C(18: 年, 02: 周) |
| 5 | 温度范围 Temperature Range |

六、铝电解电容器的使用注意事项 Guidelines For Using Aluminum Electrolytic Capacitor

为使您获得电解电容器的最佳性能和延长电解电容器的使用寿命，在使用电解电容器前，请务必阅读本注意事项。

Upon using Aluminum Electrolytic Capacitors, please proper handing and observing to following important points will insure optimum capacitor performance and long life.

1. 直流电解电容器是有极性的 DC electrolytic capacitors are polarized.

确定极性，极性标志在电容器的基体上。以免因极性反可能引起电路短路或电容器损坏，当极性不固定或不确定的，使用双极性电容器。注意直流电解电容器不能使用于交流。

Make sure of the polarity. The polarity is marked on the body of the capacitor .Application of the reversed voltage cause a short circuit or damage to the capacitor. Use bipolar capacitors when the polarity is not determined or unknown. Note that DC electrolytic capacitors can not be used for AC application.

2. 使用电压不要大于额定电压 Do not apply voltage greater than rated voltage.

使用电压大于额定电压，漏电流会增大，可能损坏电容器。建议工作电压为额定电压的百分之七十~八十，电容器在建议的工作电压下使用可延长电容器的寿命。

If a voltage exceeding the rated voltage is applied, the leakage current will increase, which damage the capacitor. Recommended working voltage is 70 to 80 percent of tatted voltage. Using capacitors at recommended working voltage prolongs capacitor life.

3. 不要使过量的纹波电流通过电容器 Do not allow excessive ripple current through the capacitor.

流过电容器的纹波电流超过许可值，将会引起电容器发热，电容量减少，损害电容器。通过电容器的纹波电流不要大于允许值。

The flow of ripple current over permissible ripple current will cause heat of the capacitor, which may decrease the capacitance and damage the capacitor. Ripple current on the capacitor must be at or bellow allowable level.

4. 快速的充放电电路中，使用专门设计的电容器 Use specially designed capacitors for the circuits where charge and discharge are frequency repeated.

在经受快速的周期性充放电电路中，电容器可能受损害，它的寿命因容量下降、温升等原因而缩短，在这种电路中，一定要使用专门设计的电容器。

In the circuit subjected to rapid charge cycles, capacitors may be damaged; its life may be shortened by capacitance decrease, heat rise, ect. Be sure and use special capacitors in these applications.

5. 工作温度范围 Operating temperature range.

电容器的特性随工作温度而变化，在温度较高的情况下，容量、漏电流增大，损耗减少；在低温情况下，容量和漏电流下降，损耗增大。电容器在较低的温度下使用会确保延长寿命。

The characteristics of capacitors change with the operating temperature. The capacitance and leakage current increase and $\text{tg}\delta$ decrease at higher temperatures. The capacitance and leakage current decrease and $\text{tg}\delta$ at increase lower temperature.

Usage at lower temperature will ensure longer life.

6. 核对工作频率 Check operating frequency.

电解电容器的容量通常是在 100Hz 或 120Hz 下测得的。然而要记住容量随频率的升高而下降， $\text{tg}\delta$ 随频率的升高而增大，并使周围温度升高。

The capacitance of electrolytic capacitors is usually measured at 100Hz or 120Hz. However, remember that capacitance decrease and $\text{tg}\delta$ increase as the applied frequency becomes higher whereas the ambient temperature becomes higher.

7. 为保持良好的焊接性，请将产品保管期限控制在一年以内。

To keep good solderability, Please send the product storage period in one year of less than control.

8. 电容器外壳与阴极端是不绝缘的 The capacitor case is not insulated from the cathode terminal.

电容器外壳与阴极端是通过电解液连接的，如果电容器的外壳必须与线路绝缘，则电容器的安装位置处，一定要采取绝缘措施。

The capacitor's case and cathode terminal connect through the electrolyte. If the case is to be completely insulated, that insulation must be at the capacitor's mounting point.

9. 电容器的端子或引线上不要施加过大的力 Do not apply excessive force to the terminals and leads.

过大的力施加到端子和引线上，可能引起引线的断裂或端子分裂，转而会引起内部连接的破坏。

The excessive strong force applied to the terminals and lead wires may cause leads to break or terminals to separate and, in turn, cause the internal contact to fail.

有害物质管理目录表

| 区分 | 物质名称(中文名) | 物质名称 (英文名) | 有害物质包含与否 | |
|------------|-------------|--|----------|----|
| | | | 有 | 无 |
| Level A-I | 铅以及它的化合物 | Lead and its compounds | | ND |
| | 镉以及它的化合物 | Cadmium and its compounds | | ND |
| | 水银以及它的化合物 | Mercury and its compounds | | ND |
| | 六价铬以及它的化合物 | Hexavalent chromium and its compounds | | ND |
| | 多溴化的联苯 | Polybrominated biphenyls | | ND |
| | 聚溴二苯醚 | Polybrominated diphenylethers | | ND |
| Level A-II | 多氯化联苯(PCB) | Polychlorinated biphenyls (PCB) | | 无 |
| | 多氯化萘 (PCN) | Polychlorinated naphthalenes (PCN) | | 无 |
| | 聚氯三联苯(PCT) | Polychlorinated terphenyls (PCT) | | 无 |
| | 氯化涂石蜡(SCCP) | Short-chain Chlorinated paraffins (SCCP) | | 无 |
| | 石棉以及它的化合物 | Asbestos and its compounds | | 无 |
| | 臭气层破坏物质 | Ozone Depleting Substances | | 无 |
| | 偶氮化合物 | Azo compounds | | 无 |
| | 镍以及它的化合物 | Nickel and its compounds | | 无 |
| | 有机锡类化合物 | Specific Organic tin compounds | | 无 |
| | 砷以及它的化合物 | Arsenic and its compounds | | 无 |
| | 甲醛 | Formaldehydes | | 无 |
| Level B | 氯化乙烯树脂 | Poly vinyl chloride(PVC) | 有 | |
| | 邻苯二甲酸盐 | Phthalates | | ND |
| | 铍以及它的化合物 | Beryllium and its compounds | | 无 |
| | 锑以及它的化合物 | Antimony and its compounds | | 无 |
| | 硒以及它的化合物 | Selenium and its compounds | | 无 |
| | 钯以及它的化合物 | Palladium and its compounds | | 无 |
| | 铋以及它的化合物 | Bismuth and its compounds | | 无 |
| | 其它氯类难燃剂 | Other chlorinated flame retardants | | 无 |
| | 其它溴类难燃剂 | Other brominated flame retardants | | 无 |

Note.

- 原则上按照公司的管理规定，但由管理总部提出按根据 Buyer 等交易商的要求制定的另行有害物质管理目录来执行的要求时，应优先按照管理总部的管理目录来记载。
- 确认合作企业现在是否在使用这类物质，应纪录使用与否。