



**Chemipol**

Biocides

防腐剂

Plant hygiene and product protection

车间清洁和产品保护

**Technical literature**

技术文献

**Guidelines for microbial contamination control during production, handling and storage of water-based products in wet state.**

水性产品生产，操作以及存储过程防控微生物污染导引



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Technical literature  
Guidelines for microbial contamination control during  
production, handling and storage of water-based products in wet state

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## 1 INTRODUCTION

### 介绍

The presence of organic matter and water are necessary premises for the development of microorganisms. Therefore, all the production processes where water and organic matter/substances are present, having the right pH and temperature conditions, will face the risk of microorganisms' growth. This uncontrolled development of microorganisms will cause undesirable effects of the produced products, damaging them for their proper use.

有机养分和水的存在是微生物繁殖的基础条件。因此，存在水和有机物，合适pH和温度条件的生产过程，将会面临微生物生长的风险。微生物的不可控繁殖将会造成生产成品的缺陷，破坏成品的正常使用。

Certain industries, such as pharma and food, they already use sterilization techniques to rightly preserve their products for a period of time. Other sectors, such as coatings, detergents, polishing, adhesives, etc., cannot use these techniques due to their high cost.

某些行业，比如说医药或者食品行业，已经可以应用成熟的杀菌技术，使他们的产品在一段时间内保存良好。其他的领域，比如说涂料，洗涤剂，打磨以及黏合剂等等，因为成本过高不能使用医药食品行业的上述技术

We must consider the following aspects when preventing the contamination of aqueous products during the production process.

在生产过程中防止微生物污染，我们必须考虑以下几个方面。

- All products that could be degraded by microorganisms should contain the right amount of preservative.  
所有可以被微生物降解的产品都应该添加适量的防腐剂。
- The preservative added must be stable for the shelf life of the product (6 months to 2 years).  
添加的防腐剂必须在涂料成品的保质期内稳定（6个月到2年）
- Some precautions must be adopted during the different processes to avoid contamination: handling, warehousing, and production.  
在不同的工序阶段必须采用一些预处理措施以避免沾污：操作，仓库存储以及生产。
- Use methods and maintenance of facilities, storing tanks and other machinery.  
注意合适的操作规范以及设备，储存罐等设备的定期维护。

**(GOOD PRODUCTION PRACTICES)**  
(好的生产习惯)



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It is frequently due to a lack of attention to the last point that microbial contaminations appear in protected products.

通常我们会忽视最后一点，以至于微生物污染会出现在已经做过防腐处理的成品中。

This work explains why **it is not possible to provide an adequate protection to products only using preservatives**. It revises the main aspects of the Good Production Practices (GPP), which helps preventing problems derived from microbial contaminations.

这篇指引文件说明了为什么**仅仅使用防腐剂来对成品进行保护是远远不够的**。我们在此会介绍一些良好的生产习惯的主要方面，这些好的习惯会预防由于微生物污染引发的问题。



## 2 CONTAMINATION IN PRESERVED PRODUCTS

### 防腐处理过产品的污染

This point answers the following important question:

这一部分回来了如下的重要问题:

#### *¿How preserved products can become contaminated?*

#### *¿经过防腐处理的产品如何被再污染?*

Preservatives are products developed to protect clean products (free of contamination) from occasional presence of contamination sources.

防腐剂是开发用来保护清洁的产品（未被污染），免于有时接触污染源被污染。

The typical levels of use of the preservatives are not enough to resist repeated contaminations of high populations of microorganisms that may happen during production process.

防腐剂的普通使用水平，不足以经受产品在生产过程中经受大量微生物的反复污染。

Producers should specially control all possible sources of harmful microorganisms during the processes of handling, warehousing and production.

厂家应该在操作，储存以及生产中特别注意所有可能的微生物污染源。

If the frequency that the product is exposed to sources of microorganisms during this processes, it is generally accepted that the dose of preservative required should be increased.

如果产品经常暴露于微生物污染下，通常建议适当增加防腐剂的用量。

Furthermore, contrary to formaldehyde, the majority of the preservatives currently used have a very low vapour pressure, not being capable the preservative to protect the head space of the cans, packaging, storing tanks, etc.

此外，与甲醛相反，大多数目前使用的防腐剂蒸汽压很低。这导致了他们不能够好的保护罐内，包装以及反应釜等顶部潮湿空气部分的罐顶空间。

This head space can allow the presence of microorganisms due to deficient conditions of warehousing or handling, being possible the presence of condensations on the walls of the container or the surface of the stirring systems.

由于储存或者操作的不足，顶层气态部分会存在微生物，他们可能会存在于内壁的冷凝水中或者搅拌系统中。

When new product is added to the storing tanks, microorganisms can grow on the surface and condensates entering inside the stocked product.

当添加新的产品到储存罐内时，微生物可以附着于表面以及冷凝水中进入储存的产品。



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Added to this, contamination of protected products is also possible during productions due to the following aspects.

除此以外，生产中防腐处理的产品也可能因为以下几个方面受到污染。

- Some or other preservatives used to preserve a product may have been consumed during the elimination of microorganisms. The preservative can eventually be finished and therefore the product is unprotected.

一些添加的防腐剂可能在微生物被杀灭的时候大量消耗。这些防腐剂可能最终会消耗殆尽，因此产品会失去保护。

- Biofilms can be formed on the surfaces of tanks, pipes and other facilities, being a safe place for microorganisms as the preservative or disinfectants have difficulties penetrating this biofilms and killing the microorganisms.

贮存罐，管子和其他设备的表面会形成生物膜。这些地方往往抗菌剂无法作用，很容易积聚微生物。

- The wide diversity of existing microorganisms that must be eliminated make that the possibility of microorganisms with certain level of capability to survive at certain values of preservative exists.

因为微生物的种类异常繁多，所以某些情况下即使抗菌剂存在，某些微生物也依然会存活。

- If a deficient warehousing or band handling exists, an uncontrolled development of microorganisms can appear, especially with inadequate level of preservatives.

如果存储或者操作存在问题，尤其是在抗菌剂添加量不足的情况下，某些不可控的微生物生长可能存在。

- When an important population of microorganisms exposed to an inadequate level of preservatives, some of them may answer to the preservative and some not. Resistance can be developed as happened in the past with the formaldehyde. On the other hand, it is not known any reference to resistance of microorganisms against preservatives based on the isothiazolinone family of preservatives.

当体系中存在大量的微生物而防腐剂添加量的不足，一些微生物会受防腐剂的的控制，另一些不会。像过去使用甲醛做防腐剂一样，可能出现抗药性。另外，目前针对异噻唑啉酮家族防腐剂的微生物抗药性尚未被发现。

## 3 PREVENTION OF THE CONTAMINATION

### 污染预防

The protection of products against microbial contamination during production processes requires a balance of the following three aspects.

在生产过程中防控微生物的污染需要下列三个方面的综合考虑。



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- Use of the adequate preservative levels  
使用足够添加量的杀菌剂
- Use of stable and compatible preservatives with the different components of the product and usual conditions when in production and storage.  
在不同配方体系中，不同生产和储存条件下使用稳定的以及相容性良好的杀菌剂。
- **Good Production Practices**  
*良好的操作习惯*

The two first aspects can be determined by laboratory tests.

前两个因素可以通过实验室测试完成。

## 3.1 Laboratory tests

### 实验测试

The first step in the prevention of microbial contamination is done during the process of development and formulation of the products. The different alternative preservatives are tested in the laboratory.

预防微生物污染的第一步取决于产品配方的选择过程中。在实验室中我们会测试各种不同的选择。

The laboratory tests normally include strict challenge test (multiple and repeated contaminations) and ageing tests followed by new challenge tests. The tests should evaluate the effectiveness and stability of the preservative during the expected shelf life of the product (6 months – 2 years).

实验工作通常包含严格的挑战测试（大量的反复的污染模拟）以及新的挑战老化测试。实验室测试可以评估在成品有效期内（6个月到2年）防腐剂的功效以及稳定性

It is possible to determine the stability of the preservative by accelerated ageing tests, measuring the remnant of the preservative after a period of time with controlled environmental conditions and the results are showing more reliable prediction than only having the challenge tests.

通过加速老化测试，可以决定防腐剂的稳定性。在设定的环境条件下，经过一定时间，通过残留的抗菌剂的测试结果，可以展现相对单纯挑战实验更为可信的预见结果。



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## 3.2 Good Production Practices

### 好的生产习惯

The next step in the prevention of microbial contamination of the products is to ensure that during production and handling of them Good Production practices have been followed. Each one of the following aspects must be directed to minimize the possibility that a contamination might occur while handling or producing.

产品微生物污染防控的第二步是在操作以及生产的过程中应该遵守良好的生产习惯。必须很好地控制下述的各个方面，以使操作以及生产中被微生物污染的可能性降到最低。

- Easy design  
简明设计
- Raw Materials  
原材料
- Production water  
生产用水
- Formation and education  
培训
- Storing and handling practices  
存储以及操作习惯
- Cleaning and disinfection  
清洁和消毒
- Microbiological control programme  
微生物学控制方案

## 3.3 Design

### 设计

The facilities for handling should be designed from the beginning thinking on the benefits of the hygiene.

操作设备选取初期应该充分考虑到清洁的因素。



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- Non porous construction materials and of high quality (vitrified, stainless steel).  
选取质量好的非渗透性建筑材料（玻璃钢，不锈钢）
- Short length pumping.  
短距离泵管
- Pipes with short number of curves, gaskets, pumps, valves and flow meters.  
管道应尽量减少折点，垫圈，阀门以及流量计
- No dead lines.  
没有死角
- Incline the pumps more than 5% to improve drainage.  
管道倾斜大于5%以改善排水

A good design should include details such as:

好的设计应该包括如下细节：

Added to the design, operation with raw materials and storage of products in intermediate tanks are crucial. These considerations are to be accounted to prevent the presence of microorganisms in those tanks.

设计上，原材料以及产品在中转存储罐中是非常重要的。这些考虑是为了防止微生物在这些贮存罐内大量繁殖。

- Lids and manholes of tanks must be sealed and be kept sealed while the tank is in use.  
储存罐的盖子和检修孔要求是密封的，并且在储存罐使用时应密封完好。
- Tanks should be designed for an easy cleaning and disinfection.  
水箱设计时应该有易于清理和消毒。
- Level indicators should not use exterior air and must be reliable, avoiding opening the tank for level checking.  
液面指示器不应使用外部空气，避免打开水罐来进行液面检查。
- Sizes of the tank should be evaluated to minimize the head space.  
水罐的大小尺寸在设计时应充分考虑以减小罐顶空隙。
- A microbial free environment should be kept in the head space and products stored in the tanks.  
存储成品的罐顶空间应尽量保持不含微生物的环境

A microbial free environment could easily be achieved using pumps with a low positive pressure or a continuous low flow of nitrogen (requiring appropriated ventilation) or purified air.

可以简单通过管道采取较低的正压，低速持续的氮流（要求合适的空气流动）或者净化空气来实现不含微生物的环境。

A continuous low flow of purified air through the head space of the intermediate tank will also reduce the condensation.



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净化空气在罐顶空间的低速流动也可以减少冷凝水现象。

The purified air can be obtained using submicron filters or ultraviolet purifiers.

净化空气可以通过亚微颗粒过滤或者紫外过滤制得。

## 3.4 Raw materials

### 原材料

Aqueous raw materials are often the appropriate medium for the microbial growth. Added to it, non aqueous raw materials can also be a good place for spores of fungus or bacteria to stay. Products derived from these raw materials are easily contaminated.

液体的原材料通常是微生物生长的良好介质。此外，非液体的原材料也可以成为真菌或者细菌孢子生长的良好场所。这些原材料衍生的场频也很容易被污染。

Avoiding these possible contamination problems derived from raw materials requires the adoption of some precautions.

为了避免这些可能的污染，原材料的问题需要采用如下预处理方法。

- Check the microbiological quality of the raw materials.  
检查原材料的微生物属性
- Treat effectively raw materials that are contaminated before introducing them in the production or storing processes. Adequate treatments could be specific biocides, gamma ray irradiation, heat, etc.  
受污染的原材料在加入到成品前以及存储前应该有效的处理。可以用特殊的杀菌剂，伽马射线或者加热等方法。
- Fix the acceptable limits of contamination and specify the conditions and biocidal treatments of all the raw materials.  
制定可接受的污染指标，详细说明所有原材料需要处理的条件和处理方法。
- Contact with your suppliers to discuss the necessities for preserved raw materials.  
联系你的原材料供应商，讨论事先抗菌预处理的必要性。
- Include in your general program for a control of all formulations and dilutions done with raw materials, including the specifications of them.  
整体计划中应包含产品配方的以及原材料稀释的监控，包含详细说明。
- Store and handle all raw materials adequately (See recommendations of storing and handling).  
正确存储以及使用所有原材料（请参见存储和使用计划）。
- Minimize dust deposition on non liquid materials.  
减少非液体原材料上积灰。

## 3.5 Production water

### 生产用水



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The water used for production is one of the most usual sources for microbial contamination during production processes. The standard quality of the production water will not always be free of microorganisms, as many water sources contains low levels or microorganisms such as the ubiquitous specimen pseudomonas.

生产用水是一种在生产过程中最常见的污染源。通常生产用水的质量并不会总是非常清洁，许多水源含有少量的微生物，比如说普遍寻在的假单孢菌。

Whenever the water source contains a low level of microorganisms we should carefully avoid exposing those microorganisms to the environment where they could proliferate.

每当水源中含有少量的微生物，我们都应该仔细避免暴露这些微生物于环境中，他们可以快速繁殖。

Good precautions for the production water include:

良好的生产用水预处理包括：

- Check regularly the microbiological quality of the production water.  
定期检查生产用水的微生物属性。
- Clean regularly, even disinfect the water treatment facilities such as water-softening devices, filters, ion-exchange resins, ultraviolet purifiers, reverse osmosis systems.  
定期清理，甚至对一些水处理设备进行消毒，比如说软水设备，过滤器，离子交换树脂，紫外清洁器，反渗透系统等。
- Avoid keeping the production water stagnant in the distribution system. Purge and drain all the pipe lines between uses. Remove dead points, valves, flexible pipes where possible.  
在分布系统中避免使生产用水停积。使用前消毒并且排干所有管内的水。在可能的情况下，移除死角，不必要的阀门以及软管。
- Ensure that condensation or recycled water is controlled verifying its microbiological quality and that they are treated with biocides whenever it is necessary to keep controlled microbiological levels.  
确保冷凝水以及水循环经过微生物属性的检测，当需要控制微生物生长时使用适量的杀菌剂。
- If production water is stored before used, it should be treated with biocides or kept at high temperatures (above 70 °C) in order to prevent and inhibit the microbial growth.  
如果生产前贮存生产用水，应该用防腐剂处理水或者将其保存在高温下（大于70 °C），以预防和阻止微生物的增长。

Treatments with products that release chlorine or bromine are excellent treatments to guarantee the optimal preservation and minimize the microbial growth in stored water in tanks. It is normally required a surplus of 2 ppm of oxidizing agent in the treated water. Quick test kits are available in the market to check this parameter.

为了保证最佳的防腐效果和减小水罐内储水的微生物生长，使用氯(CL)或溴(BR)的释放体是绝佳的处理方法。通常需要添加大于2ppm的此类氧化剂来处理水。可以在市场上购买到快速测试



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的配套设备来检测此参数。

## 3.6 Formation of the personnel

### 人员培训

The education and formation is the base for a Good Production Practices.

Educational programs should emphasize over all the ways how the products can become contaminated. Contaminating sources, microbial growth and proliferation of microorganisms can be reduced with Good Production Practices and the problems derived from a microbial contamination could be avoided.

培训实践是良好生产习惯的基础。

培训计划应该强调产品可能通过怎样的各种条件被污染。好的生产习惯可以控制减少污染源，微生物增长以及繁殖，也可以避免微生物污染带来的问题。

The most important points to show and that should be stressed are:

需要强调的重点如下：

- Microorganisms are very small. 1000 bacteria can be fitted in the head of a pin.  
微生物是极其微小的，1000个细菌才仅仅只有别针尖大小。
- Microorganisms are present everywhere, including your hands, the air and water.  
微生物处处存在，包括你的手上，空气中以及水里。
- Microorganisms grow fast. Bacteria can duplicate its population every 20 to 30 minutes. The addition of bacteria at the beginning of the working day can become more than a million bacteria at the end of the working day.  
微生物会快速繁殖。细菌可以每20到30分钟进行一次自我复制。  
细菌的增幅从早到晚可以繁殖到百万以上的数量

Once it is learned where the microorganisms are and what they can do during the production process it is better appreciate the necessity of adopting Good Production Practices.

一旦了解到微生物的存在以及生产过程中可以采取的措施，人们更易于了解到采取好的生产习惯的重要性。

When educational programs are followed with the appropriate training for Good Production Practices, it will understand easily the importance of following these recommendations.

当进行了关于良好生产习惯的培训以后，人们会很容易理解以下的问题处理建议。

## 3.7 Storing and handling

### 存储以及操作



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Good Production Practices for storing, handling and production have a very important impact in the microbiological quality of the finished products. Some of these practices should include norms to avoid contaminations during production, such as the following.

存储，操作以及生产中好的生产习惯对成品中微生物属性影响很大。一些习惯应该包含标准规范以避免生产中的污染，具体如下：

- Establish and apply procedures for periodic cleaning and disinfection of the storing tanks, production and packing facilities.  
针对储水罐，生产和包装设备，建立以及贯彻定期的清洁和消毒程序
- See recommendations for Cleaning and Disinfection.  
参看清洁和消毒建议。
- Do not keep water or product stagnant in pumps. Purge pipes with nitrogen after each use. Rinse and disinfect frequently all pipes, watching especially flexible pipes and hoses.  
不要在管道中积存死水或者成品。每次用后用氮气清洗管道。经常对所有管道冲洗以及消毒，特别注意软管和胶管。
- Ensure that no environmental air is pumped into the storing tanks when adding fresh product.  
确保当灌装产品到存储罐时，没有外部空气进入管内。
- Avoid opening storing tanks (except for cleaning and disinfection).  
避免打开存储罐（除了清洗和消毒）
- Keep production, storing and packing areas as clean as possible. Water and residual product puddles, wet scouring pads, dirty cloths, hoses filled of water, etc. are an invitation for the proliferation of microorganisms.  
尽量保持生产，存储以及包装区域的清洁。积水以及残留积存的产品，湿的设备，脏布，充水软管等非常适于微生物的增殖。
- Environmental regulations are forcing to implement recycling programs for water and other raw materials. Recycled products are sensitive to contamination; therefore, they should be analyzed and correctly treated with adequate biocides.  
如果环保规定强制执行水以及原材料的循环处理，循环产品易于被污染，因此他们应该用防腐剂进行正确地分析处理。

## 3.8 Cleaning and disinfection

### 清洗以及消毒

Effective cleaning and disinfecting practices are crucial for the prevention of microbial contaminations during the production and storing processes.

有效的清洁以及良好的消毒习惯，对生产和存储过程中微生物污染的预防是非常重要的。

Facilities, storing tanks, pipes, etc. should be cleaned and disinfected regularly using adequate procedures, which must specify frequency, materials or products to be used and doses.

应该制定规则对设备，储水罐，管道等进行定期清洗以及消毒。清洗消毒必须详述周期，使用的材料或者产品以及添加量。



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Furthermore, when microbial contaminations problems exist, the facilities must be cleaned and disinfected.

除此以外，当微生物污染问题存在时，必须对设备进行清洗和消毒。

Cleaning and Disinfection are not synonyms.  
清洗和消毒并不等同

Cleaning is the first operation that is realized to remove organic and inorganic residues from facilities. Once the facilities are clean, they have to be disinfected to eliminate any contaminant microorganism.

清洗是第一步，目的是清除设备中的有机以及无机残留物。一旦清洗设备后，必须进行消毒以消除任何微生物污染。

Many disinfectant agents can be deactivated by the presence of organic or inorganic residues. Therefore, cleaning and disinfecting process must be tested and its effectiveness checked.

许多消毒剂可以被有机或者无机残留物降解。因此，必须测试清洗以及消毒的过程和结果

Some of the most common processes of cleaning and disinfecting are the following.

一些最常见的清洗消毒方法如下。

## 3.8.1 Cleaning methods

### 清洗方法

The most usual cleaning methods are the following.

最常见的清洗方法如下：

- Clean well with water or adequate solvent to remove residues.  
用水或者适当的溶剂进行清洗以移除残留物
- Wash well the walls of the tanks and stirring systems to remove the residues of their surface.  
仔细清洗存水罐壁以及搅拌系统，移除表面的残留物。
- Use high pressure pumps if necessary with water and detergents.  
如必要，使用高压泵加水以及清洗剂。
- Drain totally all the facilities.  
排干所有设备的存水

Some equipment may need to be dismantled for its cleaning. It is also convenient to drain pipes and to rinse them with water. If possible, it is recommended to combine mechanical



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cleaning with the use of high pressure pumps to facilitate the removal of possible biofilms.

It is recommended to rinse off with water all the facilities that have been cleaned with detergents as they are a good medium for the microbial growth.

一些设备可能需要拆开清洗。这样也便于排干管道用水清洗。如果可能，推荐使用高压泵清洗所有的设备，以移除可能的生物膜。

## 3.8.2 Disinfection with chlorine or active halogen

### 用氯或者活性卤素消毒

A good practice is to fill the facilities or tanks with a solution of sodium or calcium hypochlorite (0,02 to 0,20 %), or another halogen releaser. If organic residues are present, higher doses may be required.

好的习惯是用次氯酸钠或者钙盐溶液充满设备（0.02-0.2%），或者选取另外的卤素释放剂。如果存在有机残留物，可能需要更高的添加量

It is recommended to keep this solution of active halogen for 24 hours, unless it has been tested and an inferior contact time is effective enough. Clean well all pipes with the active halogen solution. After the disinfection, all facilities must be rinsed off with water containing biocides.

推荐存留此溶液于设备中24小时，直到测试证明弱接触时间足够有效。用活性卤素溶液清洗所有的管道。消毒后，所有的设备都必须用含有抗菌剂的水漂洗。

Alternatively, storing tanks and other facilities can be washed or pulverized with a 5% solution of hypochlorite, and after 24 hours, rinsed off with water containing a biocide. This method reduced the amount of water needed.

另有选择，贮水罐以及其他设备可用5%的雾化卤素溶液清洗，24小时后，用含有防腐剂的的水漂洗。这种方法可以降低清洗需水量。

### PRECAUTIONS

#### 预防措施

- Solutions of hypochlorite and active halogens can cause burns on skin and eyes, and therefore it is highly recommended the use of adequate protective gears during its manipulation.

次氯酸盐溶液以及活性卤素可能引起皮肤或者眼睛的损伤，因此特别推荐在操作中使用必须的劳保用品设备。

- Hypochlorite solutions are corrosive. Therefore, it is necessary evaluate its compatibility with our facilities.

次氯酸盐是腐蚀性的。因此有必要评估其与设备的相容性。

- Local regulations for disposal of liquid wastes of the disinfectant solutions must be followed.

必须遵守处理消毒溶液废弃物的当地法规。



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### 3.8.3 Disinfection with vapour

#### 蒸汽消毒

Stainless steel facilities can be clean using vapour. If vapour is used, we have to ensure that all the parts arrive to at least 80 °C for at least 15 to 30 minutes. The use of temperature sensors in different parts of the facilities will help controlling the process.

不锈钢设备可以用蒸汽消毒。如果使用蒸汽，我们必须确保所有部位达到80 °C，持续15到30分钟。设备中各个部位的温度传感元件可以帮助控制这一过程。

#### *PRECAUTIONS*

#### *预防措施*

*Vapour cause burns. Be cautious when using vapour for disinfection.*

*蒸汽会引起灼伤，小心使用蒸汽消毒。*

### 3.8.4 Disinfection with quaternary ammonia

#### 用季铵盐消毒

A wide range of disinfectants based on quaternary ammonia are currently available. These disinfectants are inactivated by the presence of anionic surfactants. If detergents containing these types of surfactants are used for cleaning, the facilities have to be effectively rinsed off. Follow the indications of producers as per their safety, form, doses and use instructions.

目前大量使用的消毒剂基于季铵盐配方。这些消毒剂可能会被阴离子表面活性剂影响失活。如果包含这一类表面活性剂的清洗剂用于清洁设备，设备必须经过仔细漂洗。遵守厂家所有关于安全，组织，添加量和使用说明的指示。



## 4 EVALUATION AND CONTROL OF THE MICROBIAL LOAD

### 微生物负荷的评估控制

The existence of procedures for manipulation, control and prevention of microbial contaminations are an important active component of any program developed to control and minimize possible microbial contamination.

It is important to remember,

操作，控制以及微生物污染的控防方法，是任何控制以及减小可能的微生物污染项目的重要积极的组成部分

**“Prevention is better than curing”**  
**预防重于治理**

A good prevention program is paid by itself, as the cost to solve problems will always be superior to the prevention costs.

一个好的预防微生物增长方案有益于自身，解决问题的成本永远高于预防成本。

A good prevention program requires sampling of the raw materials, production water and products to check their status by periodical microbiological tests. The level of microorganisms in the samples can be determined in situ or in a microbiological laboratory.

一个好的预防方案，要求抽取原材料样品，生产用水以及成品以进行定期测试来了解他们的状况。样品中的微生物水平可以原地检测或者通过微生物实验室测试。

Quick microbiological test kits are available in the market. They can be useful for a first control in situ or when a microbiological laboratory is not available.

快速的微生物测试设备可在市面上购买。在没有微生物实验室测试的条件下，这一设备有助于厂内微生物污染条件的第一手控制

It is also convenient to define procedures for sampling and analysis, and procedures for actions if a microbial contamination is detected.



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如果发现微生物污染，这也适合规范抽样和分析，以及操作的程序。

## **If a low microbial contaminations is detected in a raw material**

如果在原材料中检测到较低水平的微生物污染

*¿ We eliminate the contamination, we send it back to the supplier, or we use it for the next production batch?*

*¿ 首先清除污染，然后送还给供应商，或者用于下一批次生产？*

## **If a source of contamination is found in a point of the production facilities**

如果在生产设备中某处发现污染源

*¿ How it is going to be cleaned and disinfected?*

*¿ 怎样清洗以及消毒？*

*¿ What are the steps we are going to follow to verify that we have really disinfected it and it is safe to be used again?*

*¿ 哪些步骤我们将要采取鉴别是否良好消毒，而且可以再次安全使用？*



Our recommendations regarding our products are based on in-depth tests developed by our Technical Department. They are given in good faith and no liability can be derived from them. Use biocides safely. Always read the label and product information before use.

我们对产品的推荐基于我们技术部所开发的深入测试。我们以诚信做出产品推荐，但是不对这些产品负任何责任。安全使用抗菌剂，使用前请务必阅读标签以及产品信息。



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