

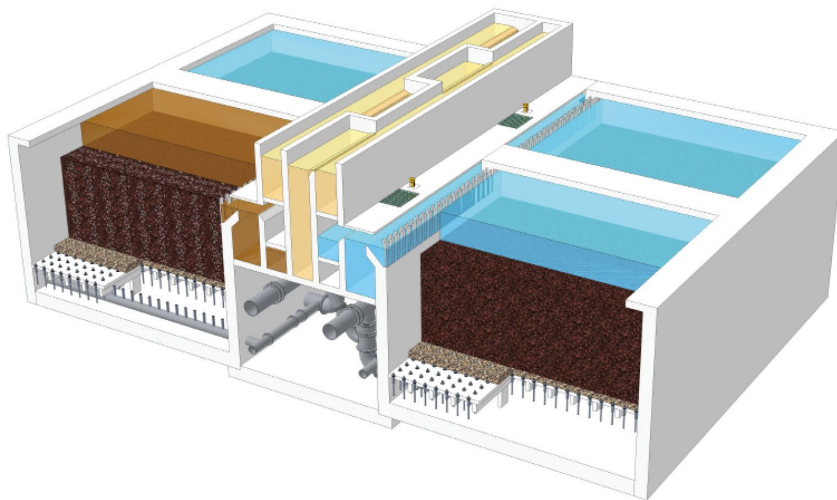


## ATAL Biological Aeration Filter 曝气生物滤池 (ABAF)

*Engineering with passion*  
用心創造

## Introduction 简介

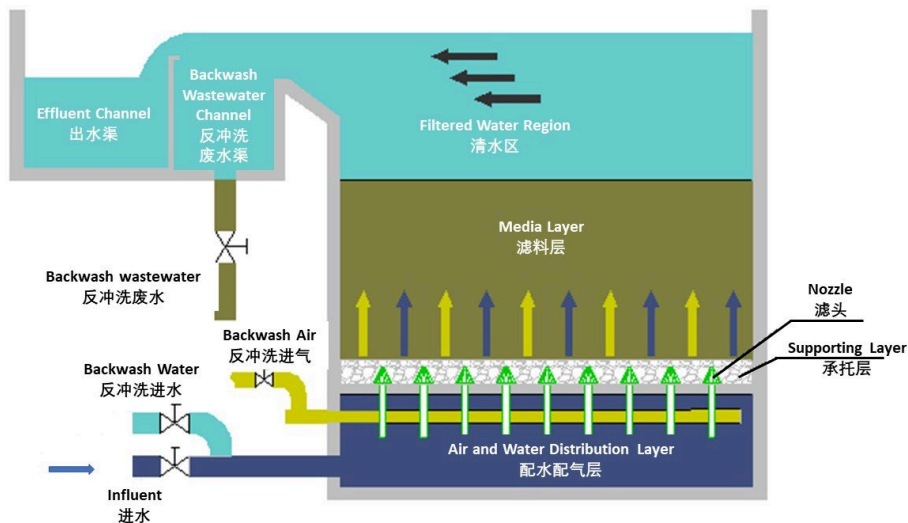
# ATAL Biological Aeration Filter (ABAF) 曝气生物滤池



3D model of ABAF  
曝气生物滤池3D效果图

**ATAL Biological Aeration Filter (ABAF)** is a patented technology (patent number: ZL2004 1 0033940.7) developed by ATAL Engineering Limited. Our Group has accumulated rich experience and good performance in the process design, equipment integration and "turnkey" project. We have a team of engineers with strong technical capabilities and rich experience in project management. In the process design, equipment supply, installation, commissioning and operation of the process package, it is practical to achieve safety, reliability, economical application, advanced technology, and ensure that the effluent meets the standards.

**曝气生物滤池 (ABAF)** 是安樂工程有限公司研发的专利技术 (专利号: ZL2004 1 0033940.7)。我司在此工艺的设计、成套设备集成和“交钥匙”工程上积累了丰富的经验和良好的业绩，并拥有一支专业技术能力强、工程管理经验丰富的工程师队伍。在工艺包的工艺设计、设备选购、施工、安装、调试和运营中，切实做到安全可靠、经济适用、技术先进、确保出水达标。



Schematic diagram of ABAF process  
曝气生物滤池工艺示意图

## Major Features 主要特点

**ABAF** has the following three functions:

- Removal of suspended solids (SS) ;
- Removal of COD/BOD ;
- Removal of ammonia nitrogen and total nitrogen.

**曝气生物滤池** 具有以下三个功能：

- 去除悬浮物 ( SS ) ；
- 去除COD/BOD ；
- 去除氨氮和总氮。

### Biological Treatment 生物处理

In an aerobic environment, the active microorganisms attached to the surface of the natural filter media will remove carbon-containing pollutants and ammonia nitrogen in the sewage by biochemical reaction. The required oxygen is provided by blower and enters the filter together with the raw sewage through the water and air distribution system.

In an anoxic environment, a large number of denitrifying microorganisms grow and attach to the surface of the filter media. Nitrate ( $\text{NO}_3^-$ ) and nitrite ( $\text{NO}_2^-$ ) in the sewage are adsorbed on the biofilm of the filter media and reduced to nitrogen gas ( $\text{N}_2$ ) through the biochemical reaction of microorganisms.  $\text{N}_2$  will be released from the sewage and thereby realising the denitrification.

好氧条件下，天然滤料表面上的活性微生物会通过生化反应去除污水中含碳污染物和氨氮。所需要的氧气由鼓风机来提供，和原污水一起经配水配气系统进入滤池中的滤料层。

缺氧条件下，滤料表面附着生长大量的反硝化生物菌群，污水中的硝酸盐 ( $\text{NO}_3^-$ ) 或亚硝酸盐 ( $\text{NO}_2^-$ ) 被吸附于滤料载体的生物膜上，经过微生物的生化作用被还原成氮气 ( $\text{N}_2$ ) 从污水中释放出来，从而实现脱氮。

### Physical Filtration 物理截留

The filter media effectively retains the suspended solids and remaining microorganisms in the sewage flowing through the filter, ensuring excellent effluent suspended solids (SS) indicators. Filter media made of clay has excellent retention effect.

滤料对流经滤池的污水中的悬浮物和剩余微生物进行有效截留，保证了卓越的出水悬浮物 (SS) 指标。黏土制成的滤料截留效果非常优秀。



Filter media made of natural clay  
黏土制成的滤料

### Backwash 反冲洗

The filter usually runs for 18-72 hours, with the increase of retained suspended solids and thickening of biofilm on the surface of the filter media. It is necessary to backwash the filter to ensure the treatment performance of filter. The backwash wastewater can be directly discharged to the primary sedimentation tank of the sewage treatment plant or the intake well of the intake pump station.

滤池通常在运行18-72小时后，随着截留的悬浮物增多和滤料表面生物膜的增厚，需要对滤池进行反冲洗，以保证滤池良好的处理效果。反冲洗废水可以直接排到污水厂的初沉池或进水泵房进水井内。



Water and air distribution system of ABAF  
曝气生物滤池的配水配气系统



ABAF under backwash  
反冲洗中的曝气生物滤池

## Major Features 主要特点

### Decarbonisation 除碳

The process is used to degrade chemical oxygen demand (COD) and biochemical oxygen demand (BOD) in wastewater treatment. Air blower piping is installed in water and air distribution system. The filter area is filled with oxygen and biochemical reaction will remove carbon pollutants. SS is simultaneously removed by filtration.

对于通常仅要求降低化学需氧量 (COD) 和生化需氧量 (BOD) 的污水处理可以采用此工艺。一般在滤池的配水配气区设置工艺空气管。滤池过滤区充满氧气，生化反应会去除碳污染物。悬浮物也同时被过滤去除。

### Nitrification 硝化

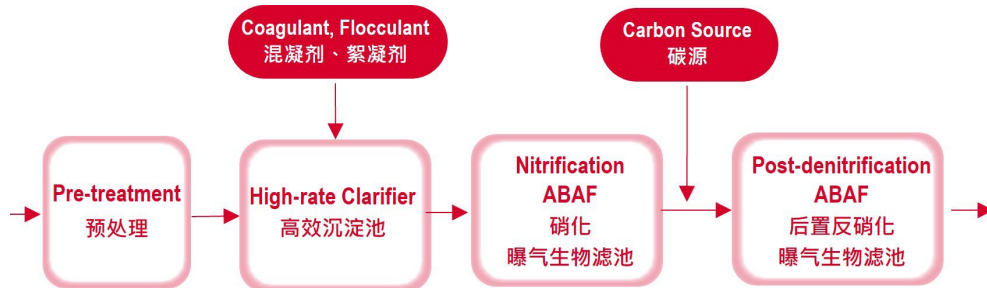
The nitrification filter design is similar to decarbonisation filter. The aerobic zone is to remove ammonia nitrogen along with biodegradable carbon-containing pollutants. SS is simultaneously removed by filtration.

硝化滤池在设计上类似于除碳型滤池。滤池用于去除氨氮，并一同去除可生物降解含碳污染物。悬浮物也同时被过滤去除。

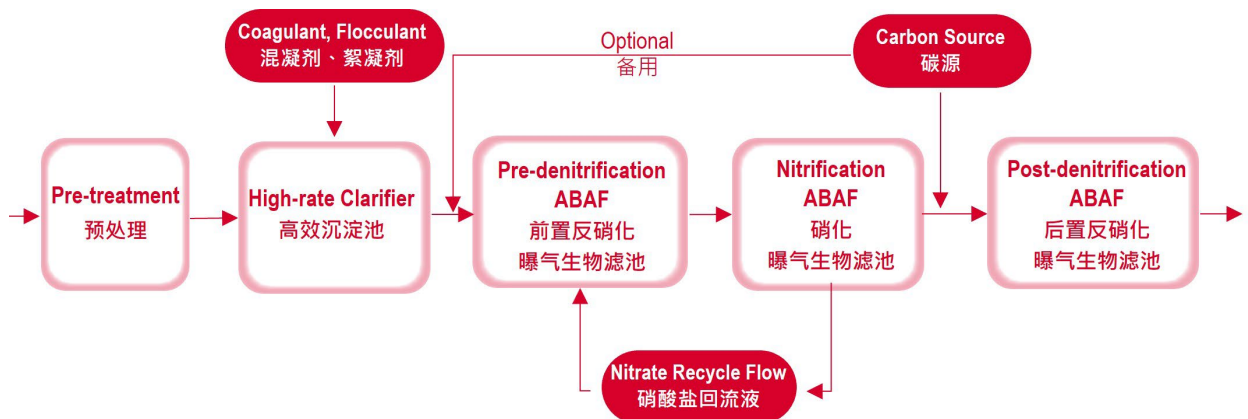
### Pre-denitrification and Post-denitrification 前置反硝化和后置反硝化

The denitrification filter can be set at the front or the back of the nitrification filter to remove total nitrogen. When it is set in the front of nitrification filters as a pre-denitrification filter, it uses the organic pollutants as a carbon source to reduce the recirculated nitrate into gaseous nitrogen. When it is set in the back of nitrification filters as a post-denitrification filter, it relies on external carbon sources to remove total nitrogen.

反硝化曝气生物滤池可以设置在硝化滤池前端或后端用于去除总氮。当设置在前端时，作为前置反硝化滤池，可以利用原水中的有机物作为碳源，将回流的硝态氮还原成气态氮去除。当设置于硝化滤池的后端时，作为后置反硝化滤池时，依靠外加碳源去除总氮。



Process flow diagram of two-stage ABAF  
二级曝气生物滤池工艺流程图



Process flow diagram of three-stage ABAF  
三级曝气生物滤池工艺流程图

## Advantages 优点

### Mature and Leading Technology 成熟领先的生物处理技术

- High effluent quality
- Upflow velocity: 4-30 m/h
- Overall automatic control
- Less impact from hydraulic loading variation
- High loading of carbon and nitrogen
- Combined removal of carbon and nitrogen pollutants
- 出水水质高
- 4-30 m/h的上升流速
- 处理过程全自动控制
- 水力负荷变化影响小
- 较高的碳和氮去除负荷
- 同一滤池内可去除含碳和氮污染物

### High Quality Filter Media 高质量的滤料

- Low loss rate of filter media
- Honeycomb surface with large surface area
- Manufactured by pure natural media
- High biological organic removal rate
- Robust mechanical structure with long service life
- Different specification to match various treatment purposes
- 滤料损耗率低
- 表面蜂窝状·比表面积大
- 采用纯天然材料加工而成
- 生物处理有机物去除率高
- 机械结构强度高·使用寿命长
- 各种规格形状·满足各种处理目的

### Excellent Filtration Performance 卓越的过滤效率

- Precipitation is not needed for effluent, which goes directly to the next process
- Even distribution of water and air by patented distribution system
- Double layer-effect between filter media and biofilm, which makes the capture of SS more prominent
- 出水无需沉淀·直接进入下一工序
- 专利的配水配气系统使布水、布气更均匀
- 滤料和生物膜的双层作用·使悬浮固体的捕获性能更加突出

### Less Pollutant Discharged 污染物排放少

- Less odor and volatile
- Use treated effluent as backwash source
- Surrounding air only contact with treated effluent to avoid second pollution
- Backwash wastewater is discharged to confined space rather than exposed to air
- 臭味和挥发物更少
- 反冲洗水源为处理后的出水
- 滤池周围的空气仅和处理后的水接触·避免二次污染
- 反冲洗污水排放到密闭的空间内·而不是暴露在空气中

## Job Reference 案例

ATAL provided ABAF for around 20 wastewater treatment plants (WWTP) with a total treatment capacity over 2,300,000 m<sup>3</sup>/d.

我司为约20个污水处理厂提供ABAF 曝气生物滤池，涉及的污水处理量超过2,300,000 m<sup>3</sup>/d。

**Dashadi WWTP, Guangzhou, China**  
中国广州大沙地污水处理厂 200,000 m<sup>3</sup>/d



**Tangxun Lake WWTP Phase III, Wuhan, China**  
中国武汉汤逊湖污水处理厂三期 100,000 m<sup>3</sup>/d



**Gongming WWTP Phase I, Shenzhen, China**  
中国深圳公明水质净化厂一期 100,000 m<sup>3</sup>/d



**Jiading WWTP, Shanghai, China**  
中国上海嘉定污水处理厂 100,000 m<sup>3</sup>/d



**Science City LG WWTP Phase III, Guangzhou, China**  
中国广州科学城LG水质净化厂三期 60,000 m<sup>3</sup>/d



**Bijie WWTP, Guizhou, China**  
中国贵州毕节污水处理厂 104,000 m<sup>3</sup>/d



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