



**ATAL High-Speed Dissolved
Air Flotation System**
高速气浮系统
(AHSDAF)

Introduction 简介

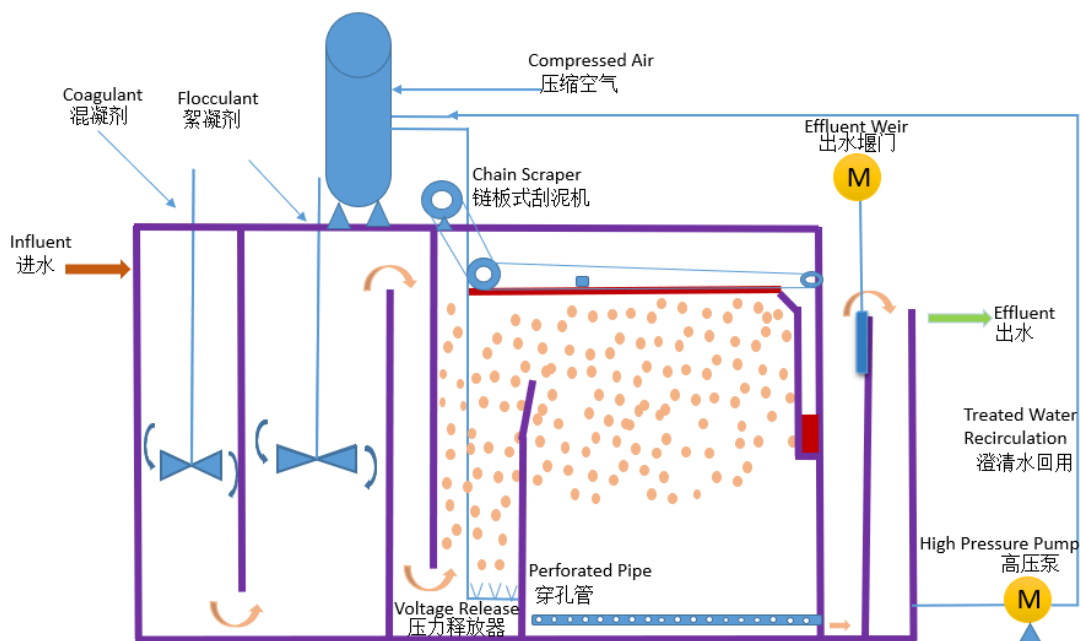
ATAL High-Speed Dissolved Air Flotation System (AHSDAF) 高速气浮系统

ATAL High-Speed Dissolved Air Flotation System (AHSDAF) is an advanced technology 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.

Compared with traditional DAF system, High-speed DAF could not only reach higher hydraulic loading to 15-40 m/h, but also effectively remove both TP and SS. The required construction area is reduced, thereby reducing the investment cost.

高速气浮系统 (AHSDAF) 是安乐工程有限公司研发的先进工艺。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。

高速气浮系统相比传统的气浮系统，具有更高的水力负荷，高达15-40 m/h的上升速度，可在除磷同时保持极高的悬浮物去除率。不仅减少占地面积，还可以节省投资。



Schematic diagram of AHSDAF process
高速气浮系统工艺流程图

Major Features 主要特点

Operating Mechanism 工作原理

The basic working principle of AHSDAF is to force air to dissolve in water under a certain pressure to form saturated water. Then the excess air dissolved in water is precipitated in the form of tiny bubbles by decreasing the pressure suddenly. These tiny air bubbles will adhere to the surface of suspended solid, which increases the buoyancy of the fine particles of which their original density is close to or smaller than that of water, both then float to the water surface together forming scum to be removed and finally realises the solid-liquid or liquid-liquid separation. AHSDAF is mainly composed of four parts: coagulation, flocculation, pressurised air dissolution, and air flotation.

高速气浮系统基本原理是在一定压力下，强制空气溶解于水中，形成饱和水，然后再突然将压力降低至常压，使溶于水的过量空气以微小气泡形式析出。而这些微小气泡将粘附在悬浮物表面，使原本密度接近或小于水的细小颗粒的浮力增大，进而一起浮到水面，形成浮渣而加以去除，实现固液或者液液分离的过程。高速气浮系统主要由混凝、絮凝、加压溶气以及气浮四个部分组成。



Air compressor system
空气压缩机系统

Coagulation Tank 混凝池

The air flotation method is suitable for removing hydrophobic particles in water, such as emulsified oil. For hydrophilic particles such as heavy metal ions, they can also be separated by air flotation by adding suitable agents to change the surface properties of the particles. For our AHSDAF, sewage passes through the water distribution system to the coagulation tank, and it is where coagulant is added.

Coagulants do not only change the surface properties of particles but can also improve the air flotation effect of tiny particles. Simultaneously, dissolved phosphates will be removed and therefore further reduce total phosphorus in effluent. As the most used coagulants, iron and aluminium salts will be dispersed into water and sewage quickly and evenly by mixing with a mechanical stirrer. As the addition of high-charged metal ions, tiny particles clump together through electro-neutralisation and destabilisation of colloids in water. In case of space limitation, a tubular static mixer could be considered for coagulant mixing. After the coagulant passes through a suitable static mixer, the coefficient of variation of mixing can reach 0.05 to ensure uniform mixing and full utilisation of the coagulant.

气浮法适宜于去除水中的疏水性颗粒，如乳化油，对于亲水性颗粒如重金属离子，投加适合的药剂以改变颗粒的表面性质，同样可用气浮法分离。对于我司的高速气浮系统，污水经过配水系统后，到达混凝池，并在混凝池中添加混凝剂。

混凝剂既可以改变颗粒的表面性质，又可以提高很细小的微粒的气浮效果，还可去除水中的溶解性磷酸盐并进一步降低出水中的总磷。铁盐和铝盐作为最常用的混凝剂，可以通过机械搅拌器与液体混合，迅速均匀地分散到水、污水中，充分发挥混凝剂高电荷金属离子对水中胶体的电中和脱稳作用，使微小颗粒聚集在一起。如果项目占地紧张，亦可通过管式静态混合器进行添加。混凝剂通过适宜的静态混合器后，混合的变异系数可到达0.05，确保混合均匀、充分利用混凝剂。

Flocculation Tank 絮凝池

After the sewage flows from the coagulation tank to flocculation tank, in order to form larger and denser flocs, it is necessary to add a polymer flocculant to the flocculation tank. The flocculant has the function of adsorption and bridging, which makes the fine particles gradually form larger flocs, which is convenient for solid-liquid separation and effectively removes the suspended substances and colloids in the water. The mixing of flocculant and sewage can be achieved either by mechanical stirring or hydraulic flocculation. a properly designed turbine-type agitator is applied for mechanical agitation uses, while hydraulic flocculation is accomplished by several plug-flow reactors in series. Regardless of the mixing form, there should be sufficient energy input to satisfy the velocity gradient required for the flocculation reaction.

污水从混凝池流向絮凝池后，为了使固体悬浮物进一步形成较大、较密实的絮体物，需要在絮凝池中投加高分子絮凝剂。絮凝剂具有吸附架桥作用，使细小颗粒逐渐结成较大絮体，便于固液分离，使水中的悬浮物质及胶体得到有效去除。而絮凝剂与污水的混合既可以通过机械搅拌的方式达到，也可以使用水力絮凝的方式达到。机械搅拌采用设计合理的涡轮式搅拌器，而水力絮凝则通过几个串联的推流式反应器完成。不管哪一种混合形式，都应具有足够的能量输入，以满足絮凝反应所需要的速度梯度。

Major Features 主要特点

Air Saturation 加压溶气

8%-12% clarified effluent of AHSDAF is recycled to the air saturation tank, meanwhile the compressed air also enters the dissolved air tank through the pipeline. In the dissolved air tank, the air and water are fully mixed through the media to form air-saturated water for air flotation in the following air flotation tank. Low recycle flow can greatly reduce the volume of the air saturation tank, and at the same time, the dissolved gas pressure can be greatly increased to form smaller and much uniform bubbles, which could be better utilised.

8%-12%的高速气浮系统所产生的澄清出水将会被再循环·回到加压溶气罐内·压缩空气亦通过管道进入溶气罐·在溶气罐内·气水通过填料充分混合·形成空气饱和水以用于后面气浮池的气浮·较低的出水回流量·可使溶气罐体积大减·同时溶气压力可以大大提高·形成的气泡更小·更均匀·更能得到充分利用·

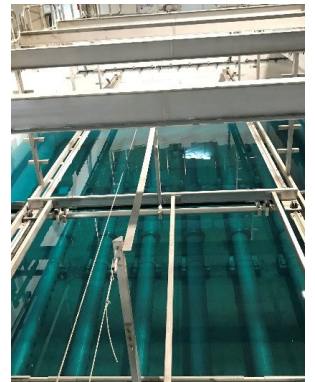


Saturation tank
加压溶气罐

Air Flotation Tank 气浮池

The air flotation tank mainly contains the dissolved air releaser for flotation cell, the perforated pipe at the bottom for drainage, and the scraping system at the top of the air flotation area. After the saturated water comes out from the air saturation tank, it enters the air flotation unit through the dispersing head and flows through the injection nozzle into the flotation cell. In the flotation cell, the pressure suddenly drops to normal pressure, and the dissolved air in the saturated water is separated out, forming many bubbles with a diameter of about 20-100 microns. These tiny air bubbles attach to suspended particles in the water and bring these particles to the surface, forming scum. The scraping system further scrapes the scum away while the clarified water flows out through the perforated pipe at the bottom, and part of the clarified water is returned to the air saturation tank, and the rest flows to the next process unit.

气浮池主要包括浮选槽的溶气释放器·气浮区底部用于排水的穿孔管以及气浮区顶部的刮泥系统·饱和水从溶气罐出来后·通过一个分散头进入气浮单元·并流过注射喷嘴进入浮选槽·在浮选槽中·压力骤降为常压·原先饱和水中溶解的空气析出·形成大量直径约20-100微米的气泡·这些微小的气泡附着在水中的悬浮的颗粒物上·将这些颗粒物带至水面上·形成浮渣·刮泥系统则进一步将这些浮渣刮走·澄清水则通过底部的穿孔管流出·部分澄清水回流至溶气罐·其余的则进入下一个工艺单元·



Air flotation tank
气浮池

Advantages 优点

Excellent Processing Performance 出色的处理能力

- Excellent effluent quality: turbidity less than 2 NTU and total phosphorus less than 0.3 mg/L
- Low moisture content of scum and easy to handle
- Small space and low investment with a high hydraulic loading up to 15-40 m/h
- Low recirculation flow and energy consumption
- 出水水质优：浊度可小于2 NTU·总磷可低于0.3 mg/L
- 浮渣含水率低·易于处理
- 水力负荷高达15-40 m/h·占地面积小·投资低
- 回流量低·能耗低

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