中航国际
AVIC INTL

中国航空技术杭州有限公司
AVIC INTERNATIONAL HANGZHOU COMPANY LIMITED



Customised Industrial Gas Plants

Individually designed to meet customer-specific demands.

in **1993**

AVIC INTL made its debuts in Hangzhou,China.





ZHOU LIANBING
Member of Board
President of AVIC INTL HANGZHOU COMPANY

Message from the President

AVIC INTERNATIONAL HANGZHOU CO., LTD. (AVIC INTL HANGZHOU), one of the first state-owned enterprises going abroad, following the times of "going global", has gone through more than twenty years of growth and developed into a well-known company with international competitiveness and strength in international engineering projects contracting, overseas industrial investment, foreign trade and labor service.

Quality is driven by professionalism and masterpiece is built on strength. We have gone through wind and rain, and also reaped success during reform and innovation over the years. The reform and opening-up policy and economic globalization have given us plenty of space, where we have continuously improved in providing advanced products and professional services to the world. We are highly trusted by our clients with excellent products and services, creating numerous records of exporting complete sets of ASP and mechanical equipment. Over the past two decades, the economic development in the world has gained great momentum. The demand for industrial gas & complete set of equipment has been constantly growing. Seizing the historical opportunity, AVIC INTL Hangzhou allocates resources all over the world and make utmost efforts to build up world-class core competitiveness in industrial gas. complete set of equipment & project general contracting, to become the best quality and respectable supplier of integrated solutions in industry and project general contracting.

Relying on our global sales and service network, we could give full play to the policy resources enjoyed by the state-owned enterprises under the supervision of the Chinese Central Government, cumulative advantage of combining industry and financing, and human resource advantage. We cooperate with strategic partners to pursue sustainable development in our main overseas market and assist emerging economies in improving industrial capabilities, creating jobs and constantly improving people's livelihood.

AVIC INTL HANGZHOU has been actively advocating and carrying out the core value of "People-orientation, Responsibility, Partnership, Innovation, and the unity of knowing and doing", providing international platform for Chinese and foreign talents to realize their value and potential.

"Go beyond commerce for a better world", AVIC INTL HANGZHOU would like to provide the world-class products and services to global clients. "Integrate the world through action, and benefit people's livelihood through business", we warmly welcome you to cooperate with us, together create a better world.



▲ Project Contracting Department

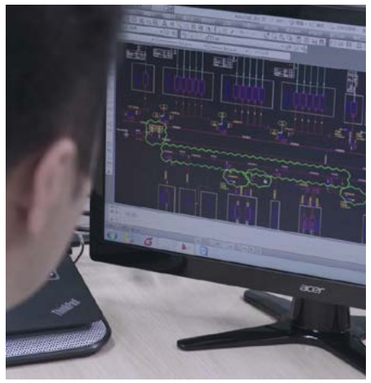


▲ Professional Transportation Team



▲ Professional Manufacture Support

We firmly believe that products have souls and we are making great efforts to make products express our dreams and pursuits. The top-ranking design team strives for excellence to impart a distinguished gene to products. Based on the tremendous strength of the central enterprises, executive team actively cooperates with renowned supporting manufacturers home and abroad to endow the products with advantages of numerous masterpieces. Like caring for babies skillful master workers elaborate products with the spirit of craftsman. Quality control team inspects whole process of production with rigorous standards to guarantee quality. Experienced service personnel devote themselves to service all year round, making products thrive and remarkable.



▲ Layout Planning



▲ ASU Model



▲ Professional Installation Team

Sicong Dai

- Tenured senior technical consultant of AVIC INTERNATIONAL HANGZHOU CO., LTD.
- Professor level senior engineer
- State council allowance recipient
- 50 years working experience in air separation industry



"AVIC INTL Hangzhou participates in international market operations as a central governmental enterprise representing the national image. We are determinded to combine world-class technology with China manufacturing China speed and global industrial chain. Let the world share the brilliance of China and let China feel the beauty of the world. "

—— Sicong Dai



Cryogenic *Air Separation Plants*

AVIC INTL HANGZHOU has always been aiming at the international markets, and making great efforts in developing ASP General Contracting and Investment exportation. AVIC INTL HANGZHOU is one of the leading enterprises in gas producing industry in scientific research, design, consultation. service, integrated solutions, manufacture, marketing, completion of engineering project, equipment installation and commissioning etc.

The ASP of AVIC INTL HANGZHOU, is capable of supplying all scales of ASP from 100 Nm^3/h to 120,000 Nm^3/h as one single unit.

Since 1993, we have produced more than 40 sets of large & medium size ASUs, in which, the largest capacity of oxygen is 84,000 Nm^3 per hour.

In addition to producing of oxygen, nitrogen and argon, we are also capable to produce krypton, xenon etc. rare gases in the large air separation plant, satisfying customers' various demands.

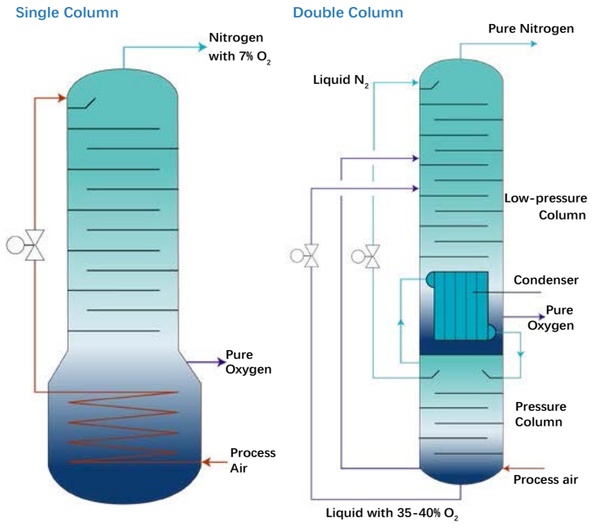
The Principles of Air Separation

Air separation by rectification in a single/double column.

This involves installing a pressure column below the low-pressure column. At the top of this pressure column, pure nitrogen was drawn off, liquefied in a condenser and fed to the top low-pressure column as reflux. At the top of the low-pressure column, pure gaseous nitrogen was withdrawn, while liquid oxygen evaporated at the bottom of this column to deliver pure gaseous oxygen. This principle of double-column rectification combining the condenser and evaporator to form a heat exchanger unit is still used today.

Condenser/reboiler

The principle of double-column rectification is characterised by the combination of condenser and evaporator to form a common heat exchanger unit. This divides the rectification into two separate areas with different pressures.



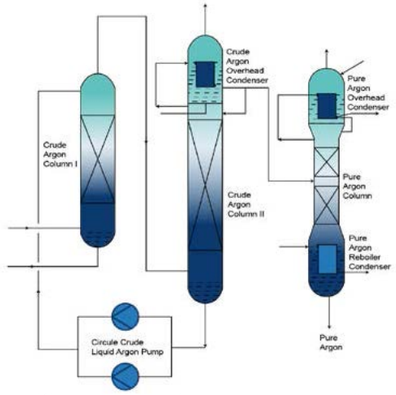
Process inside a column

Any tray of the rectification column follows the same principle:

The O_2 concentration of the boiling O_2/N_2 liquid mixture F is greater than the O_2 concentration of the vapour D. A certain volume of liquid corresponding to the same volume of reflux constantly flows from the tray above into the liquid mixture below with an equivalent volume flowing down over a weir onto the tray below.

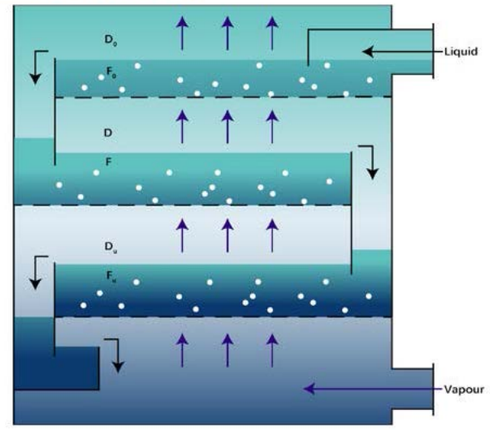
The vapour Du coming from the bottom tray penetrates the liquid mixture F and has a higher O_2 content than the vapour mixture D.

The O_2 concentration of the vapour Do rising from the upper tray is in turn less than that of the vapour D. Thus a gas rich in nitrogen is obtained in the head of the column and a liquid rich in oxygen is obtained in the sump of the column.



Fully rectified hydrogen-free argon process flow chart

Principle of sieve trays



Process inside a column

- Low energy consumption
- High product extraction rate
- Large operational flexibility
- Due to the small liquid retention of the packed tower, it's beneficial to the production under variable load conditions.
- The argon-making process is greatly simplified, which improves the reliability of equipment operation.
- Since the hydrogen production workshop is not installed, the safety of equipment operation is greatly improved.
- Engineering construction and installation costs are greatly reduced
- Eliminate environmental pollution

Applications

We serve customers in a wide range of industries. Our accumulated practical experience allows us to design and deliver the perfect fit to meet your individual needs based on your industry recommendations. Our reference range includes:

Metals

- Iron and steel

Chemicals

- Ethylene oxide, NH_3 synthesis, petrochemicals

Electronics

- Electronics, semiconductors, solar cell panels

Energy and Gasification

- IGCC, biomass and coal gasification, oxyfuel, natural gas, synthetic fuel, partial oxidation, coal-to-liquid, gas-to-liquid

Other Industrial Gases Applications

- Healthcare
- Food processing
- Glass
- Pulp and paper
- Environmental technology, etc.



Large *Air Separation Plants*



84,000 Nm^3 /h O_2

Air Separation Plant Project

The site of this project is located in the Persian Gulf of Petrochemical Complex, which is one of the world's biggest Petrochemical Complex zone. This plant consists of one air separation plant plus Instrument gas plant, oxygen is injected into the reservoir at high pressure and this calls for methanol product. AVIC completed a purpose-built land-based Air Separation Plant in 2019.

It is one of largest air separation facilities in the owner's country, this unit produces 1,036,800 tons per year of pressurized oxygen. It produces its own power through one large gas turbine using an advanced seawater cooling and vaporizing system. Based on positive experiences and efficiency work completion, the owner is satisfied with the contract.

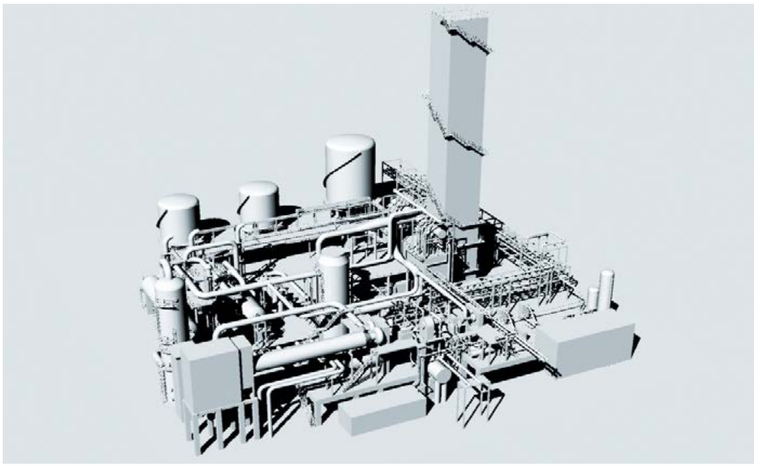




The 84000Nm3/h ASU project adopts the process of full low pressure molecular sieve purification, turbine expander refrigeration, internal compression with product LOX&LIN double pumps and full distillation through air circulation boosting. It features stable running, advanced process, convenient operation, economic and reasonable equipment configuration, safety and low consumption.

Feed air filter is online self-cleaning type, the filter parts can be replaced under non-stop conditions. Processing air volume was designed to be greater than or equal to 2.5 times.

This plant is capable of variable working conditions and variable load operation, and operates economically and stably under variable load without any additional units.





Requests for Welding Process

1. According to the requirements of WPS, the outer surface of each shell section is marked as follows:
   - Project No.
   - Piece No.
   - Sequence number of patches on longitudinal welds and girth welds
   - Material identification number
   - Weld No.
   - Welder No.
2. The following protection measures were taken:
   - Shell section ends protection from dirt, dust, metal chips, etc.
   - Package on wooden bracket

On-site Installation

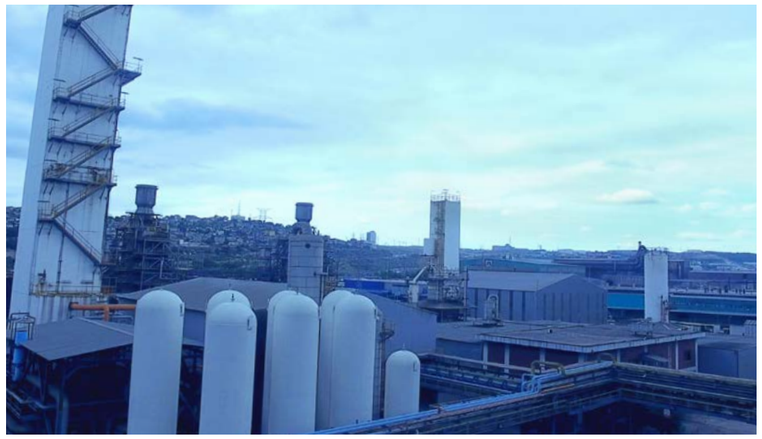
The whole set of this 84,000Nm^3/h air separation plant project covers an area of about 25,000 square meters and was put into operation in 2018. The main equipment - air separation cold box was made in China, the air compressor & booster were made by famous companies in the industry, and the expander, DCS system, analysis instrument and some valves were made by domestic brands. Our construction team took over the project as a turnkey contractor and completed the design and equipment installation work, while the owner's third-party company was responsible for civil construction work and project supervision. We attached great importance to the tower manufacturing of this project by adopting ASME standards and sending staff to supervise the whole manufacturing, and paying attention to the details of quality control.

Due to the limitation of transportation conditions, this project adopted land transport - sea transport - land transport.



Medium *Air Separation Plants*

15,000 Nm^3 O_2 per hour for Türkiye



Extensive Experience in ASUs

In 2005, in Türkiye, among all the competitors, we won the bid of KDON(Ar)-15,000(200Y)/12,000/500Y with our extraordinary supervisor, professional experiences and remarkable achievement. we built this ASU with the capacity of 15,000 Nm^3/h O_2. With our previous experience of manufacturing and procurement, we finally succeeded in handing over this plant to the client efficiently and reliably. Despite all the internal and external obstacles, we dedicated ourselves to this project. Though the project location is remote, we mobilized our global and local network and social connections to procure the proceeding of the project. As a result, our client is very satisfied with our diligent endeavor, and the steel workshop of client can start to produce as scheduled.

15,000 Nm^3 O_2 per hour for Algeria



Overseas EP+C Cooperation Mode

The project adopts the pre-fabricated cold box, which means all the equipment and instruments inside the cold box are installed in China. After onsite assembling and commissioning, the plant can be under operation in short time. The backup system uses 1600Nm^3/h spherical tank and 2000Nm^3/h nitrogen spherical tank, which are installed on site.

All engineering equipment and materials have passed the APGV approval process of the Algerian DGM department. As an overseas EPC project, AVIC is responsible for the preliminary design and production of this set of equipment, as well as the installation work at the project site. During the installation and commissioning stage, AVIC dispatched its Chinese installation team to Algeria, which improved the efficiency and shortened the time.



Strong Support from Global and Domestic

The owner of this project is a Türkiye well-known steel company, who required one set of Air Separation Plant with capacity of KDONAr-15000(500)/1000/575. For this project, AVIC designed the pre-fabricated cold box, divided the cold box into three sections, and sent them to the project site in Türkiye by sea. According to the customer's requirements, the power equipment of the plant was selected from world-wide famous brands, and the instrument and electronic control system are all imported brands.

The project selected a local Türkiye installation team, which has many years of cooperation experience with AVIC. Under the tacit cooperation, the installation work was carried out in an orderly manner.

15,000 Nm^3 O_2 per hour for Türkiye

2x10,000 Nm^3 O_2 per hour for Türkiye



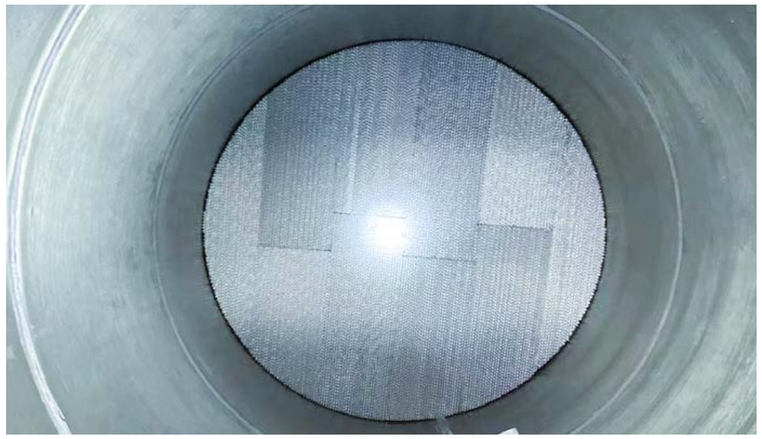
Good ASUs Come in Pairs

This project is owned by a Turkish corporation, which is one of this country's top steel and iron companies. Due to the needs of business expansion, the user required to establish two sets of air separation with the oxygen capacity of 10,000Nm^3/h. Fortunately, AVIC won this bid with professional technologies and service. After two years of design, production, construction and commissioning, these two sets ASUs have been successfully put into operation. All products meet the design requirements.

The ASU includes the following systems: air compression, air precooling, air purification, heat exchange and refrigeration, air separation, argon extraction. Through these systems, the production of various gases and liquids can be obtained.

Medium *Air Separation Plants*

10,000 Nm^3
O_2 per hour for Uzbekistan



Pre-fabricated Coldbox for Landlocked Country

The KDONAR-10000(210Y)/3000(160Y)/230Y Air Separation Plant project is supplied by AVIC in EPC mode to a large local steel and iron company in Uzbekistan. The core part of this plant, the coldbox, is designed by AVIC's professional engineering team as pre-fabricated style. Since Uzbekistan has no port, the transportation of this project can only be carried out by land transport. The total transportation distance from the production site to the project location is 6,500 km, and the height of the transported goods must be less than 4.5m. These make the transportation of cold boxes with a length of 60m and a width of 7m difficult. Our technical team has discussed and tried truck tests for many times, and finally established a five-piece finishing cold box design. Which solves the problem perfectly.

10,000 Nm^3
O_2 per hour for Russia



One More Cooperation With the Same Group

In 2021, a subsidiary of the leading Russian metallurgical group signed a contract with AVIC. The model of this plant is KDONAr-10000(1400Y)/400(1600Y)/100(225Y), for obtaining of required products, we designed and manufactured one of the plant's main equipment – cold box, besides, all the main power equipment is worldwide famous brands. According to local regulations, only instruments that have been verified by authorities can be used in the ASU, therefore, we selected those models, which have been registered on the official registration website, and prepared the technical passport and other documents required for the verification of each measuring instrument to ensure the successful commissioning of the plant.The plant is expected to be put into operation in June 2023.



Even Harsh Environment Can Not Stop Us

In 2011, we've contracted with Russian Client for Oxygen Demand as 400TPD, which is used for melt shop plant.

The weather in Russia at that time was freezing, so the project is difficult to promote. After long time service against with cold weather, AVIC INTL HANGZHOU together with clients staff successfully carried out to operate the ASU unit at the highest possible leading to maximum efficiency as scheduled.

As for this ASU, we offer a lot more than the design and delivery of state-of-the-art plant components and process technologies. Our ultimate aim is to make doing business with us as easy and pleasant as possible, and the client satisfy every action that we have done.

10,000 Nm^3
O_2 per hour for Russia

8,100 Nm^3
O_2 per hour for Türkiye



Mutual Trust Through Cooperation

In 2006, in Türkiye, a remarkable steel producer launched a bid, AVIC is the perfect bidder for this project. We built this external compression ASU with the capacity of 8,100 Nm^3/h O_2. With our previous experience of manufacturing and procurement, we finally succeeded in handing over this plant to the client efficiently and reliably. Although we were confronted with lots of difficulties, we still managed to hand over the key to the client perfectly. Though the project location is away from downtown area, we mobilized our global and local network and social connections to procure the proceeding of the project. In this project, we showed great capacity of engineering, procurement as well as construction. Our client witnessed it, and we believe you will witness our ability in the future, too.

Medium Air Separation Plants

7,500 Nm³ O_2 per hour for Türkiye



Strong Focus and Excellent Track Record in ASUs

In 2009, one top ranking Türkiye steel manufacturer chose us, as well as our experienced engineer and procuring ability. The bid is one ASU with the capacity of 7,500 Nm^3/h O_2 for the use of iron and steel production. In Türkiye, client trust our ability of ensuring this project, though the project location is very inconvenient, with the assist from client and HQ, we eventually succeeded in finishing this project perfectly. It is very difficult for both us and client during this time, but with the global and domestic connection, and the support from the AVIC HQ, no matter how big the problem is, we have the confidence to tackle it. starting from Türkiye, we believe we will have a brighter future in the global market.

6,360 Nm³ O_2 per hour for Libya



Always Stand-by for Our Customers

The owner is one of the largest iron and steelmaking companies, located in Libya. Which has an annual production capacity of approximately 1,324,000 tons of liquid steel. As the demand for steel production in the factory continues to increase, more oxygen supply is needed. Therefore, the company initiated bidding on a global scale and wanted to build a cryogenic oxygen plant with a capacity of around 6,000 Nm^3/h. In 2006, we won the bid with our excellent reputation and advanced technology. After that, we supported this project by delivering one set ASU, which is designed for O_2 capacity of 6,360 Nm^3/h. By teaming up with the customer and equipment manufacturers, we managed to optimize the plant configuration to leverage economies of scale and boost energy efficiency.



Professional Work brings High Performance

The Türkiye KDONAr-6500(200Y)/10000/200 Air Separation Plant project is located in the southern Turkish city, Iskenderun, and serves the steel industry. The project process design is smooth. The technical indicators after acceptance reach the advanced level of similar domestic and international products. The oxygen extraction rate is higher than 99%, the argon extraction rate is > 70%, the oxygen in argon is less than 1ppm. Restart after 2 hours power-off, the oxygen products are qualified. 4 hours after restarting of the argon column, the actual argon output is 1% higher than the assessment indicators.

This set of ASU has high reliability, good operability, and excellent equipment operation stability.

6,500 Nm³ O_2 per hour for Türkiye



6,350 Nm³ O_2 per hour for Türkiye

Professional Support Services from Start-up to Operation

The owner of project KDON (Ar)-6,350/1,000/150 is an Iron and Steel company, sites in Türkiye over an area of about 460,000m^2. The melting capacity of this company is around 1,000,000 tons and its rolling capacity is about 700,000 tons per year. As the company wants to expand its business scope and production, and provides special steel products to different industries. The company's leadership decided to set up a cryogenic oxygen plant with a capacity of around 6,000 Nm^3/h. In the year of 2008, AVIC INTL HANGZHOU had signed the contract with the company, and designed an ASUs with oxygen production capacity of 6,350 Nm^3 per hour after considering the local elevation and climate. Until now, the plant is continue working and the owner is very satisfied with this cooperation.

Medium *Air Separation Plants*

6,150 Nm^3 O_2 per hour for Türkiye



Through Challenges to Achieve Professional

In 2001, we won a bid from an iron and steel producer, the plant is medium size ASU. we built this ASU with the capacity of 6,150 Nm^3/h O_2. With our previous experience of manufacturing and procurement, the project proceeds smoothly and perfectly without error. We overcomed a lot of problems in the procedure of the project. Such as the remote location of this project, which led to transportation difficulties of equipment, we tried very hard to cultivate our global and local network and social connections to procure the proceeding of the project. Throughout this project, we had a broader vision of the world market. We believe now, we are fully competent to face any engineering obstacle coming towards us.

4,700 Nm^3 O_2 per hour for Türkiye



Recognized Certificate of "Oxygen Production Efficiency"

This plant is used in Iron and Steel Industries, the company is located in Türkiye and has an annual production capacity of 1.25 million tons, their productions are exporting to more than 60 countries all over the world.

All types of construction steel are manufactured by a highly skilled workforce in the production plant, which requires highly purified oxygen. Based on this requirement, AVIC helps to provide a large air separation units (ASU), which has “Oxygen Production Efficiency” certificates.

With such kind of ASU, whose capacity is 4,700 Nm^3/h, high purity oxygen and nitrogen gases are produced at the plant to be used for industrial purposes.



5,000 Nm^3 O_2 per hour for Algeria

Do Our Best to Meet the Needs of Our Customers

The owner of project KDON (Ar)-5,000/1,900/150 is an Iron and Steel company, sites in Algeria. As the leadership of this factory wanted to expand their overseas business, and the amount of their received orders was constantly increasing. It was necessary to build a cryogenic new air separation units (ASUs) to provide adequate oxygen support. Based on the altitude and humidity of the owner’s location, AVIC INTL HANGZHOU has customized a cryogenic oxygen plant with a capacity of 5,000Nm^3/h. As the main contractor, AVIC INTL HANGZHOU was responsible over the entire project lifecycle for ensuring timely completion of the turnkey facility, which was gradually brought on stream exactly as planned.



3,500 Nm^3 O_2 per hour for Türkiye

Customized ASU for Glass Industry

The owner of this plant is involved in Glassware Business, and its focus is glassware design, production and sales; specialized chain stores; and production of paper-carton packaging. In glass industry, the owner is one of the biggest companies in the world and second in Europe with its extensive and strong distribution network, wide array of products, exemplary production capabilities, and customized strategic approach.

Their production process needs oxygen support, hence, we supplies them a customized air separation units (ASU). This plant was carefully designed by our engineers, and its oxygen production capacity is 3,500 Nm^3/h with 175 Nm^3/h Liquid oxygen product.

Small & Liquid Air Separation Plants

200 TONS
O_2 per day for Iraq



Liquid ASU Located in Middle Asia

This project located near New Town Iraq, roughly 20 kilometers away from Baghdad city. The user is one local gas trading company. It is the first all-liquid air separation plant in that country, which has the produce capacity of 150 tons per day of liquid nitrogen, 50 tons per day of liquid oxygen, and approximately 1.3 tons per day of liquid argon.

The cold box in the plant is AVIC's own brand and was designed in pre-fabricated type. That speeded up the installation process and made it possible to start production quickly. Meanwhile, the other three major components are world-famous brands, which make the maintenance work more convenient.

10 TONS
O_2 per day for South Africa



Economical Liquid Air Separation Plant

The user of this liquid air separation plant is a gas trading company in South Africa. According to their requirements, we designed a small liquid air separation plant, which can realize product switch from liquid oxygen to liquid nitrogen smoothly.

Besides, considering the convenience of transportation and installation, this project adopted skid-mounted cold box, other equipment of this plant is also designed in skid-mounted or pre-fabricated type, which allows the user to put it into use quickly and to maximize the interests of the user. This proposal was highly recognized by the end user.

In accordance with local requests, the production of this plant followed CE standard.



Aiming at Safe and Efficient

This 28 tpd small-scale ASU project locates in Türkiye, which requires liquid oxygen with purity of 99.6% and liquid nitrogen with purity of 99.999% in different time. Through AVIC's technology, the output of this plant can switch from 28 ton per day liquid oxygen to liquid nitrogen in same capacity.

The equipment adopts automatic switching molecular sieve purification system, with simple process and convenient operation. At the same time, the switching efficiency is high, and the working state is safe, stable and reliable.

With advanced computer-aided design and manufacturing technology, the ASU's product purities and distillation efficiency are in the leading position in the world.

28 TONS
O_2 per day for Türkiye



Product Switching Small ASU

The end user of this project is one gas trading company located in Kuwait, who requires one small plant to produce around 10 tons liquid oxygen per day with purity of 99.6%. Considering these requirements, our professional team suggested our small air separation plant for the user, which could not only meet the needs, but also realize product switching from liquid oxygen to liquid nitrogen smoothly. This proposal was highly recognized by the end user.

Due to the limited area provided by the user, the normal design of small liquid ASU was hard to place. Finally, under the premise of considering safety, we completed the equipment layout design and realized a reasonable and compact use of space.

10 TONS
O_2 per day for Kuwait



PSA/VPSA *Oxygen Plant/Nitrogen Plant*

AVIC INTL HANGZHOU's PSA/VPSA plant system adopts air suction adsorption and Vacuum desorption process. It includes the following main equipment: Blower, Vacuum Pump, Molecular Sieve Absorber, Buffer Tanks, Switching Valves, Instrument Control System, Electric Control System, and Compressor etc.

The Basic Process

A VPSA plant is often designed as “2-bed system”. One bed is in the adsorption stage and the other in the regeneration stage

Each adsorber undergoes a cyclic process, consisting of:
→ Adsorption (O_2 production)
→ Desorption (evacuation)
→ Re-pressurisation (pressure build-up)

Adsorption

The vessel in the adsorption phase is fed with compressed process air through an open air valve.

Moisture and carbon dioxide are captured at the entrance zone of the adsorber. Nitrogen molecules are continuously adsorbed, thus separating oxygen molecules from nitrogen molecules. At the discharge side of the adsorber, the dry oxygen flows into the buffer vessel.

Before the adsorbent is fully saturated with nitrogen, the system switches over to the other bed in order to regenerate the saturated adsorber.

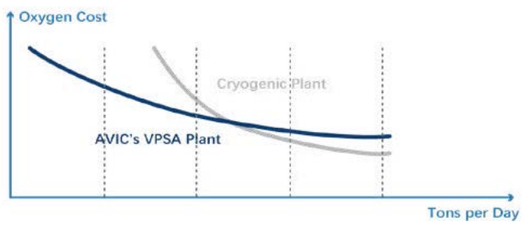
Desorption

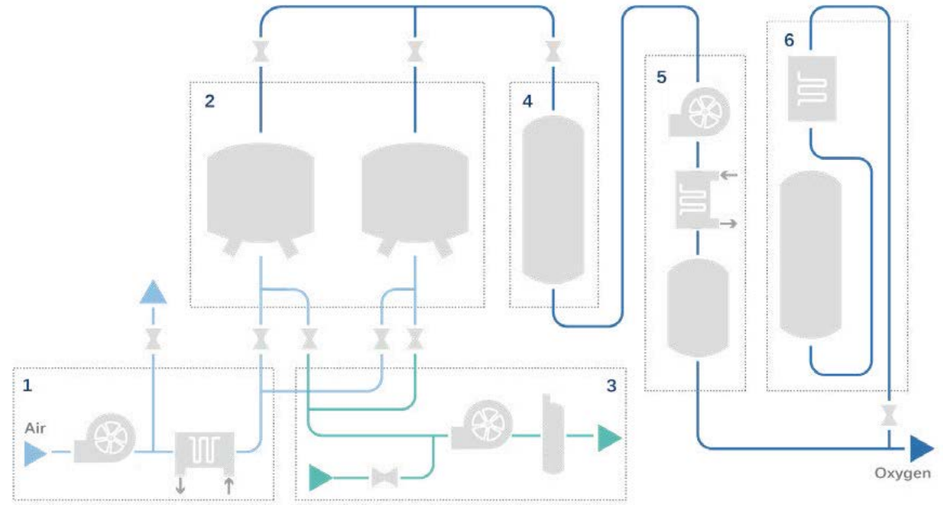
While the first adsorber is in adsorption stage, the second bed is regenerated by opening the residual gas valve, which is connected to a vacuum pump. This pump draws out moisture, carbon dioxide and nitrogen in the opposite direction to the gas flow in adsorption mode. This residual gas is vented to the atmosphere.

Re-pressurisation

In order to reduce energy consumption during pressurisation of the regenerated adsorber, dry gas from the pressurised adsorber flows to the evacuated adsorber. To increase pressure further, the process air blower pressurises ambient air and feeds it into the adsorber.

And so the cycle continues.





1 Air Blower Unit 2 Oxygen Absorption Unit 3 Evacuation Unit 4 Oxygen Buffer vessel 5 Oxygen Compression Unit
6 Back-up System

Applications

Users in wide range of industrial applications can cut the production costs by using AVIC INTL HANGZHOU 's VPSA systems.

Glass and enamel industry
→Melting of glass in melting ends
→Melting of enamel in rotary drum type kilns and tank furnaces
→Heating of effluent grooves

Steel industry
→Arc furnace
→Cupola melting furnaces
→Holding furnaces
→Forge furnaces

Potable water supply
→Feedgas for ozone production for potable water treatment

Pulp and paper industry
→Oxygen delignification
→Black liquor oxidation
→Feed gas for the ozone production at the ozone bleaching stage

Chemical industry
→Oxidation processes such as production of H_2O_2

Public and private waste water treatment and waste disposal industries
→Aerobic waste water treatment
→Thermal refuse incineration

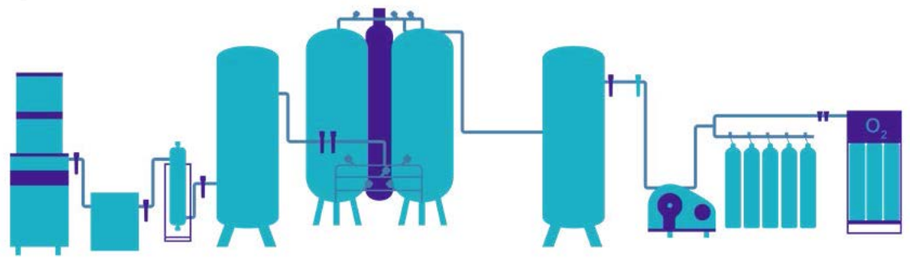
Biotechnology
→Fermentation processes

Outstanding features of AVICINTL HANGZHOU 's Oxygen Plant:

1) Good performance of molecular sieve
2) Long service life.
3) High production capacity of oxygen
4) Low consumption rate of power and cooling water
5) High automation control

Index of AVIC INTL HANGZHOU 's PSA/VPSA Oxygen Plant:

1) Capacity (Nm^3/h): 50-5000
2) Oxygen purity: 90 -95%
3) Oxygen pressure: as required by the clients



1,500
Nm^3
O_2 per hour
VPSA



High Quality, Professional Service and Good Reputation

The owner of this VPSA-1,500/93 is one of the largest iron and steel factories in Türkiye, who delivery their productions all over the world. The factory has a long history since 1964, for them, continuous oxygen with high purity is extremely important.

They chose AVIC INTL HANGZHOU as supplier of VPSA, because of the high quality of our plant, professional service and also our good reputation in Türkiye. Our contract was signed in the year of 2012, the capacity of this oxygen plant is 1,500 Nm^3/h, after that we did our best to delivery the plant and construct.

Nowadays, this equipment is still in service, and our staff are always on site when our clients need us.



Masterpiece near Black Sea

2,500
Nm^3
O_2 per hour
VPSA

The Turkish Iron steel company, located in besides of black sea bank for Türkiye, bought one set of VPSA 2500Nm^3/h Plant for their furnace oxygen using in 2018.

Oxygen in VPSA plant in there, satisfied user's urgent oxygen using demand to replace the LOX by local market, let the owner share the low cost of products with low energy consumption.

Our client is an extraordinary member of Turkish Steel Produce Association member, the company has been making productions in compliance with the international standards, the oxygen from VPSA plant helps the efficiency of utility using, which is supplied based on the melt shop actual peak using, ensuring the high quality.

700
Nm^3
O_2 per hour
VPSA



Engineering Masterpiece in Hungary

Hungary, a country at the foot of Alps. Our client, an outstanding industrial company, is located in such place.

This company is famous in Hungary for its ability to manufacture quality mineral-wool. In order to extend further market, enhanced productivity is required by client. The VPSA of AVIC INTL HANGZHOU perfectly fits the urgent need of the client.

In March 2018, we won this oxygen EPS contract. After the establishment of this VPSA, in owner's factory, 700m^3/h, 93vol% purity of oxygen can be injected in the furnace to increase the internal temperature. Thanks to the high temperature better mineral wool product with high quality can be produced.



Work Hard to Meet the Customer's Demands

700
Nm^3
O_2 per hour
VPSA

The owner of this VPSA-700/93 is located in Türkiye, and is the biggest rock wool producers not only in Türkiye but also in the region thanks to its 120.000 tons of annual production capacity.

During the process of rock wool production, continuous offer of high purity oxygen is necessary.

As factory owners want to broaden the market and increase their production, they would like to add a small VPSA plant to provide oxygen support.

Considered with the customer's special requirement in this trade and the local geographical environment, our professional engineers customized a VPSA device with a production capacity of 700 Nm^3/h, fully meeting the customer's demand for the plant.

2,500
Nm^3
O_2 per hour
VPSA



In-time Support on Site or Remote

This VPSA oxygen generation plant is their second oxygen plant after the cryogenic air separation plant, which is also supplied by AVIC INTL HANGZHOU.

In the melt shop, the VPSA is famous of having adjustable and flexibility running mode advantage compared to cryogenic, therefore, the 2,500 Nm^3/h 93% oxygen gas is used in for adjusting peak oxygen using while steel production increasing. The Turkish Iron steel company, located in Türkiye, bought this plant in 2014, it has been running for 5 years up to now. Whenever the owner needs supports for not only site or remote service but also spares, AVIC INTL HANGZHOU always give hands at the first time, This action has been appreciated by the Customer.



Ease of Maintenance for Low Operation Expenses

1,100
Nm^3
O_2 per hour
VPSA

Our client is now among the largest manufacturers of the insulation industry with 5 state-of-the-art manufacturing facilities, over 4 thousand product varieties, and expert workforce.

The company located in Istanbul, which has operations in insulation industry since 1985, their main business activity is distribution of insulation materials such as glass wool and electrometric rubber foam.

The VPSA plant produces 1,100 Nm^3/h capacity 93% purity of oxygen, is using the smelter of their own for producing the insulation material, which supplied as burning assistant gas, ensuring the high quality and productivity.

2,150
Nm^3
O_2 per hour
VPSA



Oxygen Generation Plant for Chemical

The customer is a Türkiye-based company engaged in the production and distribution of soda ash and chromium chemicals.

Their plant produces heavy soda ash, light soda ash, technical and food grade sodium bicarbonate and sodium silicate serve to a range of industrial sectors.

The 2,150 Nm^3/h VPSA oxygen gas with 93% vol purity is applied in its furnace burning as assistant gas to ensure the quality of its product.

The VPSA plant's adjustable flexibility in producing oxygen, by two pieces of machines, would make the user's selection more efficient. The soda maker company has been satisfied for this plant.



Shorten Construction Period to Minimize Expenses

2,150
Nm^3
O_2 per hour
VPSA

Our owner, the Iron steel company, is one of Turkish Steel Produce Association members, is a Türkiye-based company engaged in the production and distribution of Steel, which is using electric arc furnace to produce. The oxygen here is using for furnace playing role as burning assistant gas.

The customer actually bought 2 plants, this one is second plant for them, both of them are running in good condition right now, and supplying the oxygen to them to satisfy their peak oxygen demand.

The plant's erection and commission takes just 30 days, the owner is very admiring quick action of our response and short period of completion of plant. Our quickly service has got the owner's appreciation, are also grateful for every effort made by owner's Staff.



Hydrogen (H_2) Plant

AVIC INTL HANGZHOU's Hydrogen (H_2) Plant has a powerful technological team including the most famous experts in the field of hydrogen generation by water electrolysis, methanol decomposition and hydrogen purification.

The technology of hydrogen plant has reached to the international advanced level. Through continuous striving, our Hydrogen (H_2) Plant developed rapidly.

The Basic Process

- Hydrogen Generation by Water Electrolysis

Electrolysis is the process of using electricity to split water into hydrogen and oxygen. This reaction takes place in a unit called an electrolyzer. Electrolyzers can range in size from small, appliance-size equipment That is well-suited for small-scale distributed hydrogen production to large-scale, central production facilities that could be tied directly to renewable or other non-greenhouse-gas-emitting forms of electricity production.

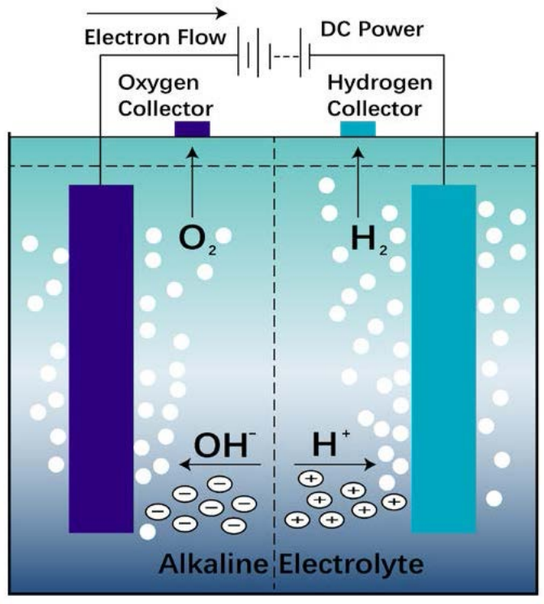
POLYMER ELECTROLYTE MEMBRANE ELECTROLYZERS

In a polymer electrolyte membrane (PEM) electrolyzer, the electrolyte is a solid specialty plastic material.

Water reacts at the anode to form oxygen and positively charged hydrogen ions (protons).

The electrons flow through an external circuit and the hydrogen ions selectively move across the PEM to the cathode.

At the cathode, hydrogen ions combine with electrons from the external circuit to form hydrogen gas. Anode Reaction: $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$ Cathode Reaction: $4H^+ + 4e^- \rightarrow 2H_2$



- Hydrogen Generation by Steam Reforming

The production of hydrogen from natural gas is the cheapest source of hydrogen currently. This process consists of heating the gas to between 700-1100 °C in the presence of steam and a nickel catalyst. The resulting endothermic reaction breaks up the methane molecules and forms carbon monoxide CO and hydrogen H_2. The carbon monoxide gas can then be passed with steam over iron oxide or other oxides and undergo a water gas shift reaction to obtain further quantities of H_2. The downside to this process is that its major byproducts are CO, CO_2 and other greenhouse gases. Depending on the quality of the feedstock (natural gas, rich gases, naphtha, etc.), one ton of hydrogen produced will also produce 9 to 12 tons of CO_2.For this process high temperature (700–1100 °C) steam (H_2O) reacts with methane (CH_4) in an endothermic reaction to yield syngas.

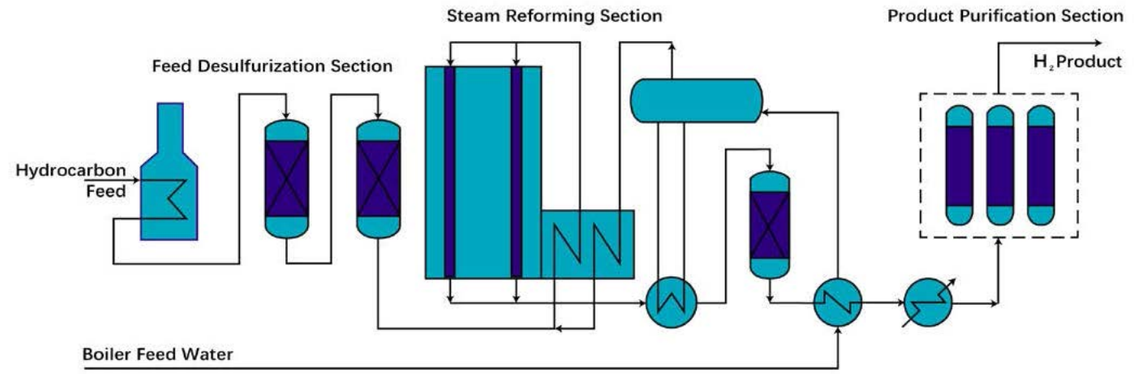
Gasification

$CH_4 + H_2O \rightarrow CO + 3\ H_2$

In a second stage, additional hydrogen is generated through the lower-temperature, exothermic, water gas shift reaction, performed at about 360 °C:

$CO + H_2O \rightarrow CO_2 + H_2$

Essentially, the oxygen (O) atom is stripped from the additional water (steam) to oxidize CO to CO_2. This oxidation also provides energy to maintain the reaction. Additional heat required to drive the process is generally supplied by burning some portion of the methane.



Applications

We serve customers in a wide range of industries. Our accumulated practical experience allows us to design and deliver the perfect fit to meet your individual needs based on your industry recommendations. We offer a flexible supply solution to an extensive range of industries, including:

- **Metals**
- **Glass**
- **Chemicals**
- **Foods**
- **Electronics**
- **Photovoltaics**
- **LEDs**
- **Energy**
- **Fuel Cells**

Differences between the two methods:

- Hydrogen Generation by Water Electrolysis

- Mature technology
- Simple process
- run smoothly
- Easy to operate
- Not geographically restricted
- Unattended automatic operation
- Automatic adjustment of load can be realized with changes in the amount of hydrogen
- Suitable for medium and small scale production

- Hydrogen Generation by Methanol Steam Reforming

- Mature technology
- Reliable operation
- Simple process
- Less operating conditions
- High raw material utilization rate
- No special material requirements
- Simple operation and maintenance
- Suitable for mass production







65
Nm^3
H_2 per hour for Egypt



Professional Staff Make Construction More Efficient

In 2018, We have signed contract with Egypt's Glass Maker company for supply one pre-tested containerized 65Nm^3/h Hydrogen Generator. The plant is according to Client's requirement, adopted CE, designed in EU standard line.

The plant consists of purification system to generate high purity hydrogen gas, which is required in glass surface treatment process, the hydrogen in the controlled atmosphere acts as a scavenging agent to ensure an oxygen-free environment.

After 30 days erection and commission period, the plant successfully put into operation to provide user qualified hydrogen gas. Additionally, the plant also using advanced control system to serve the client with better solution when they have operation issues to ask remote support.

2x50
Nm^3
H_2 per day for Russia



Special Design to Adopt to Special Local Conditions

In Russia's N.Novogorod Industrial zone, Two sets of pre-tested containerized, designed in GOST requirement line, 50 Nm^3/h hydrogen generators supplied to our Türkiye based Russian Federation Glass Maker.

In their process of flat glass and glass ware production, the high purity hydrogen gas is used as an inverting and medium pressurized protective gas.

Right now, both of plant has been working several years, this customer is satisfied with our service through debugging to running.

In N.Novogorod it is cold in winter, the water is frozen, and the container is designed with insulation, selecting explosion-proof and anti-freeze type.



Be Environmentally Friendly and Sustainable Development

In 2015, one of the biggest Glass Factories in Bulgaria searched supplier worldwide to build up a new Hydrogen Generation Plant, in order to increase their production capacity. After comparing the professional capabilities of many international companies and the design solutions they provided, the owner finally decided to cooperate with AVIC INTL HANGZHOU. As the local government had special requirements for environmental protection, our engineers made a customized special proposal of Hydrogen Plant with capacity of 100 Nm^3 per hour, which is much more efficient and environmentally friendly than proposals offered by other companies. Until now, the plant still works smoothly, and the owner feels really satisfied.

100
Nm^3
H_2 per hour for Bulgaria



New Cooperation in Uzbekistan

In 2019, we got a contract with one oil factory from Uzbekistan. The company produces oil from seeds. In order to improve the stability and taste of their productions, the technology of oil hydrogenation is needed.

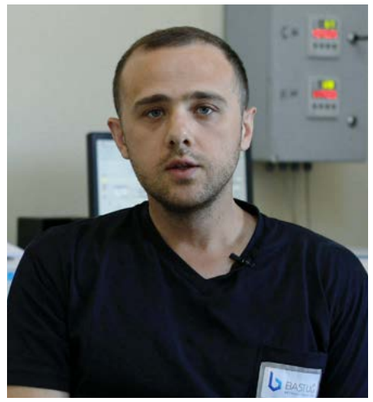
After researching of Hydrogen (H_2) Plants all over the world, they chose AVIC INTL HANGZHOU as their supplier. Combined with the owner's requests and the environment in Uzbekistan, our engineers designed one customized Hydrogen Plant with capacity of 100 Nm^3 per hour. After professional explanation of this design, the owner accepted this proposal and was satisfied with service we supported.

100
Nm^3
H_2 per hour for Uzbekistan

Evaluation from cooperative partners

Serkan Dolapcioglu

Technical Manager of Iron and Steel Company



"We are very happy to use AVIC INTL HANGZHOU oxygen plant, and our oxygen plant is in very good condition right now. When we need any supports AVIC INTL HANGZHOU support us as quick as possible."

—— Serkan Dolapcioglu

Haeri Mohammad

Engineering Director, Petrochemical Company



"They have done this job professionally and in high quality. And our managers are satisfied with the group of AVIC INTL HANGZHOU nominated groups"

—— Haeri Mohammad

Ata ÖZDEMIRLER

General Manager, Iron and Steel Company



"Sixteen years ago, we bought from AVIC INTL HANGZHOU the first oxygen plant. It was also the first plant to buy in Türkiye."

—— Ata ÖZDEMIRLER

Mehdi Mostajab

Managing Director/Member of Board, Petrochemical Company



"I should mention that, I am satisfied with this contract."

—— Mehdi Mostajab

Necati Abacioglu

Chairman, Türkiye-Hongkong Business Council, DEIK



"We have been also established a bridge between Türkiye and China. We are very happy to use oxygen plant, and our oxygen plant is in very good condition right now. When we need any supports AVIC INTL HANGZHOU support us as quick as possible."

—— Necati Abacioglu

Semih Canpolat

Oxygen Plant Manager of Iron and Steel Company



"AVIC INTL HANGZHOU always provide us with good and quick solutions for our problems."

—— Semih Canpolat

Our largest single-train air separation unit

2,900 tpd oxygen

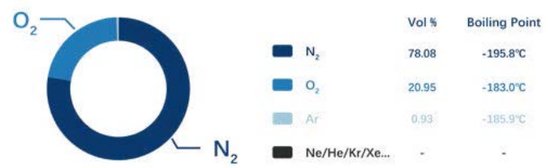
-15%

average power consumption of our ASUs over the last 30 years

20% TCO (Total Cost of Ownership) saving in past **30 YEARS**

1993 ... AVIC INTL made its debuts in Hangzhou,China.

2000 ... the earliest plant of AVIC INTL HANGZHOU was built in Türkiye



Our largest coldbox:

Height: 67 m

Weight: 1,000 t

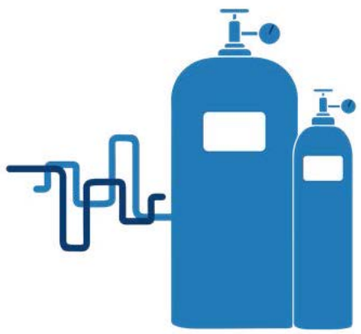


Number of plants overseas:

50+ ASU Plants

22 VPSA Plants

15 Hydrogen Plants



Our largest capacity:

ASU:

GOX	84,000 Nm³/h
LOX	1,000 Nm³/h
GAN	14,000 Nm³/h
LIN	500 Nm³/h

VPSA:

GOX	3,000 Nm³/h



EUROPEAN REGION

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> TRADING DEVELOPMENT GMBH
> REPRESENTATIVE OFFICE IN RUSSIA
> (MARSEILLE) EUROPE OFFICE

AMERICAN REGION

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> CARDOGAN HOTEL SON BHD

Strategic Partners

With the principle of creating value and mutual benefit, AVIC INTL HANGZHOU has established strategic partnership with several outstanding companies and organizations such as Atlas Copoco, ABB, SIEMENS etc., which will not only provide necessary support of technology and talent but also help us establish a good brand image of Air Separation Plant in the markets overseas.



中国航空技术杭州有限公司
AVIC INTERNATIONAL HANGZHOU COMPANY LIMITED

15A Skyline Plaza, No. 181 Tianmushan Road, Hangzhou-China
www.intl-hz.avic.com
www.avicryo.com
info@intl-hz.avic.com