



**TAIYO NIPPON SANSO**  
The Gas Professionals

# Air Separation Plants

*Plant  
Engineering*

## **Plant Engineering**

Taiyo Nippon Sanso assumes full control of every aspect of plant construction from feasibility studies, engineering, procurement of materials, manufacturing of equipment, construction, operation, to maintenance after delivery.

## **Engineering Technology**

### **Feasibility Study**

The company conducts feasibility studies on behalf of its clients to examine their needs from the viewpoints of technology, cost, safety, and legal restrictions.

### **Design**

Taiyo Nippon Sanso develops both basic and detailed designs comprising processes, equipment, machinery, electricals, instrumentation, utilities, and civil engineering. Design work, including piping arrangement and heat exchanger, involves use of the CAD system.

### **Research and Development**

The force that leads and supports the Company's technology is the Research and Development Division. Here, basic and applied research necessary for developing new processes and machinery is conducted. In addition, work is proceeding on metal treatment technology for production of plants and equipment.



# MG Air Separation Plants

Customers acknowledge Taiyo Nippon Sanso's MG air separation plants as being outstanding performers, because their designs have been honed by feedback over many years of reliable operation. The plants bridge a spectrum of capacity requirements and satisfy diverse needs in the iron and steel, electric power, copper smelting, chemical, oil refining, and glass industries.

## Main Features

- Molecular sieve air purification
- High-yield production of high-purity product oxygen, nitrogen, and argon
- Non-Freon process
- Fully automated operation
- Flexible, on-demand production
- No oxygen compressor
- Totally integrated production with complete control over storage tanks and pipelines

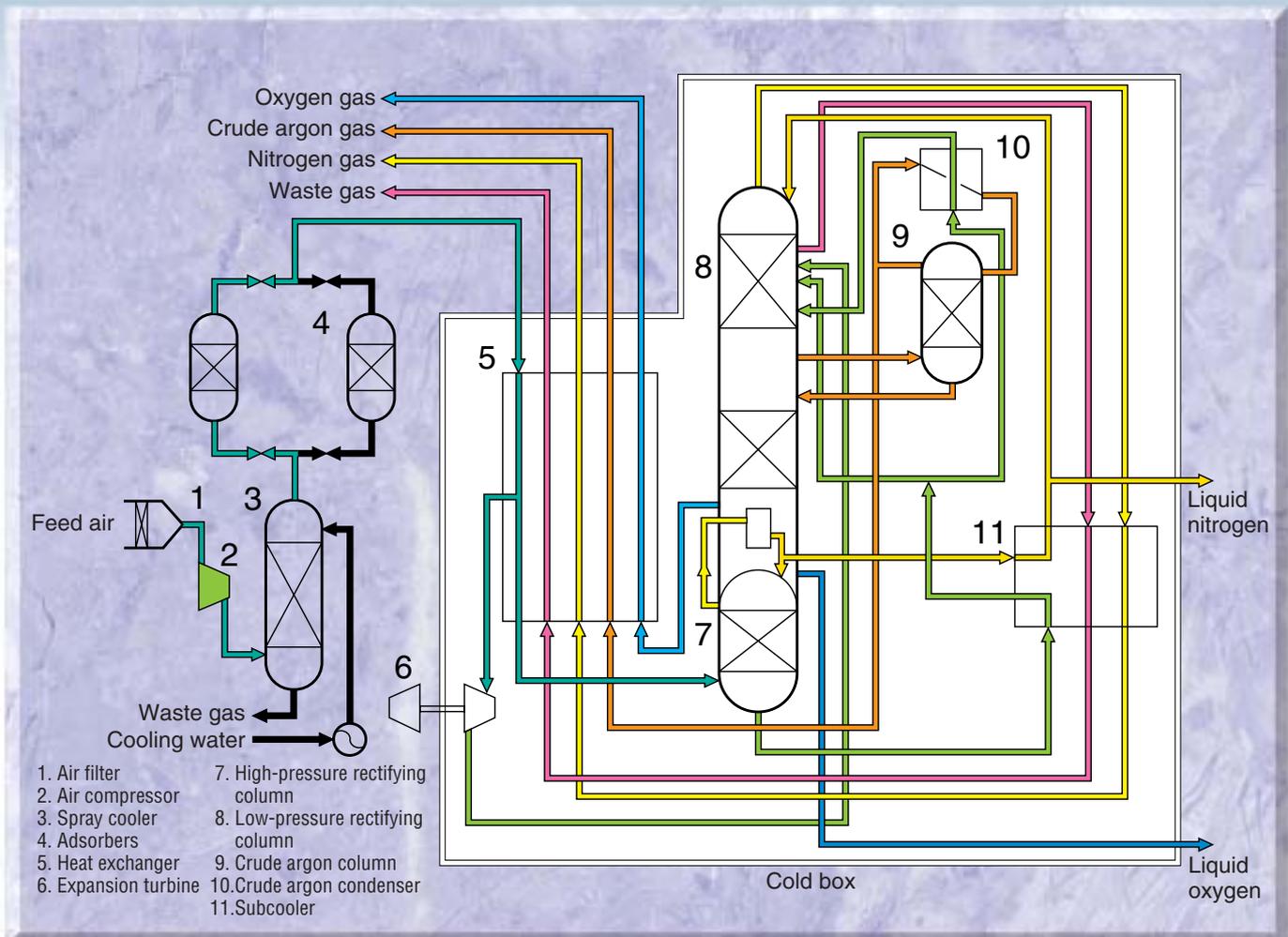
Note: Acquisition of liquid argon requires an additional liquid argon facility.



## Specifications

Module type	Amount of feed air (Nm <sup>3</sup> /h)*	Product purity	
		Oxygen (vol %)	Nitrogen (ppm)
Large capacity	Over 50,000 Nm <sup>3</sup> /h	O <sub>2</sub> ≥ 99.6	O <sub>2</sub> ≤ 0.1
Medium capacity	10,000 to 50,000 Nm <sup>3</sup> /h	O <sub>2</sub> ≥ 99.6	O <sub>2</sub> ≤ 0.1
Small capacity	Less than 10,000 Nm <sup>3</sup> /h	O <sub>2</sub> ≥ 99.6	O <sub>2</sub> ≤ 0.1

\*Nm<sup>3</sup>/h" means gaseous volume at 0°C and 760mmHg



## Summary of the process

Filtered feed air is compressed by the air compressor and cooled in the spray cooler using cooling water. Then, water vapor and carbon dioxide are removed from the air by the MS adsorbers.

The air enters the cold box and is further cooled in the main heat exchanger. Then it enters the rectifying column. There, the air is separated into its final products: oxygen gas, nitrogen gas, crude argon gas, liquid oxygen, and liquid nitrogen.

Cold generation is provided by expanding partially cooled air in the expansion turbine.

# MMG Air Separation Plant

Developed from extensive experience in the field, these highly reliable types of air separation plants are ideal for producing liquid oxygen, nitrogen, and argon.

## Main Features

- Molecular sieve air purification
- Efficient production of high-purity product oxygen, nitrogen, and argon
- Dramatic reduction of feed air, thanks to efficient liquefying technology
- Fully automated operation
- Energy-saving mode for peak and off-peak electric power rates
- Minimal use of electricity through the use of LNG refrigeration
- Totally integrated production with complete control over storage tanks and pipelines
- No oxygen compressor

Note: Acquisition of liquid argon requires an additional liquid argon facility.



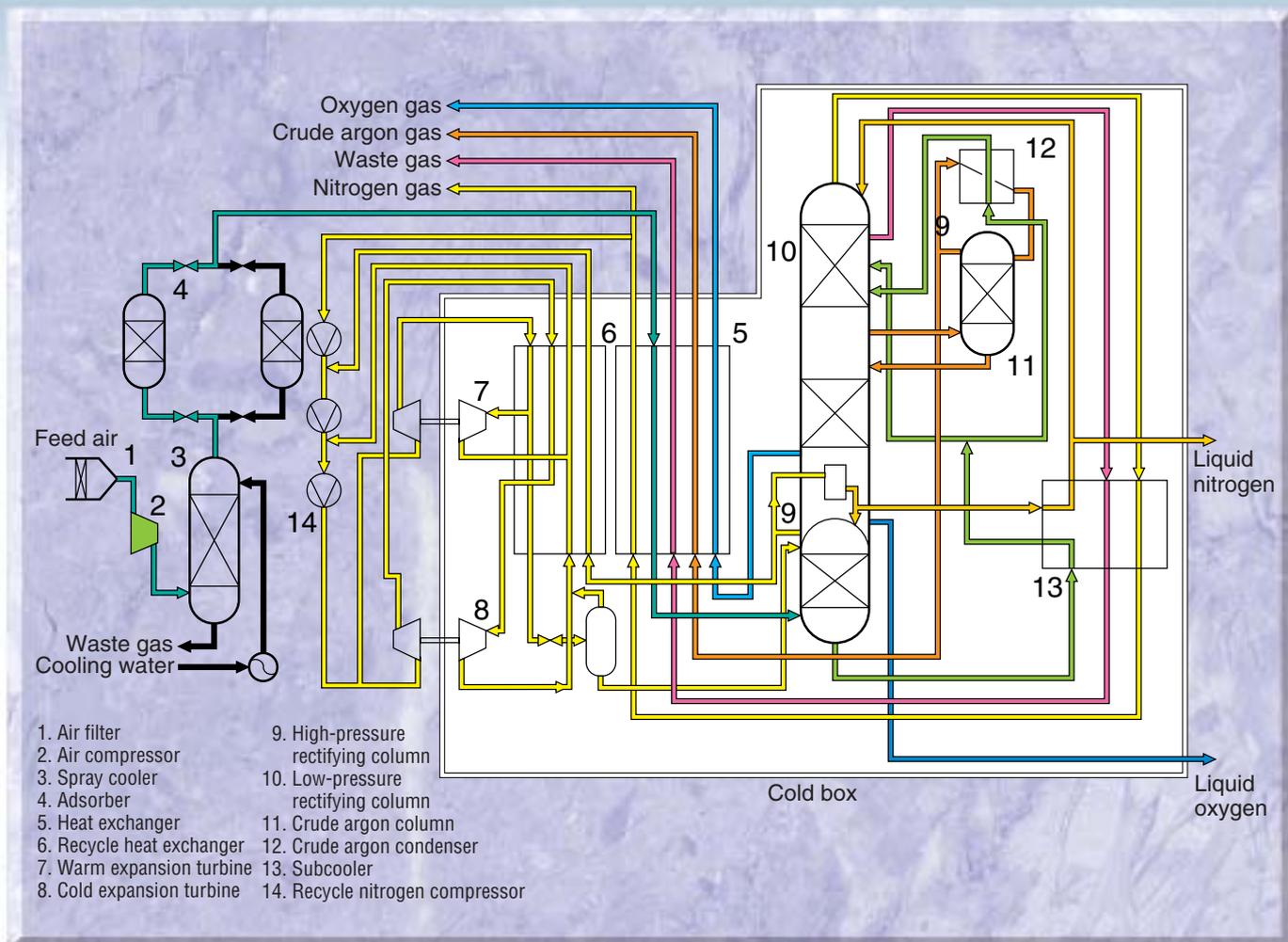
## Specifications

	Amount of products (Nm <sup>3</sup> /h) and purity		
	LO <sub>2</sub> (O <sub>2</sub> ≥ 99.7%)	LN <sub>2</sub> (O <sub>2</sub> ≤ 0.1 ppm)	LAr (O <sub>2</sub> ≤ 1 ppm)
MMG3800	500	500	15
MMG5600	1,000	1,000	30
MMG10000	2,000	1,100	60
MMG15500	3,000	7,000	120
MMG23000	4,500	8,200	180

Note: Plants with a capacity greater than the MMG23000 are also available by special order.

\*\*“Nm<sup>3</sup>/h” means gaseous volume at 0°C and 760mmHg

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## Summary of the process

Filtered feed air is compressed by the air compressor and cooled in the spray cooler using cooling water. Then, water vapor and carbon dioxide are removed from the air by the MS adsorber.

The air enters the cold box and is further cooled in the main heat exchanger. Then it enters the rectifying column. There, the air is separated into its final products: oxygen gas, nitrogen gas, crude argon gas, liquid oxygen, and liquid nitrogen.

Cold generation for producing product liquids is accomplished by compressing, cooling, and expanding the nitrogen gas produced in the rectifying columns through the recycle nitrogen compressor, recycle heat exchanger, and expansion turbine.

# High-Purity Nitrogen Pro

The JN Series is a new addition to Taiyo Nippon Sanso's lineup of high-purity nitrogen production plants, first introduced in the 1960s. Since then, improvements have been made over the preceding PN, UPN, and NG series plants.

Taiyo Nippon Sanso's plant types fulfill a complete range of requirements for virtually any industry. The general-purpose JN type is used for the chemical, glass, textile, metal, and foods industries. The JNP type is exclusively for semiconductor applications. The JNC type is ideal for small-volume applications.

## Main Features

- Molecular sieve air purification
- Minimal plot size and field installation work
- Dramatic reduction of feed air, thanks to highly efficient processing

### JNP type

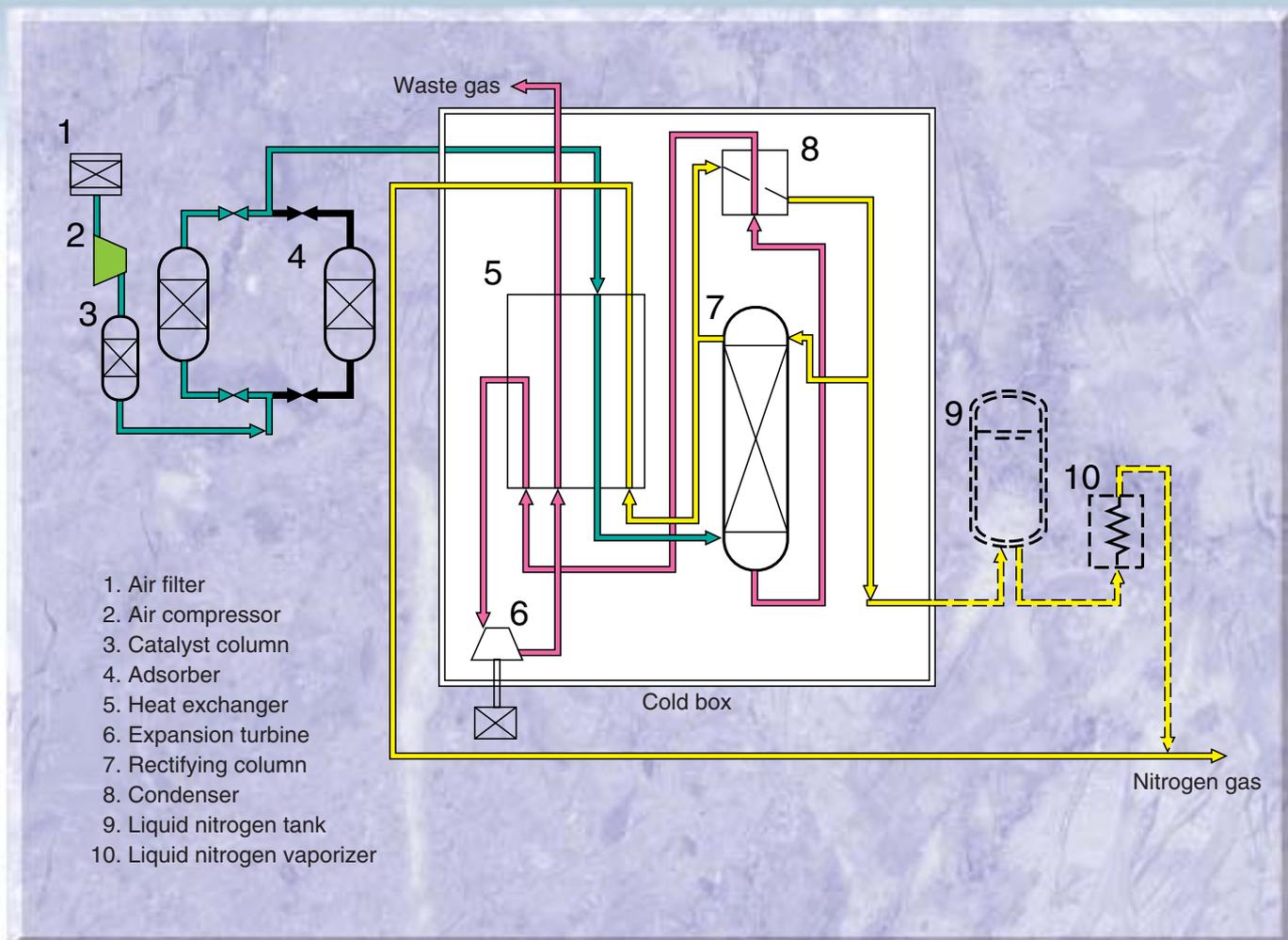
- Three types available: JNP40, 60, 100
- Non-Freon process
- Dramatic reduction of installation work by employing unitized construction
- Maximum removal of impurities
- Easy upgrade possible to simultaneous production of liquid nitrogen with minimal changes in equipment
- Remote, centralized monitoring
- Automatic, one-touch operation

### JNC type

- Two types available: JNC25, 50
- Non-Freon process
- Compact design
- Automatic, one-touch operation
- No cooling water used
- Simple components with a minimal number of rotary parts



# duction Plants



## Summary of the process

Filtered feed air is compressed by the air compressor. Water vapor and carbon dioxide are removed by the MS adsorber. The air is cooled in the main heat exchanger, then sent to the rectifying column. There, nitrogen gas is produced from the column's top product. Then, the nitrogen product is rewarmed in the heat exchanger.

Refrigeration for the operation of the process and cooling down of the equipment is provided by the expansion turbine, which expands the waste gas from the rectifying column. (With the JNC type, refrigeration is supplemented by the liquid nitrogen delivered to the cold box from the storage tank.)



ISO 9001 95QR-016  
ISO 14001 01ER-162



**CAUTION!**

FOR CORRECT AND SAFE USE, MAKE SURE YOU READ THE CORRESPONDING MANUALS BEFORE OPERATION.

Specifications are subject to change without prior notice.

For inquiries, please contact:

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