ET2C Professional Secondary Refrigerants Coolants

2026

ET2C International Inc.

SOURCING MADE SIMPLE

Product Overview

01

01 | Secondary Refrigerants

Our secondary refrigerants are high-performance heat transfer media designed to replace traditional brine and glycol/water-based coolants. They offer proven corrosion resistance, excellent heat transfer efficiency, a wide operating temperature range (-135 °C to 350 °C), and are environmentally friendly.

02

02 | Lithium-Ion Electrolytes

Lithium-ion electrolytes are part of the emerging energy storage industry supporting the global roadmap toward net-zero carbon. Our products are engineered with three key characteristics: high energy density, a wide operating temperature range, and long service life.

03

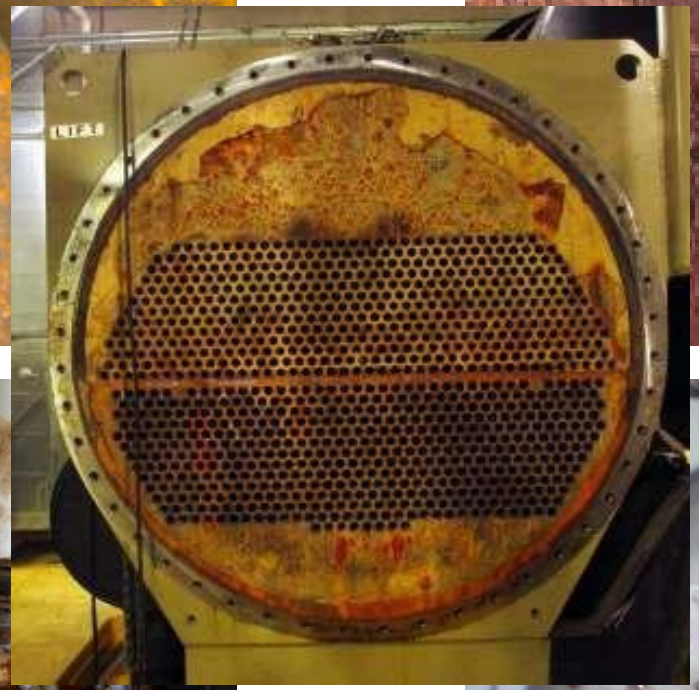
03 | Novel Lithium Salts

Novel lithium salts are advanced additives for lithium-ion electrolytes. These products significantly enhance electrolyte performance in terms of operating temperature, energy efficiency, and recirculation properties.

Traditional Coolants Comparison

WATER	Suitable for operation above 0 °C, such as air-conditioning systems. Industrial cooling water typically operates between 10–30 °C and is corrosive to equipment.
BIRNE	The freezing point varies with concentration. The minimum freezing point of NaCl is -55 °C, while $CaCl_2$ is -21.2 °C. Both are highly corrosive to systems.
ALCOHOL	Freezing point below -110 °C, with an operating range between -100 °C and ambient temperature. Alcohol is flammable, volatile, explosive, and highly corrosive.
GLYCOL	A stable cooling agent that can be diluted. Although the freezing point can reach -50 °C, viscosity increases rapidly at lower temperatures. Recommended operating temperature is above -20 °C. Diluted solutions are corrosive.
DICHL ORMET HANE	Freezing point around -97 °C, operating range -50 °C to 90 °C. Highly volatile with frequent refilling required. Low boiling point, corrosive, low water solubility, and prone to blockage and pipe rupture at low temperatures.

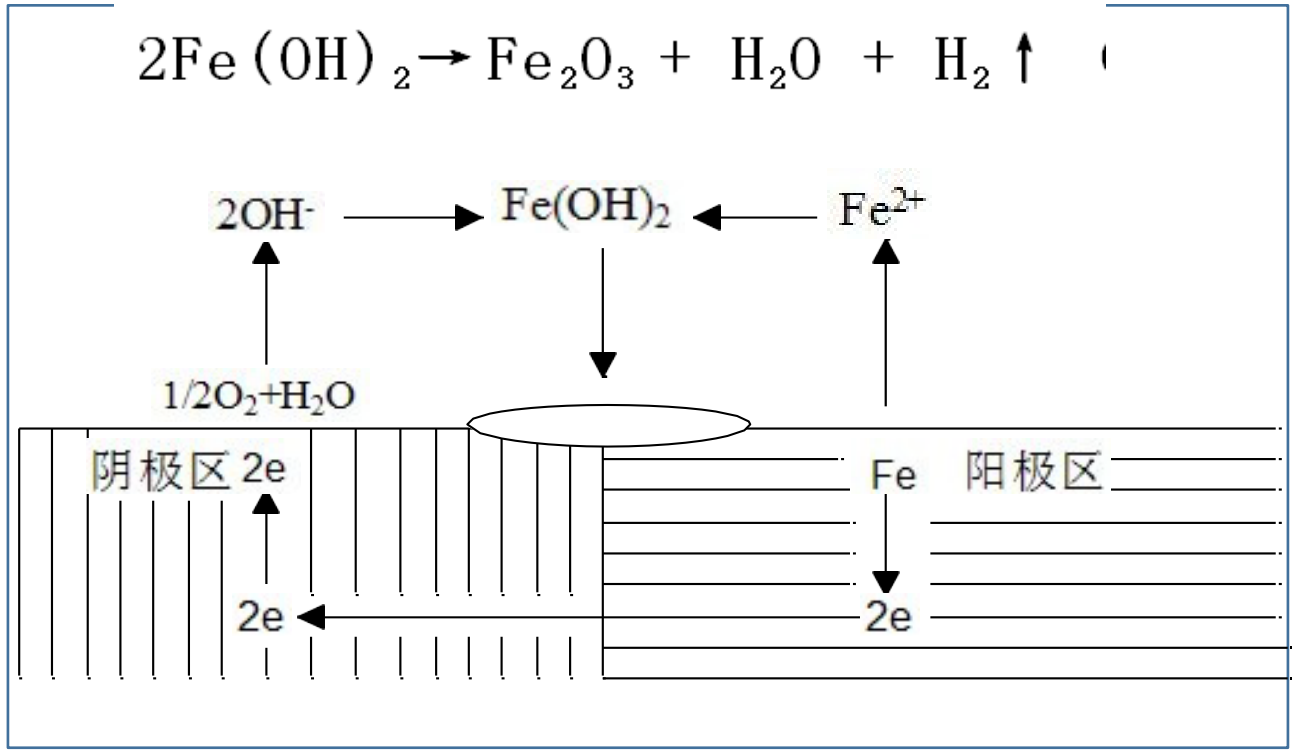
Equipment in Contact with Brine and Glycol



Corrosion Mechanism of Glycol

$$3Fe(OH)_2 \rightarrow Fe_3O_4 + 2H_2O + H_2\uparrow$$

$$2Fe(OH)_2 \rightarrow Fe_2O_3 + H_2O + H_2\uparrow$$



Electrochemical Corrosion

OH^- ions are generated from glycol solutions, causing iron to ionize. These ions react to form $Fe(OH)_2$, which further decomposes into Fe_2O_3 or Fe_3O_4.

Chemical Corrosion

Glycol can oxidize into weak acids, reducing solution pH and accelerating corrosion.

Metal color changes under corrosion

Fe——**Fe^{2+}**——**$Fe(OH)_2$**——**$Fe(OH)_3$**——Fe_3O_4——**Fe_2O_3** **Red color**

Corrosion Issues in Conventional Secondary Refrigeration Systems

01 Corrosion of heat exchangers reduces heat transfer efficiency and negatively impacts overall system performance.

02 Glycol solutions can severely corrode pipelines, creating a high risk of leakage.

03 Pumps and valves are subject to serious corrosion. Welding joints are immersed in electrolytes where corrosion products accumulate, intensifying corrosion caused by electrical coupling and concentration differences.

Overall, brine and glycol solutions can cause severe corrosion to equipment in secondary refrigeration systems.

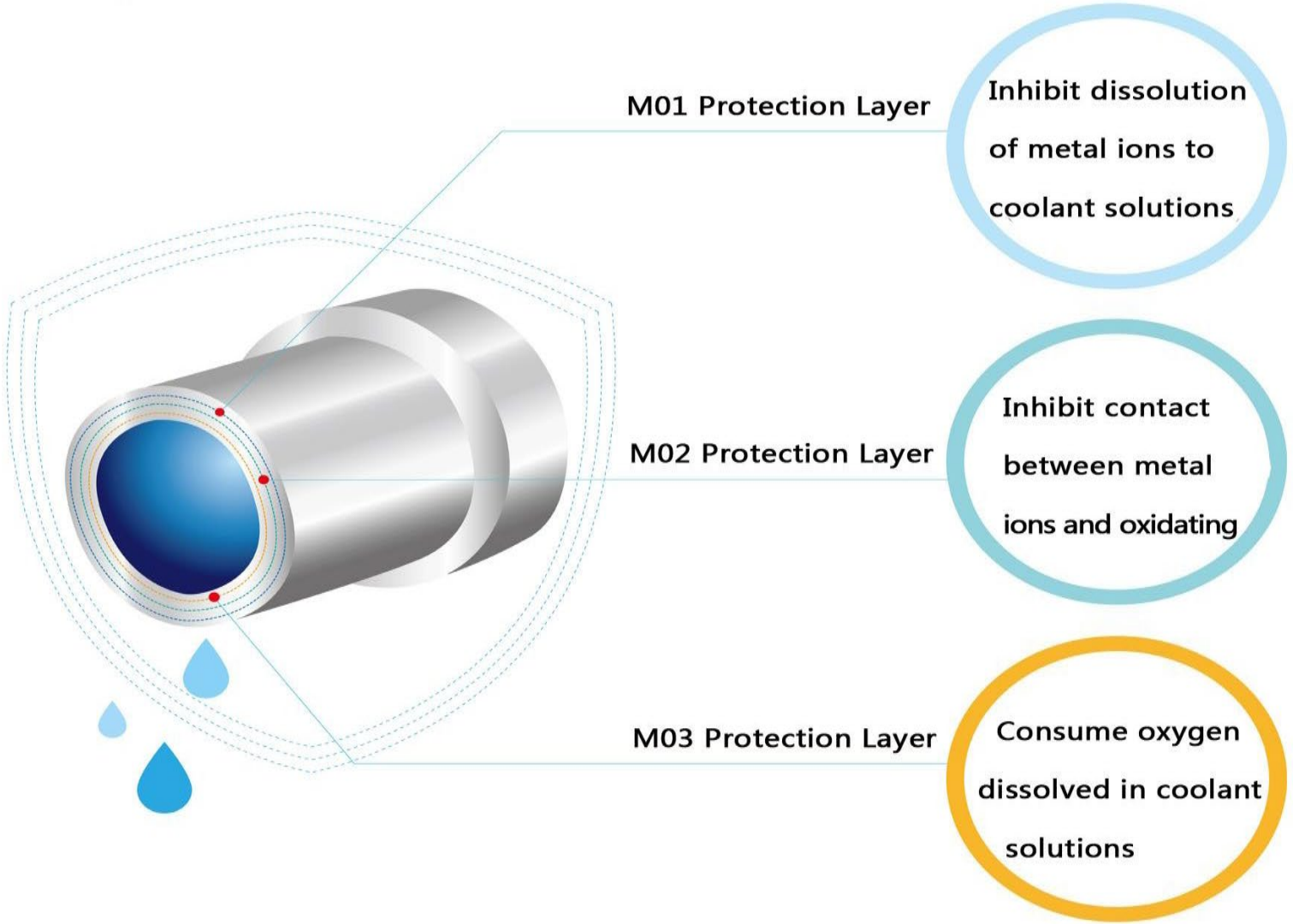
If no corrective measures are taken, corrosion will continue to worsen, increasing operating and maintenance costs. Leakage may occur due to penetration and failure of valves and pipelines.

Summary of Main Products

PRODUCTS		OPERATING TEMPERATURE (℃)	CORROSIVITY	TOXICITY	FLAMMABILITY	FLASH POINT (℃)
Traditional Secondary Coolant	BRINE	-40~90	YES	LOW	NONE	N/A
	GLYCOL	-30~140	YES	LOW	YES	111
	ALCOHOL	-80~40	YES	LOW	YES	12
Our Coolant	ET-1	-100~40	NO	LOW	YES	20
	ET-2	-80-40	NO	LOW	YES	20
	ET-3	-80~40	NO	NONE	YES	20
	ET-4	-35~150	NO	LOW	YES	120
	ET-4A (FOOD)	-30~100	NO	NONE	YES	100
	ET-8	-50~100	NO	LOW	NONE	N/A
	ET-8A	-40~90	NO	LOW	NONE	N/A
	ET-11	-75~150	NO	LOW	YES	64
	ET-11D	-35~180	NO	LOW	YES	94
	ET-12 (COLD STORAGE)	-25~0	NO	LOW	NONE	N/A
	ET-13 (COLD STORAGE)	-30	NO	LOW	NONE	N/A

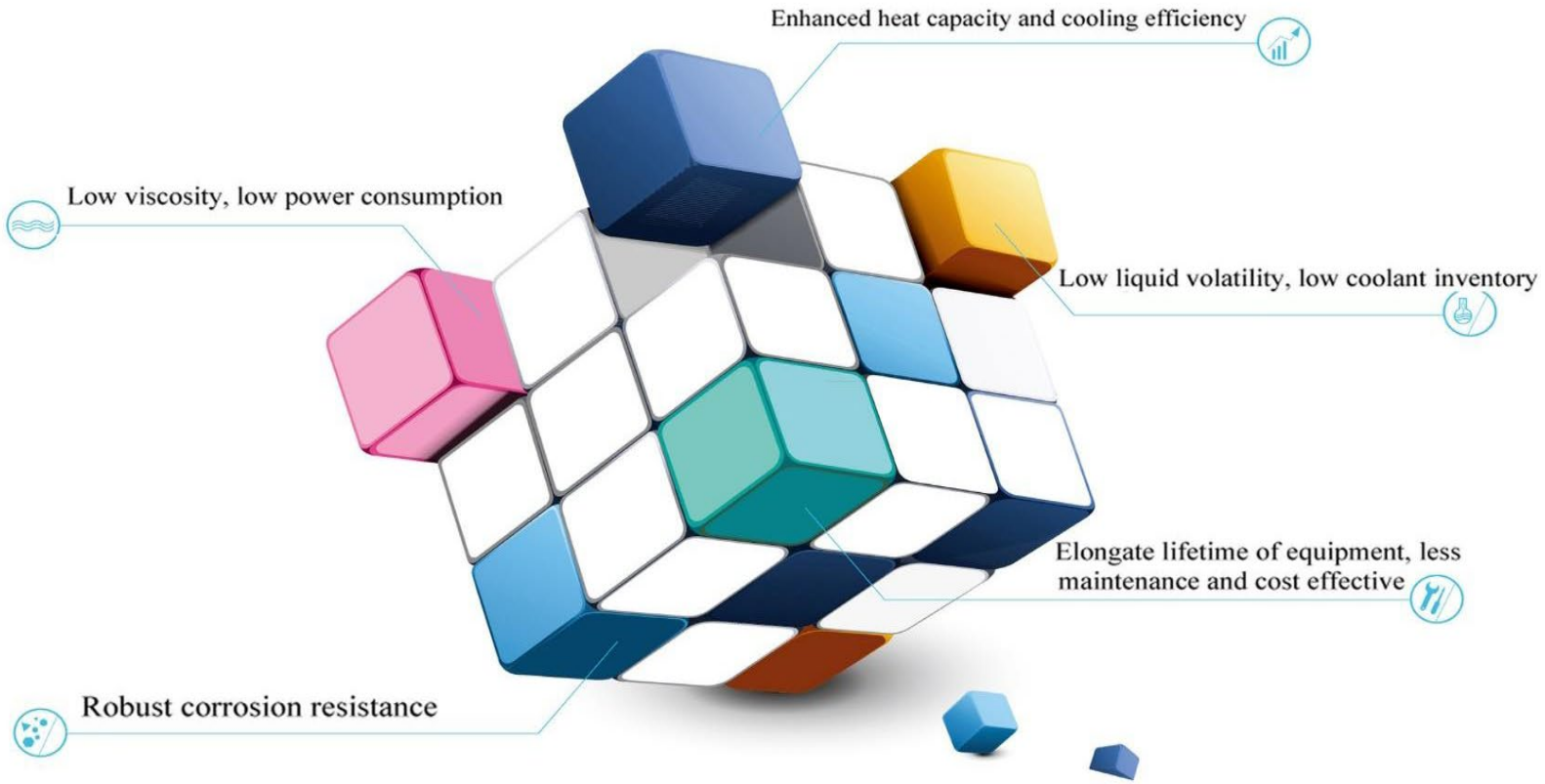
M3-Corrosion Protection Mechanism

Advanced multi-layer corrosion protection technology designed to safeguard metal surfaces under extreme operating conditions.



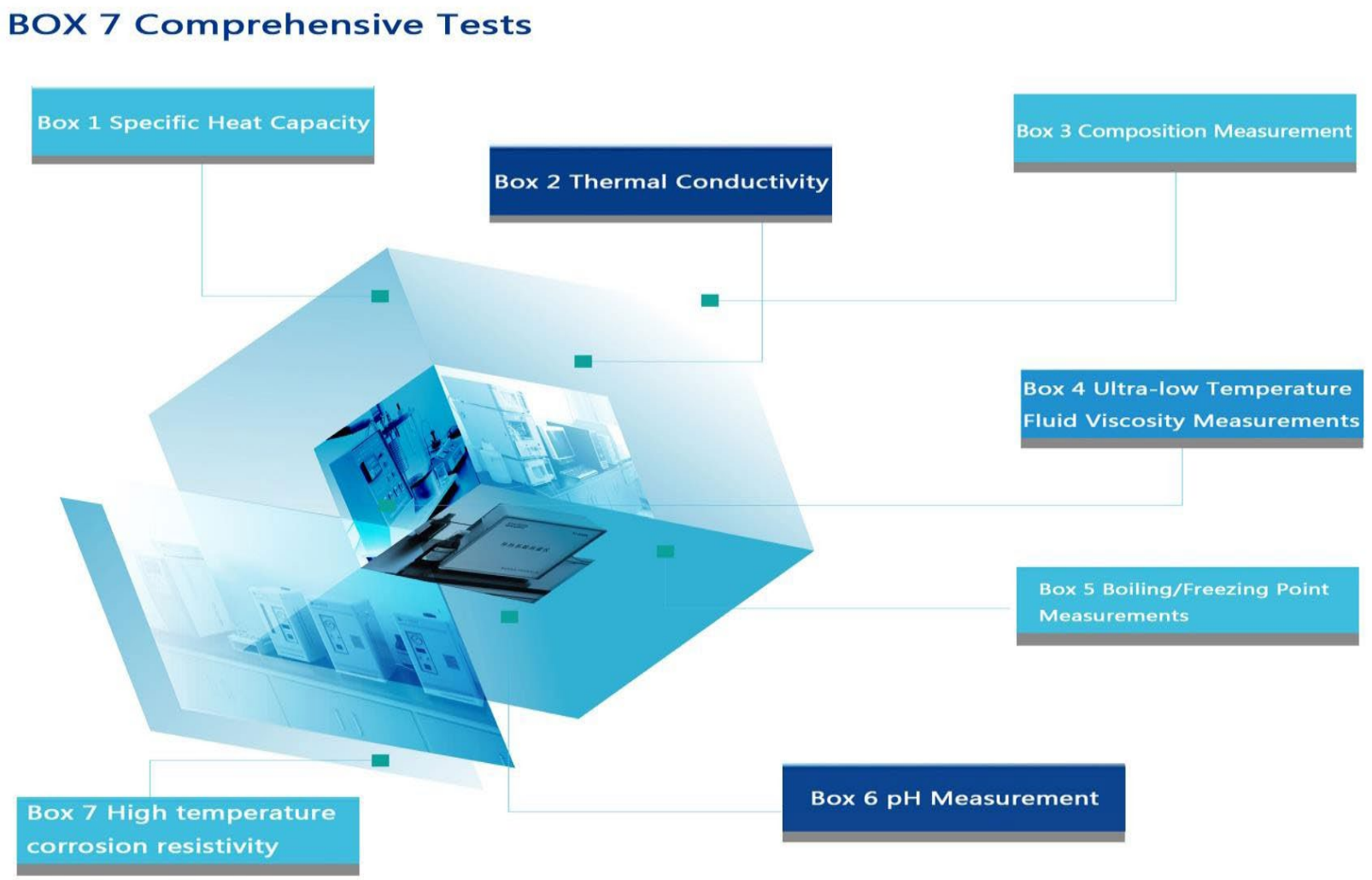
Modify2000 Technology

Proprietary formulation technology optimizing molecular structure for superior heat transfer and corrosion resistance.



Box7 Comprehensive Tests

Extensive laboratory and field testing to validate performance, safety, and long-term reliability.

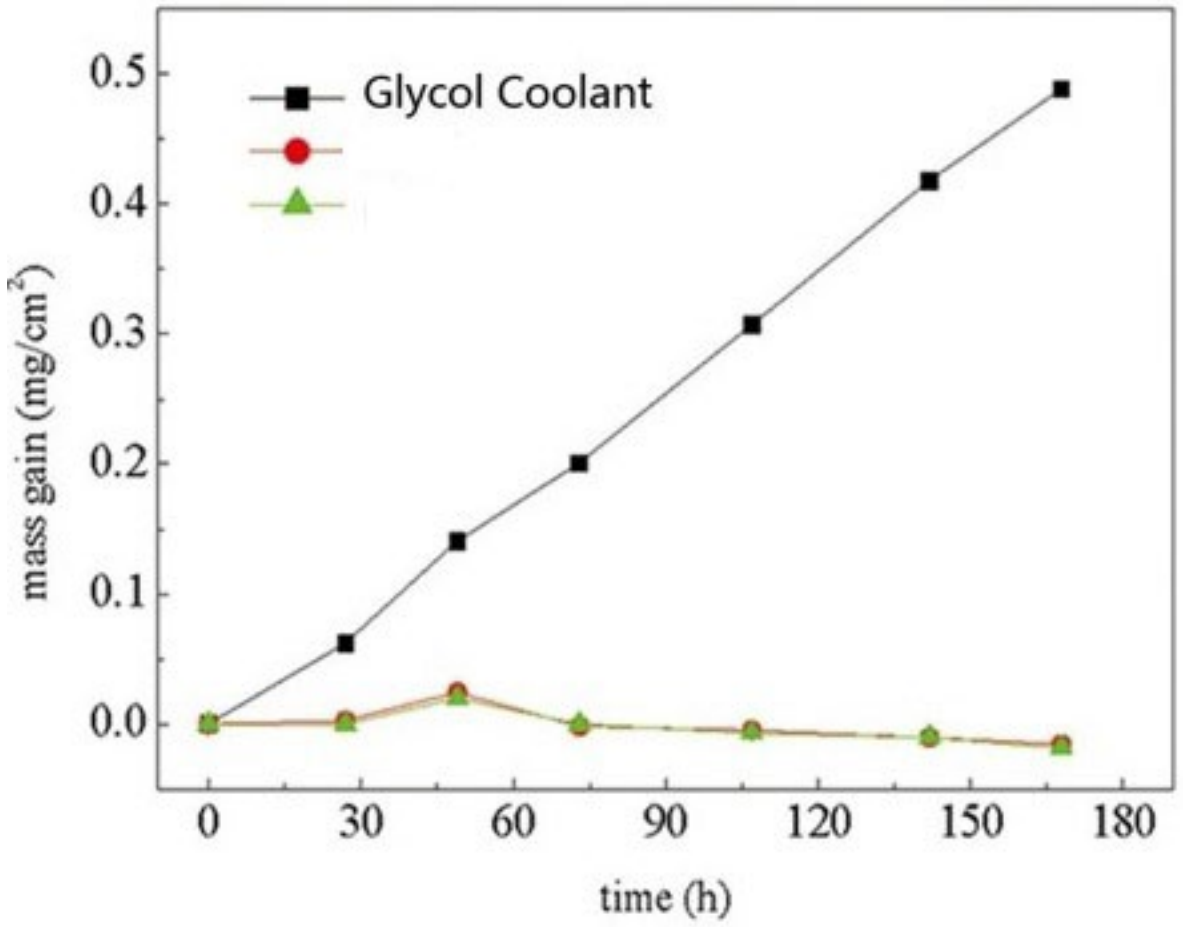


Corrosivity Measurements

A3 Carbon Steel was immersed in three solutions and the result showed that the anti-corrosion performance of our coolants was robust.

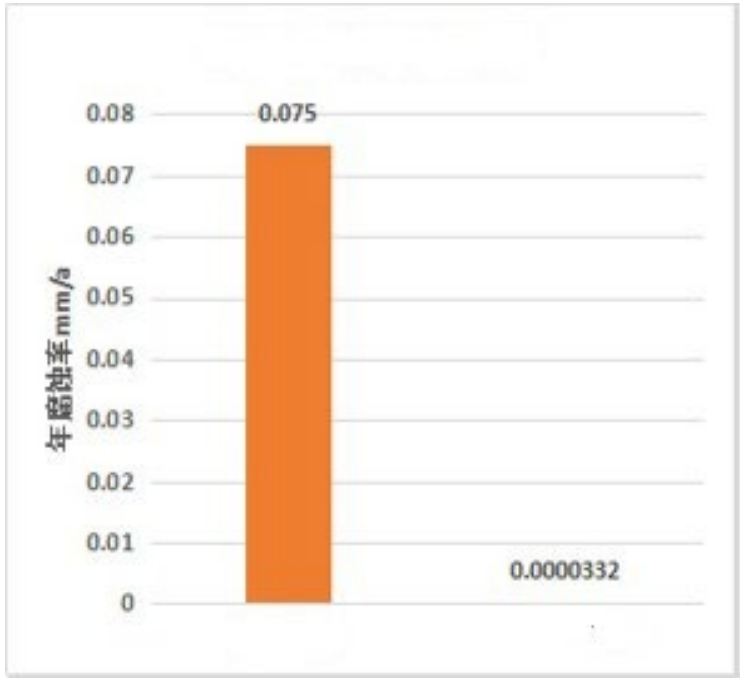
Corrosivity Measurements

Appearance and weight change of A3 carbon steel due to corrosion after 168 hours of immersion in glycol solution, ET-1, and ET-4.

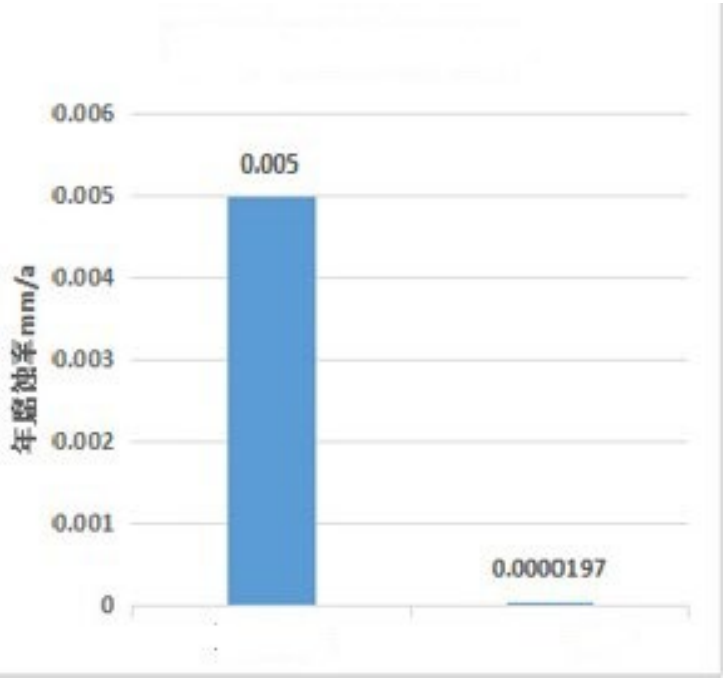


Comparison of corrosion rate between carbon steel, stainless steel and copper

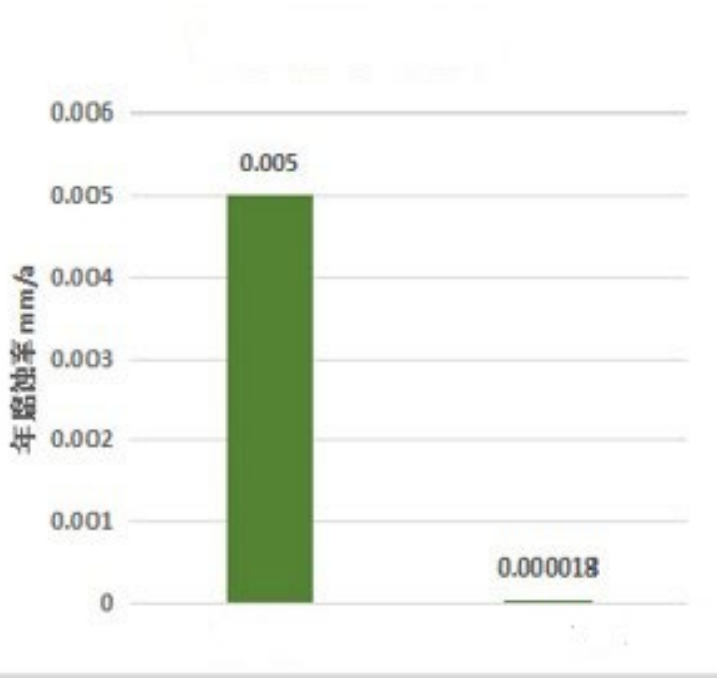
National Standard	ET-4	National Standard	ET-4	National Standard	ET-4
0.075mm/a	3.32×10^{-4}mm/a	0.005mm/a	1.97×10^{-5}mm/a	0.005mm/a	1.80×10^{-5}mm/a



Annual corrosion rate
of carbon steel (Q235)



Annual corrosion rate
of stainless steel (Q304)



Annual corrosion rate
of copper (T2)

Test Standard: JB/T 7901-1999 – Uniform Corrosion Laboratory Immersion Testing
Evaluation Criteria: GB/T 50050-2017 – Industrial Recirculating Cooling Water Design Code
Results demonstrate corrosion rates significantly below national standards.

Anti-corrosion performance approved by Chinese Academy of Sciences

IMR

载冷剂腐蚀性能评价

检 测 报 告

委托单位：朝阳光达化工有限公司

产品名称：(载冷剂)

检验类别：委 托

SKLCP

中国科学院金属研究所

金属腐蚀与防护国家重点实验室

二〇〇八年七月七日

中国科学院金属研究所

检 验 报 告

客户单位	朝阳光达化工有限公司		委 托 人	[illegible]
样品牌号			联系电话	0421-7210956
生产日期	2008.6.26	2008.6.26	形状规格	液态
生产编号	/108062601	408062601	来样状态	液态
来样数量	3		来样日期	2008-06-28

来样情况及委托内容

来样情况：

来样为朝阳光达化工有限公司生产的 载冷剂和分析纯乙二醇。试验用A3钢和紫铜尺寸均为10×10×40。

委托内容：

配制成质量百分比为25%的水溶液，评价对A3钢和紫铜的腐蚀性能。

检测结论

1、检测过程：

根据委托合同检测要求按GB/T 19291-2003《金属和合金的腐蚀 腐蚀试验一般原则》评价载冷剂对A3钢和紫铜的腐蚀性能。

2、检测条件：

在常温下测试载冷剂A3钢和紫铜的腐蚀性能，测试时间168h（7天）。

3、检测仪器：

检测仪器：Sartorius 电子天平（最小分度值0.01毫克）。

4、检测结果：

见附录。

5、检测结论：

试验168h后，A3钢在乙二醇溶液中腐蚀严重，表面变黑，而在 和 溶液中仍保持光亮，基本无腐蚀。

紫铜在乙二醇溶液中的腐蚀失重最多，发生了局部腐蚀，而在 和 溶液中保持光亮，基本无腐蚀。

编写	王成	批准：
校对	[signature]	
日期	08年7月7日	

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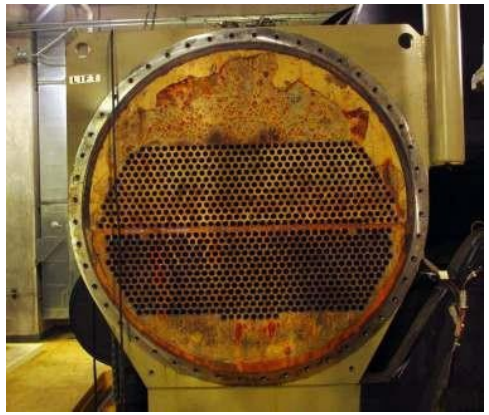
Comparison of Corrosion Between Normal Glycol and ET2C

Glycol: 3~4 years service life



ET2C Coolants: 8 years service life

Market Outlook for Professional Secondary Refrigerant

LARGE MARKET

Refrigeration systems are widely applied across multiple industries, including pharmaceuticals, chemicals, food and beverage, and data processing centers.

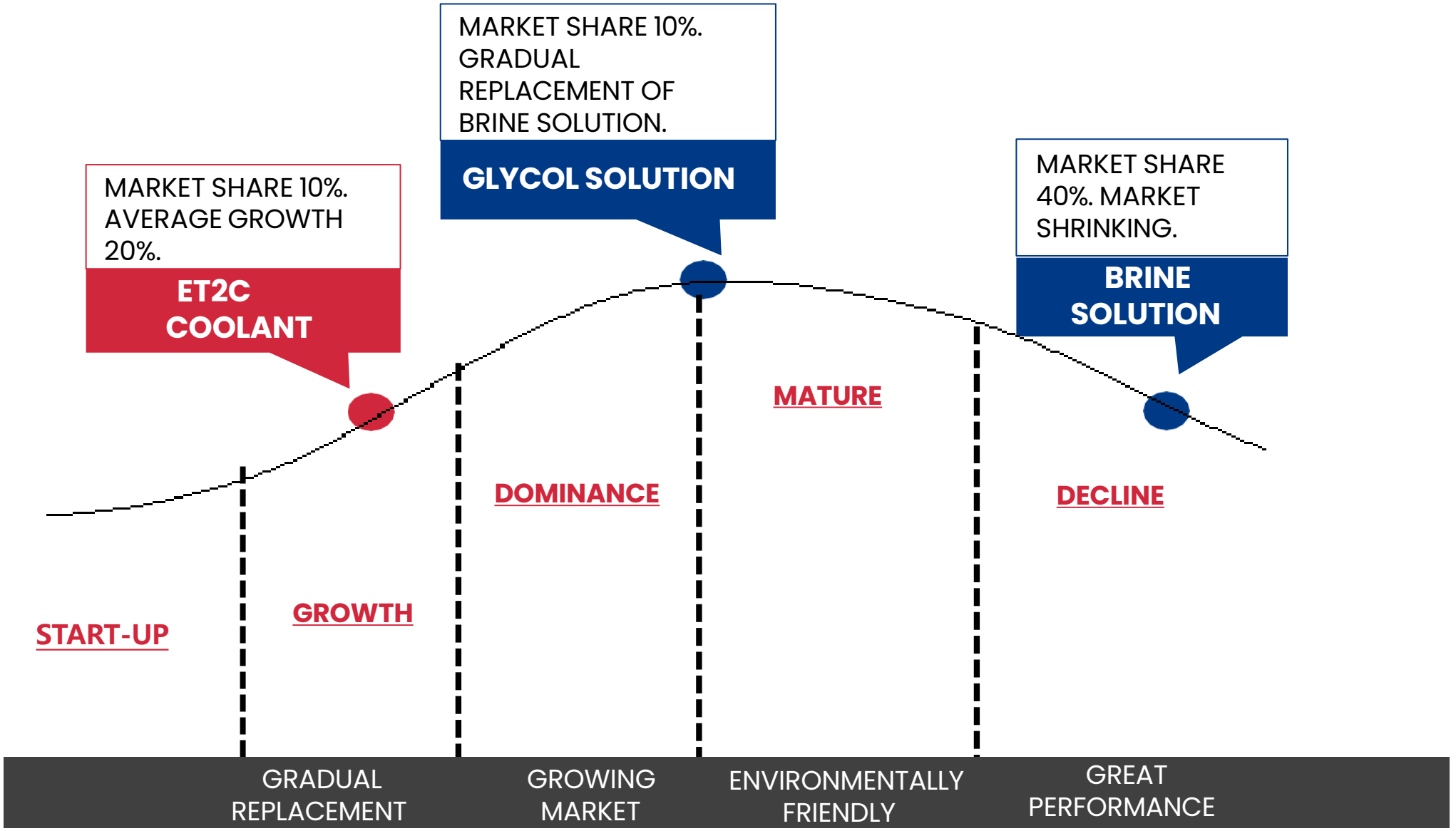
Secondary refrigeration systems are increasingly adopted because they offer improved safety and require a smaller inventory of primary refrigerants.

SMALL INDUSTRY

The professional secondary refrigerant industry remains relatively small due to:
Lack of unified industrial regulations
Absence of specific governmental policies
Widespread use of conventional glycol and brine solutions that cause severe corrosion.

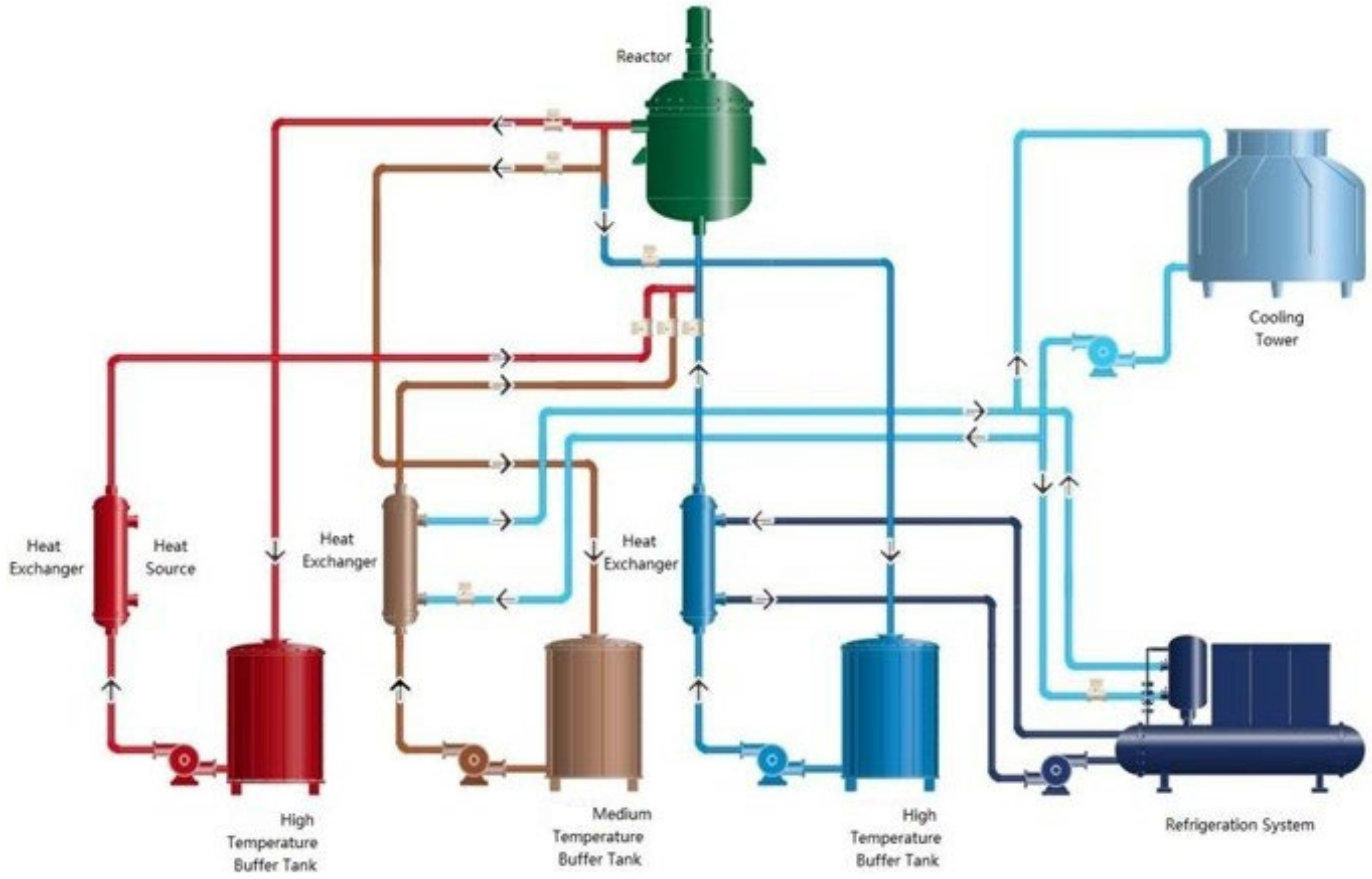
ET2C is the leading brand in China's secondary refrigeration industry.

Supply and Demand of Secondary Refrigerant



Case Study: Pharmaceutical Application

In a pharmaceutical plant, severe corrosion of reactors, heat exchangers, and pipelines caused by brine, water, and steam heat transfer media resulted in a complete system replacement and destruction of a batch of pharmaceutical intermediates during production. ET2C products demonstrated excellent anti-corrosion performance on carbon steel, copper, aluminum, and stainless steel, significantly extending the service life of the secondary refrigeration system. After the system was refilled with ET-4, the corrosion problem was completely resolved.



Case Study of Pharmaceutical Application

Previous System with Brine/Water/Steam

Operating temperature range: -20 °C to 120 °C
Coolant: Brine / Water / Steam
Cost of coolant: RMB 50,000
Total annual operating cost: RMB 300,000 per year
Additional cost: RMB 2 million

Severe corrosion led to the replacement of equipment and the destruction of a batch of pharmaceutical intermediates during processing. The mixing of brine, water, and steam accelerated equipment corrosion and required a high level of manual intervention to control the process. The operation was unstable, and production was eventually stopped. The reactor, heat exchanger, and pipelines in the secondary refrigerant system all had to be replaced.

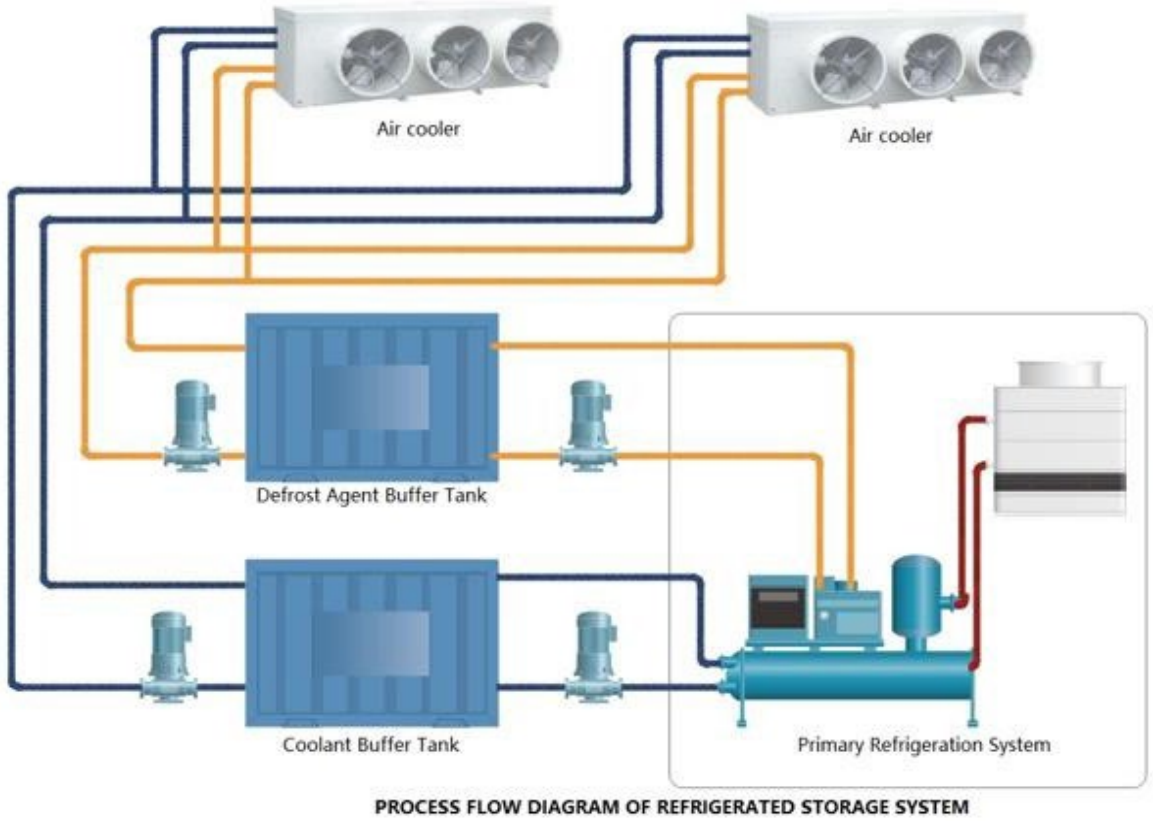
Case Study of Pharmaceutical Application

New System with ET-4

Operating temperature range: -20 °C to 120 °C
Coolant: ET2C ET-4
Cost of coolant: RMB 2.28 million
Total annual operating cost over 10 years: RMB 300,000 per year

After filling the system with ET-4, the cooling system operated smoothly. No corrosion issues have been reported to date. With optimized process design, the system achieves a high level of automation, requires significantly less labor involvement, and is more cost-effective for long-term operation.

Case Study of Cold Storage Application



PROCESS FLOW DIAGRAM OF REFRIGERATED STORAGE SYSTEM

Direct refrigeration systems using ammonia or HCFCs are becoming less favored for refrigerated storage applications. Handling large quantities of ammonia near residential areas is often restricted or prohibited. HCFC refrigerants, due to their high global warming potential (GWP), are also not sustainable options. The deployment of secondary cooling systems using ET2C products provides a safer, more environmentally friendly, and more economical solution. ET2C offers not only high-performance heat transfer media but also professional engineering consultation to tailor refrigerated storage system designs for customers. Below is an example comparing indirect and direct refrigeration systems for a refrigerated storage application.

Case Study of Cold Storage Application

Direct Refrigeration System with Ammonia, (10,000 m2 Refrigerated Storage System)

CAPEX: RMB 5.5 million
Power consumption: 75.6kW

This system involves a large quantity of hazardous ammonia circulating throughout the system. It complicates system design and requires dedicated and intensive safety training for operators, resulting in higher CAPEX and OPEX over long-term operation.

Indirect Refrigerated System with Ammonia + ET2C, (10,000 m2 Refrigerated Storage System)

CAPEX: RMB 5.3 million
Power consumption: 86.9kW

By using ET2C as the secondary refrigerant, the inventory of primary refrigerant is significantly reduced, resulting in a much safer system. The system features a high level of automation and requires less personnel intervention.

Traditional Coolants

COLD STORAGE

PHARMACEUTICAL APIs

PHARMACEUTICAL INTERMEDIATES

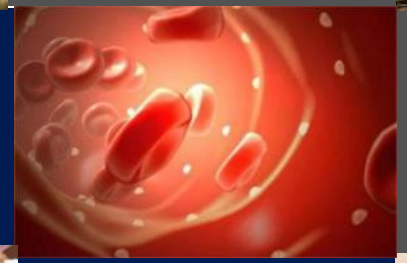
DATA PROCESSING

CHEMICALS

LNG

PAINTS

SNOW SPORTS



BIOPRODUCTS

AIR CONDITIONINGS

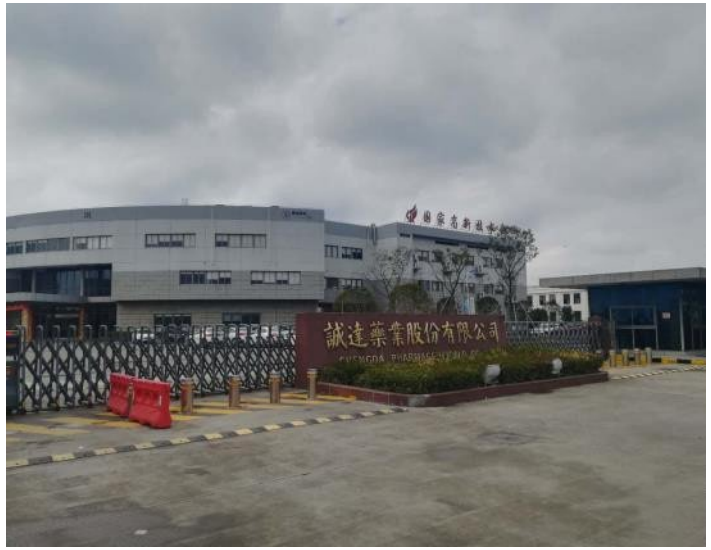
FOOD AND BEVERAGE

MEAT PROCESSING

More than 2000 customers, including but not limited to:

- Top 30 of Chinese pharmaceutical companies
- Top 35% of Chinese chemical companies

Case 1



Alternative heat transfer solutions are required for both low- and high-temperature operations in API synthetic reactions within the pharmaceutical industry. The key is selecting an optimal cooling medium that meets both temperature requirements.

ET2C perfectly fits this application with its wide operating temperature range. The system has been in operation for six years with no corrosion observed.

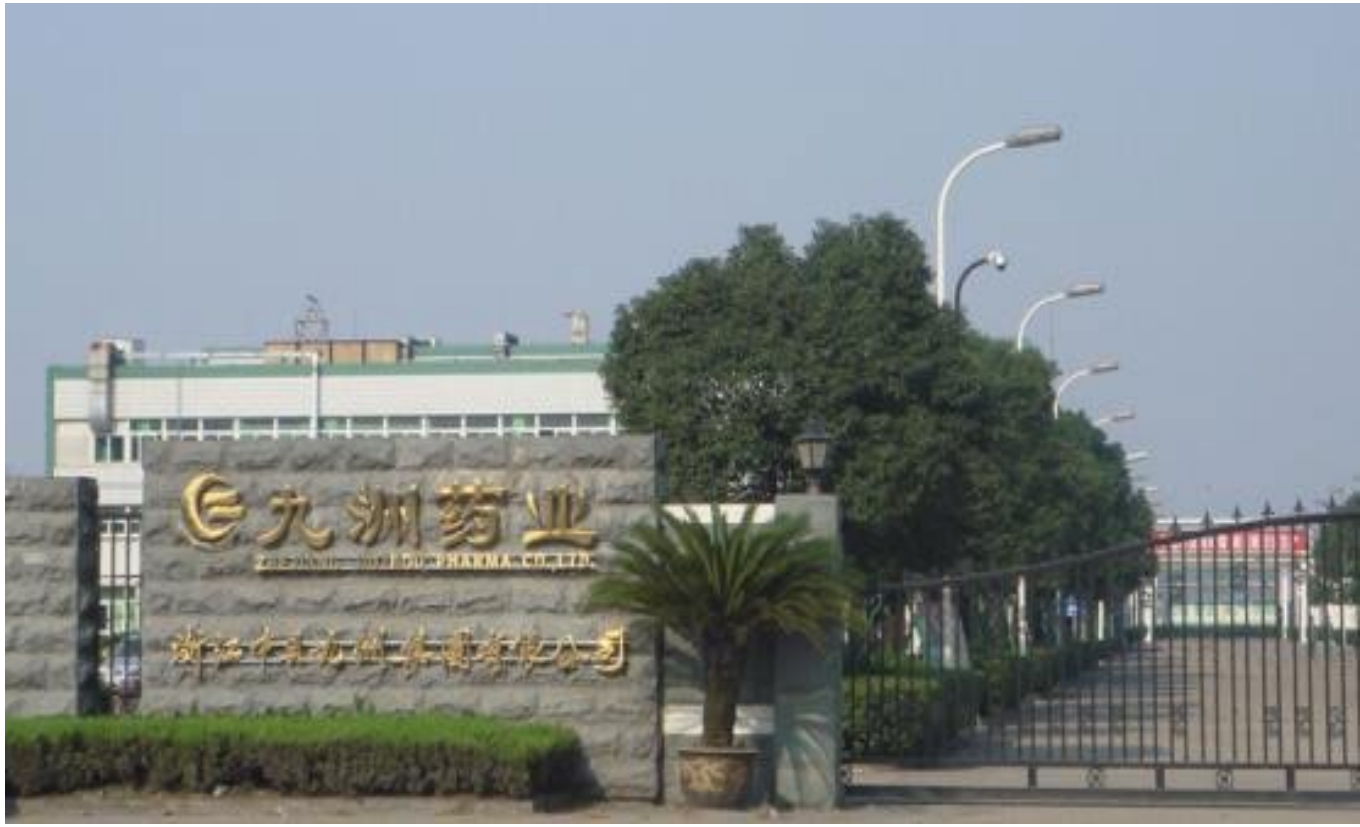
Switching between different operating modes is smooth and highly automated, reducing the risk of human error and providing inherent safety by design.

Case 2

A glycol solution was initially used in 2010, operating at temperatures of -20 °C to 100 °C. High-temperature operation caused severe corrosion within three months. The glycol solution was replaced with 50% ET2C ET-4, with a total system capacity of 500 metric tons. In another case, a brine system with a capacity of 1,000 m^3 operating at -20 °C experienced corrosion within four years. It was then converted to ET2C Coolant ET-4 (50 wt% diluted solution). Since the change, no corrosion has occurred, resulting in substantial maintenance cost savings.

Case 3

A glycol solution was initially used in 2010, operating at temperatures of -20 °C to 100 °C. High-temperature operation caused severe corrosion within three months. The glycol solution was replaced with 50% ET2C ET-4, with a total capacity of 500 metric tons. A brine system with a capacity of 1,000 m³ operating at -20 °C experienced corrosion within four years and was subsequently converted to ET2C ET-4 (50 wt% diluted solution). Since then, no corrosion has occurred, saving substantial maintenance costs.



Case 4

This company began using ET-4 in 2006. For a newly built plant, ET-4 continued to be used, with a purchase volume of 500 metric tons. The system continues to operate smoothly with no corrosion issues.

Case 5

This company has used ET-1 and ET-4 since 2006. Performance testing, including heat capacity and anti-corrosion properties, was conducted after one year of operation. Following discussions among the manufacturing, technology, and equipment departments, the results were highly satisfactory. Many of the company's other manufacturing sites have also used ET2C products for many years.

Case 6

An IRC indirect refrigeration system was introduced in 2015. A 40,000-metric-ton cold storage facility was constructed in 2015, designed with integrated primary and secondary refrigerant systems (Freon + ET2C).

ET2C ET-4 was selected as the secondary refrigerant. Although electricity consumption is higher compared to a primary refrigerant system, the solution is significantly safer and more environmentally friendly.

Corrosion was completely eliminated, resulting in major maintenance cost savings. The company is now planning to purchase an additional 500–600 tons of ET2C products.

ET2C Offices

Sourcing from China, India, Vietnam and Turkey

250 +

Staff all over the world at your service

25

years of experience in Asia

With our quality control service, ET2C guarantees that all of your sourcing orders will arrive in faultless condition.

ISO 9001:2015 CERTIFIED

ET2C International is committed to facilitating international trade and providing businesses with access to global markets as well as putting in place fully integrated solutions at source to enhance its clients' existing supply chains.

Our objective is to deliver long term sustainable value to our clients' supply chains that creates cost and quality benefits to their purchase channels from China, India, Vietnam and Turkey. With a focus on service, we deliver tailor made solutions to our clients to provide an 'at the source' management capability.

The products in this presentation are just a sample of our capabilities. If you are looking for a similar product not included in the presentation, please contact your Sales Agent and we will get back to you with more options.

DROP US A LINE

Did you find what you were looking for?
Let us know!

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Proprietary Design

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