移动（气调）冷舱性能检测报告

Performance Test Report of Mobile CA. Cold Store

委托方：某制冷空调设备有限公司受托方：

中粮工科检测认证有限公司

2026 年 03 月

Client: X Refrigeration and Air-conditioning Equipment Co., Ltd.

Trustee: COFCO Engineering Testing and Certification Co.Ltd.

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Performance Test Report of Mobile CA. Cold Store

受某制冷空调设备有限公司的委托，根据相关的标准和依据，本着客观、独立、公正、科学的原则，按照科学的评价方法，对移动（气调）冷舱性能进行检测。本单位检测人员按照必要的检测程序对委托的系统及设备开展实地查勘、现场检测等工作。移动（气调）冷舱性能检测结果如下。

At the request of X Refrigeration and Air-conditioning Equipment Co., Ltd., and in accordance with the relevant standards and norms, this unit conducted performance testing on the Mobile CA. Cold Store. The testing adhered to the principles of objectivity, independence, impartiality, and scientific rigor, following established scientific evaluation methods. The unit's personnel carried out necessary testing procedures, including on-site inspection and field testing of the commissioned system and equipment. The performance test results for Mobile CA. Cold Store are as follows.

1 基本概况

1 General Information

1.1 检测范围

1.1 Scope of Testing

本次委托检测的对象为某移动（气调）冷舱，具体检测项目及设备以合同约定为准，

The object of this commissioned testing is the X Mobile CA. Cold Store. The specific testing items and equipment shall be in accordance with the contract agreement.

1.2 检测对象概况描述

1.2 Description of Test Object

该项目产品为某制冷空调设备有限公司生产的移动（气调）冷舱（40英尺高柜），冷藏温度0～4℃。该冷舱包含制冷系统和气调系统两个部分。

The product is a Mobile CA. Cold Store (40-foot high cube container) manufactured by X Refrigeration and Air-conditioning Equipment Co., Ltd., with a

refrigeration temperature range of 0-4°C. The container consists of two main systems: a refrigeration system and a CA. system.

1.3 检测目的及检测基准日

1.3 Testing Objectives and Baseline Date

本项目对某移动（气调）冷舱的实际性能进行检测，本次检测所有项目在空库状态下进行，包含对该移动（气调）冷舱气密性检测、对冷舱内空气温湿度检测、以及对冷舱内氧气与二氧化碳的含量进行测定。

检测基准日为 2026 年 03 月 21 日。

This project involves testing the actual performance of the X Mobile CA· Cold Store· All tests in this project were conducted under empty storage conditions. The testing includes the airtightness test of the mobile cold store, the measurement of air temperature and humidity inside the cold store, and the concentration of oxygen and carbon dioxide within the cold store.

The baseline date for this testing is March 21, 2026.

1.4 评估方法

1.4 Evaluation Methods

（1）依据相关标准规范要求，对移动（气调）冷舱内空气温湿度进行 48 小时不间断检测，并计算空库状态下冷舱内温、湿度平均值。

（2）依据相关标准规范要求，对移动（气调）冷舱内氧气、二氧化碳气体体积分数进行 1 小时不间断检测，并计算在检测稳定期间两种气体体积分数的平均值。

（3）根据现场实际运行情况，对移动（气调）冷舱的气密性进行检测，并计算该移动（气调）冷舱的气密性是否满足相关规范要求。

(1) In accordance with the requirements of the relevant standards and specifications, the air temperature and humidity inside the Mobile CA. Cold Store were monitored continuously for 48 hours. The average temperature and humidity inside the empty storage were calculated.

(2) In accordance with the requirements of the relevant standards and specifications, the volume fractions of oxygen and carbon dioxide gases inside the Mobile CA. Cold Store were monitored continuously for 1 hour. The average volume fractions of the two gases during the stable monitoring period were calculated.

(3) Based on the actual operating conditions, the airtightness of the Mobile CA. Cold Store was tested. It was evaluated whether the airtightness of this cold storage meets the requirements of the relevant specifications.

1.5 检测依据

1.5 Testing Standards

（1）本次检测的依据主要有：

1）《冷库设计标准》GB 50072-2021

2）《气调冷藏库设计规范》SBJ 16-2009

3）《水果和蔬菜气调贮藏技术规范》GB/T 23244-2009

4)《冷库热工性能试验方法第一部分：温度和湿度检测》GB/T 30103.1-2013

5）《制冷集装箱》T/CECA-G 0136—2021T/CSTE0181—2021

6）其他适用的标准，

（2）经济行为文件

某制冷空调设备有限公司与我单位签订的检测合同，

（3）企业相关方提供的重大合同协议

1）企业相关方提供的图片及影像资料，

2）企业相关方提供的检测期间移动（气调）冷舱运行的相关数据。

(1) The primary standards and specifications referenced for this testing are:

1) Standard for Design of Cold Store GB 50072-2021

2) Code for Design of CA. Cold Store SBJ 16-2009

3) Fruit and Vegetables—Principles and Techniques of the Controlled Atmosphere Method of Storage GB/T 23244-2009

4) Methods of Testing for Thermal Performance on Cold Store—Part 1: Temperature and Humidity Testing GB/T 30103.1-2013

5) Assessment Requirements for Forerunner Standard—Refrigerated Container T/CECA-G 0136—2021 / T/CSTE 0181—2021

6) Other applicable standards.

(2) Economic Action Document

The testing contract signed between X Refrigeration and Air-conditioning Equipment Co., Ltd. and our organization.

(3) Major Contractual Agreements Provided by the Relevant Enterprise Party

1) Images and video materials provided by the relevant enterprise party.

2) Operational data of the Mobile CA. Cold Store during the testing period, provided by the relevant enterprise party.

2. 现场检测

2. On-site Testing

2.1 移动（气调）冷舱内空气温湿度场检测

2.1 Air Temperature and Humidity Field Testing Inside the Mobile CA. Cold Store

移动（气调）冷舱内温湿度场检测布点如图 1 所示：

The sensors layout for temperature and humidity field testing inside the Mobile CA. Cold Store is shown in Figure 1.

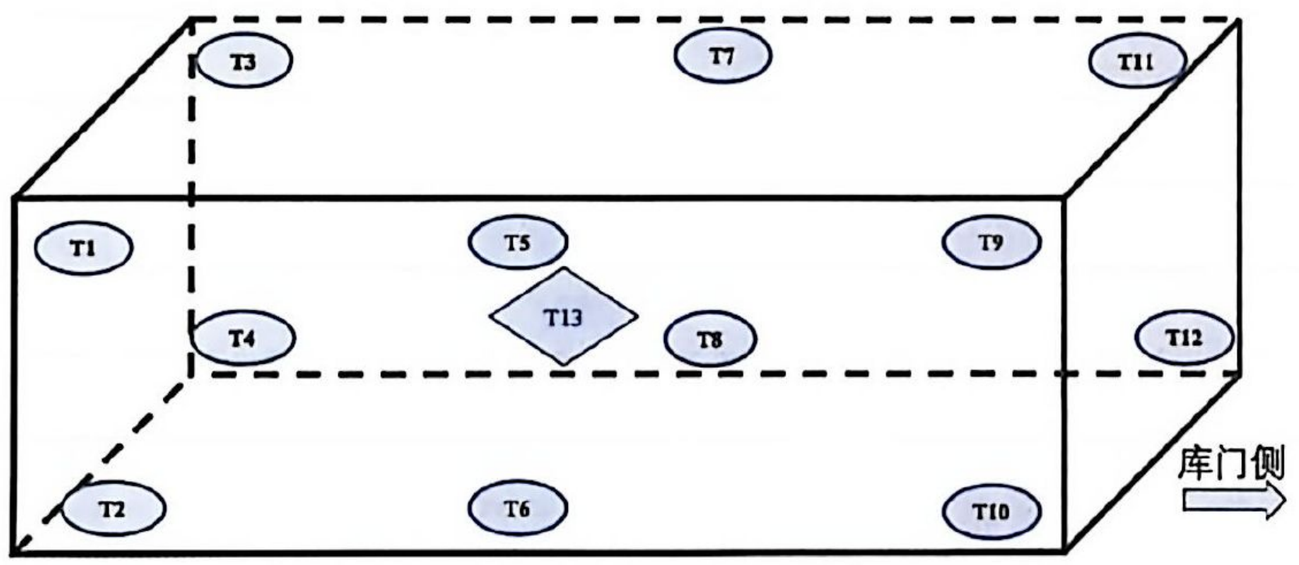


图 1. 冷舱内温湿度场检测布点示意图

Figure 1. Schematic diagram of sensors layout for temperature and humidity field testing inside the Cold Store.

注：1. 图中 T_{13} 温湿度测点为舱体几何中心点。

2. 其中 T_1、T_3、T_5、T_7、T_9、T_{11}、T_{13} 为温湿度测点，其余测点为温度测点。

Note: 1.The T_{13} located at the geometric center point of the container.

2.Among these, points T_1, T_3, T_5, T_7, T_9, T_{11}, and T_{13} are temperature and humidity measurement points, while the remaining points are temperature-only measurement points.

移动（气调）冷舱内温湿度检测结果，如表 1、表 2 所示，数据截取时间段 2026 年 03 月 22 日 14:00—03 月 23 日 14:00。

The test results for temperature and humidity inside the Mobile CA. Cold Store are shown in Tables 1 and 2. The data covers the period from 14:00 on March 22, 2026, to 14:00 on March 23, 2026.

表 1. 冷舱内温度检测结果

Table 1. Temperature Test Results Inside the Cold Store

测点 Measuring Point	最小值（℃） Minimum (°C)	最大值（℃） Maximum (°C)	平均值（℃） Average (°C)
T_1	1.3	5.1	2.1
T_2	1.3	3.3	1.8
T_3	2.8	3.7	3.2
T_4	0.2	3.9	1.4
T_5	2.1	3.4	2.5
T_6	0.7	2.6	1.4
T_7	1.8	4.1	2.4
T_8	1.6	3.4	2.2
T_9	2.2	3.6	2.8
T_{10}	1.3	4.9	2.0
T_{11}	3.0	4.3	3.5
T_{12}	2.9	3.9	3.3
T_{13}	1.6	3.5	2.1
平均温度（℃） Average Temperature（°C）	2.4		

表 2. 冷舱内相对湿度检测结果

Table 2. Relative Humidity Test Results Inside the Cold Store

测点 Measuring Point	最小值（%RH） Minimum(%RH)	最大值（%RH） Maximum (%RH)	平均值（%RH） Average (%RH)
T_1	92.3	99.9	98.6
T_3	84.6	91.4	88.4
T_5	87.1	95.4	92.3
T_7	98.9	99.9	99.8
T_9	78.7	98.0	89.9
T_{11}	82.5	91.5	87.5
T_{13}	96.8	99.9	99.2
平均相对湿度(%RH) Average Relative Humidity (%RH)	92.8		

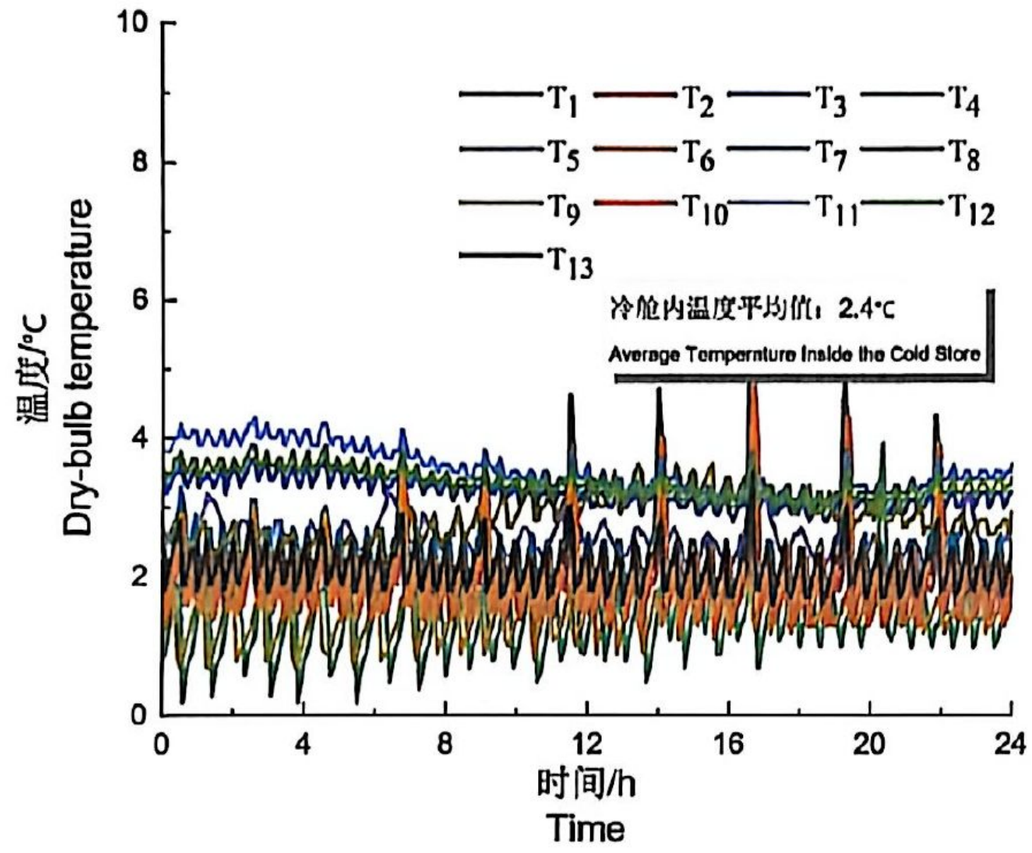


图 2. 冷舱内测点 1-测点 13 温度随时间变化情况

Figure 2. Temperature Variation Over Time for Points 1 to 13 Inside the Cold Store.

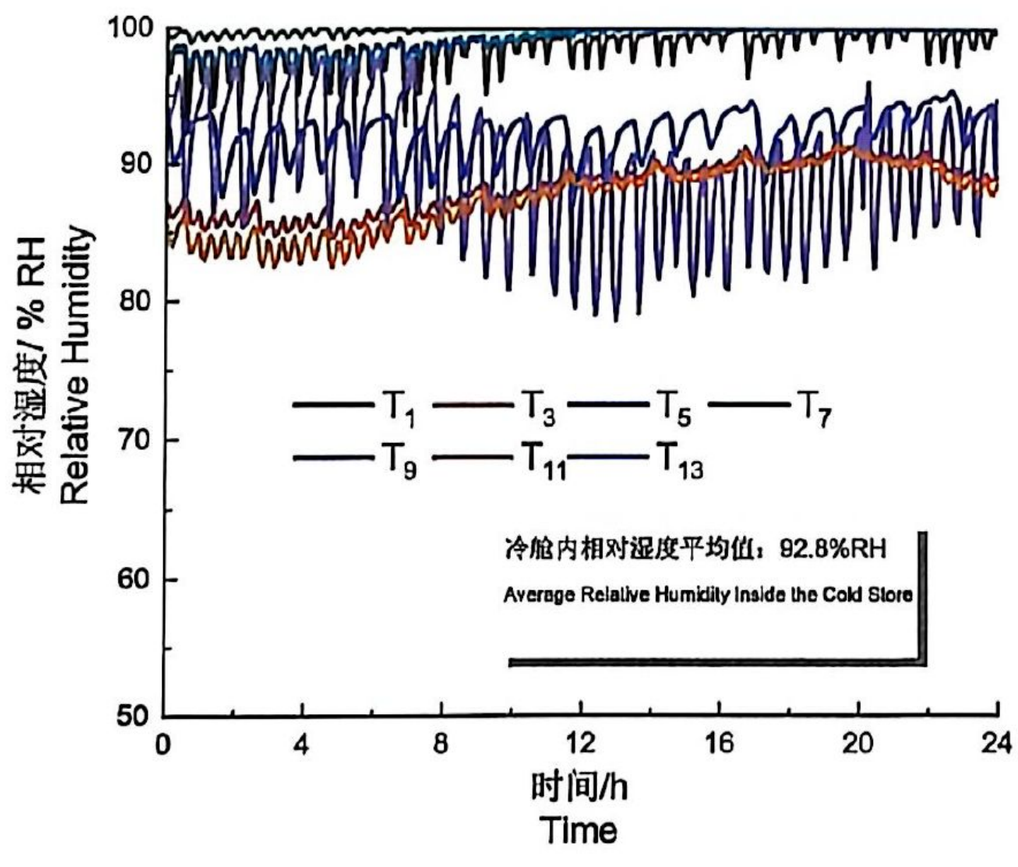


图 3. 冷舱内湿度测点随时间变化情况

Figure 3. Humidity Variation Over Time for Measurement Points Inside the Cold Storage.

2.2 移动（气调）冷舱氧气、二氧化碳含量检测

2.2 Oxygen and Carbon Dioxide Concentration Testing for the Mobile CA. Cold Store

移动（气调）冷舱内气体体积分数测定结果如表 3、图 4 所示，数据截取 30

分钟。

The measured gas volume fraction results inside the Cold Store are shown in Table 3 and Figure 4. The data covers a period of 30 minutes.

表 3. 冷舱内 O_2 及 CO_2 体积浓度检测结果

Table 3. O_2 and CO_2 Volume Concentration Test Results Inside the Cold Store

气体 Gas	最小值（%vol） Minimum(%vol)	最大值（%vol） Maximum (%vol)	平均值（%vol） Average (%vol)
O_2	4.5	4.6	4.5
CO_2	0	0	0

注：1. 空库检测，CO_2 气体体积浓度值为 0。

2. 检测期间，O_2 气体体积浓度设定值为 0-5%vol。

Note: 1.Detection under no load , the CO_2 volume concentration reading was 0.

2.During detection period, the set value of O_2 gas volume concentration is 0-5%vol.

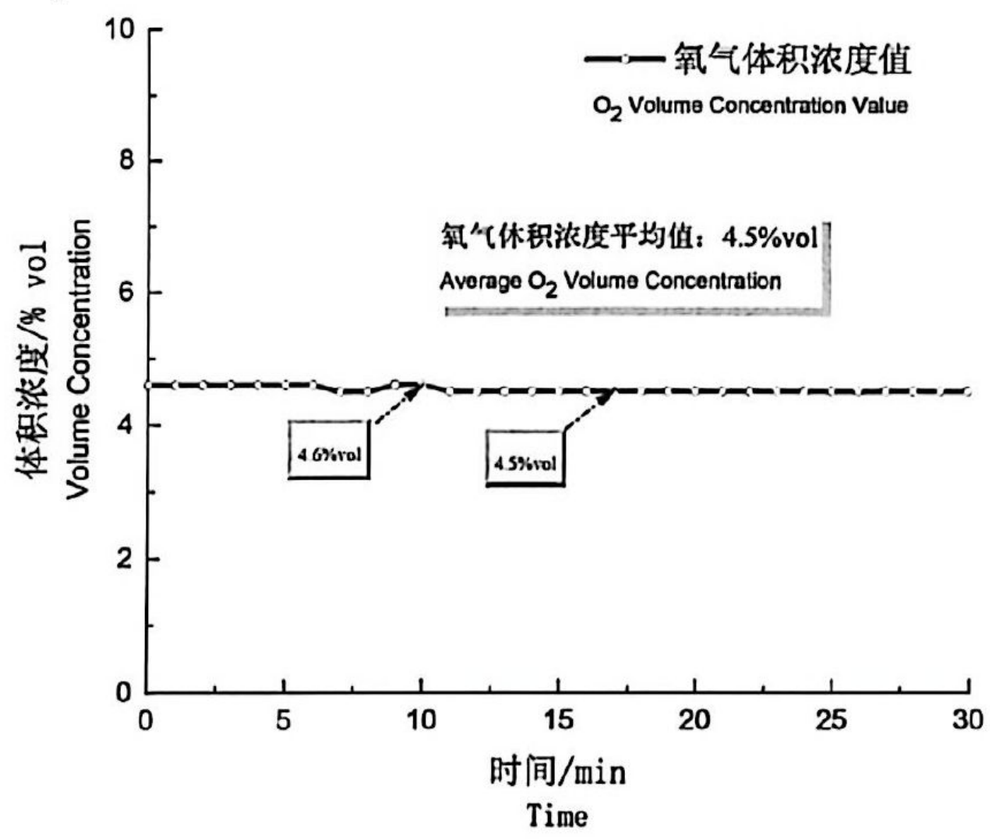


图 4. 冷舱内 O_2 体积分数随时间变化情况

Figure 4. Variation of O_2 Volume Fraction Over Time Inside the Cold Store.

2.3 移动（气调）冷舱气密性检测

2.3 Airtightness Test for the Mobile CA. Cold Store

移动（气调）冷舱气密性检测结果如表 4、图 5 所示，压降时间为 20 分钟。

The airtightness test results for the Mobile CA. Cold Store are shown in Table 4 and Figure 5. The pressure drop time was 20 minutes.

表 4. 冷舱内气体压力检测结果

Table 4. Gas Pressure Test Results for the Cold Store

初始压力（表压） Initial Pressure (Gauge Pressure)	196 Pa
压降 20min 后结束压力（表压） Final Pressure (Gauge Pressure) after 20 minutes of pressure drop.	159 Pa
气密性检测结果 Airtightness Test Results	合格 Qualified
注：该项检测依据标准 SBJ 16-2009《气调冷藏库设计规范》第 3.0.5 条款。 Note: This test was conducted in accordance with Article 3.0.5 of the standard SBJ 16-2009 Code for design of CA. cold store.	

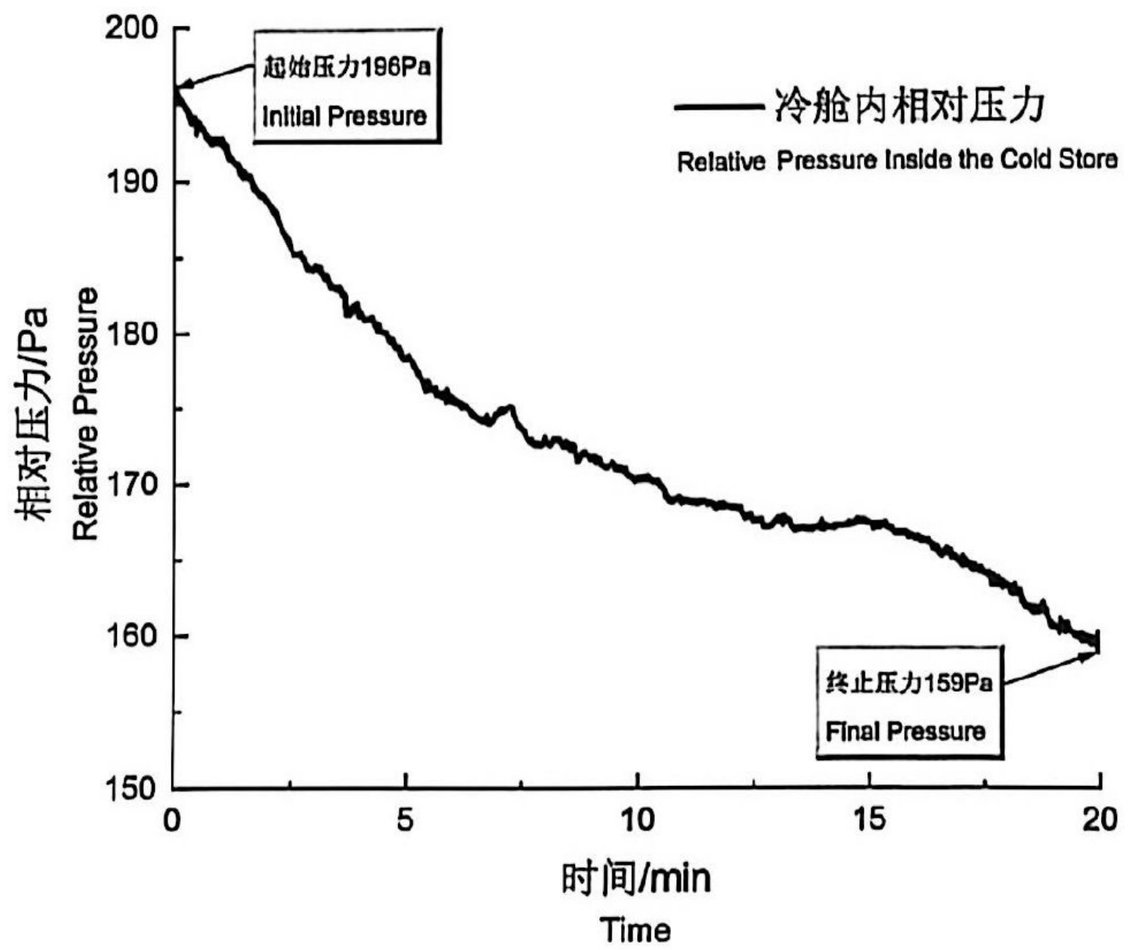


图 5. 冷舱内气体压力随时间变化情况

Figure 5. Variation of Gas Pressure Over Time Inside the Cold Store.

3. 检测结论

3. Testing Conclusions

（1）在检测期间，对移动（气调）冷舱内空气温湿度场检测。从检测结果看，在稳定运行的 24 小时期间，该冷舱内空气平均温度为 2.4℃（设计要求 0～4℃），平均相对湿度为 92.8%RH（设计要求不低于 85%RH），冷舱内空气温湿度值满足设计要求。

（1）During the testing period, the air temperature and humidity field inside the Mobile CA. Cold Store was monitored. Based on the test results, during the 24-hour stable operation period, the average air temperature inside the cold store was 2.4 °C(Design Requirements: 0 to 4°C), and the average relative humidity was 92.8 %RH(Design Requirements: Humidity of no less than 85% RH), the air temperature and humidity field inside the Mobile CA. Cold Store meet the design requirements.

（2）在检测期间，对移动（气调）冷舱内氧气、二氧化碳含量进行测定（空库）。从检测结果看，在稳定测定的 0.5 小时期间，该冷舱内 O_2 体积分数平均值为 4.5%vol（设定值 0-5%vol），CO_2 体积分数为 0，满足设计要求。

（2）During the testing period, the oxygen and carbon dioxide concentration inside the Mobile CA. Cold Store was measured (Detection under no load). Based on the test results, during the stable 0.5-hour measurement period, the average O_2 volume concentration inside the cold store was 4.5 %vol, and the CO_2 volume concentration was 0, the oxygen and carbon dioxide concentration inside the Mobile CA. Cold Store meet the design requirements.

（3）在检测期间，对移动（气调）冷舱在空库状态下气密性进行检测。从检测结果看，该冷舱的密封性满足相关标准要求。

（3）During the testing period, the airtightness of the Mobile CA. Cold Store was tested under no load conditions. Based on the test results, the sealing performance of the cold store meets the requirements of the relevant standards.

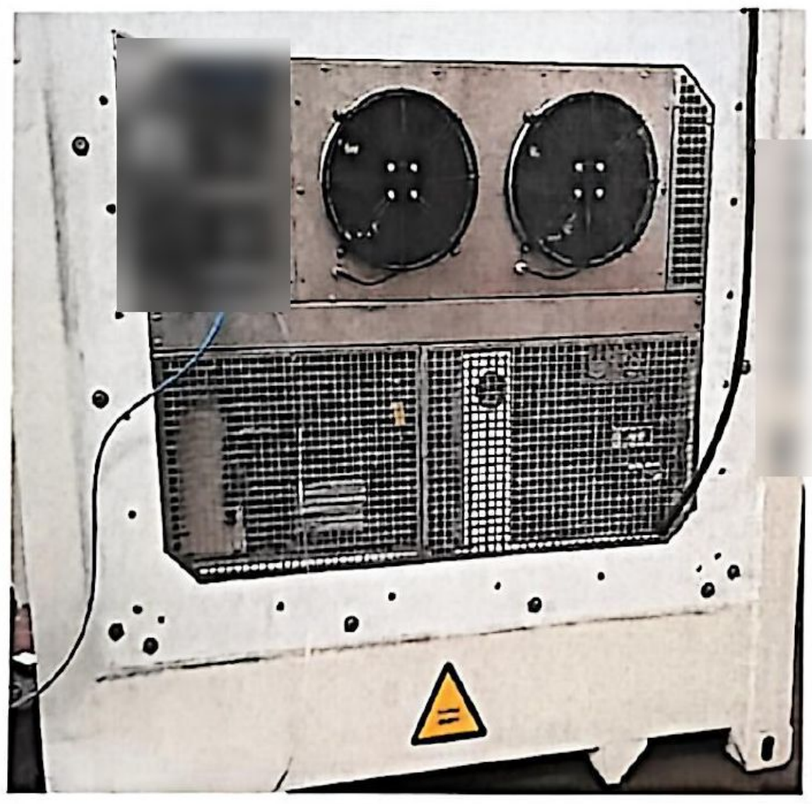
4. 检测附图

4. Test Figures



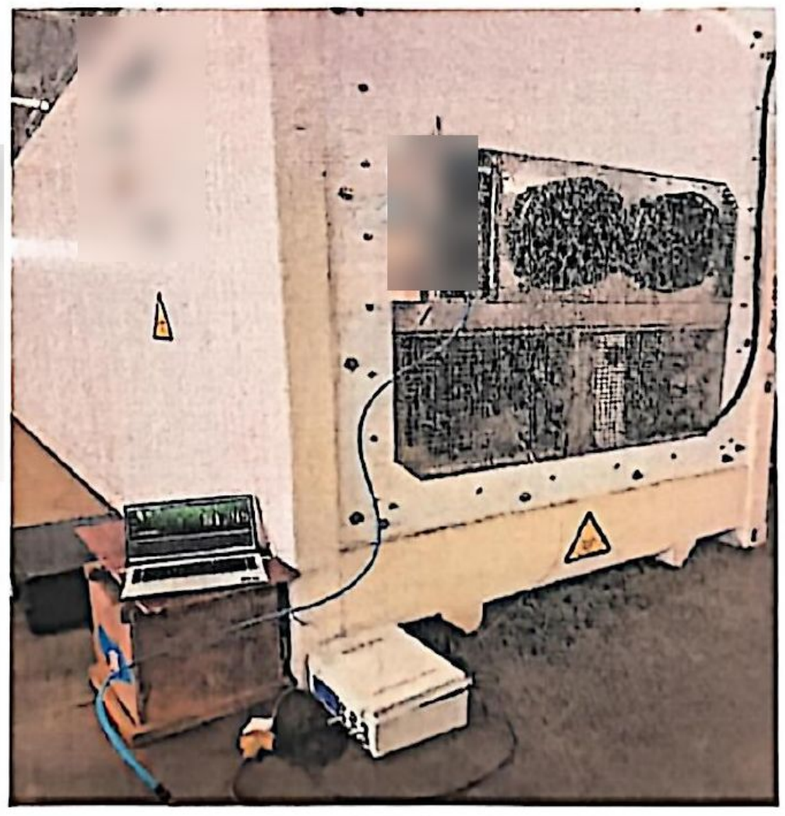
附图 1. 移动气调冷舱外观

Figure 1. External View of the Mobile CA. Cold Store



附图 2. 制冷系统及气调系统外观

Figure 2. External View of the Refrigeration System and CA. System



附图 3. 冷舱气密性检测

Figure 3. Airtightness Testing of the Cold Store



附图 4. 冷舱内气体含量检测

Figure 4. Gas Concentration Testing Inside the Cold Store



附图 5. 冷舱内温湿度测点布置

Figure 5. Temperature and Humidity setting Inside the Cold Store