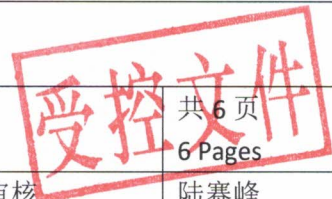


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气密试验工艺规程 Air Tightness Testing Procedure	编制 Draft	王磊 Wanglei	审核 Approval	陆赛峰 Lu Saifeng
			实施日期 Effective Date	2010.8 Aug. 2010



气密试验工艺规程 Air Tightness Testing Procedure

适用范围：本规程适用于三九制冷设备有限公司生产的封闭式蒸发式冷凝器气密性检验。

Scope of Application: The procedure is applied for air tightness testing of evaporative condenser manufactured and fabricated by Wuxi Sanjiu Cooling Equipment Co., Ltd.

1. 保压目的:

1. Purpose of Pressure-holding

保压测试的目的是检查冷凝器盘管是否有泄露（保证盘管的气密性），另一目的则是在于利用高于工作压力之气体保持在一封闭管路内，经过一段时间后可侦测出管路焊道上是否有沙孔（沙孔会因过高的压力而造成泄露）以及衔接点是否可承受如此高的压力而不致泄露，以确保设备的稳定运行。

The purpose of the pressure-holding test is to check whether the coils of condenser exist any leakages (to ensure the air-tightness of the coils), and another purpose is to keep them in a closed pipeline at a higher working pressure, after a period of time, measure and detect whether there are sand holes in the pipeline welding bead (sand holes will cause leakage due to excessive pressure) and whether the joint can withstand such a high pressure without leaking to ensure the stable operation of the equipment.

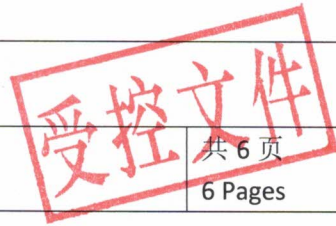
2. 工艺原理:

2. Process Principle

将待测盘管通入高纯氮气，使其压力达到盘管正常使用压力的 1.5 倍或是 1MPa，在一端接上记录器，经过一段时间后检查是否有降压现象，若无则表示该盘管已通过保压测试，反之，则检查压降之原因，并在原因排除后再做一次保压测试，直到完全没有泄露为止。

Fill the coil to be tested with high-purity nitrogen to make the pressure reach 1.5 times the normal working pressure of the coil or 1 MPa, connect a recorder to one end, and check whether there is a pressure drop after a period of time. If not, it means the coil has passed the pressure holding test, otherwise, check the cause of the pressure drop, and perform a pressure holding test again after the cause is eliminated, until there is no leakage at all.

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3. 试验用仪表

3. Testing Instruments

3.1 试验用压力表量程应为测试压力的 1.5 倍-3 倍，以 2 倍为宜。

3.1 The range of the testing pressure gauge should be 1.5 to 3 times of the test pressure, preferably 2 times.

3.2 压力表盘直径应不小于 100mm。

3.2 Diameter of pressure gauge should be not less than 100mm.

3.3 试验用压力表应经校验合格且在有效期内。

3.3 The pressure gauge used for the test shall be qualified and within the validity period.

3.4 试验时应使用二个压力表，二个压力表的量程相同。

3.4 Two pressure gauges should be used during the test, and the ranges of the two pressure gauges are the same.

3.5 用于气密试验的压力表精读不低于 1.5 级。

3.5 The intensive reading of the pressure gauge used for air tightness test shall not be less than 1.5 grade.

3.6 试验前两个压力表指针都应回零，不符合要求的应立即送计量室重新校准，合格后才能使用。

3.6 Before the test, the pointers of the two pressure gauges should be returned to zero, and those that do not meet the requirements should be sent to the measurement room for recalibration immediately, and can be used only after being qualified.

3.7 在升压过程中，两个压力表的读数相差不能超过两个最小刻度。两压力表读数超过两个最小刻度时应中止试验，讲压力表送计量室重新校准。

3.7 During the pressure increase, the difference between the readings of the two pressure gauges cannot exceed two minimum scales. When the readings of the two pressure gauges exceed the two minimum scales, the test should be suspended, and the pressure gauge should be sent to the measuring room for recalibration.

4. 操作步骤

4. Operation Procedures

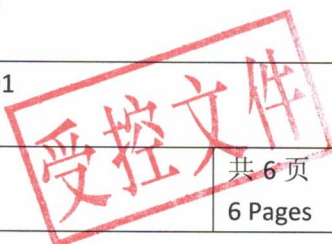
4.1 将冷凝器放在一个通风良好的地方进行检漏。

4.1 Place the condenser in a well-ventilated area for leak detection.

4.2 检查试验工装、连接皮管、仪表是否完好。

4.2 Check whether the test tooling, connecting hoses, and instruments are in good condition.

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4.3 根据试验压力选用相应量程和精度的压力表，压力表应安装在同充气阀相对应端且易于观察的部位，压力表应朝向一致。

4.3 According to the test pressure, select the pressure gauge with the corresponding range and accuracy. The pressure gauge should be installed at the corresponding end of the inflation valve and easy to observe. The pressure gauge should have the same orientation.

4.4 根据进出口管径选用相应规格的试验用闷盖工装。

4.4 According to the diameter of the inlet and outlet pipes, choose the corresponding test plug tooling.

4.5 各连接部位螺栓装配齐全，紧固妥当。

4.5 The bolts of each connection part are fully assembled and fastened properly.

4.6 紧固螺栓应至少分三遍逐步对称拧紧，每遍起始位置应错开。

4.6 The fastening bolts should be tightened symmetrically in at least three passes, and the starting position of each pass should be staggered.

4.7 试验介质：压缩空气，氮气（N₂）。

4.7 Test medium: compressed air, nitrogen (N₂).

5. 加压、检漏：

5. Pressurization and Leakage Detection

5.1 应先充注 0.1-0.5MPa 的压缩空气，要注意防止压力上升过速；在升压过程中，一旦有异样情况发生，应立即停止加压并泄压，查明原因，排除故障。重复步骤 3.1。

5.1 The compressed air of 0.1-0.5MPa should be filled first, and attention should be paid to prevent the pressure from rising too fast; in the process of pressure increase, if any abnormal situation occurs, the pressure should be stopped and released immediately. After find out the cause and eliminate the fault. Repeat step 3.1.

5.2 将压力升至 1MPa 左右，保压 10 分钟。

5.2 Raise the pressure to around 1Mpa, holding pressure 10 minutes

5.3 用检漏液检漏。对主要受压零部件逐一喷撒检漏液，检查可能存在的漏点。

5.3 Leak detection by leak detection fluid. Check the spray leak detection liquid on the main pressure parts one by one.

5.4 对冷凝器包管的检漏:用检漏液检漏,从上到下逐个检查各焊接处。如发现漏点,对漏点标记,则将压缩空气排尽,泄压至表压力为零,对漏点进行修复,修复后重复 3.2-3.4 步骤,直到没有漏点为止。试验完成后用压缩空气将机体表面残留水吹净。

5.4 Leak detection for the condenser cover: use a leak detection liquid to detect leaks, and check each welding place one by one from top to bottom. If a leak is found, mark the leak, drain the compressed air, release the pressure until the gauge pressure is zero, repair the leak, and repeat steps 3.2-3.4 after repairing until there is no leak. After finish the test, use compressed air to blow off the residual water on the surface of the body.

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5.5 以上步骤完成以后，将压缩空气排尽，泄压至压力表压力为零，充入氮气，至 2.5MPa，保压 24 小时。

5.5 After the above steps are completed, exhaust the compressed air, release the pressure until the pressure of the pressure gauge is zero, fill with nitrogen to 2.5MPa, and keep the pressure for 24 hours.

5.6 合格标准：保压 24 小时，压力表不下降且许可的波动范围±2%。

5.6 Eligibility criteria: Keep the pressure for 24 hours, the pressure gauge does not drop and the allowable fluctuation range is ±2%.

5.7 将氮气排尽，泄压至压力表压力为零，拆除工装。

5.7 Drain the nitrogen, release the pressure until the pressure of the pressure gauge is zero, and remove the tooling.

5.8 填写检查表。

5.8 Fill in the checklist.

6. 试验安全

6. Safety Instruction for Testing

6.1 试验操作人员必须经过相应的培训，操作应熟练。

6.1 The test operator must be trained accordingly and the operation should be proficient.

6.2 在试验过程中，应有醒目的安全警告牌置于试验场所，无关人员不得在现场停留。

6.2 During the test, an eye-catching safety warning board should be placed at the test site, and irrelevant personnel are not allowed to stay on site.

6.3 如用高压气瓶对冷凝器加压，则从气瓶出来的气体必须经过减压阀后才能进入冷凝器。当用气瓶进行充气加压时，操作和检验人员一定要先确认气瓶索状气体是否为试验所需气体，可通过观察气瓶的颜色标志、气瓶上的字体标记来确认。严禁使用氧气、任何可燃性气体或可燃性气体的混合物。

6.3 If a high-pressure gas cylinder is used to pressurize the condenser, the gas from the cylinder must pass through the pressure reducing valve before entering the condenser. When using gas cylinders to inflate and pressurize, operators and testing personnel must first confirm whether the gas cylinder cable is the gas required for the test. This can be confirmed by observing the color signs of the gas cylinders and the font marks on the gas cylinders. It is strictly prohibited to use oxygen, any flammable gas or a mixture of flammable gases.

6.4 试验用连接皮管必须用专用皮管，不允许使用氧气管、乙炔管或者其他皮管。皮管应进行定期检查。

6.4 The connecting hose for the test must be a exclusive hose. Oxygen, acetylene or other hoses are not allowed. The hose should be checked regularly.

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6.5 严禁带压紧固螺栓，不允许敲击冷凝器。

6.5 It is strictly forbidden to tighten the bolts under pressure, and it is not allowed to knock the condenser.

6.6 当冷凝器或机组中有压力时，不允许起吊。

6.6 When there is pressure in the condenser or the unit, lifting is not allowed.

6.7 加压过程中必须有二人在场，不允许操作人员离开现场。

6.7 Two testing personnel must be present during the pressurization process, and operators are not allowed to leave the scene.

6.8 加压完毕，断开连接气管，以防误操作。

6.8 After the pressurization is completed, disconnect the pipe to prevent misoperation.

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冷凝器保压测试报告			
Pressure-holding Testing Report of Condenser			
项目名称 Project Name		报告编号 Report No.	
合同编号 Contract No.		型号 Model	
测试信息 Testing Information			
测试设备 Testing Equipment		测试仪器 Testing Instrument	
设计压力 Design Pressure		测试气体 Testing Gas	
测试要求 Testing Requirement			
所需测试压力 Testing Pressure		所需测试时间 Testing Time	
测试记录 Testing Record			
开始时间 Starting Time		环境温度 Ambient Temp.	
漏点检测压力 Leakage Point Pressure		漏点数量 Leakage Point No.	
保压开始时间 Pressure-holding Start Time		压力表读数 Pressure Gauge Reading	
保压完成时间 Pressure-holding Finish Time		压力表读数 Pressure Gauge Reading	
试验验收 Acceptance Test			
测试结论 Testing Conclusion			
测试人员 Testing Personnel		日期 Date	
验收人员 Acceptance Personnel		日期 Date	
主管签字 Director Signature		日期 Date	
备注 Remark			