



CONSTRUCTION  
INDUSTRY COUNCIL  
建造業議會

# **Refrigeration/ Air-conditioning/ Ventilation Mechanic (Unitary System) Trade Test Mock Practical Test Paper**

此文件關於空調製冷設備技工（獨立系統）工藝測試考題。如有需要索取此文件的中文版本，請致電 2100 9000 與香港建造業工藝測試中心聯絡。

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## **Enquiries**

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Practical Test Paper for Trade Test (EAU)

Job Title : Refrigeration / Air-conditioning / Ventilation Mechanic (Unitary System)

Skill Level : Skilled worker

Time Limit : 3 hours

This test has a total of 2 tasks. To pass the practical test, candidates must achieve the 60% of the full score for each task.

Test : Complete the following two practical tasks at the specified locations :

**Task 1)** Make a refrigerant tube (25 marks of total score, 15 marks or above to pass)

**Task 2)** Install a split type air conditioner (75 marks of total score, 45 marks or above to pass)

**List of materials, equipment and tools**

Item	Materials	Quantity
1	5/8" copper tube	0.75m
2	1-3/8" copper tube	1
3	1-3/8" X 5/8" welding reducer	2
4	5/8" X 1/4" male adapter with copper cap	1 set
5	5/8" hand valve with copper nut	1 set
6	Silver welding rod	1
7	1/4" and 3/8" copper tubes	1 roll each
8	Shock-absorbing rubber	4
9	3/8" X 1-1/2" screws with nuts, washer and spring washer	As appropriate
10	1/4" and 3/8" copper cap	2 each
11	5/8" thermal insulation sealant	As appropriate
12	Thermal insulation sealant tape	As appropriate
13	Outdoor machine hanger	1 set
14	20mm PVC pipe	1

Item	Equipment	Quantity
1	Acetylene welding equipment	1 set
2	Air-cooled split type air conditioner	1 set

Item	Tools	Quantity
1	5/8" tube bender	1
2	Copper tube clip set	1 set
3	Copper tube cutter	1
4	Tube flush set	1 set
5	Inner and outer scraper	1
6	Measuring tape, 3.6m	1
7	File	1
8	Hand hammer	1
9	Welding gloves	1 pair
10	Acetylene welding goggles	1 pair
11	8", 10" and 12" adjustable wrench	1 of each
12	Spirit level	1
13	Screwdriver, crosshead	1
14	Screwdriver, flathead	1

Note: After completing the test, candidates should return all borrowed tools as well as this test paper. Candidates may not leave until the invigilator's instructions.

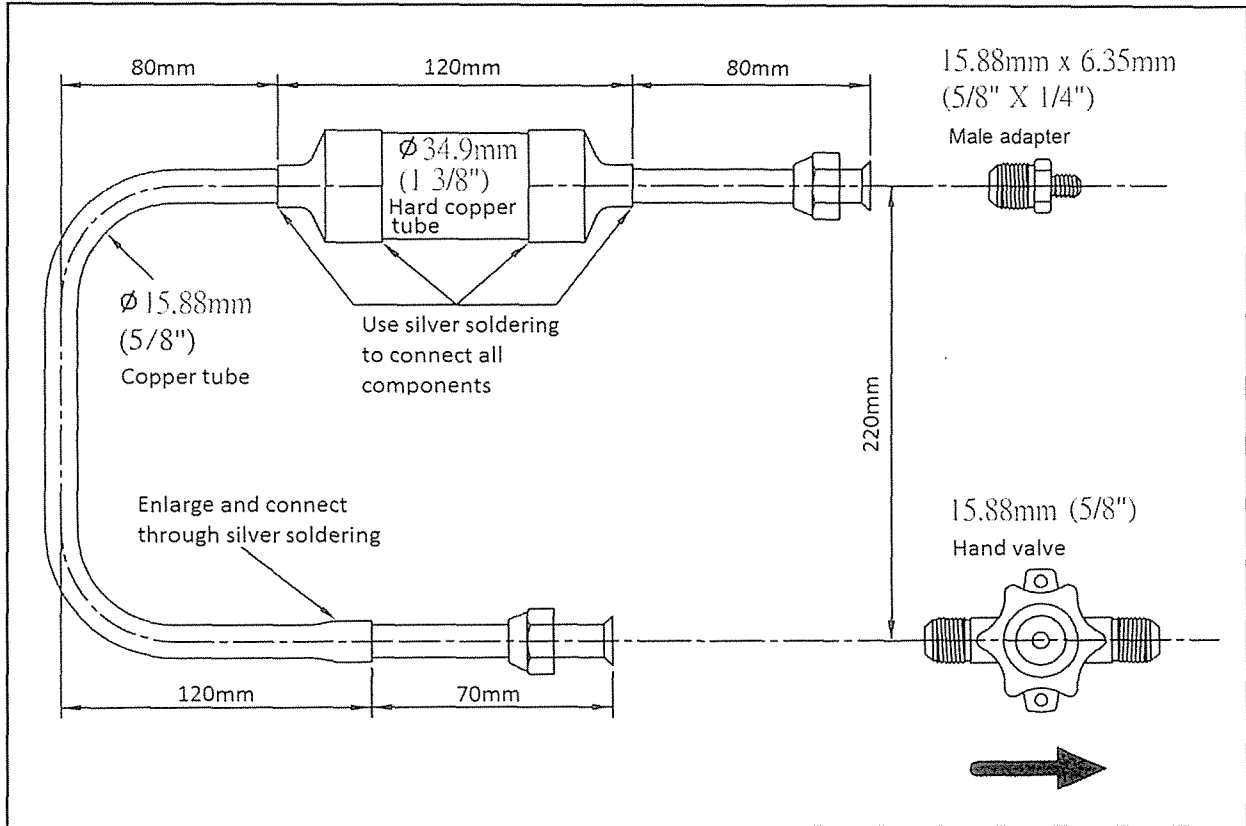
**Practical Test Paper for Trade Test (EAU)**

Name of candidate : \_\_\_\_\_

Exam date: \_\_\_\_\_

**Task 1 : Refrigerant tube section fabrication**

1. Fabricate tube section according to the drawing below, inform the invigilator for checking upon completion.
2. Once verified by the invigilator, tighten hand valve and connect to nitrogen gas outlet, use 1,040 kPa (150 psi) nitrogen gas for leakage test.  
**(Caution: dimensions tolerant must be less than ±2mm.)**



**Leakage test record**

<u>Leakage test</u>	<u>Leakage test start time</u>	<u>Leakage test result</u>	<u>Leakage test success time</u>	<u>Candidate's signature</u>	<u>Invigilator's signature</u>
1 <sup>st</sup> time		Successful / Unsuccessful			
2 <sup>nd</sup> time		Successful / Unsuccessful			
3 <sup>rd</sup> time		Successful / Unsuccessful			

**Practical Test Paper for Trade Test (EAU)**

Task 2: Install a split type air conditioner

1. Install and fix the outdoor unit and hanger according to diagram 1.
2. Install and fix the indoor unit according to diagram 1.
3. Connect refrigerant tubes form indoor to outdoor.
4. Apply appropriate thermal insulation on refrigerant tubes.
5. Connect power wiring to power box and control wiring between indoor unit and outdoor unit.
6. Connect condensate drain pipe (PVC pipe) to indoor unit.

You should inform the invigilators to verify the correct installations stated in steps 1 to 4, before performing the below tasks.

7. Nitrogen gas system pressure test to 1,000 kPa (145 psi), apply soap water to find out leakage if necessary. Pressure drop should not excess 15 kPa (2 psi) within 10 minutes.
8. Before performing the pressure test, you should inform the invigilator to time the test. When 10 minutes is up, please notify the invigilator for checking.

**Record of Pressure Test**

Testing	start time	reading	End time	reading	reading	Candidate's signature	Invigilator's signature
1 <sup>st</sup> time					Successful / Unsuccessful		
2 <sup>nd</sup> time					Successful / Unsuccessful		
3 <sup>rd</sup> time					Successful / Unsuccessful		

9. System vacuum for 10 minutes, stop vacuum pump at reading more than 29.5 inHg (should be confirmed by invigilator)

**System Vacuum Record**

Testing	start time	reading	End time	reading	reading	Candidate's signature	Invigilator's signature
1 <sup>st</sup> time					Successful / Unsuccessful		
2 <sup>nd</sup> time					Successful / Unsuccessful		
3 <sup>rd</sup> time					Successful / Unsuccessful		

**Practical Test Paper for Trade Test (EAU)**

Name of candidate : \_\_\_\_\_

Exam date: \_\_\_\_\_

Task 2: Install a split type air conditioner.

(Continued)

10. Vacuum for 5 minutes.

Time of completion:	Candidate's signature:	Invigilator's signature:

11. Fill refrigerant from outdoor unit to the whole system, start up system, perform operational test and fill in the test report below:

Running current	A	Indoor Unit: supply air temperature	°C
Refrigerant low pressure	kPa / psi	Indoor Unit: return air temperature	°C
		Outdoor Unit: supply air temperature	°C
		Outdoor Unit : return air temperature	°C

12. Determine whether the system refrigerant is sufficient. (  Sufficient,  Insufficient )

13. If refrigerant is insufficient, connect the refrigerant bottle to the system and prepare to refill refrigerant. (Before opening the refrigerant bottle to refill refrigerant, candidates must have the invigilator check whether the system is connected correctly.)

Refrigerant refilling time:	Candidate's signature:	Invigilator's signature:

14. After refilling refrigerant, perform operational test and fill in the test report below:

Running current	A	Indoor Unit : supply air temperature	°C
Refrigerant low pressure	kPa / psi	Indoor Unit : return air temperature	°C
		Outdoor Unit : supply air temperature	°C
		Outdoor Unit : return air temperature	°C

15. To pump down the system:

Pump down the system and store refrigerant to outdoor unit

Notes to Candidates:

1. Candidates should read the test papers carefully and ask the invigilator for any queries.
2. Candidates should study the drawings and specifications attached to test papers, if any, before the test begins.
3. Candidates should carry out the test according to test papers, working drawings and specifications provided.
4. Candidates shall bring their own safety shoes, other safety equipment will be provided by trade testing centre. Candidates must take all necessary safety precautions to ensure work safety.
5. All tools and materials required by the test will be provided by trade testing centre, candidates should check and ensure their adequacy and quality. Candidates shall use the tools and materials properly based on trade practice. All the tools must be returned to trade testing centre after the test. The candidates may ask the invigilator for any problems.
6. Candidates are required to handle and move the tools and materials for use in the test, and to carry out associated works.
7. Invigilator will take record photos periodically during the test.
8. Candidates are not allowed to take any photo or video with cameras or mobile phones.
9. Candidates are not allowed to use their mobile phones during the trade tests, except for emergency situation.
10. The marking scheme is based on the following criteria :
  - a) Understanding of drawing and specification
  - b) Preparation works before commencement of test



- c) Working procedures
- d) Accuracy and quality of works
- e) Progress of works
- f) Proper handling and use of materials
- g) Proper use of tools and equipment
- h) Safety precautions
- i) Considerate of other trades
- h) Housekeeping after completion of test

11. All candidates must stop when time is up.
12. Candidates are required to return the test paper to invigilator after the test.
13. Offering bribe to invigilator is an offence in law and trade testing centre will report to the ICAC for any such case.

**In the event that the candidate fails to take any necessary safety precautions and / or works in any dangerous situations, he / she will be assessed failed**

Diagram1

