

2019 FINAL COMPETITION OUTLINE BRIEF:

The competition involves 4 tasks;

Task	Title	Time	Mark
1	AC Wiring and Control Set Up	3hr	23
2	Refrigerant Retrofit, Commission & Fault Find	3hr	48
3	Fabricate AC system with Mechanical joints	3hr	14
4	Fabricate Heat Exchanger with Flame Brazing	3hr	15

Safe Working:

Candidates must follow the control measures noted in the risk assessment and work safely at all times. Wear appropriate safety clothing for all tasks and maintain a safe working environment with no slip or trip hazards.

Skills & Knowledge required to complete the tasks:

- Interpreting detailed drawings including location dimensions
- Calculating area and volume of different components
- Transferring information obtained onto industry charts (Pressure Enthalpy and Psychrometric)
- Calculating coefficient of performance
- Measuring, fitting and use of materials in an efficient way
- Installation of components using general hand tools
- Joining of permanent mechanical joints using compression tools & equipment
- Joining of permanent joints using flame brazing tools & equipment
- Joining of non-permanent mechanical joints using tools & equipment
- Correct use of specialised refrigeration tools & equipment
- Connection of wiring conductors to industry standards
- Safe and correct use of electrical testing equipment
- Pressure and Evacuation testing in accordance with Fgas regulations / BSEN378:2016
- Handling refrigerants according to Fgas category 1 procedures

Installation Standards:

- All measurements to be made from the datum line indicated
- The pipe work measurements should be within +/- 2mm of specification unless otherwise detailed
- All components to be fitted/positioned according to manufacturer's instructions
- All mechanical joints to be fitted as per manufacturer's instructions.
- Pressure and leak testing to BSEN 378; 2016 unless otherwise stated
- Wiring terminations to be tight and without conductors showing when viewed at 90°
- All components to be suitably bracketed to prevent movement and earthed
- Electrical tests to prove the installation is safe to energise
 - Earth continuity, Insulation resistance, Polarity 'dead' & 'live'.
- Prevent / minimise loss of refrigerant during all recovery & charging activity
- Efficient operation, control set up of all devices and temperature controller.

Flame brazing standards:

- A joint is to be full all around, and have no parent metal loss
- Joint mouth to have a full fillet – no depressions, holes or sharp peaks
- Components to be free from all flux residue
- Components to be protected from heat according to manufacturer's instructions
- No scorching on surrounding areas

Sponsored by Toshiba Carrier Air Conditioning

Task	Title	Hours	Marks
1	Air Conditioning system Wiring & Controls set up	3	23

Competitors are provided with Toshiba air conditioning unit and AHU controls equipment, and are to complete the electrical power and controls wiring, then commission and complete records according to a design specification.

Sponsored by AGAS & Fieldpiece

Task	Title	Hours	Marks
2	Refrigerant Retrofit & Commissioning & Fault Find	3	48

Competitors are provided with a refrigeration system test rig containing clean refrigerant and Eliwell controller. The task is to find and correct an electrical & mechanical fault, retrofit to a new low GWP refrigerant, re-commission & demonstrate operation and settings plus complete industry records along with pH diagram.

Sponsored by Lawton Tubes, Beijer Ref, Climalife and Toshiba

Task	Title	Hours	Marks
3	Fabricate AC System with Mechanical joints	3	14

Competitors are provided with a 90° angled back board along with a fixed location for Air Conditioning outdoor unit and pipe work brackets. The task is to install copper pipe work and compression fittings according to a layout and schematic diagram provided then pressure test to competition standard instructions.

Sponsored by Advanced Engineering, Lawton Tubes and Climalife

Task	Title	Hours	Marks
4	Fabricate Heat Exchanger with Flame Brazing	3	15

Competitors are to fabricate, assemble, flame braze an assembly using rigid copper pipe work according to a detailed diagram, then pressure test to competition instructions. Competitors also have to fabricate & calculate the volume of a chosen joint on the heat exchanger in order to know how much alloy is required to fill the joint made by the competitor.

Continued

The competition judges will mark the work of each competitor according to a detailed mark scheme.

Summary Marking Scheme

(breakdown by Task and Aspect are subject to minor change)

- A – Fabrication
- B – Electrical wiring and Fault Find
- C – Pressure Testing & Evacuation
- D – Refrigerant Handling
- E – Commissioning
- F – Work Organisation and Safety

Aspect		Task 1	Task 2	Task 3	Task 4	TOTAL
A1	Flame brazing				11.25	11.25
A2	Fabrication			10.25		10.25
B1	Wiring	6.75				6.75
B2	Fault find		5			5
C1	P test – Ref		6.75			6.75
C2	P test – AC			2.5		2.5
C3	P test – HX				2.5	2.5
D1	Recovery		10			10
D2	Charging		10			10
E1	Commission A	3.75				3.75
E2	Commission B	3.75				3.75
E3	Commission C	3.75				3.75
E4	Commission D	3.75				3.75
E5	Commission Ref		15			15
F1	Safety A	1.25				1.25
F2	Safety B		1.25			1.25
F3	Safety C			1.25		1.25
F4	Safety D				1.25	1.25
		23.00	48.00	14.00	15.00	100