

**2009 WorldSkills Australia Regional
Refrigeration Competition
REF09/3 Pre-Competition Information**

PREAMBLE

A Refrigeration Mechanic is required to use a number of different skills in the installation and servicing of refrigeration and air conditioning equipment. This competition will test a range of skills used in the trade.

Competitors must follow all necessary safety precautions throughout the competition.

SKILLS LIST

There are four (4) tasks in the competition, which are listed below. Each task will test a different skill area, they are:

1. Fabrication Task

This task involves the marking out, cutting,, swaging and silver soldering of copper tube to a high standard. Also Charging a refrigeration system. The finished job will then be cleaning before presentation and judging.

2. Determine Electrical Faults

This task requires the competitor to identify electrical faults on two (2) refrigeration and /or air conditioning systems, one (1) fault on each unit.

3. Determine Refrigeration Faults

This task requires the competitor to identify refrigeration faults on two (2) refrigeration and/or air conditioning systems, one (1) fault on each unit.

4. Program Electronic Controllers

This task requires the competitor to determine the settings and then the adjustment of two (2) Electronic Controllers, one (1) fitted to a refrigeration system and the other to an air conditioning system. The controllers are to be set to ensure their safe and effective operation, given the design conditions.

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MARKING SUMMARY

The various task marks allocated below are based on their level of difficulty and the expected time to complete them.

Task	Time Allocated	Maximum Marks
1. Fabrication	5 hours	50
2. Determine Electrical Fault	1.hour	15
3. Determine Refrigeration Faults	1.hour	15
4. Program Electronic Controllers	1 hour	20
	TOTAL	8 hours
		100

The times allocated for the Tasks are the maximum times allowed and must not be exceeded. If a competitor finishes a task in less than the allocated time, they will be able to use this time on task 1.

Marking will be conducted using a preset, detailed marking scale. The competitors will be shown this detailed marking scale for 15 minutes during the Familiarisation Session, before the start of the competition.

Each task is divided into a number of skills, which will be individually marked. These skills will be either judged correct or incorrect. For example, if the copper tube is to be cut to 150 mm long + or - 1 mm, marks will be given if the tube is within these dimensions. No marks will be given if the tube is cut below 149 mm or above 151 mm.

The judges will mark some of the competitors' skills while they are working and some when the tasks are completed.

A minimum of four (4) judges should be used for this competition because of the number competitors and tasks.

BREAKING A TIE

The Highest score in Task 1 will be used as the Tie Breaker. If still even the highest score in Task 4 will be used.

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TIMETABLE FOR TASKS AND COMPETITORS

Task 1 - Fabrication can be carried out by the competitors at the same time. Tasks 2, 3 and 4 however require the competitors to work on the same equipment at different times.

Below is a suggested timetable for the tasks and competitors. It is based on the fact that a Regional Competition must have a minimum of six (6) or eight (8) competitors. Competition are for eight (8) hours a day.

COMPETITORS TIMETABLE

Time	No.1/5	No.2/6	No.3/7	No.4/8
7.30 - 8.00	Set Up & Familiarisation	Set Up & Familiarisation	Set Up & Familiarisation	Set Up & Familiarisation
8.00 -10.00	Task 1	Task 1	Task 1	Task 1
10.00 -10.15	Morning Tea	Morning Tea	Morning Tea	Morning Tea
10.15 -11.15	Task 2	Task 3	Task 1	Task 1
11.15 – 12.15	Task 3	Task 4	Task 1	Task 1
12.15 -12.45	Lunch	Lunch	Lunch	Lunch
12.45 – 1.45	Task 4	Task 2	Task 1	Task 1
1.45 - 2.45	Task 1	Task 1	Task 2	Task 3
2.45 - 3.00	Afternoon Tea	Afternoon Tea	Afternoon Tea	Afternoon Tea
3.00 – 4.00	Task 1	Task 1	Task 3	Task 4
4.00-5.00	Task 1	Task 1	Task 4	Task 2

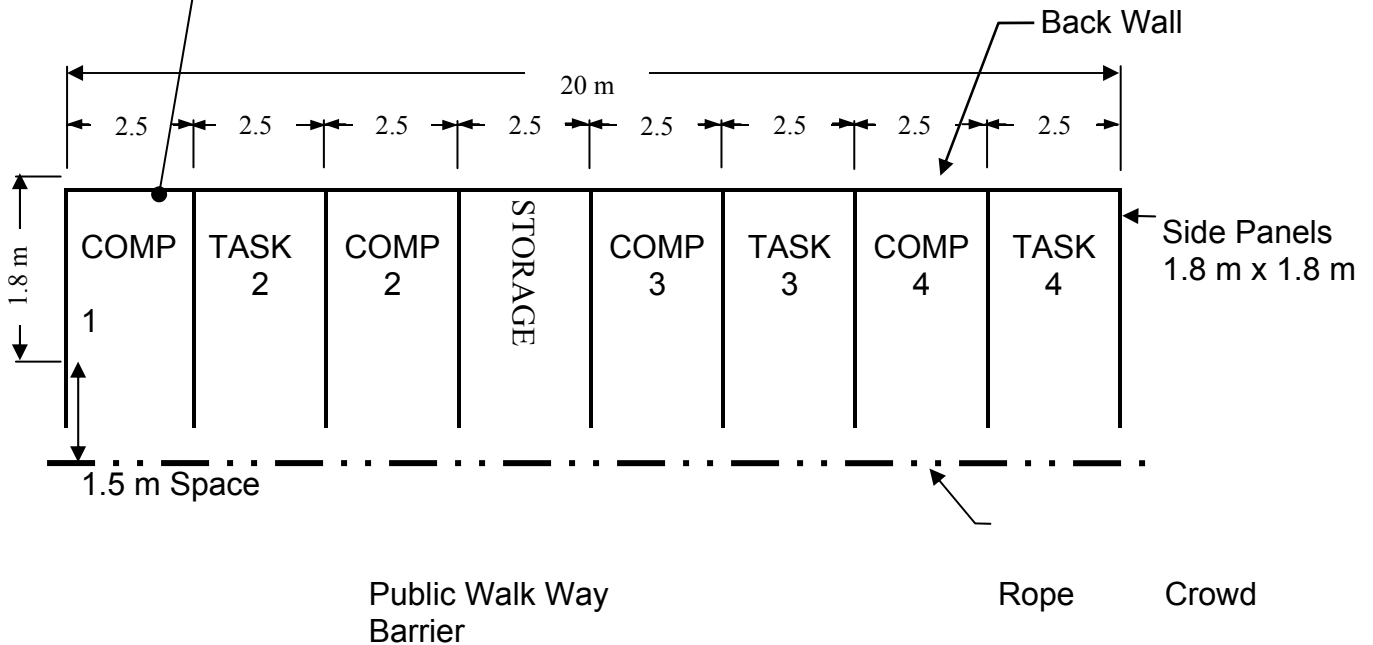
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COMPETITION LAYOUT

Below is a suggested layout for the competition based on four (4) competitors per day. This layout enables the judges to have clear view of all competitors at all times and provides separation between competitors.

Example:

Eight (8) Work Areas at 2.5 m x 1.8 m each. Total Length 20m
 One (1) work area is to be provided for each competitor to complete Tasks 1 and 5. One (1) work area is to be provided for Tasks 2, 3 and 5. Duplicate for eight (8) competitors.



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TOOLS/EQUIPMENT PROVIDED BY THE COMPETITORS

Each competitor is to provide the following tools for their own use throughout the competition. The tools listed below are the minimum requirements; they are free to bring additional trade related tools.

- | | |
|---|----------------------------------|
| * Flare Kit | * Hammer |
| * Tube cutter | * Rule |
| * Swaging tools | * Files |
| * Hacksaw | * Pen and Paper |
| * Oil Can | * Pressure/temperature chart |
| * Ratchet Key | * Square |
| * Gauge Manifold Set for R22 R134 & R407C | * Pliers |
| * Leak Detector | * Side cutters |
| * Leak detection solution | * Multi-grips |
| * Small mirror | * Screw drivers |
| * Set of spanners | * Steel wool |
| * Shifting spanners | * Emery cloth |
| * Scriber | * Multi-meter |
| * Bending spring 6mm to 20 mm | * Tong-ammeter |
| * Mechanical tube bender 6mm to 20 mm | * Tape measure |
| * Insulation Resistance Meter (Mega) | * De Burring Tool |
| * Sling Psychrometer | * Socket Set – Metric / Imperial |

Notes: It is recommended that:

- Competitors also provide a temperature probe capable of measuring pipe temperatures.
- The organiser has a complete set of these tools available.

SAFETY EQUIPMENT

All competitors must provide and wear their own personal safety equipment at all times throughout the competition. Any competitor without the required safety equipment **WILL NOT** be allowed to compete. This Safety Equipment includes:

- Safety Shoes
- Safety Glasses
- Overalls or Long Sleeve Shirt and Long Pants
- Hair Net, if your hair can hang over your face.

Competitors who do not wear the required safety equipment as designed (i.e. glasses on their forehead rather than over their eyes) will be told to use them correctly and will also loose 0.25 penalty marks per infringement.

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TOOLS AND EQUIPMENT TO BE SUPPLIED BY THE ORGANISERS

The organisers will provide the following tools and equipment for the competitors use during the competition.

TASK 1 - FABRICATIion

EQUIPMENT

- Silver soldering equipment, one set for each competitor (Oxy-Acetylene or Air-Acetylene)
- Dry Nitrogen cylinder and regulator, one for each competitor
- Small welding/workbench with vice, one for each competitor
- 2 x 240 volt GPO, one for each competitor

MATERIALS

Required for each competitor,

- ACC Compressor 1/20 HP 42w @-25 DEG C
- 8M of ¼ " Copper
- 150mm x 100mm PVC Tube
- 150mm x 65mm wooden dowel
- 2meters of 0.66mm Capillary tube
- 1 x 10 gram copper spun drier with ¼ " tails
- 150mm of 3/16" Copper tube
- 120 x 120 x 38mm 240V axial computer fan
- 2 gang SPDT switch plate mounted on 36mm high spacer block
- 1 x 350 x240 x 11mm MDF board
- 1 x ¼ copper tee
- 2 x ¼' Schraeder valves
- 3 pin 10A plug
- 5 x ¼ saddles
- Screws
- Rag
- Emery cloth & steel wool
- Brown Tip Silver solder
- Blue tip Silver solder
- Solder Flux

TOOLS

- 1 x pistol drill, shared between 2 competitors
- Drill bits, 6mm for each competitor

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TASK 2 - DETERMINE ELECTRICAL FAULTS

EQUIPMENT

- Two Refrigeration and or Air Conditioning units
- Wiring diagram for the above units

TOOLS

- Tong-ammeter
- Insulation Resistance Meters (Megga)
- Multimeter

TASK 3 – DETERMINE REFRIGERATION FAULTS

EQUIPMENT

- Two of 240 volt units, a commercial refrigeration unit fitted with a TX valve and an air conditioning unit. Each system is to be set up with a different refrigeration fault. They are to be operating and fitted with manifold gauges to assist the competitors identify the faults.
- 2 x 240 volt GPOs, one for each unit

TOOLS

- 2 x Manifold gauge sets
- 4 x Digital thermometers
- Pressure / temperature charts

TASK 4 - ADJUST ELECTRONIC CONTROLLERS

EQUIPMENT

- One commercial cabinet or training unit fitted with a refrigeration designed electronic controller and one air conditioning unit fitted with an air conditioning designed Electronic Controllers.

Note: The organiser must select an appropriate unit and list the design conditions for the system on the Competitors Instruction sheet.

- 2 x 240 volt GPOs, one for each unit.

TOOLS

- Digital thermometer
- Manufacturer's operating instructions
- Pressure/temperature chart

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ELECTRICAL EQUIPMENT TEST & TAG

Organisers and Competitors - Only 240V & 415v electrical equipment that has been tested by a competent person and has a current test tag attached shall be allowed to be used in the competitions

DEMONSTRATE GOOD HOUSEKEEPING

Organisers and Competitors are required to properly manage their workplace, including minimising waste, preventing unavoidable power/gas consumption and effectively using materials and tools.

SAFE WORK METHOD STATEMENT

Competitors must complete a Safe Work Method Statement in preparation to compete in the competition. Completed Safe Work Method Statements must be submitted to the Judges prior to the start of the competition. No competitor will be allowed to compete in the competition unless a Safe Work Method Statement has been completed.

ELECTRICAL PROCEDURES

Organisers and Competitors involved in any electrical activities associated with the competitions are required to use a safe system of work. This shall include following the WorldSkills Australia Electrical procedure and completing an Electrical Risk Assessment prior to competition.