Skill name

Refrigeration and Air Conditioning

	Criteria	Mark
A	Component Fabrication	12.50
B	Component and System Installation	20.00
C	Electrical Installation	15.00
D	Commissioning and Adjustment	17.50
E	Electrical Fault Find and Repair	10.00
F	Refrigeration Fault Find and Repair	10.00
G	Refrigerant Recovery and Control	10.00
H	Work Practices and Safety	5.00

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
A1	Module A - Copper Fabrication			
		O	Fabricated headers has inlet and outlet pipes arranged as per sp	
		O	Fabricated headers are squared and lies flat on the table	
		O	Overall width is as per specifications	
		O	Overall depth is as per specifications	
		O	Overall height is as per specifications	
		O	Fabricated copper tube is leak tight on first attempt	
		O	Evaporator is fabricated and leak tight in under 150 minutes	
		O	Evaporator is fabricated and leak tight in under 180 minutes	
		O	Brazed joint #1 is made to acceptable standard	
		O	Brazed joint #2 is made to acceptable standard	
		O	Brazed joint #3 is made to acceptable standard	
		O	Brazed joint #4 is made to acceptable standard	
		O	Brazed joint #5 is made to acceptable standard	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
B1	Module B - Major Components			
		O	Electrical switchboard installed in specified location and securely	
		O	Condensing unit installed in specified location and securely fixed	
		O	Low Pressure vessel leveled and securely fixed to wall	
		O	Brazed Plate Heat Exchanger leveled and securely fixed to the b	
		O	Plate heat exchanger bracket is leveled and securely mounted t	
		O	Glycol Tank installed as specified	
		O	Fabricated copper coil installed in ice rink as specified	
		O	All pipework is installed within the boundaries of the supplied cra	
B2	Module B - Refrigerant Controls			
		O	Electric expansion valve installed in correct location in system , w	
		O	Capacity regulating valve installed in correct location in system,	
		O	Dual pressure control piped as per specifications	
		O	Pressure control is leveled and securely mounted to wall	
B3	Module B - Low Pressure Liquid and Vapour Lin			
		O	All Suction, low pressure liquid and vapour lines are insulated	
		O	All bends of appropriate radius with no kinks	
		O	All pipe installed in vertical and horizontal planes and the pipe w	
		O	Installed pipework does not rub on any components when operat	
		O	Suction line is securely fastened using approved method	
		O	Nitrogen used to make all brazed connections	
		O	Brazed joint #1 is acceptable	
		O	Suction, low pressure liquid and low pressure vapour lines are se	
B4	Module B - High Pressure Liquid Line			
		O	All bends of appropriate radius with no kinks	
		O	All pipe installed in vertical and horizontal planes and the pipe w	
		O	Installed pipework does not rub on any components when operat	
		O	Liquid line is securely fastened using approved method	
		O	Nitrogen used to make all brazed connections	
		O	Brazed joint #2 is acceptable	
B5	Module B - High Pressure Discharge Line			
		O	All bends of appropriate radius with no kinks	

		O	All pipe installed in vertical and horizontal planes and the pipe w
		O	Installed pipework does not rub on any components when operat
		O	High pressure line is securely fastened using approved method
		O	Nitrogen used to make all brazed connections
		O	Brazed joint #3 is acceptable
		O	Ball valve installed as specified
B6	Module B - Low Pressure Vessel and Heat Exch		
		O	Low Pressure vessel is piped as per diagram
		O	Brazed Plate Heat Exchanger is piped as per diagram
		O	Brazed joint #4 or refrigerant side of heat exchanger is acceptabl
		O	Glycol pipework installed as per diagram
		O	All glycol pipework lines are insulated
		O	Glycol pipework has no kinks on copper and plastic tubing
		O	All pipe installed in vertical and horizontal planes
		O	Pipework does not rub on any components when operating (fan b
		O	Glycol lines are securely fastened using approved method
		O	Brazed joint #5 on glycol side heat exchanger is acceptable
B7	Module B - Pressure Test		
		O	Starting pressure of all attempts meet required standards
		O	The appropriate valves were opened to ensure pressure testing c
		O	Gauges were correctly fitted to the system
		O	Nitrogen was safely added to the system to the desired test press
		O	System was leak tested while under pressure
		O	No leaks were detected on FIRST pressure test attempt
		O	System held pressure for complete standing time after any leaks
		O	Nitrogen was safely released from system at completion of press
B8	Module B - Evacuation		
		O	Vacuum level (value) of all attempts meet required standards
		O	The appropriate valves were opened to ensure evacuation of the
		O	Vacuum gauge installed so it can be isolated from the vacuum pu
		O	The vacuum held when isolated from the vacuum pump for 10 m
		O	The vacuum held when isolated from the vacuum pump for 10 m

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score

C1	Module B - Connect the Electrical Circuit			
		O	All wiring installed as per supplied wiring diagram	
		O	Supply voltage is wired correctly on supplied plug	
		O	220V supply wired to correct terminals in switchboard, and correc	
		O	Condensing unit wired to correct terminals in switchboard and un	
		O	Low level switch wired to correct terminals in switchboard and se	
		O	High level switch wired to correct terminals in switchboard and se	
		O	Pressure control wired to correct terminals in switchboard and co	
		O	Glycol pump wired to correct terminals in switchboard and correc	
		O	All cables saddled (fixed), and secured separate to piping	
		O	Installed cables not be crushed by piping or other components	
		O	Installed cables and wires installed as per test project for adequa	
		O	All cables and conduit is installed within the boundaries of the su	
C2	Module B - Connect the Electronic Controls			
		O	Temperature probe is wired to the correct terminals in switchboa	
		O	Temperature probe is installed in conduit correctly	
		O	Conduit is verticaly and horizontaly leveled and securely fastene	
C3	Module B - Electrical Testing			
		O	Installation tested for earth continuity to power supply	
		O	Installation tested for earth continuity to condensing unit prior to e	
		O	Installation tested for earth continuity to AKV valve	
		O	Installation tested for earth leakage prior to energising	
		O	Installation tested for shorts between active and neutral prior to e	
		O	No wiring faults found on circuit testing	
		O	Circuit energised safely the first time without blowing fuses/circuit	
		O	Circuit operated safely and correctly the first time without wiring n	
		O	Circuit operated safely and correctly after any necessary modifica	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
D1	Module B - Charge with Refrigerant Primary Circ			
		O	The correct valves were opened prior to operation	
		O	Liquid refrigerant was added to the liquid line only (not suction)	
		O	The correct refrigerant charge weighed into the system and recor	
		O	Amount of refrigerant added is within acceptable guidelines	

		O	Electronic leak check was made during charging of refrigerant
		O	The gauges were removed from the system with no avoidable los
D2	Module B - Charge with Refrigerant Secondary C		
		O	Water added to the system was measured to ensure 60% water
		O	Glycol pump circulated prior to any refrigeration being energised
D3	Module B - Commissioning Report		
		O	Commissioning report - ambient temperature recorded correctly
		O	Commissioning report - refrigerant type recorded correctly
		O	Commissioning report - refrigerant charge recorded correctly
		O	Commissioning report - suction pressure recorded correctly
		O	Commissioning report - discharge pressure recorded correctly
		O	Commissioning report - condenser subcooling recorded correctly
		O	Commissioning report - total system superheat recorded correctly
		O	Commissioning report - LP control cut in and cut-out are set and
		O	Commissioning report - HP control cut out is set and recorded co
		O	Commissioning report - Capacity regulator set and recorded corr
		O	Commissioning report - glycol supply and return temp to and from
		O	Commissioning report - condensing unit operating current measu
		O	Commissioning report - glycol pump operating current measured
D4	Module B - Commissioning - Complete the Instal		
		O	Project completed requiring no additional materials
		O	Covers installed securely on all equipment
		O	Correct refrigerant type was recorded
		O	No burn marks and no damage on any equipment from installatio
		O	System left operational at completion of module
		O	After minimum 12hrs run time there is NO water present above th
		O	The control was correctly programed as per test project specifica
D5	Module C - Commissioning Report		
		O	Commissioning report - ambient temperature measured and reco
		O	Commissioning report - return air temperature dry bulb / wet bulb
		O	Commissioning report - supply air temperature dry bulb / wet bul
		O	Commissioning report - air velocity measured and recorded corre
		O	Commissioning report - air volume measured and recorded corre
		O	Commissioning report - Indoor fan speed and mode of operation
		O	Commissioning report - refrigerant type and refrigerant charge re
		O	Commissioning report - suction pressure measured and recorded
		O	Commissioning report - total system superheat measured and re
		O	Commissioning report - compressor current draw measured and
		O	Commissioning report - Indoor fan current draw measured and re

D6	Module C - Commissioning - Complete the Insta	O	Supply and return air conditions were joined to indicate cooling p	
		O	Project completed requiring no additional materials	
		O	Covers installed securely on all equipment	
		O	No burn marks on any equipment from installation	
		O	Installation not damaged in any way	
		O	System left in correct operation	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
E1	Module C - Electrical Fault Finding	O	The unit was tested for short circuit, insulation resistance and ea	
		O	The fault was correctly identified, repaired and recorded in under	
		O	The fault was correctly identified, repaired and recorded in under	
		O	The fault was correctly identified, repaired and recorded in under	
		O	The fault was correctly identified, repaired and recorded in over 9	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
F1	Module C - Refrigeration Fault Finding	O	The fault was correctly identified, recorded and reclaim started in	
		O	The fault was correctly identified, recorded and reclaim started in	
		O	The fault was correctly identified, recorded and reclaim started in	
		O	The fault was correctly identified, recorded and reclaim started in	
		O	The fault was correctly identified, recorded and reclaim started in	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
G1	Module C - Reclaim Refrigerant			
		O	Power supply to air conditioner was isolated before refrigerant re	
		O	Service manifold gauge lines were fitted to the system in the corr	
		O	Moisture contamination was prevented without loss of refrigerant	
		O	The correct refrigerant cylinder was selected for the recovery of r	
		O	Refrigerant cylinder weighed and recorded before recovery starte	
		O	Refrigerant recovery lines set up was correct first time	
		O	The full refrigerant charge was removed from the system using re	
		O	Electronic leak check was made during recovery of refrigerant	
		O	System pressures were at atmospheric pressure or below after re	
		O	All service caps replaced on the recovery unit and recovery cylind	
		O	The quantity of refrigerant recovered from the system was record	
G2	Module C - Evacuation			
		O	First vacuum attempt meets required standards	
		O	The vacuum held when isolated from the vacuum pump for 10 m	
G3	Module C - Charge with Refrigerant			
		O	The correct refrigerant charge weighed into the system and recor	
		O	Amount of refrigerant added is within acceptable guidelines	
		O	The gauges were removed from the system with minimal loss of	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
H1	Module A - Work Practices and Safety			
		O	Protective gloves were worn at all times when exposed to heat so	
		O	Protective eye wear was worn at all times while brazing	
		O	The competitor always used the correct tool and safe work practi	
		O	The competitors brazing torches and regulators are left at atmosp	
H2	Module B - Work Practices and Safety			
		O	Protective gloves were worn at all times when exposed to heat so	
		O	Protective eye wear was worn at all times while brazing, drilling, h	

H3	Module C - Work Practices and Safety	O O O O O O	The competitor always used the correct tool and safe work practi The competitors brazing torches and regulators are left at atmos Protective gloves were worn at all times when exposed to heat s Protective eye wear was worn at all times while brazing, drilling, h The competitor always used the correct tool and safe work practi The competitors equipment was in a safe condition on completio	

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes	Refer drawing R00	2	0.50
YES	+/- 2 mm	4	0.50
Yes	533mm +/- 2mm	4	1.00
Yes	420mm +/- 2mm	4	1.00
Yes	300mm +/- 2mm	4	1.00
Yes	Pressure tested t	4	2.00
Yes		4	1.00
Yes		4	0.50
Yes	2.5% solder used,	4	1.00
Yes	2.5% solder used,	4	1.00
Yes	2.5% solder used,	4	1.00
Yes	2.5% solder used,	4	1.00
Yes	2.5% solder used,	4	1.00

Criterion A

Total Mark 12.50

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes	Refer drawing R00	2	0.40
Yes	Refer drawing R00	2	0.40
Yes	2 mounting points	4	0.30
YES	2 mounting points	3	0.30
Yes	Four mounting poi	3	0.30
Yes	Refer drawing R00	3	0.20
Yes	Refer drawing R00	3	0.20
Yes	Back plates and co	3	0.20
Yes	Refer drawing R00	3	0.50
Yes	Refer drawing R00	3	0.40
Yes	Refer drawing R00	1	0.30
Yes	2 mounting points	4	0.20
Yes	Refer to standard s	4	0.20
Yes	Refer to standard s	4	0.10
Yes	Refer to standard s	4	0.30
Yes		1	0.20
Yes	Refer to standard s	4	0.30
Yes	Refer to standard s	4	0.20
Yes	Refer to standard s	4	0.50
Yes		3	0.20
Yes	Refer to standard s	4	0.10
Yes	Refer to standard s	4	0.30
Yes		1	0.20
Yes	Refer to standard s	4	0.30
Yes	Refer to standard s	4	0.20
Yes	Refer to standard s	4	0.50
Yes	Refer to standard s	4	0.10

Criterion B Total Mark 20.00

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes	Refer to standard s	4	0.20
Yes		1	0.20
Yes	Refer to standard s	4	0.30
Yes	Refer to standard s	4	0.20
Yes	Refer to standard s	4	0.50
Yes	Refer drawing R00	4	0.20
Yes	Refer drawing R00	2	0.50
Yes	Refer drawing R00	2	0.50
Yes	Refer to standard s	4	0.50
Yes	Refer drawing R00	2	0.40
Yes	Refer to standard s	3	0.20
Yes	Refer to standard s	4	0.10
Yes	Refer to standard s	4	0.20
Yes		1	0.20
Yes	Refer to standard s	4	0.10
Yes	Refer to standard s	4	0.50
Yes	Refer standards se	3	0.50
Yes	All isolation valves	1	0.40
Yes		4	0.20
Yes	Refer test project i	4	0.40
Yes	Soapy water or sup	4	0.20
Yes	test project	4	2.00
Yes	Refer standards se	4	0.50
Yes	Refer standards se	4	0.20
Yes	Refer standards se	3	0.50
Yes		1	0.20
Yes		4	0.20
Yes	Refer standards se	4	2.00
Yes	Refer standards se	4	0.50

Criterion C Total Mark 15.00

Yes	Refer R007, R008,	2	1.50
Yes	Refer R007, R008,	4	0.50
Yes	Refer R007, R008,	4	0.50
Yes	Refer R007, R008,	4	0.50
Yes	Refer R007, R008,	4	0.50
Yes	Refer R007, R008,	4	0.50
Yes	Refer R007, R008,	4	0.50
Yes	Refer R007, R008,	4	0.50
Yes	Every 400mm mmi	4	0.40
Yes		4	0.40
Yes	conduit or double i	3	0.40
Yes	front or rear of crac	3	0.20
Yes	Refer R007, R008,	4	0.50
Yes		3	0.40
Yes	Every 400mm max	4	0.40
Yes	Refer standards se	5	0.30
Yes	Refer standards se	5	0.30
Yes	Refer standards se	5	0.30
Yes	Refer standards se	5	1.00
Yes	Refer standards se	5	1.00
Yes		3	1.00
Yes		3	1.50
Yes		3	1.50
Yes		3	0.40

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes	All isolation valves	3	0.20
Yes		3	0.50
Yes	R134a vapour or li	3	0.50
Yes	Agree on acceptab	3	0.50

Criterion D Total Mark 17.50

Yes	Refer standards se	3	0.50
Yes	Refer standards se	5	0.20
Yes	Test project	3	1.00
Yes		5	0.50
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.60
Yes	Refer test project	5	0.60
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.60
Yes	Refer test project	5	0.30
Yes	Refer test project	5	0.30
Yes	Refer to test projec	1	0.20
Yes	Refer to test projec	1	0.20
Yes	Refer to test projec	1	0.20
Yes	Refer to test projec	1	0.70
Yes	Refer to test projec	1	0.50
Yes	Refer to test projec	2	1.00
Yes	Refer to test projec	5	0.50
Yes		5	0.20
Yes		5	1.00
Yes		5	1.00
Yes		5	0.20
Yes		5	0.20
Yes		5	0.40
Yes		5	0.40
Yes		5	0.20
Yes		5	0.20
Yes		5	0.20
Yes		5	0.20

Yes		3	0.20
Yes		1	0.10
Yes		1	0.20
Yes		1	0.20
Yes		1	0.20
Yes		1	0.40

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes		6	3.00
Yes		6	3.00
Yes		6	2.50
Yes		6	1.00
Yes		6	0.50

Criterion E Total Mark 10.00

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes		6	3.50
Yes		6	2.50
Yes		6	2.00
Yes		6	1.50
Yes		6	0.50

Criterion F Total Mark 10.00

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes		5	0.50
Yes		5	0.40
Yes		5	0.50
Yes		5	0.20
Yes		5	0.50
Yes		5	1.00
Yes		5	1.00
Yes	Refer to standards	5	0.20
Yes		5	0.50
Yes		5	0.40
Yes		5	0.40
Yes	Refer to standards	3	1.00
Yes	Refer to standards	4	1.00
Yes		3	1.00
Yes	Refer manufacture	5	1.00
Yes	Refer to standards	5	0.40

Criterion G Total Mark 10.00

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Yes		1	0.25
Yes		1	0.25
Yes		1	0.25
Yes		1	0.25
Yes		1	0.50
Yes		1	0.50

Criterion H Total Mark 5.00

Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50

Competition Total Mark 100.00