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	8.00
F	Refrigeration Repair	10.00
G	Refrigerant Recovery and Control	12.00
H	Work Practices and Safety	5.00
I		

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
A1	Module A - Copper Fabrication			
		M	Is the heat recovery coil and accessories as per specifications (D	
		M	Fabricated heat recovery coil fit in support prepared by Festo(it g	
		M	Is the length of the recovery coil as per mesurements	
		M	Is solenoid _____as per specifications (mesurements, flow diagr	
		M	Is acess valve _____ as per specifications (mesurements, flow d	
		M	Is bend _____ as per specification (see standards)(mesurement	
		M	Is bend _____ as per specification (see standards)(mesurement	
		M	Fabricated copper tube is leak tight on first attempt	
		M	IS Heat recovery coil fabricated and finished with in 150 minutes	
		M	IS Heat recovery coil fabricated and finished with in 180 minutes	
		J	Brazed joint #1 is made to acceptable standard (Copper to coppe	
				0
				1

				2 3
		J	Brazed joint #2 is made to acceptable standard	0 1 2 3
		J	Brazed joint #3 is made to acceptable standard	0 1 2 3
		J	Brazed joint #4 is made to acceptable standard	0 1 2 3
		J	Brazed joint #5 is made to acceptable standard	0 1 2 3
		J	Brazed joint #6 is made to acceptable standard	0 1 2 3

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
B1	Module B - Major Components			
		M	Compressor installed in specified location and securely fixed to c	
		M	Liquid reciever installed as specified	
		M	Suction accumulator installed as specified	
		M	Fabricated copper coil installed in ice rink as specified	

		M	All pipework is installed within the boundaries of the supplied crad	
B2	Module B - Refrigerant Controls			
		M	Thermostatic expansion valve installed in correct location in syste	
		M	Capacity regulating valve installed in correct location in system, v	
		M	Pressure controls are piped as per specifications	
		M	Pressure controls are leveled and securely mounted to wall	
B3	Module B - Low Pressure Vapour Lines			
		M	All Suction, low pressure vapour lines are insulated	
		M	All bends of appropriate radius with no kinks	
		M	All pipe installed in vertical and horizontal planes and the pipe wo	
		M	Installed pipework does not rub on any components when operat	
		M	Suction line is securely fastened using approved method	
		M	Nitrogen used to make all brazed connections	
		M	Suction low pressure vapour lines are set out so that these pipes	
		J	Brazed joint #1 is acceptable (copper to copper)	
				0
				1
				2
				3
		J	Is brazed joint ____ on suction accumulator acceptable	
				0
				1
				2
				3
B4	Module B - High Pressure Liquid Line			
		M	All bends of appropriate radius with no kinks	
		M	All pipe installed in vertical and horizontal planes and the pipe wo	
		M	Installed pipework does not rub on any components when operat	
		M	Liquid line is securely fastened using approved method	
		M	Nitrogen used to make all brazed connections	
		J	Brazed joint #2 is acceptable (copper to copper)	
				0
				1
				2
				3
		J	Is brazed joint ____ on liquid reciever acceptable	
				0
				1
				2

				3
B5	Module B - High Pressure Discharge Line			
		M	All bends of appropriate radius with no kinks	
		M	All pipe installed in vertical and horizontal planes and the pipe wo	
		M	Installed pipework does not rub on any components when operat	
		M	High pressure line is securely fastened using approved method	
		M	Nitrogen used to make all brazed connections	
		M	Are both Ball valves installed as specified per drawing	
		J	Brazed joint #3 is acceptable (copper to copper)	
				0
				1
				2
				3
		J	Is brazed joint _____ on Hotgas By-Pass acceptable	
				0
				1
				2
				3
B6	Module B - Pressure Test			
		M	Starting pressure of all attempts meet required standards	
		M	The appropriate valves were opened to ensure pressure testing c	
		M	Gauges were correctly fitted to the system	
		M	Nitrogen was safely added to the system to the desired test press	
		M	System was leak tested while under pressure	
		M	No leaks were detected on FIRST pressure test attempt	
		M	System held pressure for complete standing time after any leaks	
		M	Nitrogen was safely released from system at completion of press	
B7	Module B - Evacuation			
		M	Vacuum level (value) of all attempts meet required standards	
		M	The appropriate valves were opened to ensure evacuation of the	
		M	Vacuum gauge installed so it can be isolated from the vacuum pu	
		M	The vacuum held when isolated from the vacuum pump for 10 m	
		M	The vacuum held when isolated from the vacuum pump for 10 m	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
C1	Module B - Connect the Electrical Circuit			
		M	All wiring installed as per supplied wiring diagram	
		M	Supply voltage is wired correctly on supplied plug	
		M	220V supply wired to correct terminals in switchboard, and correc	
		M	Compressor wired to correct terminals in switchboard and unit, b	
		M	Supply voltage and contacts to A-421 thermostat (Heat recovery	
		M	Supply voltage and contacts to A-421 thermostat (Ice rink wired c	
		M	Low Pressure control wired to correct terminals in switchboard ar	
		M	High Pressure control wired to correct terminals in switchboard a	
		M	All cables saddled (fixed), and secured separate to piping	
		M	Installed cables not be crushed by piping or other components	
		M	Installed cables and wires installed as per test project for adequa	
		M	All cables and conduit is installed within the boundaries of the sup	
C2	Module B - Connect the Electronic Controls (The			
		M	Temperature probe is wired to the correct terminals in thermostat	
		M	Temperature probe is installed correctly	
		M	Cable channel is verticaly and horizontaly leveled and securely fa	
C3	Module B - Electrical Testing			
		M	Installation tested for earth continuity to power supply	
		M	Installation tested for earth continuity to compressor prior to ener	
		M	Installation tested for earth continuity to solenoide valves	
		M	Installation tested for earth leakage prior to energising	
		M	Installation tested for shorts between active and neutral prior to e	
		M	No wiring faults found on circuit testing	
		M	Circuit energised safely the first time without blowing fuses/circuit	
		M	Circuit operated safely and correctly the first time without wiring n	
		M	Circuit operated safely and correctly after any necessary modifica	

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score

D1	Module B - Charge with Refrigerant Primary Circ		
		M	Gas manifold valves in correct position prior to operation
		M	All mecanical valves in correct position prior to operation
		M	Liquid refrigerant was added to the liquid line only (not suction)
		M	The correct refrigerant charge weighed into the system and recor
		M	Amount of refrigerant added is within acceptable guidelines
		M	Electronic leak check was made during charging of refrigerant
		M	The gauges were removed from the system with no avoidable los
D3	Module B - Commissioning Report		
		M	Commissioning report - ambient temperature recorded correctly
		M	Commissioning report - refrigerant type recorded correctly
		M	Commissioning report - refrigerant charge recorded correctly
		M	Commissioning report - suction pressure recorded correctly
		M	Commissioning report - discharge pressure recorded correctly
		M	Commissioning report - condenser subcooling recorded correctly
		M	Commissioning report - total system superheat recorded correctly
		M	Commissioning report - LP control cut in and cut-out are set and
		M	Commissioning report - HP control cut out is set and recorded co
		M	Commissioning report - Capacity regulator set and recorded corr
		M	Commissioning report - compressor operating current measured
D4	Module B - Commissioning - Complete the Insta		
		M	Project completed requiring no additional materials
		M	Covers installed securely on all equipment
		M	No burn marks and no damage on any equipment from installatio
		M	System left operational at completion of module
		M	After minimum 12hrs run time there is NO water present above th
		M	The Thermostat was correctly programed for reheat
		M	The Thermostat was correctly programed for Ice rink
D5	Module C - Commissioning Report		
		M	Commissioning report - ambient temperature measured and reco
		M	Commissioning report - return air temperature dry bulb measured
		M	Commissioning report - supply air temperature dry bulb measure
		M	Commissioning report - Indoor fan speed and mode of operation
		M	Commissioning report - refrigerant type and refrigerant charge re
		M	Commissioning report - suction pressure measured and recorded
		M	Commissioning report - total system superheat measured and re
		M	Commissioning report - compressor current draw measured and
D6	Module C - Commissioning - Complete the Insta		
		M	Project completed requiring no additional materials

		M	Covers installed securely on all equipment	
		M	No burn marks on any equipment from installation	
		M	Installation not damaged in any way	
		M	System left in correct operation	
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
E1	Module C - Electrical Fault Finding			
		M	Was the compressor capacitor tested correctly and resault recor	
		M	Were the compressor windings identified correctly and recorded	
		M	Was the unite tested for short circuit	
		M	Was the unite tested for earth continuity	
		M	The fault was correctly identified under 30 minutes	
		M	The fault was correctly identified under 60 minutes	
		M	The fault was correctly identified under 75 minutes	
		M	Is the fault repaired and the system functionnal (operating)	
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
F1	Module C - Refrigeration system repair			
		M	Flared made to acceptable standards	
		M	Expantion (Swage) made to proper depth	
		M	Tubing reamed properly	
		M	Noitrogen was used while brazing	
		M	Pressure tested repaired and check with soap and did not leak or	
		M	All covers, caps, screws etc. put back on the unite	
		M	Insulation not damaged	
		M	Is the system repaired and functionnal (operating)	
		J	Brazing joint is made to acceptable standards	
				0
				1

				2 3
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
G1	Module C - Reclaim Refrigerant			
		M	Power supply to air conditioner was isolated before refrigerant re	
		M	Service manifold gauge lines were fitted to the system in the corr	
		M	Moisture contamination was prevented without loss of refrigerant	
		M	The correct refrigerant cylinder was selected for the recovery of r	
		M	Refrigerant cylinder weighed and recorded before recovery starte	
		M	Refrigerant recovery lines set up was correct first time	
		M	The full refrigerant charge was removed from the system using re	
		M	Electronic leak check was made during recovery of refrigerant	
		M	System pressures were at atmospheric pressure or below after re	
		M	All service caps replaced on the recovery unit and recovery cylinc	
		M	The quantity of refrigerant recovered from the system was record	
		M	Filter drier installed in the correct flow direction	
		M	Refrigerant was purged from recovery unite	
G2	Module C - Evacuation			
		M	First vacuum attempt meets required standards	
		M	The vacuum held when isolated from the vacuum pump for 10 m	
G3	Module C - Charge with Refrigerant			
		M	The correct refrigerant charge weighed into the system (recorded	
		M	The gauges were removed from the system with minimal loss of	
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score
H1	Module A - Work Practices and Safety			
		M	Protective gloves were worn at all times when exposed to heat so	
		M	Protective eye wear was worn at all times while brazing	

		M	The competitor always used the correct tool and safe work practi
		M	The competitors brazing torches and regulators are left at atmosp
H2	Module B - Work Practices and Safety		
		M	Protective gloves were worn at all times when exposed to heat so
		M	Protective eye wear was worn at all times while brazing, drilling, h
		M	The competitor always used the correct tool and safe work practi
		M	The competitors brazing torches and regulators are left at atmosp
H3	Module C - Work Practices and Safety		
		M	Protective gloves were worn at all times when exposed to heat so
		M	Protective eye wear was worn at all times while brazing, drilling, h
		M	The competitor always used the correct tool and safe work practi
		M	The competitors equipment was in a safe condition on completio

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type M = Meas J = Judg	Aspect - Description	Judg Score

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark
Yes	Refer drawing R00	2	1.00
Yes		2	0.75
Yes	2mm +-	4	0.75
Yes	2mm +-	4	0.75
Yes	2mm +-	4	0.75
Yes	see standard	4	0.50
Yes	see standard	4	0.50
Yes	Pressure tested t	4	1.25
Yes		4	0.75
Yes		4	0.50
		4	0.75
Performance below industry standards			
Performance meets industry standards			

Criterion A Total Mark 12.50

Performance meets industry standards andsurpasses that Excellent or outstanding performance relative to industry e		4	0.75
Performance below industry standards Performance meets industry standards Performance meets industry standards and surpasses tha Excellent or outstanding performance relative to industry e		4	0.75
Performance below industry standards Performance meets industry standards Performance meets industry standards andsurpasses that Excellent or outstanding performance relative to industry e		4	0.75
Performance below industry standards Performance meets industry standards Performance meets industry standards andsurpasses that Excellent or outstanding performance relative to industry e		4	1.00
Performance below industry standards Performance meets industry standards Performance meets industry standards andsurpasses that Excellent or outstanding performance relative to industry e		4	1.00
Performance below industry standards Performance meets industry standards Performance meets industry standards andsurpasses that Excellent or outstanding performance relative to industry e			

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark
Yes	Refer drawing R00	2	0.40
Yes	Refer drawing R00	2	0.30
Yes	Refer drawing R00	3	0.20
Yes	Refer drawing R00	3	0.20

Criterion B Total Mark 20.00

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	0.40
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		3	0.20
		4	0.80
Performance below industry standards			
Performance meets industry standards			
Performance meets industry standards andsurpasses that			
Excellent or outstanding performance relative to industry e			
		4	1.00
Performance below industry standards			
Performance meets industry standards			
Performance meets industry standards and surpasses tha			
Excellent or outstanding performance relative to industry e			
Yes	Refer to standard s	4	0.40
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
		4	0.80
Performance below industry standards			
Performance meets industry standards			
Performance meets industry standards andsurpasses that			
Excellent or outstanding performance relative to industry e			
		4	1.00
Performance below industry standards			
Performance meets industry standards			
Performance meets industry standards andsurpasses that			

Excellent or outstanding performance relative to industry e			
Yes	Refer to standard s	4	0.40
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 drawing R00	4	0.50
		4	0.80
Performance below industry standards			
Performance meets industry standards			
Performance meets industry standards andsurpasses that			
Excellent or outstanding performance relative to industry e			
		4	1.00
Performance below industry standards			
Performance meets industry standards			
Performance meets industry standards andsurpasses that			
Excellent or outstanding performance relative to industry e			
Yes	Refer standards se	3	0.50
Yes	All isolation valves	1	0.50
Yes		4	0.20
Yes	Refer test project i	4	0.40
Yes	Soapy water or sup	4	0.20
Yes	test project	4	1.50
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	1.50
Yes	Refer standards se	4	0.50

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark
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

Criterion C Total Mark 15.00

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark

Criterion D Total Mark 17.50

Yes	All isolation valves	3	0.20
Yes	All isolation valves	3	0.30
Yes		3	0.50
Yes	R134a vapour or li	3	1.00
Yes	Agree on acceptab	3	0.50
Yes	Refer standards se	3	0.50
Yes	Refer standards se	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	0.50
Yes	Refer test project	5	0.50
Yes	Refer test project	5	0.50
Yes	Refer test project	5	0.50
Yes	Refer test project	5	0.80
Yes	Refer test project	5	0.80
Yes	Refer test project	5	0.80
Yes	Refer test project	5	0.30
Yes	Refer to test projec	1	0.30
Yes	Refer to test projec	1	0.20
Yes	Refer to test projec	1	0.90
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	Refer to test projec	5	0.50
Yes		5	0.20
Yes		5	0.50
Yes		5	0.50
Yes		5	0.40
Yes		5	0.50
Yes		5	0.50
Yes		5	0.40
Yes		5	0.40
Yes		1	0.10

Yes		1	0.20
Yes		1	0.20
Yes		1	0.20
Yes		1	0.40

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark
Yes		6	1.00
Yes		6	1.00
Yes		6	1.50
Yes		6	1.50
Yes		6	1.00
Yes		6	0.50
Yes		6	0.50
Yes		6	1.00

Criterion E Total Mark 8.00

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark
Yes		6	2.00
Yes		6	1.00
Yes		6	1.00
Yes		6	1.00
Yes		6	1.00
Yes		6	1.00
Yes		6	1.00
Yes		6	1.00
		6	1.00
Performance below industry standards			
Performance meets industry standards			

Criterion F Total Mark 10.00

Performance meets industry standards andsurpasses that
Excellent or outstanding performance relative to industry e

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark
Yes		5	0.50
Yes		5	0.50
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	0.80
Yes		5	0.50
Yes		5	0.50
Yes		5	0.50
Yes	Refer to standards	3	1.00
Yes	Refer to standards	4	1.00
Yes		3	2.00
Yes	Refer to standards	5	0.80

Criterion G Total Mark 12.00

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

Criterion H Total Mark 5.00

Yes		1	0.25
Yes		1	0.25
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50
Yes		1	0.50

Extra Aspect Description (Meas or Judg) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Measurement Only)	WSSS Section	Max Mark

Criterion I Total Mark 0.00

Competition Total Mark 100.00