HEATING, VENTILATING AND AIR CONDITIONING

Scope of Contest

The contestants will demonstrate their knowledge and ability ofair conditioning and refrigeration tasks. The contestants will compete in 4 areas.

1. Supplied with a digital heat/cool thermostat the student must install the thermostat and then make tests and adjustments to the furnace. This will include electrical, gas pressure, temperature and calculating air flow.

   60 MIN

2 Supplied with a furnace with a split air conditioning system. The student will identify basic system information. This will include temperature, pressure, electrical tests, and determine if the unit is undercharged, overcharged or correctly charged. All information needs to be recorded and verified by the judge.

   45 MIN

3. The student will construct atubing project using several different sizes, connectors and types oftubing

   60 MIN

4. The student will take a two page multiple choice test. 15 MIN.

TOOLS AND EQUIPMENT

1. Tape measure or ruler
2. Safety glasses and gloves
3. Pencil
4. Tool box with all required hand tools. Such as wrenches, tubing cutter, tubing bender, Assorted screwdrivers, wrenches, torpedo level, fairing tools, swaging tools, and pliers.
5. VOM Meter
6. Amp meter
7. Manifold gauges

EQUIPMENT SUPPLIED BY A.W. BEATTIE CAREER CENTER

1. Acetylene torch
2. Braze, lead free solder, and flux
3. Copper tubing and fittings
4. Gas pressure testing tools
5. Thermometers

SAFETY REQUIREMENTS

1. Contestants must have knowledge of safe operation of torches and handling of refrigerants.
2. All standard shop and safety rules must be followed.
3. During the shop competition, contestants must wear safety glasses or goggles, work boots, long pants, and a long sleeve shirt at all times.

ROSEDALE TECHNICAL COLLEGE

Recovery, Evacuation, Charging

Name:_____ **Date:**_____

Refrigerant Recovery

1. Recover refrigerant from a split system assigned to you.
2. Record condensing model make: _____ model #: _____
3. Record refrigerant type: _____
4. Record pressure on high side gauge: _____, prior to beginning the recovery process.
5. Record pressure on the low side gauge: _____, prior to beginning the recovery process.
6. Record recovery tank weight: _____ lbs.
7. Record final evacuation high side pressure: _____.
8. Record final evacuation low side pressure: _____.

System Evacuation

1. Use the same system as above evacuation the system to properly degas and dehydrate the system.
2. Before starting the process check if your micron gauge and vacuum pump are working normally.
    a. Micron gauge - _____ operational or _____defective
    b. Vacuum pump - _____ operational or _____defective
3. Record final evacuation level: _____ microns.

System Charging

1. Determine the amount of refrigerant to be weighed in. Record this value: _____.
2. Weigh in the properly amount of refrigerant.
3. Run system and record the following conditonings:

Suction pressure: _____ psig. Evaporator Superheat: _____°F

Discharge pressure: _____ psig. Condenser Subcooling _____°F

ROSEDALE
TECHNICAL COLLEGE

Skills USA

Name: _____ Date: _____

1 One ton of cooling is equivalent to:

A 288,000 BTU/24hr.
B 12,000 BTU/hr.
C 200 BTU/min.
D **All of the these**

2 Heat transfer may be accomplished by which method?

A Conduction
B Convection
C Radiation
D **All of the above**

3 A refillable refrigerant cylinder must not be filled more than _____ of its total capacity.

A 60%
70%
C **80%**
D 90%

4 Acetylene becomes unstable and volatile above _____.

A 5 psig
B 10 psig
C 12 psig
D **15 psig**

5 The TXV maintains what condition in the evaporator?

A Temperature
B **Superheat**
C Pressure
D Subcooling

6 RLA stamped on a refrigeration compressor stands for:

A Running load amps
B Running limit amps
C **Rated load amps**
D Rated limit amps

7 How often must a recovery cylinder be tested?

A Every year
B Every two years
C **Every five years**
D Every seven years

8 Temperature is _____.

A **the intensity of molecular motion**
B the measurement of latent heat
C the absence of heat
D the measurement of heat quantity

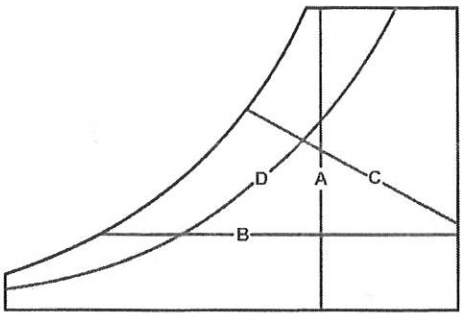
ROSEDALE
TECHNICAL COLLEGE

9 Owners or operators of refrigeration and air-conditioning equipment with refrigerant charges greater than - _____ pounds are required to repair leaks within 30 days when those leaks result in the loss of more than a certain percentage of the equipment's refrigerant charge over a year.

A 25
B **50**
C 75
D 100

10 As air is heated its relative humidity:

A Increases
B **Decreases**
C Remains the same
D Can either increase or decrease



11 Using the above pictorial of a psychometric chart as a reference, what value does line "A" represent?

A **Dry-bulb temperature**
B Wet-bulb temperature
C Relative humidity
D Enthalpy

12 Compression ratio is the _____.

A **absolute discharge pressure divided by the absolute suction pressure**
B evaporator pressure divided by the condensing pressure
C discharge pressure divided by the evaporator pressure
D discharge pressure divided by the evaporator pressure

13 The heating value of natural gas is approximately _____ BTU/cu. ft.

A **1050**
B 1850
C 2250
D 3250

14 Boyle's Law states:

A The total pressure of a confined mixture of gases is the sum of all the individual pressures in the mixture.
B At a constant pressure, the volume of a gas varies directly as to its absolute temperature, and at constant volume, the absolute pressure of a gas varies directly with the absolute temperature.
C Energy can be transformed from one form to another, but cannot be created or destroyed.
D **The volume of a gas varies inversely with the absolute pressure of a gas, provided the temperature remains constant.**

ROSEDALE
TECHNICAL COLLEGE

15 How much heat does one pound of steam release as it is condensed to water at 212°F?

A 144 BTU
B 212 BTU
C 1280 BTU
D **970 BTU**

16 Air that is mixed with natural gas before burning is called:

A Outside air
B Total combustion air
C Secondary air
D **Primary air**

17 How much air is needed to burn 1,000 BTU of natural gas?

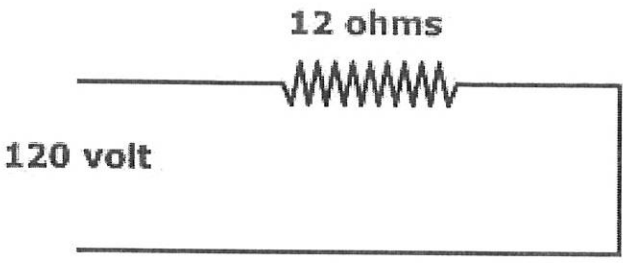
A 100 ft^3
B 50 ft^3
C **10 ft^3**
D 1 ft^3

18 What three conditions are necessary for combustion?

A Fuel, air and moisture
B Carbon, air and pressure
C **Fuel, heat and oxygen**
D Carbon, hydrogen and oxygen

19 Controls are typically drawn in their _____ position on wiring diagrams.

A energized
B **de-energized**
C energized or de-energized
D closed



20 Using Ohm's Law, what is the amperage draw of this circuit?

A **10 amps**
B 0.1 amps
C 0.01 amps
D 1 amp