Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) I. Demonstrate safety skills in typical HVACR work situations to NATE Core – Installer Knowledge Areas for
Technician Excellence for Safety standards. Tasks Instructions:

Each number refers to a single candidate (1-10). Place check (\checkmark) in										
respective column for appropriate candidate if the behavior was observed as	1	2	3	4	5	6	7	8	9	10
stated. Leave blank if not observed. If any of these are not observed, the		2	5	-	J	U	<i>'</i>	0	5	10
candidate shall NOT receive credit for last line in section as well.										
Demonstrate safe procedures when working in electrical panels and electric										
supply devices										
Demonstrate how to turn off power										
Demonstrate the use of lockout/tag-out devices										
Utilize appropriate use of electrically insulated tools and personal protective										
equipment										
Demonstrate correct procedure for connecting torch equipment including										
regulators, tanks, hose, torch, and tips										
Ignite and extinguish torch using safe practices										
Aim torch safely										
Check for unsafe conditions of hoses, safety ring caps, gauges, tanks, and										
leaks										
Explain the "never use oil" rule with regard to brazing torches										
Set electric test meter for the appropriate test being performed										
Demonstrate the safe handling of pressurized gases										
Ensure valves are properly closed prior to removing attached hoses/caps										
Demonstrate caution when removing attached components under pressure										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										

Points earned										
Total possible points (15)										
				1			-			
II. Demonstrate basic refrigeration skills to NATE Refrigeration – Light Con	nmer	cial ·	- Ins	stalla	ation	/Ser	vice	Kno	wlee	dge
Areas of Technician Expertise for Installation and Service standards an	d to r	nanı	ufact	ture	's sp	pecif	icati	ions.		
Tasks Instructions:										
	1	2	3	4	5	6	7	8	9	10
Describe the refrigeration cycle and refrigerant circuits										
Evacuate a refrigeration system										
Pump down a refrigeration system										
Recover refrigerant from system using self contained recovery equipment										
Calculate the maximum capacity of a refrigerant cylinder										
Demonstrate the correct refrigerant cylinder handling procedures										
Explain thermostatic expansion valve operation										
Explain fixed orifice operation										
Take a superheat measurement										
Demonstrate leak checking during evacuation										
Demonstrate leak checking of a charged system										
Charge a refrigeration system following manufacturer's charging procedure										
Utilize a pressure / temperature chart to identify refrigerant type										
Safety and infection control are adhered to during all aspects of this task										
The student completed task within the time limited										
Points earned										
Total possible points (15)										
	1					1				
III. Demonstrate electric knowledge and skills necessary for HVACR situat	ions t	o NA	ΔTE	Core	ə.					
Tasks Instructions:										

	1	2	3	4	5	6	7	8	9	10
Explain the interaction of voltage, resistance, and current flow										
Describe how transformers change voltage										
Explain the importance of grounding electrical circuits										
Describe the components of an electrical circuit including switches, loads, and connectors										
Define the function of the following elements of an electric circuit; resistors,										
capacitors, contactors, motors, relays, fuses, circuit breakers, time delays, and timers										
Interpret basic pictorial, schematic, and ladder diagrams and explain their										
uses										
Interpret electrical symbols										
Identify individual circuits within a diagram provided										
Demonstrate the proper use of a multi-meter test instrument										
Demonstrate the proper places within the circuit to measure electricity										
Interpret and explain meter readings in relationship to a reported problem										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (13)										
IV. Install, diagnose and service HVACR controls and control components to Tasks Instructions:	o NA	TE (Core	•						
	1	2		4	5	6	7	8	9	

Install and replace a temperature control, a pressure control, and a solid-state										
control										
Calibrate and adjust a temperature control										
Adjust a pressure control										
Install, replace and adjust a defrost control										
Install and service electrical components										
Install, disconnect switch and circuit wiring										
Install wiring form disconnect switch to equipment										
Install and replace an electric motor										
Install and replace electric contractor, current/potential relay, transformer,										
electric motor, capacitor, solenoid valve coil. and circuit board										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (11)										
		•	•		•	•				
V. Install and service mechanical components to NATE Refrigeration – Light	t Co	mme	ercia	I, Ai	r Co	nditi	onin	g ar	d H	eat
Pump										
Tasks Instructions:										
	1	2	3	4	5	6	7	8	9	10
Isolate compressor, remove refrigerant pressure, and remove compressor										
from refrigeration system										
Use correct brazing procedure to prevent copper oxidation										
Install and replace evaporators and condensers										
Measure superheat and sub cooling										
Clean condenser and evaporator										

solenoid valve body, sight-glass/moisture indicator and head pressure control										
Isolate component from refrigerant circuit prior to removal/service										
Demonstrate proper procedures to prevent moisture contamination										
Cut, swage, flare, bend, soft solder, silver solder, braze steel, brass, or										
copper tubing and fittings										
Demonstrate correct applications of different types of brazing and soldering										
filler metals and fluxes										
Demonstrate correct preparation of materials										
Demonstrate correct brazing procedures including the use of nitrogen to										
prevent copper oxidation										
Install and replace a manifold gauge set										
Identify the use of each of the various pressure measurements; absolute,										
gauge, inches, mercury, microns										
Calibrate manifold gauge										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (17)										
VI. Diagnose and repair common problems in refrigeration systems according	ng to	o apj	olica	ble	requ	iren	nent	s ide	ntifi	ed
by the Refrigeration Service Engineers Society.										
Tasks Instructions:										
	1	2	3	4	5	6	7	8	9	10
	-			-			-			
Diagnose electrical problems in self-contained refrigerated merchandisers										
Use a schematic diagram to trace circuits in equipment										
Diagnose problems in single-phase motor circuit										
Diagnose merchandiser lighting problems										

Diagnose refrigeration problems in self-contained refrigeration merchandisers										
Determine reason for frosted evaporator and explain defrost cycles										
Diagnose air flow problems										
Check and clean air passages										
Check and clean evaporator										
Check/replace evaporator fan										
Diagnose air pattern disturbances										
Diagnose flooded evaporator drain pan										
Check condensate drain line for blockage										
Explain the principles of condensate traps including their application to										
evaporates mounted in the inlet or outlet of the system blower										
Install and replace a plastic pipe										
Demonstrate proper preparation of materials and correct gluing procedure										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (18)										
VII. Diagnose and solve common problems related to air conditioners and h Conditioning – Service & Heat Pumps	heat	oum	ps a	ccor	ding	to N	ITA	E Air	•	
	heat	oum	ps a	ccor	ding	to N	NATI	E Air		
Conditioning – Service & Heat Pumps	heat (2	ps ad	4	ding	6	7 7	E Air	9	10
Conditioning – Service & Heat Pumps										10
Conditioning – Service & Heat Pumps Tasks Instructions:										10
Conditioning – Service & Heat Pumps Tasks Instructions: Troubleshoot a refrigerant circuit										10
Conditioning – Service & Heat Pumps Tasks Instructions: Toubleshoot a refrigerant circuit Demonstrate a systematic approach to diagnosing the cause of an incorrect										10

operation within an electrical circuit										
Test a control thermostat, fuse, capacitor, compressor motor, electric motor										
and refrigerant metering device demonstrating the proper test method for each										
component										
Inspect a condensate pump and drain, blower assembly, and filter										
Demonstrate inspection procedure										
Demonstrate the procedure to check refrigerant charge										
Demonstrate the procedure to check superheat										
Demonstrate the procedure to check superheat										
Demonstrate the procedure to check sub cooling										
Demonstrate the procedure to check wet-bulb depression										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (14)										
VIII. Install and service general heating systems to NATE Gas Furnaces										
Tasks Instructions:										
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	1	2	3	4	5	6	7	8	9	10
Read and interpret manufacturer's installation instructions										
Demonstrate procedures using the applicable codes										
Describe the sequence of operation and safety controls of the system										
Service electronic controls, timing devices, sensing devices, and solid-state										
control boards										

Explain the function of each component								
Demonstrate test and adjustment procedure								
Troubleshoot and service various electrical capacitors, relays, contractors,								
motors, controls, heaters, and transformers								
Describe the function and test procedure for each component								
Demonstrate gas leak checking procedure								
Check line pressure, manifold pressure and firing rate								
Explain the principles of gas venting								
Explain the effects of altitude on furnace operation, and steps needed during								
setup to compensate								
Check and adjust electric heat section in coil blower								
Explain the operation of electric heat elements, electric heat sequences,								
limits, fusible links and other safety devices								
Check voltage and amperage draw of electric elements								
Service blower in a forced-air system								
Explain operation of blower including: correct rotation, blower housing and								
cutoff plate								
Describe the relationship between system static pressure, air flow, and								
temperature rise								
Clean and inspect a heating system								
Measure airflow or air handling system								
Safety and infection control are adhered to during all aspects of this task.								
The student completed task within the time limited.								
Points earned								
Total possible points (22)								
IX. Install and service an air conditioner or heat pump system with auxiliar	y elec	tric to	NA1	E Air	r Con	ditio	oning	
Tasks Instructions:								

	1	2	3	4	5	6	7	8	9	10
Describe the applicable codes										
Read and interpret manufacturer's installation instructions										
Explain the sequence and operation of the system										
Explain the purpose of safety controls and their operation										
Demonstrate the test procedure and adjustment procedure of electronic										
controls, timing devices, sensing devices and solid-state control boards										
Demonstrate the test procedure and adjustment procedure of various electrical										
capacitors, relays, contractors, motors, controls, heaters, and transformers										
Demonstrate the test procedure and adjustment procedure to service various										
refrigeration components including reversing valves, check/expansion valves,										
and shutoff valves										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										
X. Use basic construction designs in HVACR situations to NATE Core. Tasks Instructions:										
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	1	2	3	4	5	6	7	8	9	10
Read and interpret basic construction designs for piping/plumbing layouts									<u> </u>	
Describe room specifications										
Explain roof, ceiling, wall and floor layout										
Describe girders, trusses and duct layout									L	
Safety and infection control are adhered to during all aspects of this task.									L	
The student completed task within the time limited.										

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