Test Project

Module 6 - Heating Ventilation and Air Conditioning (HVAC)

Heavy Vehicle Technology

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This module includes the following documents:

1. TP Skill 49 repair order form (supplied).
2. Task-1 Checklist – HVAC (supplied).
3. Pre-rental Equipment Inspection form (supplied).

Tasks

Complete the following two tasks in any order. You may begin with either task one or task two.

If you complete both tasks early or can no longer progress, give your documents to your judge and return to the Competitors briefing room to await the next station rotation.

Task 1

Rental unit returned: Compliant about HVAC system not working. System air feels warm from diffusers and has been getting progressively worse over the summer.

For marking purposes, you must show the judge what you are doing as you work (for example, measurements, fault locations torque wrench settings, adjustments, and conclusions).

Complete the following:

1. Using the supplied Task-1 Checklist (HVAC), inspect the machine - diagnose and repair to OEM specifications, the cause of the customer's complaint.
2. Using the supplied repair order form, document in proper industry standard service reporting format what you diagnosed and what was required to return the system to its normal condition.

Task 2

Dealer Request: Machine is going out on rental, complete the multi-point pre-rental inspection form. Record any issues, diagnose and repair any faults that are found.

For marking purposes, you must show the judge what you are doing as you work (for example, measurements, fault locations torque wrench settings, adjustments, and conclusions).

Complete the following:

1. Inspect the machine using the supplied pre-rental inspection form, inspect, diagnose and repair to OEM specifications, the cause of any issues found during inspection.
2. Using the supplied repair order form, document in proper industry standard service reporting format what you diagnosed and what was required to return the system to its normal condition.

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Equipment, machinery, installations, and materials required

Pressure conversion chart:

Measured pressure unit	**Converted pressure unit**								
	Bar	**cmHg**	**cmH2O**	**inHg**	**inH2O**	**kg/cm²**	**kPa**	**Mpa**	**psi**
1 - Bar =	1	75.006	1,019.72	29.53	401.463	1.02	100	0.1	14.5
1 - cmHg =	0.13	1	13.595	0.394	5.352	0.014	1.333	0.0013	0.193
1 - cmH2O =	0.00098	0.74	1	0.029	0.394	0.001	0.098	0.000098	0.014
1 - inHg =	0.34	2.54	34.532	1	13.595	0.035	3.386	0.0034	0.491
1 - inH2O =	0.0025	0.187	2.54	0.074	1	0.0025	0.249	0.00025	0.036
1 - kg/cm² =	0.981	73.556	1,000	28.959	393.701	1	98.066	0.098	14.223
1 - kPa =	0.01	0.75	10.197	0.295	4.015	0.01	1	0.001	0.145
1 - Mpa =	10	750.062	10,197.16	295.3	4,014.63	10.197	1,000	1	145.038
1 - psi =	0.069	5.171	70.307	2.036	27.68	0.07	6.895	0.0069	1

Multiply the measured pressure unit by the converted pressure unit to achieve conversion.

Example: You measured 267.4 Bar and need to convert to Mpa 267.4 X 0.1 = 26.74 Mpa

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Judge:	Competitor Country:	VIN/PIN/ESN	Date:
Manufacturer:	Model	Odometer / hours	Type and amount of refrigerant

Complete All of the Inspection and Service Points According to the Service Worked on and Indicate:

✓ = OK **O = REPAIRED REQUIRED** **N/A = NOT APPLICABLE**

VISUAL INSPECTION: (Engine not running)	Pass	Fail
Operators Cab: damaged or missing glass, damaged or missing door and window seals, cab floor damaged, damp or wet floor, damaged or missing air direction diffusers		
Fresh air and Recirculation Filters: damaged or missing seals, clean/replace annually,		
Compressor & Engine Fan Drive Belt(s): wear, cracked, glazed, incorrect tension, alignment		
Engine drive belt tensioner and idler: uneven wear across pully, rust, weak spring, loose mounting evidence of overheat, rough bearing		
Compressor Clutch: Indication of overheating, wrong air gap, oil soaked Record oil resistance: _____ Ω		
Compressor Mounting: loose hardware, improper mounting, belt miss-alignment		
Electrical Wiring: burnt connections, loose connections, harness routing, damage or open insulation		
Condenser Coil: restricted air flow, damaged fins or tubes, improper mounting, loose hardware, missing air flow seals		
Cooling/Condenser Fan and Fan motor: proper operation, improper mounting, broken, bent or missing fan blades or schroud, oil leaks, slippage		
Refrigerant and Heater hoses: leaking, cracking, dirty or oily, routing, chaffing, mounting missing service port caps or plugged service ports		
Receiver/dryer or Accumulator: damaged or improper mounting, moisture indicator replace rec/dry if more than 1 yr of service		
Radiator and Cap: restricted air flow, damaged fins or tubes, improper mounting, loose hardware, missing air flow seals coolant leaks, overflow system and hose		
inspect and pressure test cap		
Heater Valve Operation: test heater valve operation, coolant leaks, mounting, cable adjustments		
Evaporator and Heater Core: restricted air flow, damaged fins or tubes, improper mounting, loose hardware, missing heater box seals missing insulation tape, damaged blower housing		
Evaporator Drain Hose: properly draining water, not plugged		
Initial System Pressures: (engine off)		

System Performance (Engine Running)	Pass	Fail
System Voltage Engine Running: inspect system voltage, should be between 13.5-14.5v		
Blower Switches and Motors: switch operates in every position, unusual noises indication of high current draw, fast air flows on high speed		
Air Flow Directional Control: directional air flow operates properly in every position *if not inspect adjustment of doors*		
Thermostatic Temperature Control: duct temperature changes with changes in t-stat control without A/C running record duct temp Hot _____ °C record duct temp cool _____ °C		
A/C Compressor Clutch: (does clutch engage?) unusual noises from compressor or clutch during engagement, verify voltage at connection for clutch record system voltage at clutch _____ V		
Running system pressures: record both high and low side pressures after cab has stabilized high side _____ pressure low side _____ pressure		
FOT Cycling switch record low side cut-in and cut-out pressures cut-in _____ pressure cut-out _____ pressure		
Cooling/Condenser Fan : record cut-in (engage) and cut-out (disengage) pressures cut-in _____ pressure cut-out _____ pressure record how long fan is engaged _____ sec		
Duct outlet temperature: record the following information record duct temp _____ °C record outside ambient temp _____ °C record relative humidity % _____		
Thermostatic switch operation: run blower fans on low, verify clutch cycles on/off record temperature clutch disengages and engages clutch		

Turn sheet over and record all needed repairs:

If you are going to recover refrigerant? Record the needed information on the reverse side of this page

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