MAINTENANCE INFORMATION

MI15-51

DATE : DECEMBER 2015	SECTION : 22 - HVAC
SUBJECT : **AIR CONDITIONING PERFORMANCE TEST**	

IMPORTANT NOTICE
This test is recommended by Prevost to increase your vehicle's performance. Note that no reimbursement will be awarded for carrying out this modification.

APPLICATION

Model	VIN 
H3-41, H3-45 coaches	EQUIPPED WITH BITZER A/C COMPRESSOR
X3-45 coaches	

DESCRIPTION

Perform this test after a major repair or replacement of part on the air conditioning system which necessitated the removal of the refrigerant, or if you suspect a lack or surplus of refrigerant in the circuit.

REQUIRED TOOLS

1 dual input thermocouple thermometer

Vehicles equipped with overhead compartment A/C systems: 3 dual input thermocouple thermometer

Other type of adequate thermometer

PROCEDURE

DANGER

Park vehicle safely, apply parking brake, stop engine.

AIR CONDITIONING PERFORMANCE TEST PROCEDURE

1. The test must be done inside the service facility. A stabilized temperature inside the vehicle is required (if the vehicle was outside and the interior is very cold, it will be more difficult and will take more time to warm up).

   Requirement - Vehicle interior temperature and facility ambient temperature at the test station:
   Between 60°F & 95°F (Between 15°C & 35°C)

2. Complete what follows.

   Write down the temperature (T°) outside the vehicle=_____° F

   What is the relative humidity? ≤ 50% ☐ ou > 50% ☐

3. With the results of step 2, use the table of page 4 to complete what follows.

   T° to be reached inside the vehicle prior starting the « pull-down » (as per table) _____° F

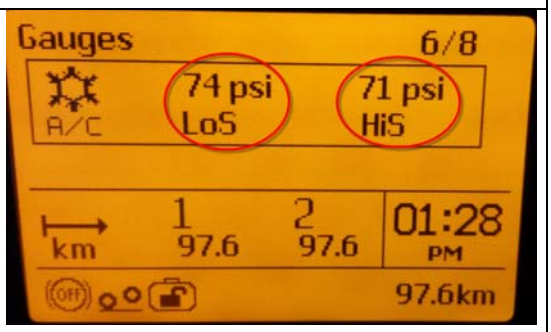
   Maximum duration of « pull-down » (as per table) =_____minutes

   « Pull-down » stopping T° (as per table) =_____° F

4. On the DID, check and record the A/C compressor high side **(HiS)** and low side **(LoS)** pressure values.

   LoS= _____PSI

   HiS = _____PSI



5. Find in table of page 14 the pressure value corresponding to the actual ambient temperature.

   Check that:

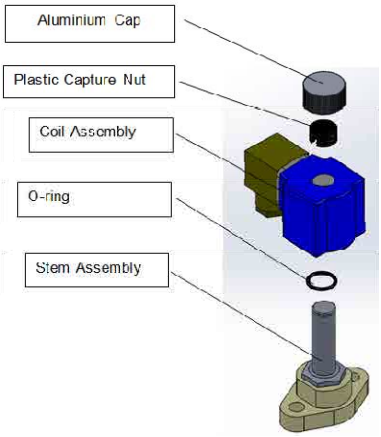
   Table pressure value ±10psi = LoS or HiS pressure

   Note: LoS and HiS values should be very close. The air conditioning system must be stopped since a while so that the pressures have equalized.

   Note: Pressure too low indicates that the charge of refrigerant is insufficient. If LoS = 34 psi and HiS = 248 psi, then there is a problem with the high side and low side pressure sensors on the A/C compressor. Check these components.

6. Remove the unloader coil on the A/C compressor. DO NOT unplug the unloader coil connector.

New clip-on coil type: Insert a flat screwdriver between the coil and the cylinder cover. Gently lift the screwdriver until the coil lifts.



Former coil type: Unscrew the aluminum cap. Remove the plastic capture nut. Insert a flat screwdriver between the coil and the cylinder cover. Gently lift the screwdriver until the coil lifts.

Pull-down parameters chart according to T ° outside of the vehicle and relative humidity				
T° outside of the coach	**Relative humidity**	**T° required inside of the coach prior starting of pull-down**	**Maximum duration of pull-down (for a ΔT of 15°F)**	**Pull-down stopping T°**
60°F to 74°F	n/a	*82°F	10 minutes	67°F
75°F	n/a	*82°F	11 minutes	67°F
76°F	n/a	*82°F	11 minutes	67°F
77°F	n/a	*82°F	12 minutes	67°F
78°F	n/a	*82°F	12 minutes	67°F
79°F	n/a	*82°F	13 minutes	67°F
80°F	≤ 50%	*82°F	13 minutes	67°F
80°F	> 50%	*82°F	15.5 minutes	67°F
81°F	≤ 50%	*82°F	14 minutes	67°F
81°F	> 50%	*82°F	16.5 minutes	67°F
82°F	≤ 50%	82°F	15 minutes	67°F
82°F	> 50%	82°F	17.5 minutes	67°F
83°F	≤ 50%	83°F	15 minutes	68°F
83°F	> 50%	83°F	17.5 minutes	68°F
84°F	≤ 50%	84°F	15 minutes	69°F
84°F	> 50%	84°F	17.5 minutes	69°F
85°F	≤ 50%	85°F	18 minutes	70°F
85°F	> 50%	85°F	20.5 minutes	70°F
86°F	≤ 50%	86°F	18 minutes	71°F
86°F	> 50%	86°F	20.5 minutes	71°F
87°F	≤ 50%	87°F	18 minutes	72°F
87°F	> 50%	87°F	20.5 minutes	72°F
88°F	≤ 50%	88°F	18 minutes	73°F
88°F	> 50%	88°F	20.5 minutes	73°F
89°F	≤ 50%	89°F	18 minutes	74°F
89°F	> 50%	89°F	20.5 minutes	74°F
90°F	≤ 50%	90°F	20 minutes	75°F
90°F	> 50%	90°F	22.5 minutes	75°F
91°F	≤ 50%	91°F	20 minutes	76°F
91°F	> 50%	91°F	22.5 minutes	76°F
92°F	≤ 50%	92°F	20 minutes	77°F
92°F	> 50%	92°F	22.5 minutes	77°F
93°F	≤ 50%	93°F	20 minutes	78°F
93°F	> 50%	93°F	22.5 minutes	78°F
94°F	≤ 50%	94°F	20 minutes	79°F
94°F	> 50%	94°F	22.5 minutes	79°F
95°F	≤ 50%	95°F	20 minutes	80°F
95°F	> 50%	95°F	22.5 minutes	80°F
		*Préchaffage requis		2015-08-15

* preheating required

7. Block the evaporator fresh air intake. You may use large masking tape, a piece of cardboard or similar products.


H3


X3

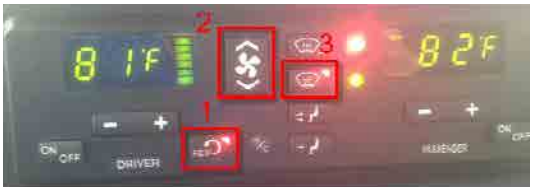
8. In order for the test to be valid, close all windows, the evaporator compartment door, the condenser compartment door and the entrance door.

9. Start the engine and set to FAST IDLE.


FAST IDLE SWITCH

PREHEATING REQUIRED (test performed in a cold environment).

10. Turn on the heating system if the ambient temperature inside the vehicle is lower than **82°F** (28°C) and adjust set points to the following values:



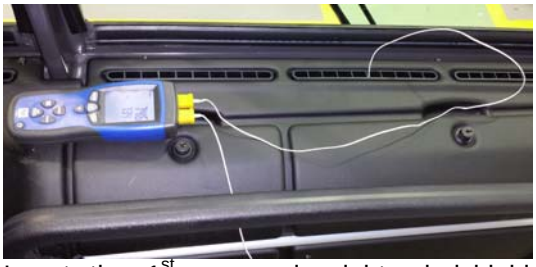
DRIVER side: **81°F** (27°C)

PASSENGER side: **82°F** (28°C)

- Press on REC button to activate air recirculation (1)
- Set the fan to maximum (2)
- Activate the manual defrost button (3)

NOTE: A preheating will not be required if the test is performed in a warm environment. If the ambient temperature inside the vehicle is 90°F for example, then the minimum required temperature at starting of pull-down is reached. The T° inside of the coach at starting of the pull-down will then be 90°F.

11. Install a thermocouple thermometer at the inlet and outlet of the front defrost unit. Sensors must be placed exactly where indicated. If the thermometer has an automatic continuous data recording function, **do not start measuring at this time**.



Insert the 1st sensor in right windshield defrost outlet, second register from the left.

Insert the 2nd sensor in the defrost return air intake, under the screw found at the center.

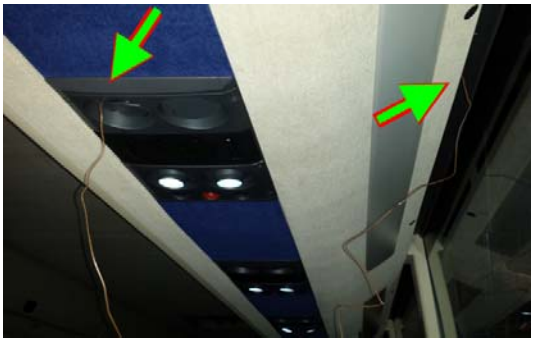
12. Check if the vehicle is equipped with the optional parcel rack air conditioning system (cooling function with an evaporator inside the unit).

    The presence of three screws indicates that an evaporator is installed in the parcel rack ventilation system.

For vehicles equipped with the optional parcel rack air conditioning system only:

13. Install one temperature sensor in the intake and one in the closest air register of <u>each</u> parcel rack A/C system (left & right). That makes 4 temperature sensors.

    Note: Make sure that the overhead air registers are all closed.



14. **If a preheating is in progress (step 8)**, continue heating up until inside temperature on the PASSENGER side reaches 84°F (29°C).

    Note: The temperature displayed on the PASSENGER side of the HVAC control module is the actual ambient temperature in this area.

15. Now, adjust the set points to the minimum values:

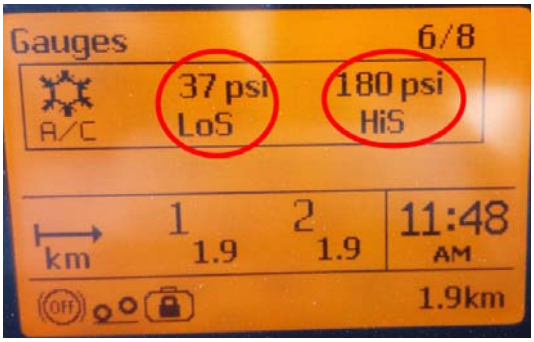
    DRIVER side: 60°F (16°C)

    PASSENGER side: 60°F (16°C)

    - Press on REC button to activate air recirculation (1)
    - Set the fan to maximum (2)
    - Press and activate the manual defrost button (3)

    Note: The entrance door must remain closed at all time during the test.

STARTING OF PULL-DOWN



16. **If a preheating (step 8) <u>was done</u>**, check and record the A/C compressor high side **(HiS)** and low side **(LoS)** pressure values when the passenger area ambient temperature <u>reaches **82°F** (29°C)</u>.

    If a preheating <u>was not necessary</u>, check and record the A/C compressor high side **(HiS)** and low side **(LoS)** pressure values at starting of the pull-down. Take note of "**T° inside of the coach at starting of the pull-down**"**=_____° F**

    LoS= _____psi

    HiS = _____psi

17. Start your timer at once. This is the starting of the pull-down.

18. On your thermometer, start the continuous moving average **T1-T2 AVG** data recording…

    or

    If this function is not available on your thermometer, note the value of temperature differential **T1-T2**, 5 minutes, 6 minutes and 7 minutes after the starting of the "pull-down".

    T1-T2 @ 5 min =_____° F

    T1-T2 @ 6 min =_____° F

    T1-T2 @7 min =_____° F

19. While the temperature is decreasing inside the vehicle, go to the condenser compartment. Close the entrance door behind you. Check the moisture indicator.

    No bubbles should be seen.

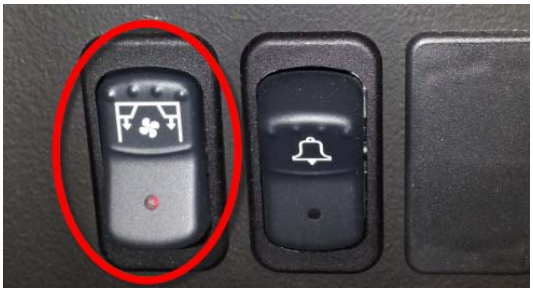
    By color matching, the moisture indication should indicate CAUTION or DRY.

20. Close the condenser compartment door, return inside the vehicle and close the entrance door behind you.

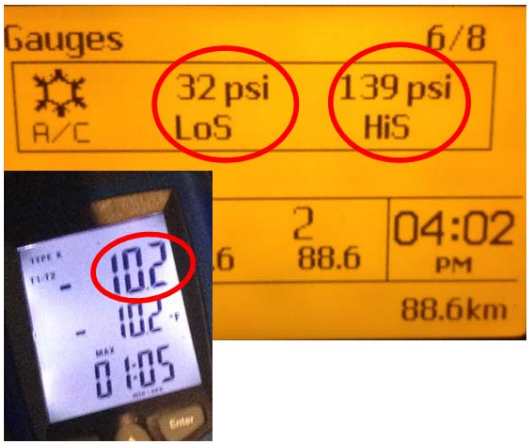
For vehicles equipped with the optional parcel rack air conditioning system

21. Activate the parcel rack A/C system when reaching 5°F (3°C) over the “pull-down stopping T°” of the chart on page 4.

    Example: If the “pull-down stopping T” is 67°F (19°C), activate the switch at 72°F (22°C).



STOPPING OF PULL-DOWN



22. When the PASSENGER side displayed temperature has reached the "T° inside of the coach at stopping of pull-down" of the table on page 4…

    a) Check and record the A/C compressor high side **(HiS)** and low side **(LoS)** pressure values.

    LoS= _____psi

    HiS = _____psi

    b) Check and record the elapsed time on your timer. Elapsed time should not exceed the **Maximum duration of « pull-down »** (as per table)".

    Elapsed time= _____min

    c) Take note of the average differential temperature T1-T2 AVG at the front defrost unit as measure by the thermometer.

    Defrost T1-T2 AVG= _____° F

    or

    if this function is not available on your thermometer, calculate the average of T1-T2 values at 5 minutes, 6 minutes and 7 minutes.

    Calculate the following average (take the + or – signs of values into account in the calculus):

    $$\text{average T1-T2} = \frac{(\text{T1-T2 } 5\text{min}) + (\text{T1-T2 } 6\text{min}) + (\text{T1-T2 } 7\text{min})}{3}$$

    Average T1-T2= _____° F

    (If the result is negative (minus sign) do not consider the minus sign in this result.

Note: defrost T1-T2 AVG or average T1-T2 as calculated must be ≥ 9°F (5°C)

23. **SPECIFICATION:** For a PASSENGER side displayed ambient temperature within the range of **66°F to 70°F** (19° C & 21° C), the value of the low side pressure (LoS) must be between **25 PSI and 27 PSI**.

    IMPORTANT: If the value is outside the above specification, adjustment of the expansion valve **superheat** is needed.

For vehicles equipped with the optional parcel rack air conditioning system:

24. For the entire vehicle (left & right side), at each pair of seats, open one of the two air registers.

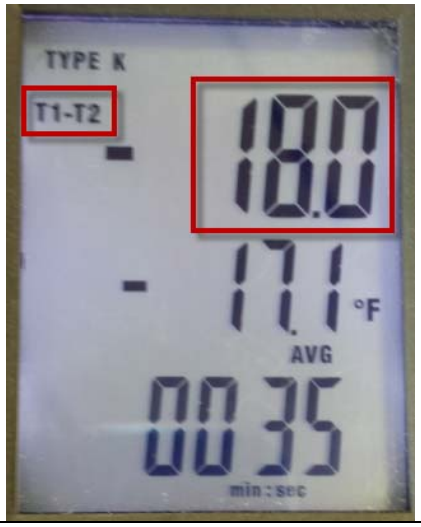
For vehicles equipped with the optional parcel rack air conditioning system:

25. Record the temperature differential **T1-T2** between the intake temperature and outlet temperature of each parcel rack A/C unit (thermometers installed at step 13).

    Left parcel rack A/C unit **T1-T2**= _____°

    Right parcel rack A/C unit **T1-T2**= _____°

    Note: parcel rack A/C unit **T1-T2** *should be > 15°F (8°C). Negative sign if present is not important.*



For vehicles equipped with the optional parcel rack air conditioning system:

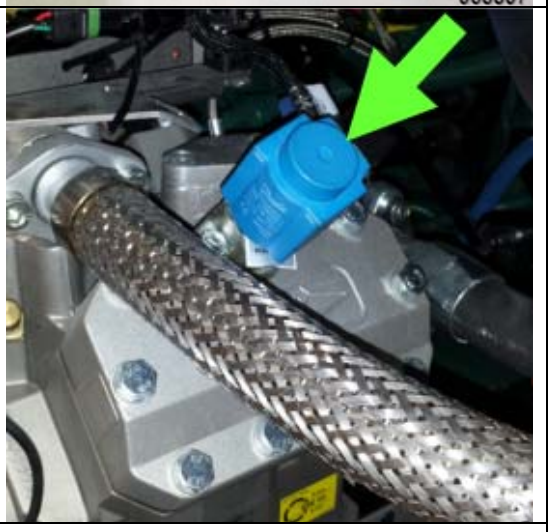
26. Turn OFF the parcel rack A/C system.

27. Deactivate the engine FAST IDLE.

FAST IDLE SWITCH

28. Stop the engine using the engine rear start switch.

29. Reinstall the unloader coil.



30. Set the rear start selector switch to NORMAL.

31. Return inside the vehicle. Start the engine and set to FAST IDLE.

32. Adjust the set points to the minimum values:

Driver side:	60°F	(16°C)
Passenger side:	60°F	(16°C)

- Press on REC button to activate air recirculation (1)
- Set the fan to maximum (2)
- Press and activate the manual defrost button (3)

Note: The entrance door must remain closed at all time during the test.

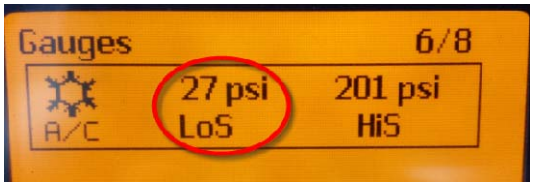
33. Increase the engine speed to **2000rpm** and maintain during 3 minutes.

34. Check the displayed LoS value and record the lowest value obtained during the 3 minutes period.

    Lowest LoS value= _____PSI

    Note: The low pressure warning signal should not activate. LoS value should normally be greater than 16 PSI.

    LoS>16 psi



35. Stop the engine.

36. Remove the evaporator fresh air intake obstruction

37. Performance test is completed.

PRESSURE VERSUS TEMPERATURE CHART

PRESSURE psi		TEMPERATURE (°F)		TEMPERATURE (°C)		PRESSURE psi		TEMPERATURE (°F)		TEMPERATURE (°C)	
-5	PSI	-22	°F	-30.00	°C	56	PSI	57	°F	13.89	°C
-4	PSI	-21	°F	-29.44	°C	58	PSI	59	°F	15.00	°C
-3	PSI	-19	°F	-28.33	°C	60	PSI	60	°F	15.56	°C
-2	PSI	-18	°F	-27.78	°C	62	PSI	64	°F	17.78	°C
-1	PSI	-16	°F	-26.67	°C	64	PSI	65	°F	18.33	°C
0	PSI	-15	°F	-26.11	°C	66	PSI	66	°F	18.89	°C
1	PSI	-12	°F	-24.44	°C	68	PSI	68	°F	20.00	°C
2	PSI	-10	°F	-23.33	°C	70	PSI	69	°F	20.56	°C
3	PSI	-8	°F	-22.22	°C	72	PSI	71	°F	21.67	°C
4	PSI	-5	°F	-20.56	°C	74	PSI	72	°F	22.22	°C
5	PSI	-3	°F	-19.44	°C	76	PSI	73	°F	22.78	°C
6	PSI	-1	°F	-18.33	°C	78	PSI	75	°F	23.89	°C
7	PSI	1	°F	-17.22	°C	80	PSI	76	°F	24.44	°C
8	PSI	3	°F	-16.11	°C	85	PSI	79	°F	26.11	°C
9	PSI	5	°F	-15.00	°C	90	PSI	82	°F	27.78	°C
10	PSI	7	°F	-13.89	°C	95	PSI	85	°F	29.44	°C
11	PSI	8	°F	-13.33	°C	100	PSI	88	°F	31.11	°C
12	PSI	10	°F	-12.22	°C	105	PSI	90	°F	32.22	°C
13	PSI	12	°F	-11.11	°C	110	PSI	94	°F	34.44	°C
14	PSI	13	°F	-10.56	°C	115	PSI	96	°F	35.56	°C
15	PSI	15	°F	-9.44	°C	120	PSI	98	°F	36.67	°C
16	PSI	16	°F	-8.89	°C	125	PSI	100	°F	37.78	°C
17	PSI	18	°F	-7.78	°C	130	PSI	103	°F	39.44	°C
18	PSI	19	°F	-7.22	°C	135	PSI	105	°F	40.56	°C
19	PSI	21	°F	-6.11	°C	140	PSI	107	°F	41.67	°C
20	PSI	22	°F	-5.56	°C	145	PSI	109	°F	42.78	°C
21	PSI	24	°F	-4.44	°C	150	PSI	112	°F	44.44	°C
22	PSI	25	°F	-3.89	°C	155	PSI	114	°F	45.56	°C
23	PSI	26	°F	-3.33	°C	160	PSI	116	°F	46.67	°C
24	PSI	27	°F	-2.78	°C	165	PSI	118	°F	47.78	°C
25	PSI	29	°F	-1.67	°C	170	PSI	120	°F	48.89	°C
26	PSI	30	°F	-1.11	°C	175	PSI	122	°F	50.00	°C
27	PSI	31	°F	-0.56	°C	180	PSI	123	°F	50.56	°C
28	PSI	32	°F	0.00	°C	185	PSI	125	°F	51.67	°C
29	PSI	33	°F	0.56	°C	190	PSI	127	°F	52.78	°C
30	PSI	35	°F	1.67	°C	200	PSI	129	°F	53.89	°C
31	PSI	36	°F	2.22	°C	205	PSI	131	°F	55.00	°C
32	PSI	37	°F	2.78	°C	210	PSI	132	°F	55.56	°C
33	PSI	38	°F	3.33	°C	220	PSI	134	°F	56.67	°C
34	PSI	39	°F	3.89	°C	230	PSI	137	°F	58.33	°C
35	PSI	40	°F	4.44	°C	240	PSI	140	°F	60.00	°C
36	PSI	41	°F	5.00	°C	250	PSI	143	°F	61.67	°C
37	PSI	42	°F	5.56	°C	260	PSI	146	°F	63.33	°C
38	PSI	43	°F	6.11	°C	275	PSI	149	°F	65.00	°C
39	PSI	44	°F	6.67	°C	290	PSI	153	°F	67.22	°C
40	PSI	45	°F	7.22	°C	305	PSI	157	°F	69.44	°C
42	PSI	46	°F	7.78	°C	320	PSI	162	°F	72.22	°C
44	PSI	48	°F	8.89	°C	335	PSI	166	°F	74.44	°C
46	PSI	50	°F	10.00	°C	350	PSI	171	°F	77.22	°C
48	PSI	51	°F	10.56	°C	365	PSI	174	°F	78.89	°C
50	PSI	52	°F	11.11	°C	380	PSI	177	°F	80.56	°C
52	PSI	54	°F	12.22	°C	405	PSI	182	°F	83.33	°C
54	PSI	56	°F	13.33	°C	500	PSI	202	°F	94.44	°C