

# Medium Heavy Vehicle–Diesel Engine

## Student/intern information:

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Vehicle used for this activity:

Year \_\_\_\_\_ Make \_\_\_\_\_ Model \_\_\_\_\_

Odometer \_\_\_\_\_ VIN \_\_\_\_\_

Learning Objective / Task (Air Induction and Exhaust Systems)	2007 NATEF Reference Number	2007 NATEF Priority Level
• Perform air intake system restriction and leakage tests; determine needed action.	F1-1	P-1
• Perform intake manifold pressure (boost) test; determine needed action.	F1-2	P-1
• Perform exhaust back pressure test; determine needed action.	F1-3	P-2
• Inspect turbocharger(s), wastegate, and piping systems; determine needed action.	F1-4	P-2
• Inspect and test turbocharger(s) (variable ratio/ geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.	F1-5	P-3
• Check air induction system: piping, hoses, clamps, and mounting; service or replace air filter as needed.	F1-6	P-1
• Remove and reinstall turbocharger/wastegate assembly.	F1-7	P-3

Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

### Recommended Resource Materials

- CDX Automotive program
- CDX eTextbook
- Technical service bulletins, shop manuals, and any other information applicable to the specific vehicle or components you are working on
- Class notes

### Materials Required

- Vehicle with possible engine concern
- Vehicle manufacturer's workshop manual
- Manufacturer-specific tools depending on the concern
- Vehicle lifting equipment if applicable

### For every task in Diesel Engines, the following safety task must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.

### Some Safety Issues to Consider

- Diagnosis of this fault may require test driving the vehicle on the school grounds or on a hoist, both of which carry severe risks. Attempt this task only with full permission from your supervisor/instructor and follow all the guidelines exactly.
- Caution: If you are working in an area where there could be "brake dust" present (may contain asbestos, which has been determined to cause cancer when inhaled or ingested), ensure you wear and use all OSHA-approved asbestos protective/removal equipment.

- Lifting equipment such as vehicle jacks and stands, vehicle hoists, and engine hoists are important tools that increase productivity and make the job easier. However, they can also cause severe injury or death if used improperly. Make sure you follow the manufacturer's operation procedures. Also make sure you have your supervisor/instructor's permission to use any particular type of lifting equipment.
- Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with federal, state, and local regulations.
- Always wear the correct protective eyewear and clothing and use the appropriate safety equipment, as well as fender covers, seat protectors, and floor mat protectors.
- Make sure you understand and observe all legislative and personal safety procedures when carrying out practical assignments. If you are unsure of what these are, ask your supervisor/instructor.

**Performance Standard**

- 0–No exposure:** No information or practice provided during the program; complete training required
- 1–Exposure only:** General information provided with no practice time; close supervision needed; additional training required
- 2–Limited practice:** Has practiced job during training program; additional training required to develop skill
- 3–Moderately skilled:** Has performed job independently during training program; limited additional training may be required
- 4–Skilled:** Can perform job independently with no additional training

**▶ TASK** Perform air intake system restriction and leakage tests; determine needed action.

**F1-1**

- Reference the manufacturer's workshop and perform air intake system restriction tests using the manufacturer's recommended tooling.
  - Manufacturer's specifications:
    - Maximum restriction/leakage permissible: \_\_\_\_\_
- Perform an air intake system restriction test.
  - Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - If no, list your recommendations for any rectifications:
   
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\_\_\_\_\_
- Reference the manufacturer's workshop; perform air intake system leakage tests using the manufacturer's recommended tooling.
- Perform an air intake system leakage test.
  - Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - If no, list your recommendations for any rectifications:
   
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Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

- Discuss the findings with your instructor.

Performance Rating

2007 NATEF Reference Number: F1-1

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Supervisor/instructor signature \_\_\_\_\_ Date \_\_\_\_\_

**▶ TASK** Perform intake manifold pressure (boost) test; determine needed action. **F1-2**

- Reference the manufacturer's workshop and perform the intake manifold pressure (boost) test.
  - Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - If no, list your recommendations for any rectifications:

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Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

- Discuss the findings with your instructor.

Performance Rating

2007 NATEF Reference Number: F1-2

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Supervisor/instructor signature \_\_\_\_\_ Date \_\_\_\_\_

**▶ TASK** Perform exhaust back pressure test; determine needed action. **F1-3**

- Reference the manufacturer's workshop and perform the exhaust back pressure test; determine needed action.
  - Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - If no, list your recommendations for any rectifications:

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Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

- Discuss the findings with your instructor.

**Performance Rating**

2007 NATEF Reference Number: F1-3

0	1	2	3	4
Supervisor/instructor signature _____				Date _____

**▶ TASK** Inspect turbocharger(s), wastegate, and piping systems; determine needed action.

F1-4

Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

- Reference the manufacturer's workshop and inspect the turbocharger(s), wastegate, and piping systems; determine needed action:
- Check and inspect the turbocharger for security.
- Check and inspect the turbocharger for correct operation.
- Check and inspect the wastegate for security.
- Check and inspect the wastegate for correct operation.
- Check and inspect the turbocharger piping for security.
  - Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - If no, list your recommendations for any rectifications:
   
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- Discuss the findings with your instructor.

**Performance Rating**

2007 NATEF Reference Number: F1-4

0	1	2	3	4
Supervisor/instructor signature _____				Date _____

**▶ TASK** Inspect and test turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.

F1-5

Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

- Reference the vehicle's specifications and identify the type of turbocharger fitted as standard equipment.
  - Type of turbocharger: \_\_\_\_\_
- Identify and name the type of turbocharger fitted to this vehicle:
  - Type of turbocharger: \_\_\_\_\_

- b. Type of controls: \_\_\_\_\_
- 3. Reference the manufacturer's workshop and inspect and test the turbocharger(s) (variable ratio/geometry VGT); pneumatic, hydraulic, and electronic controls; and actuators.
  - a. Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - b. If no, list your recommendations for any rectifications:
   
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- 4. Discuss the findings with your instructor.

**Performance Rating**

2007 NATEF Reference Number: F1-5

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Supervisor/instructor signature _____				Date _____

**► TASK** Check air induction system: piping, hoses, clamps, and mounting; service or replace air filter as needed. F1-6

1. Reference manufacturer's workshop and check the air induction system: piping, hoses, clamps, and mounting.
2. Check and inspect the air induction system for security.
3. Check and inspect the air induction system housing.
4. Check and inspect the air induction piping for security.
5. Check and inspect the air induction piping for correct sizing.
6. Check and inspect the air induction piping hoses and clamps for serviceability and mounting security.
  - a. Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_
  - b. If no, list your recommendations for any rectifications:
   
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7. Reference the manufacturer's workshop and service or replace the air filter as needed.
8. Clean and inspect the air filter in accordance with the manufacturer's specifications.
9. Inspect the air filter for serviceability.
  - a. Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_

Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

b. If no, list your recommendations for any rectifications:

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10. If directed by your instructor, replace the air filter if required.

11. Discuss the findings with your instructor.

**Performance Rating**

**2007 NATEF Reference Number: F1-6**

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Supervisor/instructor signature \_\_\_\_\_ Date \_\_\_\_\_

**▶ TASK Remove and reinstall turbocharger/wastegate assembly.**

**F1-7**

1. Reference the manufacturer's workshop and list the procedure and all safety precautions that must be observed when you remove and reinstall the turbocharger/wastegate assembly.

a. List the steps involved when you remove and reinstall the turbocharger/wastegate assembly:

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b. Determine what safety precautions must be observed when you remove and reinstall the turbocharger/wastegate assembly:

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2. Following the procedures listed above, and while referencing the manufacturer's workshop, remove and reinstall the turbocharger/wastegate assembly.

a. Meets the manufacturer's specifications: Yes: \_\_\_\_\_ No: \_\_\_\_\_

b. If no, list your recommendations for any rectifications:

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Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

3. Discuss the findings with your instructor.

**Performance Rating**

**2007 NATEF Reference Number: F1-7**

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Supervisor/instructor signature \_\_\_\_\_ Date \_\_\_\_\_