

REVISED 2020

*With Medium/Heavy
Composite Vehicle Type 4*



TEST INFORMATION
FOR THE
ELECTRONIC DIESEL ENGINE
DIAGNOSIS SPECIALIST TEST (L2)

- *Overview*
- *Test Specifications*
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- *Sample Questions*
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ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TEST OVERVIEW

INTRODUCTION

The ASE Electronic Diesel Engine Diagnosis Specialist test (L2) is an advanced level test offered for medium- and heavy-vehicle technicians. The test measures a technician's knowledge of skills needed to diagnose sophisticated engine performance problems on computer-controlled diesel engines. To register to take the L2 certification test, you must be currently certified in both Diesel Engines (A9, T2, S2, or H2) and Electrical/Electronic Systems (A6, T6, S6, or H6). To register for the recertification test (L2R), all that is required is a previous L2 certification.

The L2 test (both certification and recertification) consists of 45 scored multiple choice questions. Many questions require the use of the supplied *Medium/Heavy Composite Vehicle Type 4 Reference Booklet*; these questions will be clearly identified on the test.

If you pass the L2 test and have at least three years of hands-on working experience in automotive repair (appropriate training may substitute for up to one year of the experience), you will become certified as an ASE Advanced Level Specialist.

Registration information is available at **www.ase.com**. On the ASE website, you will create a myASE account (if you haven't already), which gives you direct access to your personal ASE certification information, as well as the ability to register for and schedule tests.

WHO WRITES THE QUESTIONS?

Each question has its roots in an "ASE question writing workshop" where working technicians, service representatives from vehicle and engine manufacturers, aftermarket trainers, and technical educators meet to share ideas and translate them into test questions. Each question written by these experts must survive review by all members of the group. The questions deal with practical problems experienced by technicians in their daily work. Naturally, the failures described in the advanced level questions are more complex and challenging.

After the question writing workshop, all questions are pre-tested and quality-checked on a national sample of technicians. Those questions that meet ASE standards of quality and accuracy are included in the scored sections of future tests; the "rejects" are redrafted or are discarded altogether.

HOW DO I PREPARE FOR THE ASE L2 TEST?

To prepare for the test, **you need both this book and the Composite Vehicle Type 4 Reference Booklet** (print version or online at www.ase.com). We suggest that you follow these steps:

- Step 1.** Study the content areas of the Test Specification, noting how many questions each content area has on the test.
- Step 2.** Carefully read the Task List, noting the areas in which your skills are strong or weak. You can do this by marking each task that you do not perform often or do not understand completely.
- Step 3.** Practice with the sample questions that follow. Although these questions will not appear in the test, they are similar in style and difficulty to the actual test questions. Use the Medium/Heavy Composite Vehicle Reference Booklet on the questions that refer to it.
- Step 4.** Use steps 1 through 3 to identify any skill areas where you need additional study or training. Then, use the Industry Training section (page 10) to find training help.

WHAT IS THE “MEDIUM/HEAVY COMPOSITE VEHICLE”?

The Composite Vehicle has a high-pressure common rail (HPCR) diesel fuel system and is equipped with sensors, actuators, emission control devices, and control logic. It contains computer circuits, sensors, and actuators used in many manufacturers' vehicles, so you should already be familiar with most of the components and how they work. It is described in detail in the *Medium/Heavy Composite Vehicle Type 4 Reference Booklet*. As you answer the questions about the Composite Vehicle, you will be simulating the real-world activities of using reference materials and diagnosing problems based on your understanding of a specific engine system.

In the test, the questions that specifically deal with the Composite Vehicle are clearly identified. To answer these questions correctly, you will need to use the information given in the question and information contained in the reference booklet, plus your own understanding of computer controls and diesel engine operation. The *Medium/Heavy Composite Vehicle Type 4 Reference Booklet* should be used only with these questions. It is important that you become familiar with the Composite Vehicle specifications and operation, as well as the organization of the reference booklet, before your test appointment.

BEFORE THE TEST

Try to be well rested for the test so you will be alert and efficient. Be sure to bring your test center admission ticket and your current (unexpired), government-issued photo identification (like a driver's license). You don't need to bring your *Medium/Heavy Composite Vehicle Type 4 Reference Booklet*. A copy will be provided at the test center and will be collected when you finish your test.

HOW LONG ARE THE TESTS?

Test	Name	# Of Questions	Testing Time
L2	Electronic Diesel Engine Diagnosis Specialist	55 *	2 hrs
L2R	Electronic Diesel Engine Diagnosis Specialist Recertification	45	2 hrs

* Ten questions on the L2 Certification test are included for research only and will not affect your score.

AT THE TEST CENTER

Lockers will be available for you to store personal items that are not allowed in the test room, including cell phones, wallets, and keys. Pencils and scratch paper will be provided to you.

Once the test begins, read each question carefully so that you understand exactly what is being asked. A note at the top of each question will tell you whether or not to use the reference booklet. There are no “trick” questions. Each question tests a specific diagnostic skill and has a single correct answer.

If you are unsure of an answer, don't get stuck. Mark the answer that you think is correct and flag the question using the on-screen button. Then go on to the next question. If you answer all questions before the allotted time is up, you can go back to the flagged questions. Answer every question to the best of your ability. **Do not leave any answers blank. Your score is based on the total number of correct answers that you give.**

TEST SPECIFICATIONS FOR THE MEDIUM/HEAVY VEHICLE ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TEST (L2)

Content Area	Questions in Test	Percentage of Test
A. General Inspection and Diagnosis	4	10%
B. Electronic Engine Controls Diagnosis	18	40%
C. Air Induction Systems Diagnosis	6	13%
D. Fuel Systems Diagnosis	8	18%
E. Emissions Systems Diagnosis	9	19%
	<hr/>	<hr/>
Total	45 *	100%

* Note: The L2 test will contain 10 additional questions that are included for statistical research purposes only. Your answers to these questions will not affect your score, but since you do not know which ones they are, you should answer all questions in the test.

The L2 Certification and Recertification tests cover the same content areas and have the same number of scored questions.

Electronic Diesel Engine Diagnosis Specialist Task List

A. General Inspection and Diagnosis (4 questions)

1. Identify engine model and serial number to research applicable vehicle and service information, service precautions, technical service bulletins, and service campaigns/updates; determine needed actions.
2. Verify operational concerns.
3. Determine if problem is electrical/electronic or engine mechanical.
4. Evaluate engine exhaust output (odor, color, quantity, residue, etc.); determine needed actions.
5. Use appropriate diagnostic tools and procedures based on available vehicle data and service information; determine if available information is adequate to proceed with effective diagnosis.
6. Diagnose performance concerns caused by engine cooling system problems.
7. Diagnose performance concerns caused by engine lubrication system problems.
8. Evaluate the integrity of the air induction system.
9. Evaluate the integrity of the exhaust system.
10. Listen for and isolate engine noises; determine needed actions.
11. Inspect and test engine compression brake systems and exhaust brake systems and controls; determine needed action.
12. Diagnose performance concerns caused by drivetrain, tire(s), vehicle configurations or modifications.
13. Diagnose performance concerns caused by vehicle operation and/or operational conditions.
14. Diagnose no-crank, crank but fails to start, extended cranking, and starts then stalls; determine needed action.
15. Diagnose performance concerns caused by engine mechanical problems.
16. Visually inspect wiring harnesses and connectors; check for proper routing, condition, and mounting hardware; determine needed actions.
17. Diagnose surging, rough operation, misfiring, low power, slow acceleration, slow deceleration, derate, and shutdown concerns; determine needed actions.
18. Determine root cause of current, multiple, and/or repeat failures.
19. Clear diagnostic codes; verify effectiveness of repairs.

B. Electronic Engine Controls Diagnosis (18 questions)

1. Inspect and test for missing, modified, or damaged powertrain control components.
2. Check and record diagnostic trouble codes (DTCs), freeze frame/snapshot, and/or operational data; interpret live data; download/save electronic control module (ECM) data (image); determine further diagnosis.
3. Connect diagnostic tool to vehicle. Access appropriate control system, parameters and calibration settings as needed.
4. Determine if a control system problem is electrical/electronic or mechanical.
5. Use diagnostic tool, digital multimeter (DMM), or digital storage oscilloscope (DSO) to inspect or test computerized engine control system sensors, actuators, circuits and electronic control modules (ECM); determine needed actions.
6. Test and confirm operation of electrical/electronic circuits not displayed on diagnostic tools.
7. Diagnose no-crank, cranks but fails to start, extended cranking, and starts then stalls; determine needed actions.
8. Diagnose concerns resulting from failures of interrelated systems (for example: safety, cruise control, security theft deterrent, transmission, electronic stability control, auxiliary power units (APU), and non-OEM installed accessories).

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9. Measure and interpret voltage, voltage drop, amperage, duty cycle, frequency, capacitance, and resistance readings using a digital multimeter (DMM) or appropriate test equipment.
 10. Inspect, test, repair, and/or replace electrical connectors, pins, harnesses, seals, and locks.
 11. Diagnose failures in the data communications bus networks; determine needed actions.
 12. Determine root cause of current, multiple, and/or repeat failures.
 13. Clear diagnostic trouble codes (DTCs); verify effectiveness of repairs.

C. Air Induction Systems Diagnosis (6 questions)

1. Perform air intake system restriction, pressure, and leakage tests; determine needed actions.
2. Inspect, test and replace intake air temperature, flow, and pressure sensors.
3. Diagnose no-crank, cranks but fails to start, extended cranking, and starts then stalls; determine needed actions.
4. Inspect and test turbocharger(s); inspect and test electronic controls, actuators, and sensors. Inspect, test, and replace wastegate and wastegate controls; calibrate as needed.
5. Inspect and test engine preheater/cold-start aids and controls.
6. Determine root cause of current, multiple, and/or repeat failures.
7. Clear diagnostic codes (DTCs); verify effectiveness or repairs.

D. Fuel Systems Diagnosis (8 questions)

1. Determine if the fuel control system concern is electrical/electronic or mechanical.
2. Check fuel system for air; determine needed repairs; prime and bleed fuel system.
3. Check fuel for contamination and quality; determine needed actions.
4. Inspect and test fuel supply system pressure, restriction, and return fuel rates; determine needed actions.
5. Inspect, adjust, and repair or replace electronic throttle and power take-off (PTO) control components, circuits, and sensors.
6. Inspect, test, and replace high-pressure common rail (HPCR) fuel system electronic and mechanical components.
7. Inspect, test, and replace hydraulic electronic unit injection (HEUI) fuel system electronic and mechanical components.
8. Inspect, test, and replace electronic unit injection (EUI) fuel system electronic and mechanical components.
9. Diagnose no-crank, cranks but fails to start, extended cranking, and starts then stalls; determine needed actions.
10. Determine root cause of current, multiple, and/or repeat failures.
11. Clear diagnostic trouble codes (DTCs); verify effectiveness of repairs.

E. Emissions Systems Diagnosis (9 questions)

1. Perform exhaust system leak test; determine needed actions.
2. Perform exhaust system backpressure and temperature tests (if applicable); determine needed actions.
3. Inspect, test, and repair or replace exhaust aftertreatment system components and controls including: diesel oxidation catalyst (DOC), selective catalytic reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF); check regeneration system operation.
4. Diagnose no-crank, cranks but fails to start, extended cranking, and starts but then stalls; determine needed actions.
5. Inspect and test EGR system components, including EGR valve(s), cooler(s), piping, sensors, controls, and wiring.
6. Inspect and test airflow control valves, sensors, and controls.
7. Inspect, test, and replace crankcase ventilation system components.
8. Determine root cause of current, multiple, and/or repeat failures.
9. Clear diagnostic trouble codes (DTCs); verify effectiveness of repairs.

Electronic Diesel Engine Diagnosis Specialist Test

Sample Questions

Questions 1-3 are to be answered without using the Medium/Heavy Composite Vehicle Type 4 Reference Booklet.

1. An engine cranks, but will not start. During diagnosis, the ECM will not communicate with the diagnostic tool. Which of these could be the cause?
- (A) A failed data link connector
 - (B) A failed engine speed/timing sensor(s)
 - (C) Low supply voltage to the ECM
 - (D) Incorrect diagnostic tool software

Question #1 Explanation:

- Option **(A)** is wrong. While a failed data link connector could cause the diagnostic tool to be unable to communicate with the ECM, it would not result in a no-start condition.
- Option **(B)** is wrong. A failed engine speed sensor or timing sensor(s) could cause the ECM to not operate the injectors, resulting in a no-start problem. However, the loss of the speed/timing signal(s) would not cause a diagnostic tool communication problem.
- Option **(C)** is correct. A low supply voltage to the ECM could result in the ECM shutting down. In this case, the ECM would not operate the injectors or communicate with the diagnostic tool.
- Option **(D)** is wrong. If the diagnostic tool software did not match the ECM being diagnosed, it would result in a loss of communications only.

2. A driver complains of low power.

Technician A says that a leaking intake manifold gasket could be the cause.

Technician B says that a failed boost pressure sensor could be the cause.

Who is right?

- (A) A only
- (B) B only
- (C) Both A and B
- (D) Neither A nor B

Question 3 contains the word EXCEPT. For this question, look for the choice that could NOT cause the described situation. Read the entire question carefully before choosing your answer.

3. A HEUI engine stumbles and lacks power on acceleration. Any of these could be the cause EXCEPT a:
- (A) leaking charge air cooler.
 - (B) plugged air cleaner element.
 - (C) faulty injection pressure regulator.
 - (D) faulty camshaft position sensor.

Questions 4-6 require the use of the Medium/Heavy Composite Vehicle Type 4

Reference Booklet. This booklet describes the engine control system and diagnostic parameters referred to in questions 4-6. Review the content of the booklet and refer to it as you answer these questions. You will receive a copy of the booklet at the Test Center to use during your L2 test.

4. The composite vehicle will start, but will not go above idle speed when the accelerator pedal is applied. This could be caused by an open circuit at:
- (A) connector CA pin 6.
 - (B) connector BH pin 2.
 - (C) ECM pin 261.
 - (D) ECM pin 264.
5. The composite vehicle is being diagnosed for the DTC “Low NOx Conversion.” Which of these could be the cause?
- (A) A short-to-ground at G603
 - (B) An open fuse 64
 - (C) A short-to-power at pin C of the DEF supply pump relay
 - (D) An open at ECM pin 621
6. The composite vehicle has an intermittent “Voltage Below Normal Cylinder 5” diagnostic trouble code. Which of these could be the cause?
- (A) Loose wires at the injector
 - (B) Loose wires at connector BC pin 1
 - (C) An open circuit at ECM pin 231
 - (D) An open circuit at connector BH pin 2

Answer Key : 1. C 2. C 3. D 4. A 5. D 6. A
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Electronic Diesel Engine Diagnosis Specialist Test Industry Training

The training sources listed in this guide are designed to help you sharpen your technical skills in diesel engine fuel systems and driveability diagnostics. Since the L2 test reflects these skills—the more you learn, the better your chances of passing this test.

Please call or write the listed organizations for availability, schedules, and prices. You may wish to check with truck and engine manufacturers, community colleges, tool and equipment suppliers, and technical training organizations for the latest training information. Training resources can also be found on ASE's home page at www.ase.com, the International Automotive Technicians Network (iATN) at www.iatn.net, or the Diagnostics Network at www.diag.net.

CARQUEST

The Training and Certification System (TACS) provides a full scope of training solutions. This includes the ability to setup a career path for instructor-led training, online training, ASE Test Prep Study Guides, Technical Assessments, and more. Visit their website for more information. Internet: www.ctionline.com

Caterpillar, Inc.

Caterpillar, Inc., Engine Div., Service Training, 501 SW Jefferson Ave., LC2124, East Peoria, IL 61630; Attn: Supervisor, Service Training.

Many Caterpillar dealers have on-site training. A fee is charged. For further info, contact the training department of your local Caterpillar dealer.

ConsuLab

Provides running engine trainers, equipped with fully operational exhaust aftertreatment systems, for the transportation market. These engine and aftertreatment systems are equipped with a series of programmable engine faults to enhance student learning by the hands-on teaching by troubleshooting strategy. Train the trainer courses are available for instructors and programs that use ConsuLab products. For further information, visit the website at www.consulab.com. See them also on Facebook, Twitter, Instagram or their YouTube page.

Cummins

Courses conducted at Cummins Distributor Training Centers in the U.S. and Canada.

For details on course locations, schedules, and costs, contact nearest Cummins Distributor Training Center, or visit the training website: www.cummins.com/na/sales-and-service/service-training.

Cengage Learning

Provides training textbooks and online, interactive courseware covering many areas of medium/heavy truck repair, including a Preparation Guide for the ASE L2 Test. The online interactive computer program is called Technician Test Preparation (TTP). TTP is designed to help prepare technicians for the ASE tests, including L2. Cengage Learning, 5 Maxwell Drive, Clifton Park, NY 12065, or call (800) 347-7707. Internet: www.trainingbay.com.

Detroit Diesel & Freightliner Corp.

Daimler Trucks North America service training and Detroit Diesel service technician training programs are offered through the corporate training center and distributors. Training is provided in the areas of overhaul, engine electronic controls, and other vehicle systems. Classes are a combination of web-based and instructor-led courses. For information contact: Detroit Diesel Corp., Box C12, 13400 W. Outer Drive, Redford, MI 48329. Ph: 313-592-5000. Internet www.DDCSN.com

Mack and Volvo Trucks North America, Inc.

Mack Trucks Academy and Volvo Trucks Academy provide service technician training relevant to Mack and Volvo trucks. Training is available to dealer and fleet personnel in several ways:

- Classroom Training—Learn from instructors at one of several facilities in the U.S. and Canada.
- Field Training—Instructors come to your facility.
- Classes on Demand—Get instructor led classes at a time that fits your schedule.
- eLearning—Training materials are available online.

For more information, go to:

www.macktrucks.com/parts-and-services/support/customer-training

OR

<http://www.volvotrucks.us/parts-and-services/service/training/>

Motor Age

Training for ASE Certification is a self-study training guide that is updated regularly and contains both technical information and sample questions. For ordering information, write: Motor Age Training, P.O. Box 6310, Duluth, MN 55806. Ph:(800) 240-1968; Internet: www.PassTheASE.com

Navistar, Inc.

International Trucks (Navistar's flagship vehicle brand) conducts training classes on diagnosis/overhaul of MaxxForce diesel engines, brakes, steering, and other vehicle systems.

For information, contact your local International Truck Dealer. For dealer locations, go to www.internationaltrucks.com.

Robert Bosch LLC

Provides a selection of training aids and reference material for gasoline and diesel fuel injection systems, starting and charging systems, and antilock braking systems on automotive and heavy duty applications. Technical hands-on training is also available. For more information, visit the Bosch site at www.boschtechno.com

Standard Motor Products, Inc.

Offers professional technician seminars for popular diesel engines. These include specific topics covering Cummins, Powerstroke, and Duramax diesel engines. Diesel exhaust fluid (DEF) topics are also covered. Engage in actual diagnosis using case studies in the shop to apply what you've learned. An ASE-Certified professional instructor conducts the four-hour seminars during the evening, with a heavy emphasis on diagnostics and troubleshooting. Each seminar includes a workbook for your reference after the class. SMP also offers live, as well as a number of archived, one-hour long webinars. These can be viewed anywhere an internet connection is available, including at home. Internet: <http://pts.smpcorp.com>

Turbo Training

Provides training solutions for Ford Powerstroke, Navistar Chassis, and automotive applications. Ph: (440) 846-3885; Internet: www.turbotraining.com



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ASE Online Resources

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