

# Trade Profile

## Heavy Duty Equipment Technician



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# **RED SEAL**

# **Trade Profile**

## **Heavy Duty Equipment Technician**



# Structure of the Trade Profile

This profile has two sections that provide a snapshot of the trade's description, and all trade activities as they are organized in the Red Seal Occupational Standard:

**Description of the Heavy Duty Equipment Technician Trade:** an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

**Trends in the Heavy Duty Equipment Technician Trade:** some of the trends identified by industry as being the most important for workers in this trade

**Task Matrix:** a chart which outlines graphically the major work activities, tasks and sub-tasks of this trade

**Major Work Activity (MWA):** the largest division within the standard that is comprised of a distinct set of trade activities

**Task:** distinct actions that describe the activities within a major work activity

**Sub-task:** distinct actions that describe the activities within a task

A complete version of the occupational standard, which provides additional detail for the trade activities, skills and knowledge can be found at [www.red-seal.ca](http://www.red-seal.ca).

# Description of the Heavy Duty Equipment Technician trade

“Heavy Duty Equipment Technician” is this trade’s official Red Seal occupational title approved by the CCDA.

Heavy duty equipment technicians diagnose, repair, adjust, calibrate, rebuild, service, and test mobile and stationary heavy duty equipment.

Heavy duty equipment technicians are employed by companies in many sectors and services: heavy duty equipment dealerships, rental and service companies, construction contractors, road building, forestry companies, mining companies, railroads, landscaping companies, public recreational areas, and government departments that service and repair their own equipment. Many heavy duty equipment technicians have experience on a wide variety of equipment types and manufacturers.

Most heavy equipment in Canada is diesel-powered. However, heavy duty equipment technicians are increasingly working with alternative prime movers such as hybrid and electric-powered equipment.

Heavy duty equipment technicians work in a full range of environmental conditions: from shop environments to remote sites where inclement weather can affect the work. Heavy duty equipment technicians perform a lot of field service work, particularly in outdoor work environments. Good physical condition and agility are important because the work often requires considerable standing, bending, crawling, lifting, climbing, pulling and reaching.

Due to the size and complexity of the equipment, safety is of prime importance. Technicians must be conscious of the impact on people, equipment, work area and environment when performing their work. There is risk of injury when working with heavy equipment.

Some important attributes of a heavy duty equipment technician are: mechanical, mathematical and technical aptitude, effective communication, independence, teamwork, and the ability to plan and work sequentially. Heavy duty equipment technicians need to be able to organize multiple jobs at the same time and adapt to various workload and supply demands as well as changing priorities.

This standard recognizes similarities or overlaps in the work of other tradespersons, such as automotive service technicians, agricultural equipment technicians, truck and transport technicians, transport trailer technicians, parts technicians and industrial mechanics (millwrights).

# Trends in the Heavy Duty Equipment Technician Trade

## Technology

Technology continues to advance in sophistication and function. Satellite and wireless technology is becoming more widespread and improves a technicians' ability to diagnose, service and repair remotely. Satellite technology such as Telematics, Global Positioning System (GPS) and Global Navigation Satellite System (GNSS) are used for various applications.

The use of remote control and autonomous and semi-autonomous equipment has been introduced, particularly in hazardous environments and in the mining industry.

There is also an increased role in network communications between individual components on equipment. This technology allows faster data transmission between control modules – this makes for more efficient and easier to operate equipment. For technicians, this has a significant effect on how they diagnose electronic components.

The heavy duty equipment market is moving towards a future of alternative powered equipment. Hybridization is making its way into many aspects of heavy duty equipment, including the powertrain system. Currently, some smaller equipment is fully electric, but this is not common in large heavy equipment. There is also research and development occurring in alternative power such as fuel cells and hydrogen fuels.

There are fewer and fewer mechanically controlled systems, which help reduce emissions and also facilitate operation of equipment.

There are a number of operator-assist technologies such as automatic guidance systems, cameras and radar to detect objects. Some equipment have operator monitoring systems to alert operators of drowsiness or lack of attention.

## Health and Safety

Safety awareness and practices continue to be forefront in the industry. Some examples include high-voltage safe work practices, pressurized hydraulic systems, ergonomic controls, lock-out and tag-out protocols, fall-arrest, equipment guards and live testing.

There are continuing advancements in the Workplace Hazardous Materials Information System (WHMIS) where there is now a Global Harmonized System (GHS).

## Tools and Equipment

Heavy duty equipment technicians are using more and more digital interfaces. Electronic devices such as smart phones, tablets and laptops are now essential tools. This in turn requires a higher level of training related to analytics for technicians with a stronger focus on advanced diagnostic tools (manufacturer-specific programs and apps). There is an increasing ability to track and repair problems before any failure happens. These advanced tools and equipment are used for diagnostics, troubleshooting, function calibration, programming, service and parts information.

New, ergonomic and safer tools and equipment are always being introduced in the trade. For example, there are more electric-power tools, lighter tools and flameless heaters.

**Products and Materials**

Products and materials are more modularized than previous equipment. The use of non-repairable electrical components and lighter weight materials continues to increase. Materials are also healthier, safer and more environmentally friendly, in their construction, as well as in their recyclability and reusability.

**Environmental, Legislative and Regulatory**

Environmental and emission control regulations continue to be important in the industry. There is always a risk for a large and expensive environmental disaster during a routine task in the trade. There is an increase in jurisdictional requirements for environmental awareness training and certification to ensure the proper handling and recycling of refrigerant and other waste materials.

# Heavy Duty Equipment Technician

## Task Matrix and Weightings

### A – Performs common occupational skills

7%

<b>Task A-1 Performs safety-related functions</b> <b>29%</b>	A-1.01 Performs hazard analysis	A-1.02 Maintains safe work environment	A-1.03 Uses personal protective equipment (PPE) and safety equipment
	A-1.04 Implements safety protocols for hybrid and all-electric equipment and attachments		
<b>Task A-2 Uses and maintains tools and equipment</b> <b>33%</b>	A-2.01 Uses hand, power, measuring, testing and diagnostic tools	A-2.02 Uses shop equipment	A-2.03 Uses access equipment
	A-2.04 Uses hoisting, rigging, lifting, cribbing and blocking equipment	A-2.05 Uses welding equipment	A-2.06 Uses heating and cutting equipment
	A-2.07 Uses electronic service tools and systems for diagnostics and programming		
<b>Task A-3 Performs routine work practices</b> <b>34%</b>	A-3.01 Uses documentation and reference materials	A-3.02 Prepares job action plan	A-3.03 Maintains fluids and lubricants
	A-3.04 Services hoses, tubing, piping and fittings	A-3.05 Services bearings and seals	A-3.06 Uses fasteners and sealing materials
	A-3.07 Services safety features	A-3.08 Performs operational check-out	

<b>Task A-4 Uses communication and mentoring techniques</b> <b>4%</b>
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<b>A-4.01 Uses communication techniques</b>
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<b>A-4.02 Uses mentoring techniques</b>
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## **B – Services, diagnoses and repairs engines and supporting systems**

**15%**

<b>Task B-5 Services, diagnoses and repairs base engines</b> <b>14%</b>
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<b>B-5.01 Services base engines</b>
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<b>B-5.02 Diagnoses base engines</b>
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<b>B-5.03 Repairs base engines</b>
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<b>Task B-6 Services, diagnoses and repairs lubrication systems</b> <b>11%</b>
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<b>B-6.01 Services lubrication systems</b>
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<b>B-6.02 Diagnoses lubrication systems</b>
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<b>B-6.03 Repairs lubrication systems</b>
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<b>Task B-7 Services, diagnoses and repairs intake systems</b> <b>10%</b>
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<b>B-7.01 Services intake systems</b>
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<b>B-7.02 Diagnoses intake systems</b>
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<b>B-7.03 Repairs intake systems</b>
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<b>Task B-8 Services, diagnoses and repairs exhaust systems</b> <b>10%</b>
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<b>B-8.01 Services exhaust systems</b>
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<b>B-8.02 Diagnoses exhaust systems</b>
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<b>B-8.03 Repairs exhaust systems</b>
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<b>Task B-9 Services, diagnoses and repairs engine management systems</b> <b>16%</b>
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<b>B-9.01 Services engine management systems</b>
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<b>B-9.02 Diagnoses engine management systems</b>
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<b>B-9.03 Repairs engine management systems</b>
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<b>Task B-10 Services, diagnoses and repairs fuel delivery systems</b> <b>13%</b>
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<b>B-10.01 Services fuel delivery systems</b>
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<b>B-10.02 Diagnoses fuel delivery systems</b>
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<b>B-10.03 Repairs fuel delivery systems</b>
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<b>Task B-11 Services, diagnoses and repairs emission control systems</b> <b>17%</b>
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<b>B-11.01 Services emission control systems</b>
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<b>B-11.02 Diagnoses emission control systems</b>
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<b>B-11.03 Repairs emission control systems</b>
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<b>Task B-12 Services, diagnoses and repairs cooling systems</b> <b>9%</b>
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<b>B-12.01 Services cooling systems</b>
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<b>B-12.02 Diagnoses cooling systems</b>
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<b>B-12.03 Repairs cooling systems</b>
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## **C – Services, diagnoses and repairs steering, suspension, brake and undercarriage systems, and wheel assemblies**

**12%**

<b>Task C-13 Services, diagnoses and repairs steering systems</b> <b>22%</b>
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<b>C-13.01 Services steering systems</b>
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<b>C-13.02 Diagnoses steering systems</b>
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<b>C-13.03 Repairs steering systems</b>
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<b>Task C-14 Services, diagnoses and repairs suspension systems</b> <b>17%</b>
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<b>C-14.01 Services suspension systems</b>
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<b>C-14.02 Diagnoses suspension systems</b>
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<b>C-14.03 Repairs suspension systems</b>
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<b>Task C-15 Services, diagnoses and repairs brake systems</b> <b>25%</b>
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<b>C-15.01 Services brake systems</b>
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<b>C-15.02 Diagnoses brake systems</b>
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<b>C-15.03 Repairs brake systems</b>
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<b>Task C-16 Services, diagnoses and repairs undercarriage systems</b> <b>21%</b>
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<b>C-16.01 Services undercarriage systems</b>
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<b>C-16.02 Diagnoses undercarriage systems</b>
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<b>C-16.03 Repairs undercarriage systems</b>
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<b>Task C-17 Services, diagnoses and repairs wheel assemblies</b> <b>15%</b>
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<b>C-17.01 Services wheel assemblies</b>
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<b>C-17.02 Diagnoses wheel assemblies</b>
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<b>C-17.03 Repairs wheel assemblies</b>
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## D – Services, diagnoses and repairs electrical and electronic systems

19%

<b>Task D-18 Service, diagnoses and repairs charging systems</b> <b>19%</b>	<b>D-18.01 Services charging systems</b>	<b>D-18.02 Diagnoses charging systems</b>	<b>D-18.03 Repairs charging systems</b>
<b>Task D-19 Service, diagnoses and repairs starting systems</b> <b>17%</b>	<b>D-19.01 Services starting systems</b>	<b>D-19.02 Diagnoses starting systems</b>	<b>D-19.03 Repairs starting systems</b>
<b>Task D-20 Service, diagnoses and repairs battery systems</b> <b>15%</b>	<b>D-20.01 Services battery systems</b>	<b>D-20.02 Diagnoses battery systems</b>	<b>D-20.03 Repairs battery systems</b>
<b>Task D-21 Services, diagnoses and repairs electrical components</b> <b>23%</b>	<b>D-21.01 Services electrical components</b>	<b>D-21.02 Diagnoses electrical components</b>	<b>D-21.03 Repairs electrical components</b>
<b>Task D-22 Services, diagnoses and repairs equipment management systems and electronic components</b> <b>26%</b>	<b>D-22.01 Services equipment management systems and electronic components</b>	<b>D-22.02 Diagnoses equipment management systems and electronic components</b>	<b>D-22.03 Repairs equipment management systems and electronic components</b>

## E – Services, diagnoses and repairs drivetrain systems

12%

<b>Task E-23 Services, diagnoses and repairs clutches</b> <b>9%</b>	<b>E-23.01 Services clutches</b>	<b>E-23.02 Diagnoses clutches</b>	<b>E-23.03 Repairs clutches</b>
<b>Task E-24 Services, diagnoses and repairs torque converters, fluid couplers and hydraulic retarders</b> <b>14%</b>	<b>E-24.01 Services torque converters, fluid couplers and hydraulic retarders</b>	<b>E-24.02 Diagnoses torque converters, fluid couplers and hydraulic retarders</b>	<b>E-24.03 Repairs torque converters, fluid couplers and hydraulic retarders</b>
<b>Task E-25 Services, diagnoses and repairs manual transmissions and transfer cases</b> <b>12%</b>	<b>E-25.01 Services manual transmissions and transfer cases</b>	<b>E-25.02 Diagnoses manual transmissions and transfer cases</b>	<b>E-25.03 Repairs manual transmissions and transfer cases</b>

<b>Task E-26 Services, diagnoses and repairs automatic and powershift transmissions</b> <b>21%</b>	<b>E-26.01 Services automatic and powershift transmissions</b>	<b>E-26.02 Diagnoses automatic and powershift transmissions</b>	<b>E-26.03 Repairs automatic and powershift transmissions</b>
<b>Task E-27 Services, diagnoses and repairs driveline systems</b> <b>12%</b>	<b>E-27.01 Services driveline systems</b>	<b>E-27.02 Diagnoses driveline systems</b>	<b>E-27.03 Repairs driveline systems</b>
<b>Task E-28 Services, diagnoses and repairs drive axles and differentials</b> <b>17%</b>	<b>E-28.01 Services drive axles and differentials</b>	<b>E-28.02 Diagnoses drive axles and differentials</b>	<b>E-28.03 Repairs drive axles and differentials</b>
<b>Task E-29 Services, diagnoses and repairs final drive systems</b> <b>15%</b>	<b>E-29.01 Services final drive systems</b>	<b>E-29.02 Diagnoses final drive systems</b>	<b>E-29.03 Repairs final drive systems</b>

## **F – Services, diagnoses and repairs environmental control systems** **7%**

<b>Task F-30 Services, diagnoses and repairs heating systems</b> <b>29%</b>	<b>F-30.01 Services heating systems</b>	<b>F-30.02 Diagnoses heating systems</b>	<b>F-30.03 Repairs heating systems</b>
<b>Task F-31 Services, diagnoses and repairs ventilation and filtration systems</b> <b>23%</b>	<b>F-31.01 Services ventilation and filtration systems</b>	<b>F-31.02 Diagnoses ventilation and filtration systems</b>	<b>F-31.03 Repairs ventilation and filtration systems</b>
<b>Task F-32 Services, diagnoses and repairs air conditioning systems</b> <b>37%</b>	<b>F-32.01 Services air conditioning systems</b>	<b>F-32.02 Diagnoses air conditioning systems</b>	<b>F-32.03 Repairs air conditioning systems</b>
<b>Task F-33 Services, diagnoses and repairs sound suppression systems</b> <b>11%</b>	<b>F-33.01 Services sound suppression systems</b>	<b>F-33.02 Diagnoses sound suppression systems</b>	<b>F-33.03 Repairs sound suppression systems</b>

## G – Services, diagnoses and repairs hydraulic, hydrostatic and pneumatic systems

18%

<b>Task G-34 Services, diagnoses and repairs hydraulic systems</b> <b>46%</b>	<b>G-34.01 Services hydraulic systems</b>	<b>G-34.02 Diagnoses hydraulic systems</b>	<b>G-34.03 Repairs hydraulic systems</b>
<b>Task G-35 Services, diagnoses and repairs hydrostatic systems</b> <b>34%</b>	<b>G-35.01 Services hydrostatic systems</b>	<b>G-35.02 Diagnoses hydrostatic systems</b>	<b>G-35.03 Repairs hydrostatic systems</b>
<b>Task G-36 Services, diagnoses and repairs pneumatic systems</b> <b>20%</b>	<b>G-36.01 Services pneumatic systems</b>	<b>G-36.02 Diagnoses pneumatic systems</b>	<b>G-36.03 Repairs pneumatic systems</b>

## H – Services, diagnoses and repairs structural components, operator stations, attachments and accessories

7%

<b>Task H-37 Services, diagnoses and repairs structural components</b> <b>27%</b>	<b>H-37.01 Services structural components</b>	<b>H-37.02 Diagnoses structural components</b>	<b>H-37.03 Performs mechanical repairs on structural components</b>
<b>Task H-38 Services, diagnoses and repairs operator station components</b> <b>35%</b>	<b>H-38.01 Services operator station components</b>	<b>H-38.02 Diagnoses operator station components</b>	<b>H-38.03 Repairs operator station components</b>
<b>Task H-39 Services, diagnoses and repairs attachments and accessories</b> <b>38%</b>	<b>H-39.01 Services attachments and accessories</b>	<b>H-39.02 Diagnoses attachments and accessories</b>	<b>H-39.03 Repairs attachments and accessories</b>
	<b>H-39.04 Installs attachments and accessories</b>		

# I – Services, diagnoses and repairs hybrid and all-electric equipment

3%

<b>Task I-40 Services, diagnoses and repairs hybrid equipment</b> 53%	<b>I-40.01 Services hybrid equipment</b>	<b>I-40.02 Diagnoses hybrid equipment</b>	<b>I-40.03 Repairs hybrid equipment</b>
<b>Task I-41 Services, diagnoses and repairs all-electric equipment</b> 47%	<b>I-41.01 Services all-electric equipment</b>	<b>I-41.02 Diagnoses all-electric equipment</b>	<b>I-41.03 Repairs all-electric equipment</b>

