



8704
APPLIED HEAVY DUTY
EQUIPMENT TECHNOLOGY
(12D)

40S/40E/40M

A Heavy Duty Equipment Technician Course

8704 APPLIED HEAVY DUTY EQUIPMENT TECHNOLOGY (12D) 40S/40E/40M

Course Description

Students will learn to apply diagnostic strategies to a variety of vehicle systems and components. They will demonstrate the ability to address customer concerns by diagnosing and correcting problems, and to complete vehicle repairs to accepted industry standards.

Goal 1: Describe and apply appropriate **safety** practices for heavy duty equipment technicians.

GLO 1.1: Describe and apply appropriate **safety** practices for heavy duty equipment technicians.

- SLO 12D.1.1.1 Describe and apply appropriate health and safety practices.
- SLO 12D.1.1.2 Create and maintain a safe and organized working environment.
- SLO 12D.1.1.3 Apply safety procedures associated with hydraulic hydrostatic system servicing.
- SLO 12D.1.1.4 Apply safety procedures associated with HVAC system servicing.
- SLO 12D.1.1.5 Demonstrate initiative in dealing with health and safety hazards.

A2 Trade and Safety Awareness (7 hours)

- SLO 12D.1.1.6 Identify safety and health requirements. (A2.1)
 - overview of *The Workplace Safety and Health Act (the Act)*
 - rights and responsibilities of employees under the *Act*
 - rights and responsibilities of employers under the *Act*
 - rights and responsibilities of supervisors under the *Act*
 - fourteen (14) regulations
 - codes of practice
 - guidelines

- right to refuse
 - explanation of right to refuse process
 - rights and responsibilities of employees
 - rights and responsibilities of employers
 - rights and responsibilities of supervisors under the *Act*

SLO 12D.1.1.7

Identify personal protective equipment (PPE) and procedures. (A2.2)

- employer and employee responsibilities as related to personal protective equipment
- standards: Canadian Standards Association (CSA), American National Standards Institute (ANSI), and guidelines
- work protective clothing and danger if it fits poorly
- gloves—importance of proper glove selection (when handling chemicals, cold items, slivers, etc.)
- headwear—appropriate protective headwear when required and the approved type of headwear
- eye protection—comparison and distinction of everyday eyeglasses, industrial safety glasses, and safety goggles
- foot protection—when required according to safety standards
- hearing protection
 - hazards of various noise levels (hearing protection must be worn)
 - laws
 - types of hearing protection
- respiratory protection—types, overview of proper selection
- fall protection—Manitoba requirements, standards, guidelines
 - ANSI (U.S.A. standards), etc.
- ladders and scaffolding
- safety principles for working with or around industrial trucks site-specific (forklifts, pallet trucks, etc.)

- SLO 12D.1.1.8 Identify electrical safety. (A2.3)
- effects of electric current on the human body
 - three factors that affect the severity of an electric shock
 - the effects of arc and blast on the human body and equipment
 - work with energized equipment
- SLO 12D.1.1.9 Identify fire safety. (A2.4)
- types of fires
 - types of firefighting equipment
 - classifications of fire extinguishers (A, B, and C)
 - location of fire extinguishers and fire exits
 - fire alarms and drills
- SLO 12C.1.1.10 Identify ergonomics. (A2.5)
- definition of ergonomics and conditions that may affect the body
 - working postures
 - repetition
 - force
 - lifting (simple safety procedures and precautions related to material handling procedures on how to lift, carry, and put down a load)
 - tools
 - identify tool and safety equipment
 - causes of hand tool accidents
 - equipment
- SLO 12D.1.1.11 Hazard recognition and control. (A2.6)
- safe work practices
 - basic risk assessment
 - injury prevention and control measures
 - identification of hazards involved in pneumatic tool use and explanation of how to guard against them
- SLO 12D.1.1.12 Hazard of confined space entry. (A2.7)
- identification of a confined space
 - hazards of a confined space
 - physical
 - biological
 - working in a confined space

- emergency response plan
 - self-contained breathing apparatus (SCBA)
- SLO 12D.1.1.13 Identify First Aid/CPR. (A2.8)
- overview of First Aid Regulation
 - obligations of employers regarding First Aid
 - Who is certified to provide First Aid?
 - What to do while waiting for help?
 - Where is First Aid kit?
 - describe basic First Aid requirements and techniques
 - scope and limits of First Aid intervention
 - specific interventions (cuts, burns, abrasions, fractures, suffocation, shock, electrical shock, etc.)
 - What is it?
 - interface with other services and agencies (e.g., Workers Compensation claims)
 - describe basic Cardiopulmonary Resuscitation (CPR) requirements and techniques
 - How do you get certified?
 - scope and limits of CPR intervention (include varieties of CPR certification)
- SLO 12D.1.1.14 Identify the safety requirements as they apply to WHMIS with emphasis on (A2.9)
- WHMIS is a system
 - provincial regulation under *The Workplace Safety and Health Act*
 - each province has a WHMIS regulation
 - federal *Hazardous Products Act*
 - WHMIS generic training:
 - WHMIS defined and the format used to convey information about hazardous materials in the workplace
 - information found on supplier and workplace labelling using WHMIS
 - hazardous materials in accordance with WHMIS
 - compliance with government safety standards and regulations

- description of WHMIS (include varieties of WHMIS certification)
- typology of WHMIS labels, symbols, and classifications
- scope and use of Materials Safety Data Sheets (MSDS)

- SLO 12D.1.1.15 Identifying and controlling hazards. (A2.10)
- basic control measures (injury prevention)
 - safe work procedures
 - explanation on the importance of industrial housekeeping
 - employer responsibilities
 - how and where to store materials
 - safety measures related to walkways, stairs, and floor openings
 - explanation of how to protect the worker and others when working in traffic paths

Goal 2: Identify, select, use, and maintain tools, equipment, materials, and consumables.

GLO 2.1: Identify, select, use, and maintain tools, equipment, materials, and consumables.

- SLO 12D.2.1.1 Identify, select, use, and maintain tools, equipment, materials, and consumables used in HDE technology.
- SLO 12D.2.1.2 Select the appropriate tools and equipment to correct diagnosed faults with a minimum of supervision and direction.

Goal 3: Maintain, diagnose, and repair HDE systems.

GLO 3.1: Perform maintenance on HDE systems.

- SLO 12D.3.1.1 Demonstrate an understanding of heavy duty equipment.
- SLO 12D.3.1.2 Demonstrate the ability to perform maintenance on heavy duty equipment with a minimum of supervision.
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GLO 3.2: Diagnose issues with HDE systems.

- SLO 12D.3.2.1 Select appropriate repair procedures.
- SLO 12D.3.2.2 Inspect vehicle to determine repair or maintenance required.
- SLO 12D.3.2.3 Select the appropriate diagnostic strategies to isolate the cause of customer concern.
- SLO 12D.3.2.4 Diagnose faults with a minimum of supervision and direction.
- SLO 12D.3.2.5 Interpret diagnostic test results.

A11 HVAC and Environmental Controls 1 (7 hours)

- SLO 12D.3.2.6 Define terminology associated with heating, ventilation, and air conditioning (HVAC) systems and system components. (A11.1)
 - SLO 12D.3.2.7 Identify hazards and describe safe work practices pertaining to HVAC systems. (A11.2)
 - air conditioning, including
 - refrigerants
 - high pressure gas safety (nitrogen testing)
 - heating system
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GLO 3.3: Repair HDE systems.

- SLO 12D.3.3.1 Apply service manual procedures to repairs.
 - SLO 12D.3.3.2 Perform repairs with a minimum of supervision and direction.
 - SLO 12D.3.3.3 Perform a comprehensive inspection to determine the vehicle's condition (e.g., seasonal inspections, potential purchase).
 - SLO 12D.3.3.4 Determine additional maintenance or repairs required.
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Goal 4: Describe and demonstrate the transferable **cross-curricular** knowledge and skills pertaining to HDE technology.

GLO 4.1: Read, interpret, and communicate information relevant to HDE technology.

- SLO 12D.4.1.1 Read, interpret, and communicate information relevant to heavy duty equipment technicians' practices.
- SLO 12D.4.1.2 Select and interpret the service information documents relevant to the issue.
- SLO 12D.4.1.3 Interpret service information (e.g., technical bulletins).
- SLO 12D.4.1.4 Identify and interpret types of service-related documents. (A4.4)
- work orders
 - schematics and service information
 - technical service bulletins (TSB)
 - preventive maintenance schedules
 - parts lists
 - time estimates
 - component specifications, OEM vs. provincial (safety inspections)
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GLO 4.2: Apply knowledge and skills from **mathematics** to HDE technology.

- SLO 12D.4.2.1 Apply knowledge and skills from mathematics to heavy duty equipment technicians' practices as they apply to HDE technology.
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GLO 4.3: Apply knowledge and skills from the **sciences** to HDE technology.

- SLO 12D4.3.1 Apply knowledge and skills from the sciences to heavy duty equipment technicians' practices.
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GLO 4.4: Apply knowledge and skills from **information and communication technology** to HDE technology.

No applicable SLOs.

Goal 5: Demonstrate an awareness of **sustainability** as it pertains to HDE technology.

GLO 5.1: Describe the HDE industry's **sustainability practices** and its impact on the environment.

No applicable SLOs.

GLO 5.2: Describe the impact of the HDE industry on **human health and well-being**.

No applicable SLOs.

GLO 5.3: Describe **sustainable business practices** within the HDE service and repair industry.

No applicable SLOs.

Goal 6: Demonstrate an awareness of **ethics** and **legal standards** as they pertain to the HDE industry.

GLO 6.1: Demonstrate an awareness of **ethics** as they pertain to the HDE industry.

SLO 12D.6.1.1 Demonstrate the ability to describe two opposing ethical points of view, including some of the benefits and disadvantages of each one.

SLO 12D.6.1.2 Demonstrate the ability to select the most appropriate of two opposing ethical points of view, and explain why it was chosen.

GLO 6.2: Demonstrate an awareness of **legal standards** as they pertain to the HDE industry.

SLO 12D.6.2.1 Demonstrate an awareness of the licences required for driving various types of HDE vehicles.

Goal 7: Demonstrate **employability skills** related to the HDE industry.

GLO 7.1: Demonstrate fundamental **employability skills**.

- SLO 12C.7.1.1 Demonstrate regular attendance and punctuality.
- SLO 12C.7.1.2 Demonstrate accountability by taking responsibility for own actions.
- SLO 12C.7.1.3 Demonstrate adaptability, initiative, and effort.
- SLO 12C.7.1.4 Demonstrate the ability to accept and follow direction and feedback.
- SLO 12C.7.1.5 Demonstrate teamwork skills.
- SLO 12C.7.1.6 Demonstrate the ability to stay on task and to make effective use of time in class and shop environments.
- SLO 12C.7.1.7 Describe the importance of effective communication. (A4.1)
 - customers
 - co-workers
 - related professionals
 - journeyperson/apprentice
- SLO 12C.7.1.8 Describe and demonstrate the methods of professional communication. (A4.2)
 - phone
 - email
 - instant messaging/texting
 - fax
 - other methods of communication

GLO 7.2: Demonstrate an understanding of the **business operation** of an HDE service and repair facility.

- SLO 12D.7.2.1 Verify and document customer concerns.
 - SLO 12D.7.2.2 Demonstrate an understanding of work orders.
 - SLO 12D.7.2.3 Read, interpret, and follow work orders.
 - SLO 12D.7.2.4 Communicate with customers regarding diagnosis, repair, and maintenance procedures.
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GLO 7.3: Demonstrate the knowledge, skills, and attitudes required to **think critically** in order to **solve complex problems**.

SLO 12D.7.3.1 Demonstrate the ability to solve complex problems that require assistance, other resources, and several steps.

GLO 7.4: Demonstrate an awareness of **cultural competence**, and its importance in the workplace.

SLO 12D.7.4.1 Demonstrate an awareness of some of the culture-related issues in the HDE industry, or in a typical HDE workplace.

Goal 8: Demonstrate an understanding of the **scope** of the HDET trades (along with associated occupations), including **working conditions**, and **training** and **career opportunities**.

GLO 8.1: Demonstrate an understanding of the **scope** of the HDET trades and associated occupations, including **working conditions**.

A1 Learning about Work (7 hours)

SLO 12D.8.1.1 Describe structure and scope of the agricultural equipment technician, heavy duty equipment technician, and truck and transport mechanic trades. (A1.1)

- *The Apprenticeship and Certification Act*
 - Apprenticeship and Certification Board and Provincial Advisory Committees
 - general and specific trade regulation
 - policies regarding attendance, evaluation procedures, conduct, and progression requirements (Apprenticeship Manitoba, Training provider)
- uses of the National Occupational Analysis (NOA)
 - technical training in-school curriculum
 - on-the-job record book of hours (Manitoba blue book)
 - examinations (level placement tests, final certification examinations)
- opportunities and future career options
- generalists and specialists: The move toward specialization is well known to modern tradespeople. Some prefer to specialize and others want to do it all. Supervisory positions require a broad scope.

- lead hands and other immediate supervisors: Apprentices need to know how to become a lead-hand as much as they need to know the benefits and pit-falls of leadership between management and shop floor workers.
- geographic mobility: What does it mean to a construction/industrial worker to have to travel to find work? Are there more opportunities if they do? What are they? What are the drawbacks to being away from home for several weeks at a time?
- job hierarchies and innovations: What trade-specific special training opportunities are available in your trade? Is there travel involved? Is there an opportunity to move up the ladder on a work crew as opposed to staying in the shop?

SLO 12D.8.1.2 Describe two levels of workplace competency. (A1.2)

- job competencies related to workplace culture
 - knowledge of workplace equipment and materials
 - skills and techniques
- social competencies related to workplace culture
 - frame of reference for evaluation workplace events
 - language of work
 - workplace belief systems
 - rules and meanings
 - multiculturalism and equity in the workplace

SLO 12D.8.1.3 Describe accommodation for apprentices with disabilities. (A1.3)

- technical training
 - requirements
 - roles and responsibilities
 - services and information required by persons with disabilities
- on-the-job
 - requirements
 - roles and responsibilities
 - services and information required by persons with disabilities

- SLO 12D.8.1.4 Demonstrate an understanding of the wages that are typical in the HDE industry, and associated occupations.
 - SLO 12D.8.1.5 Demonstrate an understanding of the working conditions of the HDE industry.
 - SLO 12D.8.1.6 Demonstrate an understanding of the scope of the three HDET trades.
 - SLO 12D.8.1.7 Demonstrate an understanding of some of the organizations associated with the three HDET trades (industry groups, trade associations, labour unions, etc.) and the roles that these organizations play.
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GLO 8.2: Demonstrate an understanding of **career** and **training opportunities** in HDE technology and associated professions.

- SLO 12D.8.2.1 Demonstrate an understanding of career and training opportunities in HDE technology and associated occupations.
 - SLO 12D.8.2.2 Demonstrate an understanding of the High School Apprenticeship Program (HSAP).
 - SLO 12D.8.2.3 Demonstrate an understanding of apprenticeship, including how to become an apprentice and a journeyman.
 - SLO 12D.8.2.4 Demonstrate an understanding of some of the specialized occupations in HDE technology.
 - SLO 12D.8.2.5 Demonstrate the knowledge and skills required to search for employment in an HDET trade or associated occupation.
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Goal 9: Demonstrate an awareness of the **evolution** of HDE technology, including its **technological progression and emerging trends**.

GLO 9.1: Describe the evolution of HDE service and repair, including its **technological progression and emerging trends**.

No applicable SLOs.
