

Diesel Equipment Mechanic (DEM) Level 3

Diesel Engine Mechanic (DEM)

Unit: A12 Commissioning and Decommissioning Equipment

Level: Three

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit of instruction provides the Diesel Engine Mechanic (DEM) apprentice an overall understanding of commissioning and decommissioning processes, from the safety hazards and precautions to the procedures, protocols and equipment used.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe special safety hazards and precautions as they relate to the commissioning and decommissioning of equipment, such as: pinch points, chemicals, drainage/capture of hazardous materials	15%
2. Describe rules, regulations, and employer or industry requirements and their operational significance on commissioning and decommissioning practices.	35%
3. Describe/demonstrate procedures for commissioning and decommissioning equipment, including interpretation of manufacturer specifications and industry standards, leasing/inspecting equipment, recordkeeping, assessing performance, including wreck assessment.	40%
4. Compare/contrast routine procedure for decommissioning/commissioning equipment with protocols for wreck assessment and road failures.	10%

Diesel Engine Mechanic (DEM)

Unit: C3 Diesel Engine Hydraulic & Hydrostatic Drive Systems

Level: Three

Duration: 35 hours

Theory: 28 hours

Practical: 7 hours

Overview:

This unit of instruction will provide the Diesel Engine Mechanic (DEM) apprentice with a broad background in hydraulic systems and concepts, from the safety hazards and precautions to the principles and components of such systems. As well, this unit will provide the working knowledge required to work on hydraulics and hydrostatic drives.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe special safety hazards and precautions as they relate to diesel engine hydraulic and hydrostatic drives, such as: high temperatures, pressurized fluids, and moving parts.	5%
2. Describe diesel engine hydraulic drive principles.	30%
3. Describe/demonstrate hydraulic drive system components and operation.	25%
4. Describe/demonstrate hydraulic system diagnosis and testing, including use of schematics and diagrams.	20%
5. Describe/demonstrate hydrostatic drive system principles and operation.	20%

Diesel Engine Mechanic (DEM)

Unit: E2 Electronic Control Systems

Level: Three

Duration: 35 hours

Theory: 21 hours

Practical: 14 hours

Overview:

This unit of instruction provides the Diesel Engine Mechanic (DEM) apprentice with the working knowledge required to understand and perform engine electronic programming. The unit also provides the working knowledge for using of diagnostic tools. As well, apprentices will learn to understand, diagnose and repair electronic control management systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe special safety hazards and precautions as they relate to electronic control systems, such as: shock hazards and static discharge.	10%
2. Describe/demonstrate electronic circuit principles, including operation and identification.	40%
3. Describe/demonstrate electronic circuit diagnostic tools and procedures.	40%
4. Describe/demonstrate software and programming concepts as they apply to electronic circuits.	10%

Diesel Engine Mechanic (DEM)

Unit: E5 Diesel Engine Power Generator Systems

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit of instruction provides the Diesel Engine Mechanic (DEM) apprentice with the working knowledge of diesel engine power generator systems, from the safety hazards and precautions to the components and operation of such systems. As well, apprentices will learn to diagnose, inspect and service diesel engine power generator systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe special safety hazards and precautions as they relate to diesel engine power generator systems, such as: pinch points, shock, heavy lifting, etc.	10%
2. Describe/demonstrate design, components and operation of electrical and mechanical power generator systems, including component removal/installation.	40%
3. Describe/demonstrate diagnostic and inspection procedures for diesel engine power generator systems.	30%
4. Describe/demonstrate servicing procedures for diesel engine power generator systems.	20%

Diesel Engine Mechanic (DEM)

Unit: F1 Diesel Engine Cab Structures and Interiors, Buildings, and Related Components

Level: Three

Duration: 14 hours

Theory: 7 hours

Practical: 7 hours

Overview:

This unit of instruction provides the Diesel Engine Mechanic (DEM) apprentice with the working knowledge of diesel engine cab structures and interiors, building and related components, from the safety hazards and precautions to the components and operation of such systems. Apprentices will learn about repair, diagnostic and inspection procedures, as well as the relevant steel fabrication techniques that are required when working with cabs, buildings and their related components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe special safety hazards and precautions as they relate to diesel engine cab structures, buildings, accessories and components, such as: encapsulated asbestos, excessive noise, restrictive clearances, need to anticipate adverse/ abnormal and unforeseen circumstances on wrecks.	15%
2. Describe/demonstrate principles and procedures regarding design, assembly/ disassembly, installation/removal/replacement as they relate to cab structures, buildings and related components, including floor and ceiling materials.	15%
3. Describe/demonstrate repair procedures for diesel engine structural and cabin components, including regulatory requirements for disposal of contaminated/ damaged components and materials.	20%
4. Describe/demonstrate diagnostic and inspection procedures for cab structure, building and related components.	20%
5. Describe/demonstrate steel fabrication techniques, including metallurgical properties, fabrication/layout procedures, and material estimation, and their significance for cabs/buildings and their related components.	30%

Diesel Engine Mechanic (DEM)

Unit: F2 Diesel Engine Climate Control Systems

Level: Three

Duration: 14 hours

Theory: 7 hours

Practical: 7 hours

Overview:

This unit of instruction will provide the Diesel Engine Mechanic (DEM) apprentice with the knowledge required to understand important Manitoba Ozone Protection Industry Association (MOPIA) issues, and how they relate to shop operations. The unit also provides apprentices with the working knowledge required to diagnose, service and repair problems related to all key aspects of HVAC.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe introductory concepts related to certification (e.g., MOPIA) for jurisdictional ozone depleting substance.	10%
2. Describe the importance and operational significance of environmental awareness and refrigerant handling safety.	30%
3. Describe/demonstrate operational and testing procedures for diesel engine climate control systems (heating, ventilation and air conditioning (HVAC) systems).	60%

Diesel Engine Mechanic (DEM)

Unit: A3 Orientation II: The Job of Journeywork

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

Diesel Engine Mechanic (DEM) technical training offers an entry-level orientation to the challenges of apprenticeship learning. The present unit introduces senior apprentices to the responsibilities of workplace *teaching* that they will assume as supervising journeypersons. Tradeworkers have a particularly rich tradition of refreshing and sharing their skills from one generation of practitioners to the next. This unit orients senior apprentices to some of the practical and conceptual tools that can enable them to contribute to this trade heritage when they themselves become certified journeypersons. The journeyperson's obligation to assist trade learners to develop skills and knowledge is complex and challenging. It involves safety considerations, employer expectations, provincial regulations, as well as the tradition of skills stewardship that links modern practice with the long history of workplace teaching and learning that defines the apprenticeable trades. The ability to offer timely, appropriate support to apprentices is itself an important area of trade learning. This unit presents material intended to help refine this ability through reflection and discussion by senior apprentices, and dialogue with their instructor. The detailed descriptors under each unit objective reflect Manitoba and Canadian standards prescribed for journey-level supervisory capabilities, as well as key topics in current research on the importance of workplace teaching and learning in trades-apprenticeship systems. Thus, descriptors represent suggested focal points or guidelines for potentially-worthwhile exploration. Delivery of this content will vary with the discretion of individual instructors, and with the experiences senior apprentices bring forward for group/individual reflection on the skills-stewardship dimension of their own future practice as journeypersons.

Objectives and Content:

Percent of Unit Mark (%)

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| 1. Describe the scope, substance, and significance of journey-level status. | 10% |
| a. Historical background, including trainee experiences | |
| • Origin, definition, and examples of journey-level status | |
| • Obligations to employers, trade clients, and apprentices | |
| • Concept of skills stewardship, and its rationale | |
| • Customary responsibilities of journeyperson as workplace trainer/supervisor | |
| • Overview development of formal systems for regulating/recognizing journey-level competence in designated apprenticeable trades | |
| • Contributions of 'unticketed journeypersons' and other informally-qualified Ironworkers to workplace trade-learning | |
| • Achievements/limitations of informal systems for workplace training | |
| • Trends (e.g. succession planning in the trades; recognition of credentials and prior learning; defined standards for on-the-job trades education and training) | |
| b. Regulatory/legal dimensions of journey-level status in designated trades | |
| • Rights and obligations re: Canada's Interprovincial 'Red Seal' program (Red | |

- Seal rationale, scope, and products, including the National Occupational Analysis [NOA], and Interprovincial examinations
- Manitoba provincial requirements [e.g. *Apprenticeship and Certification Act; General Regulation; the Diesel Engine Mechanic (DEM) Trade Regulation*; relevant policies of the Apprenticeship and Certification Board of Manitoba]
- Trade-specific requirements re: practical training supervision and documentation; importance of quality assurance and broad-scope coverage of prescribed task-content; ratios, etc.
- c. Other (as may be specified by instructor)

2. Compare/contrast role-options and responsibilities of the supervising journeyperson.

20%

- a. Recognizing the variability of supervision assignments, situations, and roles
- b. Source and specification of the supervision assignment
- c. Formal vs. informal roles (e.g. mandated by an employer's succession plan)
- d. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used,
- e. Accountability for results: subject/not subject to third-party notification; completion of supervision assignment itself is/is not assessed by third party; journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.
- f. General vs. task- or job-specific supervision assignments: e.g. scope of expectations re: content of supervisory task(s)
- g. Long-term vs. short-run supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes
- h. Formally vs. informally structured – e.g. supervision assignment is part of a prescribed cycle of assignments involving coordination among multiple journeypersons; apprentice is trained according to an individual Training Plan negotiated with employer
- i. Typology of common supervisory role-options and what is implied by each:
 - Coach role: is often initiated by someone other than apprentice, and limited to a particular skill set, task, or production requirement
 - Mentor role : often initiated by apprentice, and relatively open-ended regarding content, duration, etc.
 - Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner
 - Managerial role(s): can shade over into hire/fire issues as lead-hand or site-boss
 - Coordinator role: often a senior-level journeyperson appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices
 - Other roles: may be improvised by journeyperson
- j. Possibilities, perils, and likelihood of role-overlap in 'real-life' trade practice
- k. Importance of clarifying all roles, expectations, and implications involved in accepting a supervision assignment
- l. Role of Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
- m. Resources for developing skills and knowledge re: providing journey-level supervision
 - Books and journals (not always trade-specific)
 - Websites
 - Conversation with trade instructors, journeypersons, and peers
 - Workshops
- n. Other (as may be specified by instructor)

3. Describe/demonstrate common requirements re: providing journey-level supervision. 20%

- a. Review Unit A1 content re: challenges/opportunities of Apprenticeship learning adapted to journey-level supervision assignments and a journey-level standpoint
 - Application of adult education concepts to trades teaching/learning (e.g. responsibilities and expectations of adult learners)
 - Practical significance of 'styles' of adult learning and teaching
 - Helping apprentices to integrate technical training (in school) and practical training (on-the-job) learning experiences
 - Providing help and guidance re: new tasks and skills
 - Providing help and guidance re: fixing mistakes
 - Learning/teaching "the ropes" – socialization of learner within a community of trade practice (e.g. how to borrow a tool, interrupt a journeyperson, 'recruit' an advisor)
 - Coverage/documentation of prescribed tasks and subtasks (Diesel Engine Mechanic POA), including responsibility re: logbook sign-off (where applicable)
 - Consultation with Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
 - Communicating with apprentices and employers about supervision assignments and assignment specifications, including the limits of the trainers' own responsibilities and competence (e.g. substance-abuse intervention)
 - Benefits of maintaining a personal record of achievements, ideas, and needs as a workplace trainer
- b. Individual reflection and guided group discussion re: personal experiences of workplace learning as an apprentice
 - Identification of best and worst practices of supervising journeypersons
 - Assessment of personal experiences (if any) to date in supervising, coaching, or guiding other people to learn or improve their skills (e.g. entry-level apprentices, members of athletic team, younger family members, etc.), and how this might compare/contrast with the journey-level support of apprenticeship learning
 - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences
 - Development of personal standards re: responsibility to share one's knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc.)
- c. Comparison/contrast of discussion results with current knowledge/resources re: workplace skills coaching methods as applicable to journey-level supervision assignments
 - Qualities of a good workplace coach
 - Components of workplace skills coaching
 - Processes and recommended practices re: workplace coaching
 - Troubleshooting problems re: supervision assignments
- d. Other (as may be specified by instructor)

4. Complete Modules 1 to 3, *Workplace Coaching Skills* (or equivalent). 25%

- a. Identifying purpose of the lesson
 - Explaining the point of the lesson
 - Role of the coach in specific coaching situation
 - Other (specified by instructor)
- b. Linking the lesson
 - Learner needs
 - Lesson sequence
 - Focus on learner
 - Selection/timing of coaching opportunities
- c. Demonstration of skill/task to be learned
 - Starting the coaching session

- Demonstration
- Hands-on trial
- Recap for learner

5. Complete Modules 4 to 6, *Workplace Coaching Skills* (or equivalent).

25%

- a. Practice of skill/task to be learned
 - Nature and importance of practice
 - Setting up for learner practice
 - Types of practice
 - Recycling and reinforcing skill/task learning
- b. Providing feedback to the learner
 - Value of feedback
 - Kinds of feedback
 - Guidelines and tips
- c. Assessment
 - Value of assessing learner progress
 - Assessing level of skill
 - Planning further steps toward skill/task mastery

Diesel Engine Mechanic (DEM)

Unit: A14 Pre-Provincial Review

Level: Three

Duration: 63 hours

Theory: 63 hours

Practical: 0 hours

Overview:

This unit offers senior Diesel Engine Mechanic (DEM) apprentices a systematic review of skills and knowledge required to pass the Provincial Examination. It promotes a purposeful personal synthesis between on-the-job learning and the content of in-school technical training. The unit includes information about the significance of provincial certification and the features of the Provincial Examination. **Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a 'Pass/Fail' grade will be recorded for the unit in its entirety.**

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
<p>1. Describe the significance, format and general content of Provincial Examinations for the trade of Diesel Engine Mechanic (DEM).</p> <ul style="list-style-type: none"> a. Scope and aims of Provincial certification; value of certifications b. Obligations of candidates for Provincial certification <ul style="list-style-type: none"> • Relevance of Provincial Examinations to current, accepted trade practices; industry-based provincial validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content c. Multiple-choice format (four-option) item format, Apprenticeship Manitoba standards for acceptable test items d. Government materials relevant to the Provincial Examinations for apprentice Diesel Engine Mechanics (DEMs) <ul style="list-style-type: none"> • Provincial Occupational Analysis (POA); prescribed scope of the skills and knowledge which comprise the trade • POA "Pie-chart" and its relationship to content distribution of Provincial Examination items • Apprenticeship Manitoba technical training package. 	n/a
<p>2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations.</p> <ul style="list-style-type: none"> a. Personal preparedness <ul style="list-style-type: none"> • Rest • Nutrition • Personal study regimen • Prior experience in test situations (e.g., Unit Tests) c. Self-assessment, consultation and personal study plan <ul style="list-style-type: none"> • Self-assessment of individual strengths/weaknesses in trade related skills and 	n/a

knowledge

- Approved textbooks
- Study groups

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| 3. Review program content regarding occupational skills. | n/a |
| 4. Review program content regarding engines. | n/a |
| 5. Review program content regarding engine support systems. | n/a |
| 6. Review program content regarding suspension systems, undercarriage and wheel assemblies. | n/a |
| 7. Review program content regarding brake systems. | n/a |
| 8. Review program content regarding driven systems. | n/a |
| 9. Review program content regarding electrical and control systems. | n/a |
| 10. Review program content regarding diesel engine structural and cabin components. | n/a |
