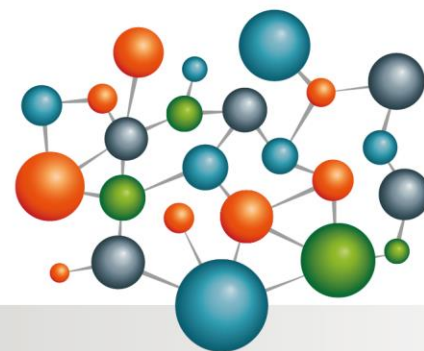


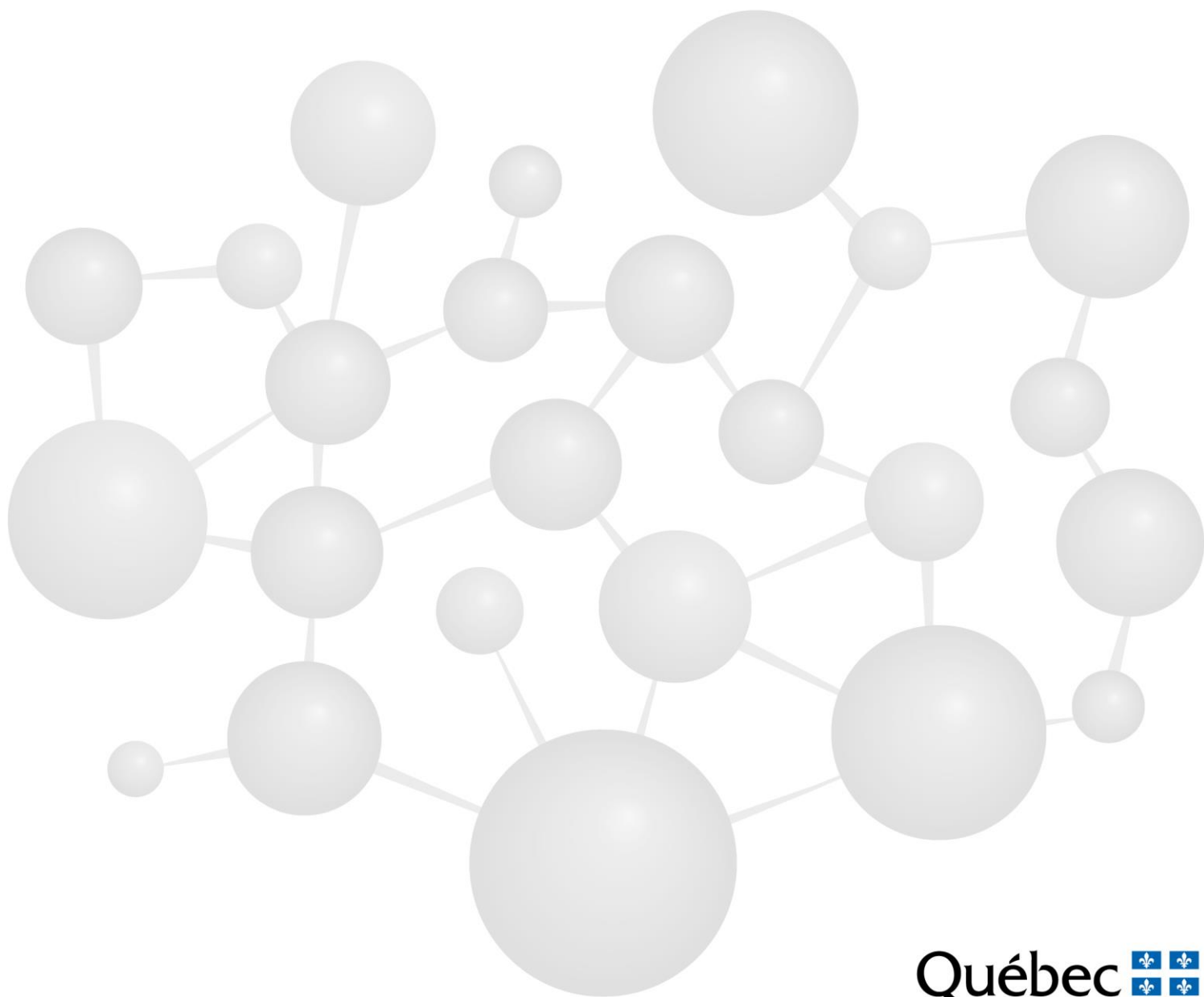
PROGRAM OF STUDY

CABLE AND CIRCUIT ASSEMBLY (DVS 5884)

Training sector
MECHANICAL MANUFACTURING



MINISTÈRE DE L'ÉDUCATION



Development Team

Coordination

André Royer
Sector head
Direction de l'éducation des adultes et de la formation
professionnelle
Ministère de l'Éducation

Design and Development

Véronique Lampron
Program development specialist

Alexandre Benoit
Teacher
Centre de services scolaire de Montréal

Bastien Houde
Teacher
Centre de services scolaire de Montréal

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Representatives Employed in Education

Mario Cardin
Cable and Circuit Assembly teacher
École des métiers de l'aérospatiale de Montréal

Éric Dionne
Principal
École Joseph-François-Perrault

Mario Héroux
Principal
École des métiers de l'aérospatiale de Montréal

Ahmed Lamhari
Cable and Circuit Assembly teacher
École des métiers de l'aérospatiale de Montréal

Benoit Lavoie
Cable and Circuit Assembly teacher
École des métiers de l'aérospatiale de Montréal

Representatives Employed in the Field

Jose Aguiar
Team leader
CMC Électronique

Marie-Ève Beauclair
Electrical assembler
Rheinmetall

Mattieu Chambot
Project manager (research and analysis)
Comité sectoriel de main-d'œuvre en aérospatiale

João Manuel Da Costa
Electrical assembler
Stelia Aéronautique Canada

Alain Dupéré
Cabling technician
Department of National Defence

Jonathan Morin
Avionics systems installer
Bombardier

Nathalie Paré
Director
Comité sectoriel de main-d'œuvre en aérospatiale

Martin Poitras
Team leader
Bombardier

Gino Turcotte
Learning business partner
Bombardier

Martine Viau
Cabling technician
NSE Automatech

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Introduction to the Program

In vocational training, a program of study presents the competencies required to practise a given trade or occupation at entry level on the job market. The training provided allows students to acquire a degree of versatility that will be useful in their career and personal development.

A program is a coherent set of competencies to be developed. It outlines the knowledge and broad orientations to be favoured during training. The competencies correspond to the tasks of the trade or occupation or to activities related to work, vocational or personal life, depending on the case. Learning is acquired in a specific achievement context and targets the ability to act, succeed and evolve.

According to the Education Act,¹ every program “shall include compulsory objectives and contents and may include optional objectives and contents that shall be enriched or adapted according to the needs of students who receive the services.” For behavioural competencies, the compulsory components include the statement of the competency, the elements of the competency, the achievement context and the performance criteria; for situational competencies, they include the corresponding components.

For information purposes, programs also provide a grid of competencies, educational aims, a summary of competency-related knowledge and know-how, and guidelines. They also specify the suggested duration of each competency. All optional components of a program may be enriched or adapted according to the needs of the students, the environment and the workplace.

Program Components

Program Goals

Program goals consist of the expected outcome at the end of training as well as a general description of a given trade or occupation. They also include the four general goals of vocational training.

Educational Aims

Educational aims are broad orientations to be favoured during training in order to help students acquire intellectual or motor skills, work habits or attitudes. Educational aims usually address important aspects of career and personal development that have not been explicitly included in the program goals or competencies. They serve to orient appropriate teaching strategies to contextualize students' learning, in keeping with the dimensions underlying the practice of a trade or occupation. They help guide educational institutions in implementing the program.

Competency

A competency is the ability to act, succeed and evolve in order to adequately perform tasks or activities related to one's working or personal life, based on an organized body of knowledge and skills from a variety of fields, perceptions, attitudes, etc.

A competency in vocational training can be defined in terms of a behaviour or a situation, and includes specific practical guidelines and requirements for learning.

¹ Education Act, CQLR, c. I-13.3, s. 461

1. Behavioural Competency

A behavioural competency describes the actions and the results expected of the student. It consists of the following features:

- The *statement of the competency* is the result of the job analysis, the orientations and general goals of vocational training and other *determinants*.
- The *elements of the competency* correspond to essential details that are necessary in order to understand the competency *and* are expressed in terms of specific behaviours. They refer to the major steps involved in performing a task or to the main components of the competency.
- The *achievement context* corresponds to the situation in which the competency is exercised at entry level on the job market. The achievement context attempts to recreate an actual work situation but does not describe a learning or evaluation situation.
- The *performance criteria* define the requirements to be respected. They may refer to elements of the competency or to the competency as a whole. When associated with a specific element, performance criteria are used to judge whether a competency has been acquired. When associated with the competency as a whole, the criteria describe the requirements for performing a task or activity and provide information on the expected level of performance or the overall quality of a product or service.

2. Situational Competency

A situational competency describes the situation in which students are placed to acquire learning, and allows for actions and results to vary from one student to another. It consists of the following features:

- The *statement of the competency* is the result of the job analysis, the orientations and general goals of vocational training and other determinants.
- The *elements of the competency* outline the essential aspects of the competency and ensure a better understanding of the competency with respect to the expected outcome. The elements of the competency are fundamental to the implementation of the learning situation.
- The *learning context* provides a broad outline of the learning situation designed to help the students develop the required competency. It is normally divided into three key phases of learning: information, participation and synthesis.
- The *instructional guidelines* provide reference points and means for teachers to ensure that learning takes place and that the context in which it occurs is always the same. These guidelines may include general principles or specific procedures.
- The *participation criteria* describe requirements that the students must meet when participating in learning activities. They focus on how the students take part in the activities rather than on the results obtained. Participation criteria are normally provided for each phase of the learning situation.

Competency-Related Knowledge and Know-How

Competency-related knowledge and know-how, together with related guidelines, are provided for information purposes. Competency-related knowledge and know-how define the essential and meaningful learning that students must acquire in order to apply and continue to develop the competency. They are in keeping with the job market and are accompanied by guidelines that provide information about the field of application, level of complexity and learning content. They generally encompass learning associated with knowledge, skills, strategies, attitudes, perceptions, etc.

Duration

The total duration of the program is compulsory and must be observed. It consists of teaching time, which includes time for the evaluation of learning and for enrichment or remedial activities, depending on the students' needs. The duration indicated for a given competency refers to the amount of time needed to develop the competency.

The amount of teaching time corresponds to the amount of time allotted to training, which is established during program development as the average amount of time needed to acquire a competency and evaluate learning. This duration is helpful in organizing training.

Credit

A credit is a unit used for expressing the quantitative value of each competency. One credit corresponds to 15 hours of training.

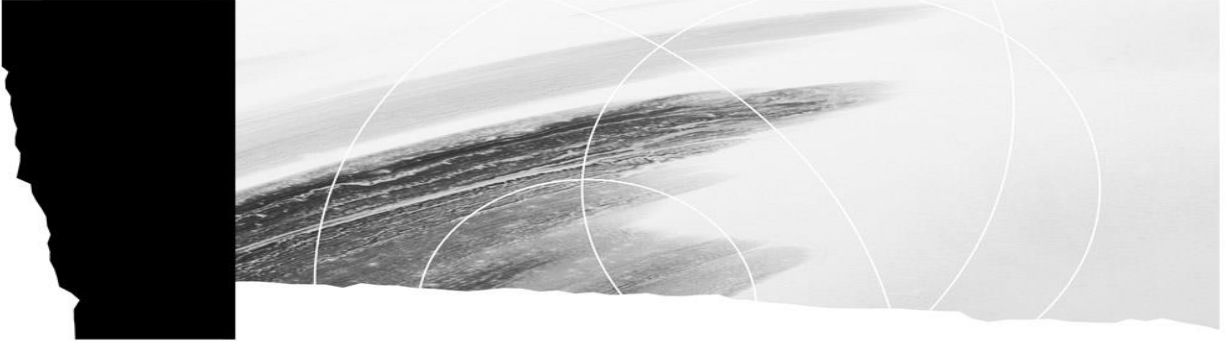
Aspects of Program Implementation

Program-Based Approach

The program-based approach is founded on a comprehensive view of a program of study and its components (e.g. goals, educational aims, competencies). It requires concerted action among all players involved, from the initial stages of program design and development, to program implementation and evaluation. It consists in ensuring that all of the actions and activities proposed are based on the same aims and take into account the same orientations. For students, the program-based approach makes training more meaningful as it presents learning as a coherent whole.

Competency-Based Approach

In vocational training, the competency-based approach is based on a teaching philosophy that is designed to help students mobilize their own individual sets of resources in order to act, succeed and evolve in different contexts, according to established performance levels with all the required knowledge and know-how (e.g. skills, strategies, attitudes, perceptions). The competency-based approach is carried out in situations that are relevant to the students' working life and personal life.



5884

Cable and Circuit Assembly

Year of approval: 2021

Certification:	Diploma of Vocational Studies
Number of credits:	56
Number of competencies:	13
Total duration:	840 hours

To be eligible for admission to the *Cable and Circuit Assembly* program, candidates must meet one of the following requirements:

- Persons holding a Secondary School Diploma or its recognized equivalent.

OR

- Persons who are at least 16 years of age on September 30 of the school year in which they begin their training must meet the following condition: they must have obtained Secondary IV credits in language of instruction, second language and mathematics in programs established by the Minister, or have been granted recognition of equivalent learning.

OR

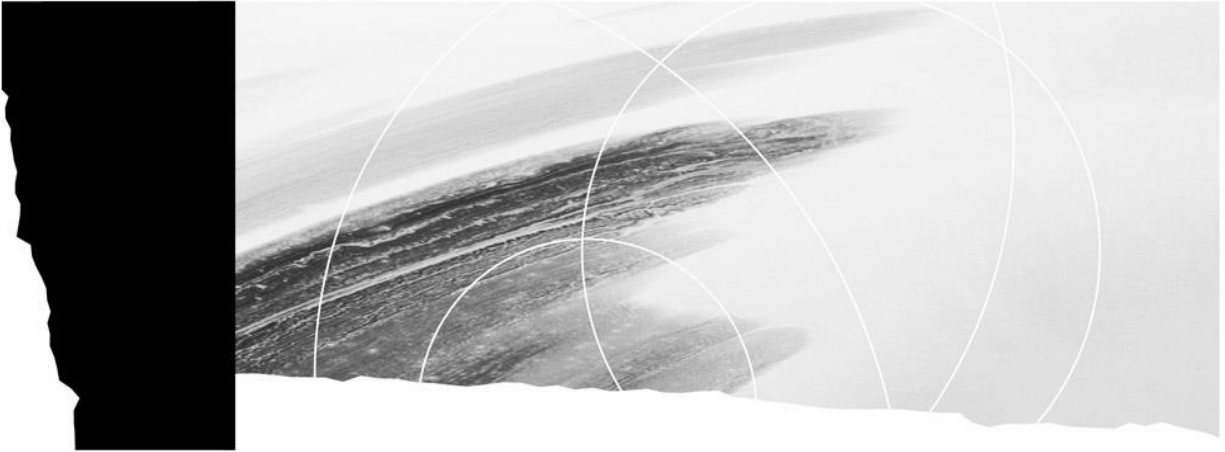
- Persons who are at least 18 years of age upon entry into the program must have the following functional prerequisites: the successful completion of the General Development Test or recognition of equivalent learning.

OR

- Persons who have obtained Secondary III credits in language of instruction, second language and mathematics in programs established by the Minister are required to pursue general education courses, concurrently with their vocational training, in order to obtain the Secondary IV credits they lack in language of instruction, second language and mathematics in programs established by the Minister.

The duration of the program is 840 hours, which includes 495 hours spent on the specific competencies required to practise the trade or occupation and 345 hours on general, work-related competencies. The program of study is divided into 13 competencies which vary in length from 30 to 120 hours. The total hours allocated to the program include time devoted to teaching, evaluation of learning and enrichment or remedial activities.

Competency	Code	Number	Hours	Credits
The Trade and the Training Process	869132	1	30	2
Health and Safety in Cable and Circuit Assembly	869142	2	30	2
Technical Drawings	869153	3	45	3
Inspecting Electrical Circuits	869163	4	45	3
Installing Fasteners and Grounds	869175	5	75	5
Preparing Wires and Cables	869186	6	90	6
Assembling Wiring Harnesses	869196	7	90	6
Assembling Electrical Enclosures	869206	8	90	6
Installing Electrical Enclosures	869213	9	45	3
Installing Wiring Harnesses	869228	10	120	8
Repairing or Modifying Electrical Circuits	869234	11	60	4
Job Search Techniques	869242	12	30	2
Entering the Workforce	869256	13	90	6



Part I

Program Goals

Educational Aims

Statements of the Competencies

Grid of Competencies

Harmonization

Program Goals

The *Cable and Circuit Assembly* program prepares students to practise the trade of cable and circuit assembler.

Cable and circuit assemblers assemble, install, repair and modify wiring harnesses and electrical enclosures. They also install printed circuit boards in electrical enclosures.

In the exercise of their duties, these workers must interpret procedures and technical drawings, inspect electrical circuits, prepare wires and cables, and install fasteners and grounds.

Cable and circuit assemblers work mainly in companies in the transportation products field (e.g. aerospace, road and rail sectors) or companies specializing in cabling, telecommunications or automation.

Physically, this trade requires excellent fine motor skills, good manual skills and the ability to perform repetitive movements. Depending on the workplace, tasks may be carried out in a shop or inside a transport vehicle, in confined spaces, at height, etc. Workers must be meticulous and respect the laws, regulations and standards in effect in a field with demanding high-quality standards.

Cable and circuit assemblers often work in teams with other assemblers. They also work with other tradespeople and professionals, including structural assemblers, engineers, avionics and aircraft maintenance technicians, inspectors and procedures officers.

The program goals of the *Cable and Circuit Assembly* program are based on the general goals of vocational training. These goals are as follows:

- To help students develop effectiveness in the practice of a trade or occupation, that is:
 - to teach students to perform roles, functions, tasks and activities associated with the trade or occupation upon entry into the job market
 - to prepare students to progress satisfactorily on the job (which implies having the technical and technological knowledge and skills in such areas as communication, problem solving, decision making, ethics, health and safety)
- To help students integrate into the workforce, that is:
 - to familiarize students with the job market in general, and with the specific context of their chosen trade or occupation
 - to familiarize students with their rights and responsibilities as workers
- To foster students' personal development and acquisition of occupational knowledge, skills, perceptions and attitudes, that is:
 - to help students develop their autonomy and ability to learn, and acquire effective work methods
 - to help students understand the principles underlying the techniques and the technology used in the trade or occupation
 - to help students develop self-expression, creativity, initiative and entrepreneurial spirit
 - to help students adopt the attitudes required to successfully practise the trade or occupation, and instill in them a sense of responsibility and a concern for excellence
- To promote job mobility, that is:
 - to help students develop positive attitudes toward change
 - to help students develop the means to manage their careers by familiarizing them with entrepreneurship

Educational Aims

The aim of the *Cable and Circuit Assembly* program is to help students develop attitudes and behaviours that representatives from education and the field deem essential to the practice of the trade or occupation:

- Autonomy and a sense of responsibility
- The ability to adapt to different situations and environments
- The ability to work in a team
- Dexterity and meticulousness

Statements of the Competencies

List of Competencies

Determine their suitability for the trade and the training process.
Prevent occupational health and safety risks.
Interpret technical drawings.
Inspect electrical circuits.
Install fasteners and grounds.
Prepare wires and cables.
Assemble wiring harnesses.
Assemble electrical enclosures.
Install electrical enclosures.
Install wiring harnesses.
Repair or modify electrical circuits.
Use job search techniques.
Enter the workforce.

Grid of Competencies

The grid of competencies shows the relationship between general competencies, which correspond to work-related activities, and specific competencies, which are required to practise the particular trade or occupation.

The general competencies appear on the horizontal axis and the specific competencies, on the vertical axis. The symbol (○) indicates a correlation between a general and a specific competency. Shaded symbols indicate that these relationships have been taken into account in the acquisition of specific competencies. The logic used in constructing the grid influences the course sequence. Generally speaking, this sequence follows a logical progression in terms of the complexity of the learning involved and the development of the students' autonomy. The vertical axis presents the specific competencies in the order in which they should be acquired and serves as a point of departure for determining how all of the competencies will be taught.

GRID OF COMPETENCIES

	Competency number	Type of competency	Duration (in hours)	GENERAL COMPETENCIES							PROCESS				TOTAL
				Determine their suitability for the trade and the training process	Prevent occupational health and safety risks	Interpret technical drawings	Inspect electrical circuits	Install fasteners and grounds	Prepare wires and cables	Use job search techniques	Organize the work	Perform tasks	Inspect the work done	Finish the job	
CABLE AND CIRCUIT ASSEMBLY															
Competency number				1	2	3	4	5	6	12					
Type of competency				S	S	B	B	B	B	B					
Duration (in hours)				30	30	45	45	75	90	30					345
Assemble wiring harnesses	7	B	90	○	●	●	●	○	●	○	▲	▲	▲	▲	
Assemble electrical enclosures	8	B	90	○	●	●	●	●	●	○	▲	▲	▲	▲	
Install electrical enclosures	9	B	45	○	●	●	●	●	●	○	▲	▲	▲	▲	
Install wiring harnesses	10	B	120	○	●	●	●	●	●	○	▲	▲	▲	▲	
Repair or modify electrical circuits	11	B	60	○	●	●	●	●	●	○	▲	▲	▲	▲	
Enter the workforce	13	S	90	○	●	○	○	○	○	○	△	△	△	△	
Total duration			495												840

Links between the general competencies and the specific competencies

- : Existence of a link
- : Application of a link

Links between the work process and the specific competencies

- △: Existence of a link
- ▲: Application of a link

Harmonization

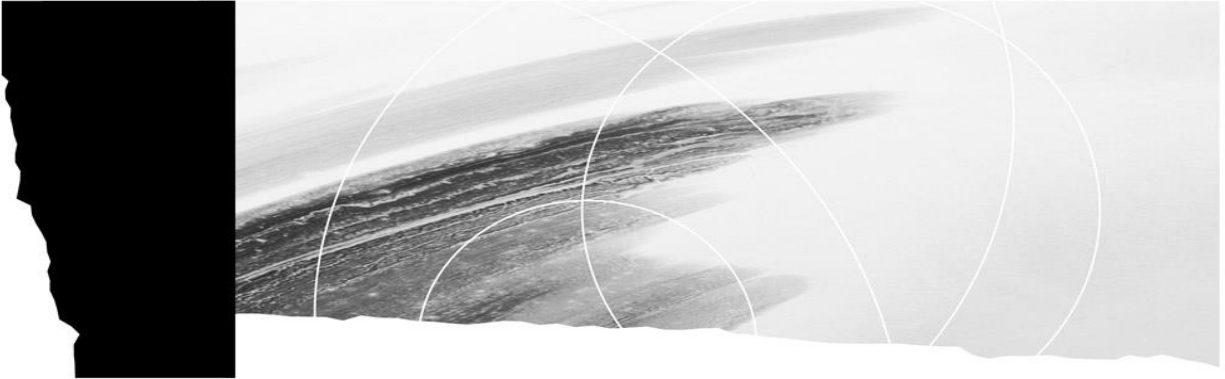
The Ministère de l'Éducation harmonizes its vocational and technical programs by establishing similarities and continuity between secondary- and college-level programs within a particular sector or between sectors in order to avoid overlap in program offerings, to recognize prior learning and to optimize the students' progress.

Harmonization establishes consistency between training programs and is especially important in ensuring that the tasks of a trade or occupation are clearly identified and described. Harmonization makes it possible to identify tasks requiring competencies that are common to more than one program. Even if there are no common competencies, training programs are still harmonized.

Harmonization is said to be “inter-level” when it focuses on training programs at different levels, “intra-level” when it focuses on programs within the same educational level, and “inter-sector” when carried out between programs in various sectors.

An important aspect of harmonization is that it allows the common features of competencies to be identified and updated as needed. Common competencies are those that are shared by more than one program; once acquired in one program, they can be recognized as having been acquired in another. Competencies with exactly the same statement and elements are said to be identical. Common competencies that are not identical but have enough similarities to be of equal value are said to be equivalent.

Harmonization of the *Cable and Circuit Assembly* program has resulted in identifying competencies that are shared with other programs. Detailed information on the harmonization of this program and its results is presented in the document entitled *Tableaux d'harmonisation Montage de câbles et de circuits*.



Part II

Program Competencies

Competency 1 Duration 30 hours Credits 2

Situational Competency

Statement of the Competency

Determine their suitability for the trade and the training process.

Elements of the Competency

- Be familiar with the nature of the occupation.
- Understand the program of study and the training process.
- Confirm their career choice.

Learning Context

Information Phase

- Learning about cable and circuit assembly:
 - Sectors of activity and types of companies
 - Historical highlights and coming changes
 - New technologies
- Learning about the characteristics of the trade:
 - Type of work, working conditions, compensation, job prospects, hiring requirements and potential for advancement
 - Possible career paths
 - Tasks, operations and work processes
- Learning about the program of study and the training process:
 - Competencies to be acquired
 - Duration of the program
 - Evaluation methods

Participation Phase

- Listing the skills, aptitudes, qualities, professional behaviours and knowledge needed to practise the trade
- Meeting with tradespeople in the field (cable and circuit assemblers, lead hands, etc.)
- Discussing the data collected as well as their perception of the trade (advantages, inconveniences and requirements)
- Finding ways of fostering their academic success and integration into the job market

Synthesis Phase

- Producing a profile listing their skills, aptitudes, preferences and attitudes, as well as their limitations with respect to cable and circuit assembly
- Assessing their career choice by comparing the aspects and requirements of the trade with their profile

Instructional Guidelines

- Make available all pertinent reference materials: information on the trade and the training program.
- Encourage students to discuss their points of view and make sure they can express themselves freely.
- Motivate students to participate in the proposed activities.
- Help students arrive at an accurate perception of the trade.
- Organize a meeting with tradespeople in the field.
- Organize visits to companies representative of the main work environments for cable and circuit assemblers.
- Provide students with the means to assess their career choice honestly and objectively.

Participation Criteria

Information Phase

- Gather information on the topics covered.
- Use a variety of sources of information to collect data about the trade and the training process.

Participation Phase

- Give their opinions on the requirements for practising the trade.
- Adopt an attentive and respectful attitude toward their peers.
- Prepare for the meeting with tradespeople in the field.
- Express their view on the trade and the training program based on the data collected.

Synthesis Phase

- Produce a profile.
- Confirm their career choice.

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each phase of the learning context, along with their attendant guidelines.

Information Phase

- Conditions required for learning: favourable climate, interest, concentration, physical and mental well-being
- Types of companies, compensation, job prospects, working conditions, etc.
- Find information and reference documents through meetings or other sources. Importance of the reliability of information sources. Determination of what they are looking for and the available sources of information
- Note-taking method: selection of information to take down, common abbreviations and organization of information (summaries, tables, etc.)

Participation Phase

- Synthesis, organization and presentation of data. Importance of using the appropriate vocabulary
- Advantages of sharing their point of view and listening to others
- Development of an attitude of openness to constructive comments
- Rules governing group discussion: listening, speaking in turn, staying on topic, being attentive to others, being open to different points of view, etc.

Synthesis Phase

- Principal elements of a profile confirming their career choice: summary of their preferences, aptitudes and interests, and the requirements for practising the trade. Comparison of the two preceding aspects. Brief conclusion explaining their career choice

Situational Competency

Statement of the Competency

Prevent occupational health and safety risks.

Elements of the Competency

- Develop a responsible attitude toward the prevention of occupational health and safety risks.
- Be aware of the importance of complying with occupational health and safety standards and regulations.
- Recognize dangerous situations or risky behaviours and the applicable preventive measures.

Learning Context

Information Phase

- Learning about the risks inherent in cable and circuit assembly and the means of preventing these risks:
 - In and around transport vehicles (aircraft, buses, trains, etc.)
 - In a workshop
- Learning about the occupational health and safety organizations, laws, regulations and standards related to the trade
- Learning about personal and collective protection related to the trade
- Learning about the measures to take in the case of an emergency (fire, lockdown, toxic spill, etc.)

Participation Phase

- Participating in situations in which risks must be prevented and dangers eliminated with respect to the environment, facilities, materials, equipment, machinery, tools, energy sources, etc.
- Participating in activities allowing them to recognize the risks related to moving loads, adopting awkward work postures, working at heights and performing repetitive movements
- Participating in activities allowing them to recognize symbols, signals, pictograms, etc., related to risk prevention
- Comparing risky behaviours observed and identifying the basic principles of safe behaviour in the workplace
- Discussing the importance of developing preventive attitudes and behaviours in the workplace

Synthesis Phase

- Presenting a report containing:
 - a summary of their newly acquired knowledge and skills
 - an assessment of their attitude with respect to occupational health and safety
 - objectives and means of improvement

Instructional Guidelines

- Provide the necessary information sources.
- Organize a meeting with resources specializing in certain aspects of occupational health and safety.
- Motivate students to participate in the proposed activities.
- Use learning situations representative of the reality of the trade.
- Foster the participation of all students.
- Guide the students in their self-assessment by providing them with the tools needed (e.g. questionnaire) to help them analyze their experience and set personal goals.

Participation Criteria

Information Phase

- Consult the sources of information made available to them.

Participation Phase

- Participate in the suggested activities and take them seriously.
- Write down examples of what they learned during the activities.
- Give their opinion on the risks related to the trade and the applicable preventive measures.
- Give their opinion on the importance of complying with occupational health and safety standards and regulations.

Synthesis Phase

- Present a report containing:
 - a summary of their newly acquired knowledge and skills
 - an assessment of their attitude with respect to occupational health and safety
 - goals and means of safeguarding their health and safety and that of others in and around transport vehicles and in a workshop

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each phase of the learning context, along with their attendant guidelines.

Information Phase

- Conditions required for learning: favourable climate, interest, concentration, physical and mental well-being
- Importance of health and safety information in cable and circuit assembly
- Most frequently encountered health and safety risks in the trade
- Sources of information about health and safety in the workplace and information searches
- Occupational health and safety roles and responsibilities of cable and circuit assemblers and companies
- Aspects of the regulatory framework, laws and regulations relevant to cable and circuit assemblers. Workers' rights
- Advantages of complying with occupational health and safety standards and regulations

- Personal and collective protection related to the trade
- Emergency measures related to the trade
- Prevention of trade-related illnesses and accidents

Participation Phase

- Risks inherent in the trade and association of these risks with the applicable preventive measures. Protective equipment. Safe work methods
- Hazardous materials identification systems (e.g. Workplace Hazardous Materials Information System (WHMIS))
- Risks inherent in damage caused by a foreign object
- Awareness of risks related to human factors, such as:
 - stress
 - lack of communication
 - fatigue
 - lack of knowledge

Competency 3 Duration 45 hours Credits 3

Behavioural Competency

Statement of the Competency

Interpret technical drawings.

Achievement Context

- Given technical drawings:
 - in paper or digital form
 - using metric and imperial units of measurement
- Given:
 - a computer workstation
 - the necessary technological tools and equipment
 - 3D visualization software

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| 1. Interpret the shape of a component. | <ul style="list-style-type: none"> • Accurate recognition of the shape of the component in different types of projections • Accurate identification of the different sectional and cross-sectional views • Accurate interpretation of types of lines • Accurate distinction between the different types of technical drawings |
| 2. Interpret the general information in a technical drawing. | <ul style="list-style-type: none"> • Accurate interpretation of information in the title block • Accurate interpretation of the information in the legends, notes and tables • Accurate interpretation of the dimensioning • Accurate interpretation of symbols, codes, initialisms and abbreviations • Accurate interpretation of the information in the change orders concerning the drawings |
| 3. Locate on a technical drawing the different sections of a transport vehicle or piece of equipment. | <ul style="list-style-type: none"> • Accurate location of reference lines, if applicable • Accurate distinction between the different parts of the transport vehicle or piece of equipment |

For the competency as a whole:

- Careful handling and storage of paper documents

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Importance of cleanliness, folding and storage of paper documents
 - Basic functions of drawing management software or apps. Technical drawing standards and conventions: International Organization for Standardization (ISO), Association française de normalisation (AFNOR), Canadian Standards Association (CSA), American National Standards Institute (ANSI), etc.
- 1 Interpret the shape of a component.
 - Distinction between the different types of technical drawings: mechanical assembly drawings, overall drawings, detail drawings, wiring harness assembly drawings, circuit diagrams, wiring harness installation drawings, etc.
 - Identification, characteristics and meaning of lines: continuous thin, continuous thick, dashed thin, dashed thick, dotted thin, dotted thick, visible, hidden, centre or axis, phantom, reference, cutting plane, hatching, short break, long break, etc.
 - Distinction between American (first-angle) and European (third-angle) projections: elevation, top view, profile (left and right), etc.
 - Identification and characteristics of views and sections: detailed view, exploded view, auxiliary view, partial section, complete section, etc.
 - Data included in the different types of views: section, detail, etc.
 - 2 Interpret the general information in a technical drawing.
 - Data included in the different sections of a technical drawing, and meaning and location of these data: border, title block, tolerance block (dimensional, angle, surface finish tolerances, etc.), list of components, annotations, formats, orientation references, centring references, etc.
 - Data included in the different tables, revision block, applicability block, etc.
 - Identification, characteristics and meaning of dimensions and symbols: dimension lines, dimensioning with tolerances (reference dimensions, nominal dimensions, minimum dimensions, maximum dimensions and deviations), tabular dimensioning, angular dimensioning, adjustments, etc.
 - Identification, characteristics and meaning of initialisms and abbreviations: reference (REF), assembly (ASM), modification (MOD), etc.
 - Distinction between a temporary and a permanent engineering order. Document structure. Meaning of the most common change requests. Impact on the work of cable and circuit assemblers
 3. Locate on a technical drawing the different sections of a transport vehicle or piece of equipment.
 - Types of reference lines (fuselage station lines, water lines, wing station lines, etc.) for a transport vehicle (aircraft, bus, train, etc.). Relationships between the different types of lines. Function of lines in a drawing
 - Identification of the main components of an aircraft (cockpit, engine, landing gear, tail unit, fuselage, wing, etc.), a bus, a train, etc.

Competency 4

Duration 45 hours

Credits 3

Behavioural Competency

Statement of the Competency

Inspect electrical circuits.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Inspection procedure
 - Quality standards
 - Manufacturers' standards: components, equipment, tools, etc.
- Given a circuit diagram
- Using:
 - materials, equipment, tools and measuring instruments
 - individual and collective protective equipment

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| 1. Find technical information on an electrical diagram. | <ul style="list-style-type: none"> • Accurate interpretation of inspection procedure • Accurate interpretation of circuit diagram |
| 2. Prepare the measuring instruments. | <ul style="list-style-type: none"> • Proper connection and start-up of measuring instruments • Verification of calibration of measuring instruments |
| 3. Perform basic tests on components of an electrical circuit. | <ul style="list-style-type: none"> • Appropriate determination of tests to be done • Accurate interpretation of manufacturer's recommendations and specifications • Thorough visual and tactile inspection of components • Accurate readings • Methodical recording of measurements |
| 4. Perform basic tests on wires and cables. | <ul style="list-style-type: none"> • Appropriate determination of tests to be done • Accurate interpretation of manufacturer's recommendations and specifications • Thorough visual and tactile inspection of wires and cables • Accurate readings • Methodical recording of measurements |

5. Diagnose the condition of the electrical circuit.
 - Accurate interpretation of the standards in force and the test results
 - Thorough validation of readings against specifications
 - Relevance of observations

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, circuit diagram and the standards in force
- Proper use of materials, equipment, tools and measuring instruments
- Detection of any anomalies

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to the inspection of electrical circuits
- Importance of an ergonomic workspace
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
- Importance of traceability standards and the risks associated with non-compliance
- Use of circuit diagram and operational testing procedure
- Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
- Cleaning and storage of materials, equipment, tools, measuring instruments and cleaning of workspace. Monitoring of control system
- Distinction between the different electrical phenomena (resistance and insulation)
- Distinction between the different optical phenomena (decibels)
- Scientific notation (ohm, milliohm, megaohm, etc.)

1. Find technical information on an electrical diagram.
 - Use of a paper or digital document management system
 - Data included in a circuit diagram, an operational testing procedure and a tool register
 - Information provided on the equipment, tools and component lists
2. Prepare the measuring instruments.
 - Identification and operation of electrical measuring instruments: milliohm meter, multimeter, megaohm meter, automated system
 - Identification and operation of measuring instruments used to measure decibel loss in fibre optic cables
 - Methods of connecting and start-up of measuring instruments
 - Verification of the calibration date of measuring instruments

3. Perform basic tests on components of an electrical circuit.
 - Characteristics of and directions for using protection devices (fuses, breakers, etc.) and electrical circuit control devices (switches, push buttons, relays, etc.)
 - Methods of inspecting electrical components
 - Main causes of error in electrical measurement
 - Main technical characteristics of components
 - Operation of electrical components
4. Perform basic tests on wires and cables of an electrical circuit.
 - Main technical characteristics of wires and cables
 - Operation of wires and cables
 - Method of calculating decibel loss
 - Main causes of error in electrical measurement
 - Main causes of error in optical measurement
 - Methods of verifying insulation and continuity
 - Methods of verifying decibel loss on a fibre optic cable
5. Diagnose the condition of the electrical circuit.
 - Main anomalies in electrical or optical circuits
 - Main methods of diagnosing electrical or optical circuits
 - Logical sequence leading to the final diagnosis

Competency 5 Duration 75 hours Credits 5

Behavioural Competency

Statement of the Competency

Install fasteners and grounds.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: parts, equipment tools, etc.
- Given a mechanical assembly drawing
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment

Elements of the Competency

Performance Criteria

- | | |
|--------------------------|--|
| 1. Organize the work. | <ul style="list-style-type: none"> • Accurate interpretation of documentation • Accurate interpretation of mechanical assembly drawing • Optimal organization of operations • Proper preparation and securing of workspace |
| 2. Prepare the surfaces. | <ul style="list-style-type: none"> • Proper use of sanding, stripping or masking method • Proper application of chemical conversion product • Visual inspection of colour and uniformity |
| 3. Install fasteners. | <ul style="list-style-type: none"> • Installation order in compliance with mechanical assembly drawing • Proper installation of fasteners • Respect for the physical integrity of the fasteners |
| 4. Secure fasteners. | <ul style="list-style-type: none"> • Correct calculation of final torque • Use of appropriate torque • Accurate location of securing system based on the type of fastener • Proper securing method based on the type of fastener |

- | | |
|---|---|
| 5. Install grounds. | <ul style="list-style-type: none"> • Proper installation of grounds • Solid fastening of terminals |
| 6. Apply a protective coating. | <ul style="list-style-type: none"> • Proper application of protective coating • Visual inspection of dimensions (diameter, thickness) and uniformity |
| 7. Inspect the work and make any necessary corrections. | <ul style="list-style-type: none"> • Absence of debris and foreign objects • Proper inspection of electrical continuity • Accurate interpretation of inspection results • Detection and correction of any anomalies |

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, mechanical assembly drawing and standards in force
- Proper verification of availability and conformity of materials, equipment, tools and measuring instruments
- Proper use of materials, equipment, tools and measuring instruments
- Methodical and thorough recording of data

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to assembly using fasteners
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
- Location of information in manufacturers' standards (manufacturing standards and codes)
- Importance of traceability standards and the risks associated with non-compliance
- Use of a mechanical assembly drawing, a work procedure and a tool register
- Use of an operational testing procedure
- Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
- Cleaning and storage of materials, equipment, tools, measuring instruments and cleaning of workspace. Monitoring of control system

1. Organize the work.
 - Use of a paper or digital document management system
 - Data included in a mechanical assembly drawing, a work procedure and a tool register
 - Information provided on the equipment, tools and component lists
 - Importance of an ergonomic workspace

2. Prepare the surfaces.
 - Distinction and characteristics of surfaces and finishes: conductive, non-conductive, aluminum, composite, paint, primer, etc.
 - Characteristics and functions of chemical conversion products
 - Sanding methods: stripper, sandpaper, pneumatic tool, etc.
3. Install fasteners.
 - Identification and conversion of metric and imperial units of measurement of length: units, fractions, decimals, etc.
 - Use of measuring instruments to measure lengths: ruler, tape measure
 - Characteristics and functions of tools: ratchet wrench, screwdriver, pliers, etc.
 - Characteristics and functions of fasteners: screws, nuts, bolts, washers, etc.
4. Secure fasteners.
 - Identification and functions of securing systems: lock wires, safety cables, cotter pins, etc.
 - Method of calculating the torque of mechanical components
 - Characteristics and functions of torquing tools
5. Install grounds.
 - Identification and methods of installing direct and indirect grounds: dimensions, components and materials needed, protective devices, etc.
6. Apply a protective coating.
 - Identification and functions of sealers: polysulfide, silicone, varnish, etc.
 - Methods of application: surface, aerodynamic, bead, etc.
 - Use of tools and materials to apply sealers: gun, spatula, paint brush, masking tape, etc.
7. Inspect the work and make any necessary corrections.
 - Importance of verifying their work and related issues: product quality, responsibilities of a cable and circuit assembler, etc.
 - Method of verifying their work: elements to be verified, critical points for verifying their work, verification
 - Issues related to the presence of damage, debris or foreign objects
 - Management system (control sheets, registers, audits, etc.) and methods for managing debris (waste) and foreign objects (components, materials, tools, etc.)
 - Issues related to the recording of information: traceability, validation of the work, compliance, presence of the necessary signatures, etc. Consequences of not recording the necessary information
 - Information to be recorded in the work procedure and tool register
 - Risks related to improper cleaning and storing tools or improper cleaning of the work area: forgotten tools, lost components, contamination, debris, etc.

Competency 6 Duration 90 hours Credits 6

Behavioural Competency

Statement of the Competency

Prepare wires and cables.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: parts, equipment tools, etc.
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment

Elements of the Competency

Performance Criteria

- | | |
|------------------------------------|--|
| 1. Organize the work. | <ul style="list-style-type: none"> • Accurate interpretation of documentation • Optimal organization of operations • Proper preparation and securing of workspace |
| 2. Select wires and cables. | <ul style="list-style-type: none"> • Appropriate selection of wires and cables based on their codes: <ul style="list-style-type: none"> – Diameter of the wire – Production material – Type of insulation – Number of conductors – Other |
| 3. Cut and strip wires and cables. | <ul style="list-style-type: none"> • Appropriate measurement of wires and cables to be cut • Appropriate adjustment of tools based on the depth of the cut and the length to be stripped • Proper length of stripped wire, cable and shielding • Proper verification of condition of strands, wires and shielding • Precise cutting and stripping of wires and cables |

4. Solder and desolder terminals.
 - Selection of appropriate soldering and desoldering methods based on the component
 - Appropriate adjustment to tools based on the choice of tip and temperature
 - Proper use of soldering and desoldering methods based on the component
 - Proper tinning of wires and terminals
 - Accurate positioning of elements to be soldered
 - Proper soldering of joints
 - Proper cleaning of solders
5. Install self-soldering sleeves.
 - Appropriate adjustment of tool based on the amount of heat to be applied
 - Appropriate positioning of sleeves and ground wire
 - Proper soldering of sleeves
6. Crimp terminals.
 - Selection of appropriate crimping tool
 - Appropriate adjustment of tool based on the gauge of the wires or cables, the terminal to be installed and the thickness of the insulating sheath
 - Precise positioning of:
 - terminal elements
 - wires and cables in the terminals
7. Inspect the work and make any necessary corrections.
 - Absence of debris and foreign objects
 - Appropriate performance of retention test
 - Accurate interpretation of the results of the retention test
 - Accurate interpretation of the results of the insulation inspection
 - Detection and correction of any anomalies

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure and standards in force
- Proper verification of availability and conformity of materials, equipment and tools
- Proper use of materials, equipment and tools
- Methodical and thorough recording of data
- Thorough inspection of the quality of the work

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to preparing wires and cables
 - Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
 - Location of information in manufacturers' standards (manufacturing standards and codes)
 - Importance of traceability standards and the risks associated with non-compliance
 - Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
 - Cleaning and storage of materials, equipment, tools and measuring instruments and cleaning of workspace. Monitoring of control system
1. Organize the work.
 - Use of a paper or digital document management system
 - Information provided on the equipment, tools and component lists
 - Importance of an ergonomic workspace
 2. Select wires and cables.
 - Identification and functions of the different types of wires (single, signal, power, etc.) and cables (twisted, shielded, etc.)
 - Characteristics and functions of the different types of wires and cables: types of conductors, shielding, insulation and production materials, diameter of the conductor, number of conductors, etc.
 - Coding of wires and cables
 3. Cut and strip wires and cables.
 - Use of measuring instruments to measure lengths (ruler, tape measure)
 - Functions of tools: manual stripper, rotary stripper, wire cutter, etc.
 - Methods of preparing and using tools
 - Methods of cutting and stripping wires and cables: thermal, manual mechanical, automated mechanical
 4. Solder and desolder terminals.
 - Function of tools: soldering iron, hot air gun, soldering cup, etc.
 - Methods of preparing and using tools
 - Distinction between the different types of soldering (solid, flux-core) and the different types of flux
 - Association of the types of soldering with the appropriate methods
 - Identification and use of cleaning products: alcohol, acetone, etc.
 - Distinction between the different types of terminals: hook, turret, cup, etc.
 - Identification and use of tinning methods
 - Identification and use of soldering methods: direct, hot air, immersion
 - Identification and use of desoldering methods: direct, hot air, immersion

5. Install self-soldering sleeves.
 - Distinction between the different types of self-soldering sleeves
 - Adjustment and use of hot air gun: types, functions and selection of nozzles
 - Identification and use of methods for installing self-soldering sleeves
6. Crimp terminals.
 - Distinction between the different types of terminals: contact, splice, lug, etc.
 - Identification and functions of crimping tools (manual and automatic)
 - Association of crimping tools with the different terminals and the appropriate crimping methods
 - Preparation (adjustment of crimping tool or positioner) and use of crimping tool
 - Crimping methods: positioning of terminal in the crimping tools, positioning of wire in the terminal, etc.
 - Differences between electric crimping and mechanical crimping
7. Inspect the work and make any necessary corrections.
 - Functions and use of tools for retention tests
 - Retention test on terminals
 - Review of Competency 5: *Inspect the work and make any necessary corrections*
 - Review of Competency 4: *Perform basic tests on wires and cables*

Competency 7

Duration 90 hours

Credits 6

Behavioural Competency

Statement of the Competency

Assemble wiring harnesses.

Achievement Context

- Working in a shop
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: parts, equipment tools, etc.
- Given an assembly drawing of a wiring harness
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment

Elements of the Competency**Performance Criteria**

1. Organize the work.

- Accurate interpretation of documentation
- Accurate interpretation of wiring harness assembly drawing
- Optimal organization of operations
- Appropriate selection or preparation of routing jig
- Proper preparation and securing of workspace

2. Route the wires and cables.

- Proper inspection of wires and cables
- Proper positioning of wires and cables
- Appropriate installation of identifiers on wires and cables
- Appropriate installation of protection on wires and cables

3. Attach the wiring harnesses.

- Proper verification of the placement of the wires and cables in each terminal and break-out
- Proper forming of wiring harnesses
- Appropriate installation of fasteners
- Appropriate installation of identifiers and protections on wiring harnesses
- Proper positioning of fasteners, identifiers and protections
- Solid fastening of fasteners, identifiers and protections

- | | |
|---|--|
| 4. Assemble the terminals. | <ul style="list-style-type: none"> • Proper preparation of wires and cables. • Appropriate installation of identifiers and protections on terminals • Use of appropriate torque • Proper securing of terminals, if applicable • Solid fastening of terminals • Proper positioning of components in each terminal |
| 5. Inspect the work and make any necessary corrections. | <ul style="list-style-type: none"> • Absence of debris and foreign objects • Proper inspection of insulation and electrical continuity • Accurate interpretation of inspection results • Detection and correction of any anomalies |
| 6. Finish the job. | <ul style="list-style-type: none"> • Appropriate protection and packaging of wiring harness • Proper cleaning and storage of equipment and tools, and proper cleaning of workspace |

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, wiring harness assembly drawing and standards in force
- Proper verification of availability and conformity of materials, equipment, tools and measuring instruments
- Proper use of materials, equipment, tools and measuring instruments
- Methodical and thorough recording of data
- Thorough inspection of the quality of the work

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to the assembly of wiring harnesses
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
- Location of information in manufacturers' standards (manufacturing standards and codes)

- Importance of traceability standards and the risks associated with non-compliance
 - Use of a wiring harness assembly drawing, a work procedure and a tool register
 - Use of an anomaly report and a non-compliance report
 - Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
 - Cleaning and storage of materials equipment, tools and measuring instruments and cleaning of workspace. Monitoring of control system
1. Organize the work.
 - Use of a paper or digital document management system
 - Data included in a wiring harness assembly drawing, a work procedure and a tool register
 - Information provided on the equipment, tools and component lists
 - Characteristics and functions of a routing jig
 - Importance of an ergonomic workspace
 2. Route the wires and cables.
 - Methods of routing wires and cables (continuous, wire by wire, etc.) and characteristics based on the type of wire, gauge, etc.
 3. Secure the wiring harnesses.
 - Characteristics of securing systems: clamps, types of supports, etc.
 - Characteristics of fastening systems: cord, tie wraps, etc.
 - Characteristics and functions of protection elements: tape, protection conduits, etc.
 - Assembly characteristics based on the type of fastener and the environment
 - Assembly characteristics based on the type of protections and the environment
 - Installation characteristics based on the type of fasteners
 - Installation characteristics based on the type of identifiers
 4. Assemble the terminals.
 - Characteristics and functions of terminals: connectors, termination units, retaining clamps, terminal couplings, etc.
 - Operation of terminal assembly tools: insertion, extraction, torque, etc.
 - Assembly characteristics of terminals based on the environment: pressurized or non-pressurized areas, area with electromagnetic interference, etc.
 5. Inspect the work and make any necessary corrections.
 - Functions and use of tools for retention tests
 - Retention test on terminals
 - Review of Competency 5: *Inspect the work and make any necessary corrections*
 - Review of Competency 4: *Perform basic tests on wires and cables*
 6. Finish the job.
 - Characteristics and functions of protection elements
 - Installation methods and characteristics of protection elements
 - Methods of packaging and storing wiring harnesses
 - Procedures for cleaning and tidying the workspace

Competency 8 Duration 90 hours Credits 6

Behavioural Competency

Statement of the Competency

Assemble electrical enclosures.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: parts, equipment tools, etc.
- Given an assembly drawing of an electrical enclosure
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment
- Using electrostatic discharge (ESD) protection equipment

Elements of the Competency

Performance Criteria

- | | |
|--|---|
| 1. Organize the work. | <ul style="list-style-type: none"> • Accurate interpretation of documentation • Accurate interpretation of standards in force • Accurate interpretation of electrical enclosure assembly drawing • Optimal organization of operations • Proper preparation and securing of workspace |
| 2. Assemble electrical and mechanical components. | <ul style="list-style-type: none"> • Correct calculation of final torque • Use of appropriate torque • Proper assembly of all electrical and mechanical components • Precise positioning of electrical and mechanical components |
| 3. Install wires, cables or a wiring harness in an electrical enclosure. | <ul style="list-style-type: none"> • Proper routing of wires, cables or wiring harness • Appropriate temporary installation of wiring harness |
| 4. Attach a wiring harness. | <ul style="list-style-type: none"> • Appropriate installation of grounds • Proper assembly of terminals • Use of appropriate torque • Solid fastening of wiring harness • Appropriate installation of identifiers and protections on wiring harnesses |

5. Perform touch-ups on a printed circuit board.
 - Selection of appropriate desoldering method, if applicable
 - Selection of appropriate soldering method
 - Appropriate adjustment to tools based on the choice of tip and temperature
 - Proper removal of sealant, if applicable
 - Accurate positioning of elements to be soldered
 - Proper soldering of printed circuit board
 - Proper cleaning of solders
 - Appropriate touch-ups to sealant
6. Install a printed circuit board in an electrical enclosure.
 - Proper insertion of printed circuit board in guide rails, if applicable
 - Proper securing and fastening of printed circuit board
 - Use of appropriate torque
 - Proper connection of board and connectors, if applicable
7. Inspect the work and make any necessary corrections.
 - Absence of debris and foreign objects
 - Proper inspection of insulation and electrical continuity
 - Accurate interpretation of inspection results
 - Detection and correction of any anomalies
8. Finish the job.
 - Appropriate installation of identifiers on the electrical enclosure
 - Appropriate protection and packaging of electrical enclosure
 - Proper cleaning and storage of equipment and tools, and proper cleaning of workspace

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, electrical enclosure assembly drawing and standards in force
- Compliance with the rules for controlling electrostatic discharges (ESD)
- Proper verification of availability and conformity of materials, equipment, tools and measuring instruments
- Proper use of materials, equipment, tools and measuring instruments
- Methodical and thorough recording of data
- Thorough inspection of the quality of the work
- Appropriate installation of identifiers and protections

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to the assembly of electrical enclosures
- Rules for controlling electrostatic discharges (ESD): types of protections (bags, caps, etc.), grounds (straps, mats, etc.), measuring instruments (inspection of strap and mat, etc.), environment (humidity, materials present, etc.)
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
- Location of information in manufacturers' standards (manufacturing standards and codes)
- Importance of traceability standards and the risks associated with non-compliance
- Use of an electrical enclosure assembly drawing, a work procedure and a tool register
- Use of an anomaly report and a non-compliance report
- Use of a serial number registry and a correction request: drawing, procedure, etc.
- Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
- Cleaning and storage of materials, equipment, tools and measuring instruments, and cleaning of workspace. Monitoring of control system

1. Organize the work.

- Use of a paper or digital document management system
- Data included in a serial number registry and a correction request: drawing, procedure, etc.
- Data included in an electrical enclosure assembly drawing, a work procedure and a tool register
- Information provided on the equipment, tools and component lists
- Importance of an ergonomic workspace

2. Assemble electrical and mechanical components.

- Criteria for distinguishing between electrical and mechanical components
- Assembly characteristics of electrical and mechanical components: organization of hardware and orientation of components

3. Install wires, cables or a wiring harness in an electrical enclosure.

- Routing characteristics of wires, cables or wiring harnesses: drip loops, service and maintenance loops, bending radius, absence of friction, etc.
- Installation of fasteners on the wiring harnesses (review of Competency 7)

4. Attach a wiring harness.

- Installation characteristics of the fastening elements of a wiring harness: clamp, glued fasteners, etc.
- Grounds (review of Competency 5)
- Assembly of terminals (review of Competency 7)
- Installation of fasteners (review of Competency 5)

5. Perform touch-ups on a printed circuit board.

- Perform touch-ups on a printed circuit board

6. Install a printed circuit board in an electrical enclosure.
 - Installation and securing of fasteners (review of Competency 5)
 - Connection characteristics of connectors by type: fixed, removable, flexible, long, etc.
7. Inspect the work and make any necessary corrections.
 - Operation and use of a serial number registry
 - Review of Competency 5: *Inspect the work and make any necessary corrections*
 - Review of Competency 4: *Perform basic tests on wires and cables*
8. Finish the job.
 - Installation methods and characteristics of identifiers on an electrical enclosure: self-adhesive labels, varnish
 - Protection and packaging methods
 - Procedures for cleaning and tidying the workspace

Competency 9

Duration 45 hours

Credits 3

Behavioural Competency

Statement of the Competency

Install electrical enclosures.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: parts, equipment tools, etc.
- Given an installation drawing of an electrical enclosure
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment
- Using electrostatic discharge (ESD) protection equipment

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1 Organize the work. | <ul style="list-style-type: none"> • Accurate interpretation of documentation • Accurate interpretation of electrical enclosure installation drawing • Optimal organization of operations • Proper preparation and securing of workspace |
| 2 Prepare to install an electrical enclosure. | <ul style="list-style-type: none"> • Proper inspection of conformity of location • Appropriate removal of the necessary components • Proper preparation of grounds, if applicable • Proper application of chemical conversion product, if applicable |
| 3. Secure the electrical enclosure. | <ul style="list-style-type: none"> • Precise positioning of electrical enclosure • Use of appropriate torque • Appropriate installation of grounds • Proper application of protection products: dimensions and uniformity • Appropriate installation of terminals • Solid fastening of electrical enclosure |

- 4. Inspect the work and make any necessary corrections.
 - Absence of debris and foreign objects
 - Proper inspection of insulation and electrical continuity
 - Accurate interpretation of inspection results
 - Detection and correction of any anomalies

- 5. Finish the job.
 - Appropriate installation of identifiers and protections on the installation structure
 - Appropriate protection of the electrical enclosure's terminals
 - Proper cleaning and storage of equipment and tools, and proper cleaning of workspace

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, electrical enclosure installation drawing and standards in force
- Compliance with the rules for controlling electrostatic discharges (ESD)
- Proper verification of availability and conformity of materials, equipment, tools and measuring instruments
- Proper use of materials, equipment, tools and measuring instruments
- Methodical and thorough recording of data
- Thorough inspection of the quality of the work

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to the installation of electrical enclosures
- Rules for controlling electrostatic discharges (ESD): types of protections (bags, caps, etc.), grounds (straps, mats, etc.), measuring instruments (inspection of strap and mat, etc.), environment (humidity, materials present, etc.)
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance

- Location of information in manufacturers' standards (manufacturing standards and codes)
 - Importance of traceability standards and the risks associated with non-compliance
 - Use of an electrical enclosure installation drawing, a work procedure and a tool register
 - Use of an anomaly report and a non-compliance report
 - Use of a serial number registry and a correction request: drawing, procedure, etc.
 - Use of a list of missing components
 - Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
 - Cleaning and storage of materials, equipment, tools and measuring instruments, and cleaning of workspace. Monitoring of control system
1. Organize the work.
 - Use of a paper or digital document management system
 - Information provided on the equipment, tools and component lists
 - Importance of an ergonomic workspace
 2. Prepare to install an electrical enclosure.
 - Characteristics of the proper removal of components needed to install the electrical enclosure
 - Removal of components needed to install the electrical enclosure
 - Preparation of surfaces (review of Competency 5)
 3. Secure the electrical enclosure.
 - (Review of Competency 5)
 4. Inspect the work and make any necessary corrections.
 - Review of Competency 5: *Inspect the work and make any necessary corrections*
 - Review of Competency 4: *Perform basic tests on wires and cables*
 5. Finish the job.
 - Installation characteristics of identifiers on the installation structure: self-adhesive labels, varnish
 - Application of protection product (review of Competency 5)
 - Procedures for cleaning and tidying the workspace

Competency 10 Duration 120 hours Credits 8

Behavioural Competency

Statement of the Competency

Install wiring harnesses.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: components, equipment, tools, etc.
- Given a wiring harness installation drawing
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment
- Using electrostatic discharge (ESD) protection equipment

Elements of the Competency

Performance Criteria

- | | |
|---|---|
| 1. Organize the work. | <ul style="list-style-type: none">• Accurate interpretation of documentation• Accurate interpretation of wiring harness installation drawing• Optimal organization of operations• Proper preparation and securing of workspace |
| 2. Prepare to install a wiring harness. | <ul style="list-style-type: none">• Appropriate removal of components, if applicable• Appropriate storage of components, if applicable• Proper preparation of location• Proper preparation of wiring harness |
| 3. Route the wiring harness. | <ul style="list-style-type: none">• Proper use of temporary protections• Proper placement of components• Proper placement of wiring harness |
| 4. Secure the wiring harness. | <ul style="list-style-type: none">• Compliance with bending radius• Appropriate distance between the different components• Compliance with torque, if applicable• Solid fastening of wiring harness |

5. Assemble the components.
 - Proper assembly of wiring harness components
 - Proper connection of wiring harness terminals
 - Proper assembly of mechanical components of the wiring harness
6. Inspect the work and make any necessary corrections.
 - Absence of debris and foreign objects
 - Proper inspection of insulation and electrical continuity
 - Accurate interpretation of inspection results
 - Detection and correction of any anomalies
7. Finish the job.
 - Appropriate installation of identifiers and protections on the installation structure
 - Appropriate protection of wiring harness
 - Proper cleaning and storage of equipment and tools, and proper cleaning of workspace

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, wiring harness installation drawing and standards in force
- Compliance with the rules for controlling electrostatic discharges (ESD)
- Proper verification of availability and conformity of materials, equipment, tools and measuring instruments
- Proper use of materials, equipment, tools and measuring instruments
- Methodical and thorough recording of data
- Thorough inspection of the quality of the work

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to the installation of wiring harnesses
- Rules for controlling electrostatic discharges (ESD): types of protections (bags, caps, etc.), grounds (straps, mats, etc.), measuring instruments (inspection of strap and mat, etc.), environment (humidity, materials present, etc.)
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
- Location of information in manufacturers' standards (manufacturing standards and codes)
- Importance of traceability standards and the risks associated with non-compliance
- Use of a wiring harness installation drawing, a work procedure and a tool register
- Use of an anomaly report and a non-compliance report
- Use of a serial number registry and a correction request: drawing, procedure, etc.
- Use of a list of missing components
- Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
- Cleaning and storage of materials, equipment, tools and measuring instruments, and cleaning of workspace. Monitoring of control system

1. Organize the work.

- Use of a paper or digital document management system
- Information provided on the equipment, tools and component lists
- Importance of an ergonomic workspace

2. Prepare to install a wiring harness.

- Characteristics of the proper removal of components needed to install the wiring harness
- Removal of components needed to install the wiring harness
- Preparation of surfaces (review of Competency 5)
- Installation of temporary protections on the structure and the wiring harness
- Unpackaging of wiring harness. Compliance criteria: absence of damage, debris and non-compliance reports. Importance of checking the wiring harness number

3. Route the wiring harness.

- Routing characteristics of wires, cables or wiring harnesses: drip loops, service and maintenance loops, bending radius, absence of friction, etc.
- Routing characteristics of optical fibre cables: handling, bending radius, cleaning of connectors, etc.
- Importance of locating the critical installation points

4. Secure the wiring harness.

- Review of Competency 5
- Specific fastening characteristics of optical fibre cables: handling, bending radius, protection, cleaning of connectors, etc.
- Specifics concerning distances between the components

5. Assemble the components.
 - Assembly of terminals (review of Competency 7)
6. Inspect the work and make any necessary corrections.
 - Review of Competency 5: *Inspect the work and make any necessary corrections*
 - Review of Competency 4: *Perform basic tests on wires and cables*
7. Finish the job.
 - Data included in an area closeout procedure
 - Use of an area closeout procedure once the installation is complete
 - Review of Competency 9

Competency 11 Duration 60 hours Credits 4

Behavioural Competency

Statement of the Competency

Repair or modify electrical circuits.

Achievement Context

- Working inside a transport vehicle (aircraft, bus, train, etc.) or in a shop (for satellites, flight simulators, communications equipment, etc.)
- Given paper or digital documentation:
 - Work procedures
 - Quality standards
 - Manufacturers' standards: components, equipment, tools, etc.
- Given technical drawings:
- Using materials, equipment, tools and measuring instruments
- Using personal and collective protective equipment
- Using electrostatic discharge (ESD) protection equipment

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| 1. Organize the work. | <ul style="list-style-type: none"> • Accurate interpretation of documentation • Accurate interpretation of technical drawings • Optimal organization of operations • Proper preparation and securing of workspace |
| 2. Prepare to repair or modify an electrical circuit. | <ul style="list-style-type: none"> • Proper inspection of electrical circuit • Proper inspection of conformity of location • Appropriate removal of components, if applicable • Accessibility of electrical circuit to be repaired or modified • Appropriate installation of temporary protections, if applicable |
| 3. Repair or modify the electrical circuit. | <ul style="list-style-type: none"> • Correct disassembly of electrical circuit • Correct location of the point where the circuit must be repaired or modified • Respect for the integrity of the wiring harnesses • Correct reassembly of electrical circuit • Compliance with the operations needed to repair or modify the electrical circuit |

4. Inspect the work and make any necessary corrections.
 - Absence of debris and foreign objects
 - Proper inspection of insulation and electrical continuity
 - Accurate interpretation of inspection results
 - Detection and correction of any anomalies
5. Finish the job.
 - Appropriate protection of the electrical circuit
 - Proper reinstallation of components
 - Proper cleaning and storage of equipment and tools, and proper cleaning of workspace

For the competency as a whole:

- Compliance with occupational health and safety rules
- Compliance with procedure, technical drawings and standards in force
- Compliance with the rules for controlling electrostatic discharges (ESD)
- Proper verification of availability and conformity of materials, equipment, tools and measuring instruments
- Proper use of materials, equipment, tools and measuring instruments
- Methodical and thorough recording of data
- Thorough inspection of the quality of the work

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

For the competency as a whole:

- Occupational health and safety rules specific to the repair or modification of electrical circuits
- Rules for controlling electrostatic discharges (ESD): types of protections (bags, caps, etc.), grounds (straps, mats, etc.), measuring instruments (inspection of strap and mat, etc.), environment (humidity, materials present, etc.).
- Importance of quality standards (company, manufacturing industry, etc.) and the risks associated with non-compliance
- Location of information in manufacturers' standards: manufacturing standards and codes
- Importance of traceability standards and the risks associated with non-compliance
- Use of technical drawings, a work procedure and a tool register
- Use of an anomaly report and a non-compliance report
- Use of a serial number registry and a correction request: drawing, procedure, etc.
- Use of a list of missing components
- Use of an area closeout procedure
- Use of a repair or modification procedure
- Use of a document concerning inspection breaches
- Visual and tactile inspection method to ensure the conformity of materials, equipment, tools, measuring instruments (calibration date, damage, etc.) and components
- Cleaning and storage of materials, equipment, tools and measuring instruments, and cleaning of workspace. Monitoring of control system

1. Organize the work.

- Use of a paper or digital document management system
- Data included in a repair or modification procedure
- Data included in a document concerning inspection breaches. Reporting of an inspection breach. Issues associated with this document. Types of information to record
- Data included in a quality alert document
- Data included in an engineering derogation
- Information provided on the equipment, tools and component lists
- Importance of an ergonomic workspace

2. Prepare to repair or modify an electrical circuit.

- Characteristics of the compliant removal of components needed to repair or modify the electrical circuit
- Installation of temporary protections
- Importance of identifying, packaging and storing removed components

3. Repair or modify the electrical circuit.

- Types of repairs (damaged wire, defective component, non-compliance with technical drawing or standards in force, etc.) or modifications (engineering change, terminal change, rerouting of wiring harnesses, etc.)
- Association of the necessary sequences of operations with the different types of repairs and modifications

4. Inspect the work and make any necessary corrections.
 - Review of Competency 5: *Inspect the work and make any necessary corrections*
 - Review of Competency 4: *Perform basic tests on wires and cables*
5. Finish the job.
 - Use of an area closeout procedure once the repair or modification is complete
 - Methods of protecting terminals
 - Procedures for cleaning and tidying the workspace

Competency 12

Duration 30 hours

Credits 2

Behavioural Competency

Statement of the Competency

Use job search techniques.

Achievement Context

- When searching for a job or practicum position
- Using a computer and software
- Given various sources of information

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| 1 Write a resumé and a cover letter. | <ul style="list-style-type: none"> • Relevance of information included • Comprehensive information • Appropriate highlighting of competencies and interest in the job |
| 2 Prepare a list of potential employers. | <ul style="list-style-type: none"> • Proper use of tools to search for employers recruiting employees or interns • Production of a list of employers that meet their search criteria (e.g. organization of work) |
| 3. Prepare for a hiring interview | <ul style="list-style-type: none"> • Relevance of information about the company • Relevance of information about the organization of work in the company • Thorough preparation of questions to ask during the interview • Comprehensive collection of documents to present during the interview |
| 4. Participate in a hiring interview. | <ul style="list-style-type: none"> • Appropriate self-introduction • Clarity and relevance of comments • Use of appropriate polite forms of address • Demonstration of: <ul style="list-style-type: none"> – interest – attentiveness – availability |

For the competency as a whole:

- Appropriate oral and written communication
- Demonstration of honesty and objectivity
- Appropriate presentation of documents

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each element of the competency, along with their attendant guidelines.

1. Write a resumé and a cover letter.
 - Search for sample resumé and cover letters
 - Types of resumé: paper, digital, by competency, etc.
 - Content of a resumé: personal information, education, work experience, achievements, competencies, etc.
 - Content of a cover letter: additional information, highlighting of job-related competencies, explanation of qualifications, request for an interview, thanks and signature
 - Importance of the quality of language and the use of a spell checker
2. Prepare a list of potential employers.
 - Sources of information: Internet, human resources sectoral committee, etc.
 - Information to include on the list: name, address, telephone number and email address of the company; name of the person responsible for hiring or recruiting interns, types of activities (installation, assembly, etc.), size of the company, etc.
3. Prepare for a hiring interview.
 - Collection of accurate information about the company, gathering of personal documents, etc.
 - Preparation of questions to ask during the interview: job description, duration, compensation, benefits, etc.
4. Participate in a hiring interview.
 - Importance of attire for employers
 - Behaviours and attitudes to adopt: introduction, greeting, respectful form of address, questions asked at the appropriate time, demonstration of enthusiasm, etc.

Competency 13 Duration 90 hours Credits 6

Situational Competency

Statement of the Competency

Enter the workforce.

Elements of the Competency

- Apply competencies learned during the training process.
- Comply with the company's standards and practices.
- Consolidate attitudes compatible with the exercise of the trade.
- Take stock of their learning.

Learning Context

Information Phase

- Learning about the terms and conditions for the practicum
- Learning about the content of a log or report
- Learning about the rules and practices in the company offering the practicum

Participation Phase

- Observing trade-related practices
- Integrating into the work team
- Performing or helping perform various trade-related tasks
- Keeping a journal

Synthesis Phase

- Producing a report on their practicum experience
- Presenting a summary of their practicum experience

Instructional Guidelines

- Encourage students to share their points of view.
- Provide the documentation needed to keep a log.
- Inform students in advance of the practicum's objectives.
- Agree with the practicum supervisors on ways of fostering the performance of trade-related tasks.
- Maintain close collaboration with the practicum supervisors.
- Make sure interns are effectively supervised.
- Regularly visit the interns in the company.
- Solve problems that arise during the practicum.

Participation Criteria

Information Phase

- Learn about the terms and conditions and other information about the practicum: organization, intern's responsibilities, etc.
- Participate in activities.

Participation Phase

- Comply with company policies concerning the tasks they are allowed to perform as interns, work schedules, occupational health and safety rules, etc.
- Perform the tasks assigned in accordance with the established agreement, methods and standards.
- Keep a journal.

Synthesis Phase

- Produce a practicum report.
- Participate in the evaluation of their practicum.

Suggestions for Competency-Related Knowledge and Know-How

The following is a summary of the knowledge, skills, strategies, attitudes and perceptions related to each phase of the learning context, along with their attendant guidelines.

Information Phase

- Terms and conditions, objectives and duration of the practicum, supervision, participation criteria, company rules
- Keeping a log: headers, purpose, importance of recording the facts as they occur and connection to the practicum report
- Main tasks to perform in the workplace

Participation Phase

- Integration into the work team: observation of ways of doing things
- Adoption of attitudes and behaviours conducive to a successful practicum
- Qualities appreciated by the employer and attitudes aimed at getting the most out of the experience
- Keeping a log. Useful and meaningful elements for the practicum report
- Observations in the workplace: work context, tasks performed, application of work methods, etc. Introduction to new work methods or processes. Recording of observations in the log
- Performance of tasks: active participation in the practicum, compliance with occupational health and safety rules and standards in force
- Instructions and company rules
- Importance of keeping the log constantly up-to-date

Synthesis Phase

- Report on activities carried out during the practicum
- Typical content of a practicum report: report on activities performed and observed on a daily basis, processes tried or new technologies used, new learning, problems encountered and solutions found, etc.
- Comments received from the company about their performance

- Evaluation of their practicum. Criteria to consider. Self-assessment. Report on their experience. Inclusion of positive elements observed, their level of satisfaction, and the problems encountered and solutions found. Perception of the occupation before and after the practicum
- Comparison of learning acquired during training with the activities performed and observed in the workplace
- Aspects of the trade that are consistent or inconsistent with their training with respect to the workplace, trade practices, employment requirements, etc.

