



CONTEST DESCRIPTION
Industrial control

POST-SECONDARY

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1 THE ESSENTIAL SKILLS FOR CAREERS IN THE SKILLED TRADES AND TECHNOLOGY

SCC is currently working with Employment and Social Development Canada (ESDC) in order to bring awareness to the importance of Essential Skills that are absolutely crucial for success in the workforce. Part of this ongoing initiative requires the integration and identification of Essential Skills in contest descriptions, projects, and project documents. The next phase and very important aspect of our Essential Skills (ES) initiative is to provide an ES report card to each competitor at the Skills Canada National Competition. The purpose of the ES report card is to inform the competitor about their current level of essential skills based on their competition scores. With this knowledge, the competitor will be made aware which essential skill may require improvement. Full implementation is expected in the next Skills Canada National Competition.

The following 9 skills have been identified and validated as key essential skills for the workplace in the legend below:

¹Numeracy, ²Oral Communication, ³Working with Others, ⁴Continuous Learning, ⁵Reading Text, ⁶Writing, ⁷Thinking, ⁸Document Use, ⁹Digital

These essential skills have been identified in section 2.4 and/or 3.2 of your Contest Description and if applicable, in your Project and all other supporting project documents.

2 CONTEST INTRODUCTION

2.1 Description of the associated work role(s) or occupation(s).

<http://skillscompetencescanada.com/en/skills/construction/automation-control/>

2.2 Purpose of the Challenge.

Install and program an industrial control system.

2.3 Duration of contest.

12 hours.

2.4 Skills and Knowledge to be tested.

Designing, installing and commissioning of a sequential process using a PLC device.

3 CONTEST DESCRIPTION

3.1 List of documents produced and timeline for when competitors have access to the documents.

DOCUMENT	DATE OF DISTRIBUTION VIA WEBSITE
Test Project	November 2020
VFD Manual	January 2021
Commissioning Procedure	March 2021
Evaluation Criteria Breakdown	March 2021
Safety Orientation	March 2021

3.2 Tasks that may be performed during the contest:

- Interpreting and using electrical designs, diagrams and a process flow chart to assemble a functional control system. ⁸
- Installing various industrial cables and raceways to a wall mounted control panel.
- Programming a programmable logic controller – PLC, to meet project requirements. ⁹
- Installing and commissioning terminal components (push buttons, limit switches, pilot devices, etc.) ¹
- Wiring a panel using standard trade practices, complying with relevant sections of the Canadian Electrical Code. ⁷
- Applying adequate protection for equipment, components and personnel. ⁷
- Diagnostic and fault finding on actual project. ⁷
- Proper Occupational Health and Safety procedures.

Pre-Requisites

- Knowledge of the current Canadian Electrical Code. ⁷
- Ability to effectively locate information in technical documents. ⁸
- Effective troubleshooting techniques. ⁷
- Ability to install various industrial cables and raceways.
- Knowledge of symbols used in an electrical diagram and a control diagram. ⁸
- Proper layout, installation practices and techniques for a control panel.
- Knowledge of fail safe designing.
- Knowledge of safety practices in the work environment.
- Knowledge of PLC programming. ⁹
- Knowledge of supplied VFD, motors.
- Effective use of allotted time ^{7, 7}

Essential Skills – ¹Numeracy, ⁷Thinking (Problem Solving, Job Task Planning and Organization, Significant Use of Memory), ⁸Document Use, ⁹Digital

4 EQUIPMENT, MATERIAL, CLOTHING

4.1 Equipment and material provided by Skills/Compétences Canada

- Step Ladder
- EMT Bender
- Power bar
- Cordless Drill
- 6" Square #1, #2 Robertson & #2 Philips Driver Bit
- All required materials to assemble the project
- Insulated Gloves

4.2 Equipment and material provided by the Competitor

- Programmable Logic Controller, communication cable and software. Laptop computer with appropriate operating system and PLC software. Computer & PLC need to be free of all pre-programmed PLC files. Computer will be inspected by the National Technical Committee (NTC) prior to usage.
- The PLC must have the following minimum requirement:
 - Both 120Vac and 24Vdc power will be available to supply the PLC; competitor must use the appropriate source
 - Fit into a space 250mm high x 250mm deep x 500 mm wide
 - 16 - 24VDC Inputs
 - 16 - Relay Outputs
 - 2 – Analog input 0-10VDC
 - Note: Additional backup PLC (Recommended), smart relay is not recommended.
- Any technical documents/manuals (pdf or paper) will be permitted provide they are free of additional notes and writings and contain only original manufacturer information.
- Multimeter
- Complete set of pliers (diagonal cutting, needle nose, electrician's, sta-kon crimper, slip-joint gripping)
- Complete set of screwdrivers (Phillips, Robertson, Flat-headed)
- Level(s)
- Wire Strippers
- Electrician's knife (Utility Knife not allowed)
- Metric measuring tape
- Ruler and/or Square
- Metal Saw (Hack saw – recommended 32TPI) & Mitre Box/Vice
- Flat and round metal file with handle
- Hammer
- Centre punch
- Set of metal drill index
- Knockout Punches (allowed) or Unibit (allowed)
- Full complement of screwdriver tips for Cordless Drill (short & long including nut drivers) (allowed)
- Set of termination screwdrivers (slotted) (allowed)
- Adjustable wrench
- Allen Keys (metric and imperial)
- Any additional tools are subject to approval from National Technical Committee Chair prior to competition starts.
- No additional Power Tools and no pre-fabricated templates allowed.

COMPETITORS WILL BE REQUIRED TO USE THE MATERIAL AND EQUIPMENT PROVIDED BY SCC. ALL OTHER MATERIAL AND EQUIPMENT WILL BE REMOVED FROM THE SKILL AREA IF NOT PRE-APPROVED.

4.2.1 Toolboxes Guidelines

One of the objectives of SCC is the sustainability of the Competition. As a result, the toolboxes brought by Competitors will be restricted to the following maximum specifications.

The Competitor toolbox must not exceed 1Meter³ in volume. It can be multiple toolbox but the total of all toolbox, must not exceed the maximum volume indicated. There is no exception to this rule. If the Competitor toolbox is larger than what is indicated, the Competitor with the guidance of the NTC, will need to remove items from the toolbox and those items will not be used during the competition.

4.3 Required clothing provided by the Competitor.

- Proper work site clothing (no shorts allowed)
- Long sleeve is recommended for installation portion of the project
- 100% cotton shirt

5 SAFETY REQUIREMENTS

5.1 Safety workshop

Upon arrival at the Skill area, Competitors will participate in a Safety workshop and they will be expected to work and maintain a safe working area during the competition. Any Competitor breaking any health, safety and environmental rules, may be required to undertake a second safety workshop, this will not affect the Competitor's competition time.

5.2 Personal protective equipment (PPE) provided by Skills/Compétences Canada:

- N/A

5.3 Personal protective equipment (PPE) provided by Competitors:

- Safety Glasses with side shields
- CSA approved Safety Shoes
- Protective Gloves (high dexterity)
- Hearing protection
- Hard Hats
- Lockout Hasp for Main Disconnect with padlock

6 ASSESSMENT

6.1 Point breakdown

POINT BREAKDOWN	/100
Installation Measurements	20
Wiring & Workmanship	42
Functionality	30
Safety	8

7 ADDITIONAL INFORMATION

7.1 Interpreter

If a competitor requires the help of an interpreter once onsite during the competition, the Skills/Compétences Canada Provincial/Territorial offices must advise Skills/Compétences Canada National Secretariat a minimum of 1 month prior to the competition or this service might not be guaranteed.

7.2 Ties

- Tiebreaker #1: The Competitor with the highest score in the Wiring & Workmanship will be declared the winner.
- Tiebreaker #2: The Competitor with the highest score in the Functionality will be declared the winner.
- Tiebreaker #3: The Competitor with the highest score in the Installation Measurements will be declared the winner.

7.3 Test Project change at the Competition:

Where the Test Project has been circulated to Competitors in advance, NTC shall change a maximum of 30% of the work content. Please refer to the Competition Rules.

7.4 Competition rules:

Refer to the [competition rules](#) of the Skills Canada National Competition which can be found on our website.

8 NATIONAL TECHNICAL COMMITTEE MEMBERS

Member Organization	Name
British Columbia	Clarence Burlock
Alberta	Peter Friesen
Saskatchewan	Devon Young
Ontario	John Sousa
Quebec - Chair	Éric Beaumier
New Brunswick	Éric Arseneau
Nova Scotia	John Harding
Newfoundland & Labrador – Co-Chair	John Dalley
Prince Edward Island	William Callbeck

Contact the Skills/Compétences Canada National Secretariat for any questions or concerns: Nathalie Maisonneuve (nathaliem@skillscanada.com).