SkillsCompétences Canada
Vancouver2022

CONTEST DESCRIPTION

Refrigeration and Air Conditioning

TEAM CANADA

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Due to unforeseeable COVID-19 regulations/uncertainties, competition documents are subject to change.

1 TECHNOLOGY

In response to the evolving labour market and changing skill needs, the Government of Canada has launched the new Skills for Success *(former Essential Skills)* model defining nine key skills needed by Canadians to participate in work, in education and training, and in modern society more broadly. SCC is currently working with Employment and Social Development Canada (ESDC) to bring awareness of the importance of these skills that are absolutely crucial for success in Trade and Technology careers. Part of this ongoing initiative requires the integration and identification of the Skills for Success in contest descriptions, projects, and project documents. The next phase and very important aspect of our Skills for Success (SfS) initiative is to provide a *Skills Report Card* to each competitor at the Skills Canada National Competition. The purpose of the report card is to inform the competitor about their current level of nine identified Skills for Success based on their competition scores. With this knowledge, the competitor will be made aware which 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 skills for success for the workplace in the legend below:

[1]Numeracy, [2]Communication, [3]Collaboration, [4]Adaptability, [5]Reading, [6]Writing, [7]Problem Solving, [8]Creativity and Innovation, [9]Digital

These Skills for Success have been identified in section 2.3 and/or 3.2 of your Contest Description and if applicable, in your Project and supporting documents.

2 CONTEST INTRODUCTION

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

https://www.skillscompetencescanada.com/en/skill_area/refrigeration/

2.2 Purpose of the Challenge

To assess the contestant's skills relating to the installation, operation, maintenance and repair of mechanical and electrical components and equipment for a refrigeration and/or air Conditioning system at a World Skills Level.

2.3 Duration of contest

16 Hours

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2.4 Skills and Knowledge to be tested.

The goal of the contest is to encourage students to learn more about refrigeration and air-conditioning. Refrigerant handling is an important component and the use of low GWP Refrigerants (A2L), and contestants must be aware of current regulations and safety precautions.

3 CONTEST DESCRIPTION

3.1 List of documents produced and timeline for when competitors have access to the documents on the Skills/Compétences Canada website

DOCUMENT	DATE OF DISTRIBUTION
Project & Drawings	Blind Project released during Orientation

3.2 Tasks that may be performed during the contest

- Applying basic and advanced control circuit concepts (electrical and, or electronic)
- From a provided electrical schematic, install electrical components and wiring to achieve provided sequence of operation
- Diagnose electrical and mechanical fault(s) in an operating refrigeration and/or air conditioning system as required[7]
- Calculate[1] and record required refrigerant charge and verify through subcooling and superheat measurement and calculations[1]
- Calculate[1] and record required settings for temperature and/or pressure controls
- Perform brazing procedures.
- Project: Install refrigeration tubing utilizing various joining methods, mechanical components and indicated accessories, on a refrigeration system. Test, evacuate, charge and commission the system.
- Safe use of low GWP & A2L refrigerants
- Comply with all Provincial and Federal codes and regulations
- Applying health and safety regulations
- Pre-requisites:
    - Thorough knowledge of the refrigeration cycle
    - The ability to use refrigeration tools and specialized equipment
    - The ability to measure accurately1 and use tools required for working with copper tubing

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- Knowledge of and compliance with current industry codes and safety regulations5
- The ability to use precision electrical test equipment
- The ability to interpret electrical diagrams
- A good operating knowledge of typical controls used in refrigeration and air-conditioning systems (mechanical, electrical and electronic)

Skills for Success – [1]Numeracy, [5]Reading, [7]Problem Solving

4 EQUIPMENT, MATERIAL, CLOTHING

4.1 Equipment and material provided by Skills/Compétences Canada

- All consumables will be provided by the organization
- HVAC Multimeter and Clamp Meter Combo Kit
- Any additional required safety equipment, testing equipment or special tools will be supplied if not indicated on competitor tool list.

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 OTHER THAN WHAT IS LISTED IN 4.2.

4.2 Equipment and material provided by **the competitor**

- Competitors may only bring the tool in the list below. Should the competitor not bring any of the tools on the following list, SCC will not supply the tool(s).
- 1 – Set of common screwdrivers
- 1 – Control screwdriver
- 1 – Set of Phillips screwdrivers
- 1 – Set of Robertson screwdrivers
- 1 – Set of nut-drivers
- 1 – Set of combination wrenches ¼ to $^{15}/_{16}$ in.
- 1 – 6in, 8in, 10in and 12in adjustable wrench
- 1 – Linesman pliers
- 1 – Electrical side cutters
- 1 – Needle nose pliers
- 1 – Slip joint pliers
- 1 – Wire crimpers

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- 1 – Wire Strippers
- 1 – Combination ratchet valve wrench
- 1 – Flaring/swaging kit
- 1 - Hammer
- 1 – Tubing cutter ¼ to 1-$^{1}/_{8}$in.
- 1 – “IMP” style mini-tube cutter
- 1 - File
- 1 – Tube reaming tool
- 1 – Mirror
- 1 - Flashlight
- 1 – Multimeter, minimum Cat III(Optional) (Meters are available)
- 1 – Clamp-on ampmeter, minimum CAT III Optional (Meters are available))
- 1 – Thermometer (electronic or mechanical)
- 1 – Brazing blanket/heat shield
- 1 – Electronic Leak detector
- 1 – Imperial Tape measure minimum ¾” blade
- 1 – Valve core removal tool
- 1 – Micron vacuum gauge and necessary connections
- 1 – Solenoid Magnet
- 1 – Nitrogen “Purge” Regulator (Diversitech DP-1 or equivalent)
- 1 – Torpedo Level
- 1 – Utility knife
- 1 – Assortment of screwdriver bits i.e.: #2 Robertson, # 2 Phillips
- 1 – Set of Analog refrigeration manifold and gauges (complete with: environmental hoses in good condition)
- Pencils, pens, notepad
- Calculator
- Required clothing provided by the competitor.
- Competitors must wear appropriate clothing and standard safety gear
- Long sleeve (non-synthetic shirt for brazing) and long pants

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.

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The Competitor toolbox must not exceed 3.4 meters^3 in volume. It can be multiple toolboxes but the total of all toolboxes 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. All tools must fit inside one or more toolboxes. Tools outside of a toolbox will not be permitted.

4.3 Required clothing provided by the competitor

- Long-Sleeved shirts must be worn during all brazing and refrigerant use.
- Legs must be covered at all times(blue jeans/work trousers/coveralls)
- CSA approved Safety shoes

5 HEALTH AND SAFETY

5.1 Safety program

SCC has implemented a comprehensive safety program as health and safety is an integral part of our competitions. Our safety program includes guidelines and procedures to make the work environment in each skill area safer.

5.1.1 Safety manual

As part of our program a safety manual has been created in order to monitor and document health and safety within each skill area. It includes a definite plan of action designed to prevent accidents. The safety manual will be provided for every skill and these instructions must be followed and respected by all participants and officials at the SCNC.

5.1.2 Safety workshop

During orientation, 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 List of required personal protective equipment (PPE) provided by competitors

- Clear Safety Glasses
- "Mechanics-style" work Gloves
- CSA approved Safety shoes

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- All-Leather welding gloves for brazing
- Long-sleeved 9non-synthetic)shirt to be worn during all brazing and refrigerant use
- Proper footwear as per section 4.3.

5.3 COVID-19 Protocol

The COVID-19 guidelines will be shared as soon as they are available.

The COVID-19 guidelines will be subject to change based on the BC COVID-19 guidelines in place at the time of the competition.

6 SAFETY REQUIREMENTS

6.1 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.

6.2 List of required personal protective equipment (PPE) provided by Skills/Compétences Canada

- Non-medical mask, if required/requested
- Ear plugs

6.3 List of required personal protective equipment (PPE) provided by the competitor

- As listed in 5.2

Note: Contestants who do not have the required protective gear will not be allowed to participate in the contest

7 ASSESSMENT

7.1 Point breakdown

Note: This list is subject to change.

TASKS	/100
Piping, Commissioning, and Electrical Controls & wiring	70
Troubleshooting	15
Safety	15

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8 CONTEST SPECIFIC RULES

Contest specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from contest to contest. Any additional contest rules will be reviewed during the competitor orientation.

TOPIC/TASK	CONTEST SPECIFIC RULE
Use of technology - personal laptops, tablets and mobile phones	• No personal laptops, tablets, or mobile phones are permitted to be used during the competition days • Mobile phones are not permitted in contest area
Drawings, recording information	• No drawings or documents are permitted to leave contest area and are not allowed to be brought in • All paperwork must remain once the competition has begun
Tools / Infrastructure	• Only tools provided and/or listed in 4.2 are permitted in contest area • All others must be removed from competitors station during competition

9 ADDITIONAL INFORMATION

9.1 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.

9.2 Ties

NO TIES ARE ALLOWED AT SCNC.

- **Tiebreaker #1:** In the event of a tie, the competitor with the highest score in the Piping, Commissioning, and Electrical Controls criteria will be declared the winner
- **Tiebreaker #2:** If a second tie occurs, the competitor with the highest score and lowest time in the troubleshooting shall be declared the winner
- **Tiebreaker #3:** If a tie still exists, the competitor with the highest score for Safety criteria shall be declared the winner

9.3 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.

9.4 Competition rules

Refer to the competition rules of the Skills Canada National Competition which can be found on our website.

10 TEAM CANADA EXPERT

Brian Nicholl

Contact the Skills/Compétences Canada national secretariat for any questions or concerns: Sophie Courchene at sophiec@skillscanada.com

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