Test Project

Refrigeration and Air Conditioning

SCNC2025_TP38_Part B_EN – V1.3

Part B – Specifications drawings and information

Competitor's

Name_____

Province_____

Developed by:
Mark Forsyth – WS UK Chief Expert WSC2024

Contents

Introduction

This Test Project was developed by WorldSkills UK expert (Chief Expert WSC2024, Lyon, France).

Part A Description of the Modules and Competitor Instructions will be released by Skills Canada to the NTC Committee Members and Competitors prior to their arrival at the competition.

Part B Specifications and Drawings without measurements will be released by Skills Canada to the NTC Committee Members and Competitors prior to their arrival at the competition.

Part B Specifications and Drawings with measurements will be released by the NTC Chair to the

- NTC at the Competition (C-1)
- Competitors at the Competition Day 1

This Test Project reflects best practice as described by the Contest Description and the WorldSkills Standards Specification. The Test Project's Marking Scheme will only assess and allocate marks to those skills that are set out in the Standards Specification.

Description of project and tasks

The Test Project is a series of standalone modules.

There are three (3) Modules to complete in the 13-hour competition.

A) Component Fabrication (heat exchanger & coil)	20 Marks Time Allowed 3 Hrs
B) Refrigeration System Installation and Commissioning	65 Marks Time Allowed 10 Hrs
C) Safety- Day 1 & Day 2	15 Marks

Test Project Documentation

The Test Project is a series of standalone modules and consists of the following two (2) parts:

Part A - Description of the modules and competitor's instructions

This contains all the competition details for each module, including the task description, time limits and instructions to competitor.

Part B – Test project, specifications drawings and information

This contains the test project drawings, information and specifications including the following:

SCNC2025_TP38_BB_A4_01_EN.pdf - HEAT EXCHANGER DRAWING

SCNC2025_TP38_BB_A4_02_EN.pdf - REFRIGERATION COIL DRAWING

SCNC2025_TP38_BB_A4_03_EN.pdf - REFRIGERATION SYSTEM PIPING DIAGRAM

SCNC2025_TP38_BB_A4_04_EN.pdf - REFRIGERATION SYSTEM COMPONENTS LAYOUT

SCNC2025_TP38_BB_A4_05_EN.pdf - ELECTRICAL CIRCUIT DIAGRAM

SCNC2025_TP38_BB_A4_06_EN.pdf - REFRIGERATION SYSTEM INSTALLATION SPECIFICATIONS

This will be provided to all participating Skill 38 NTC at the Competition C-1 and presented to the Competitor at Competition Day 1

Equipment manufacturers' drawings and instructions

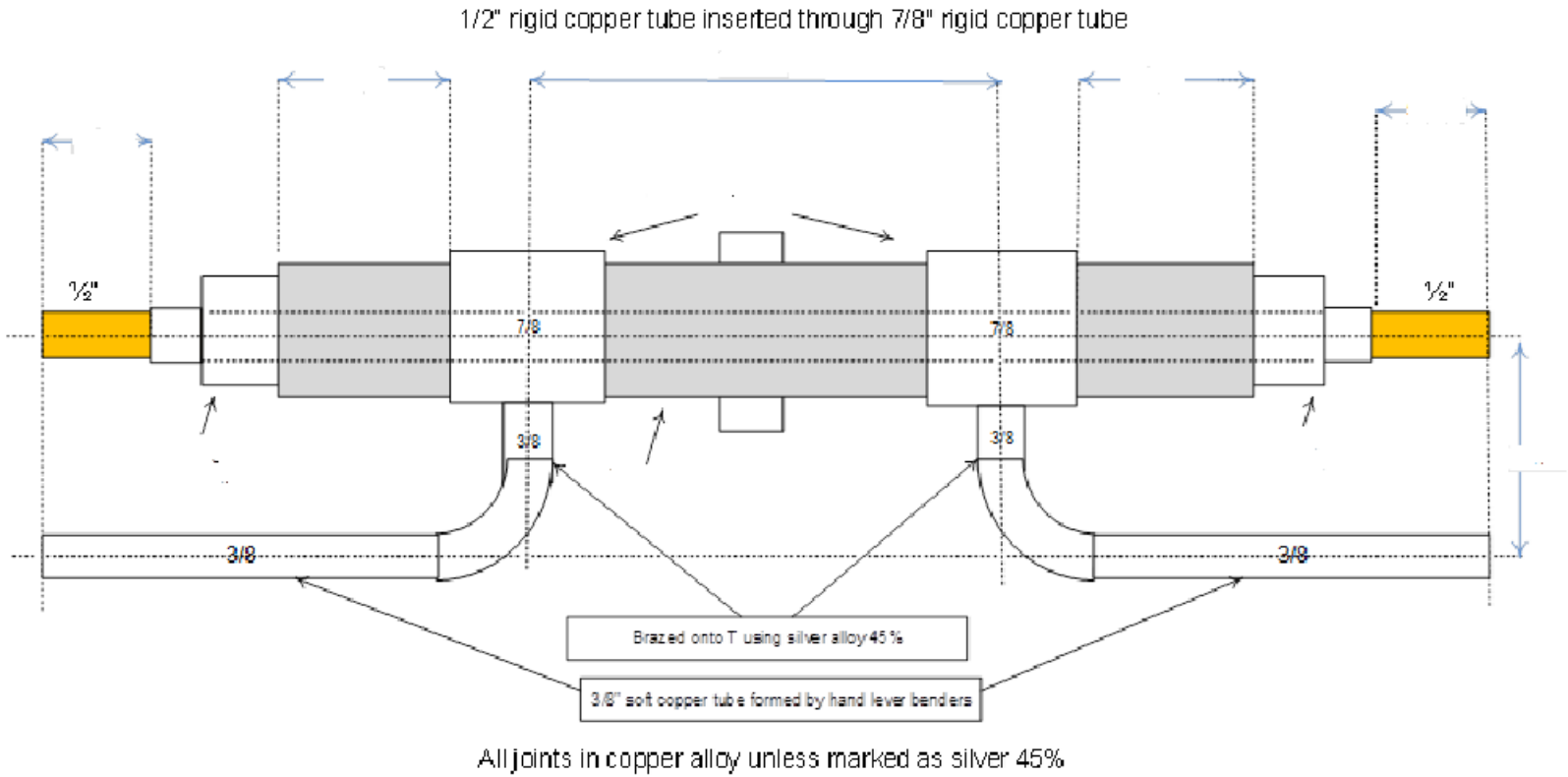
The details of the equipment are provided at the competition and provided to Competitors prior to the competition.

Additional Information

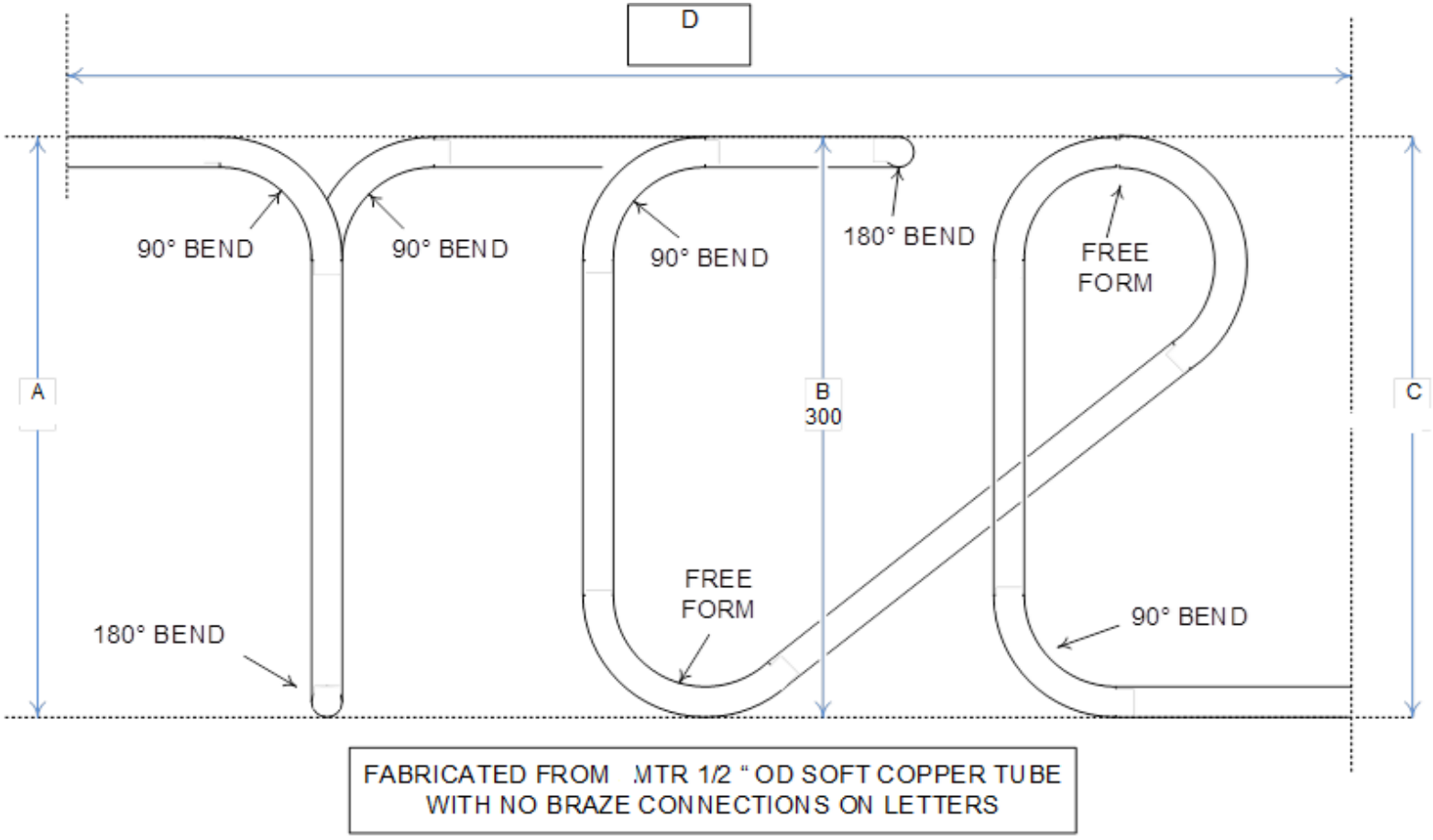
Any additional information will be provided to all Competitors at the Familiarization Session prior to start of the competition, including the Competitor's competition timetable.

Module A Component Fabrication

- **Scnc2025_TP38_BB_A4_01_EN.pdf – HEAT EXCHANGER DRAWING**

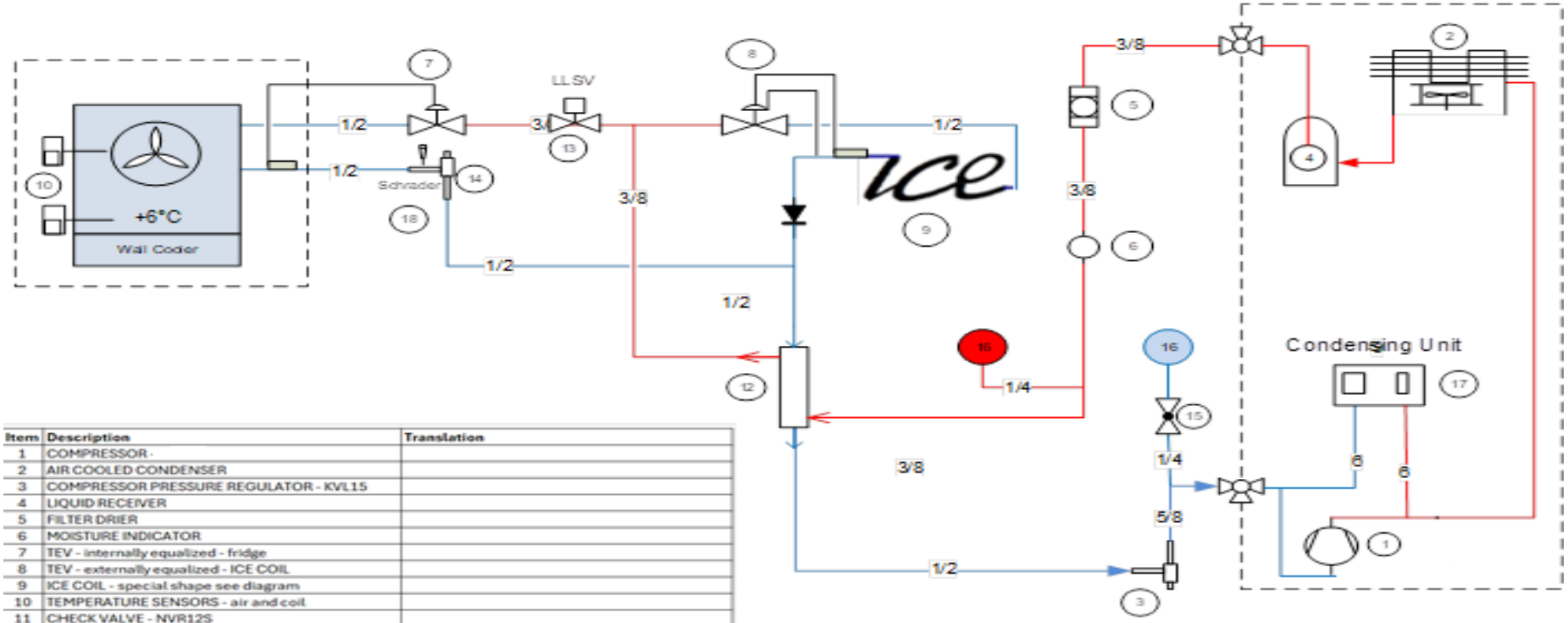


- **SCNC2025_TP38_BB_A4_02_EN.pdf – ICE COIL DRAWING**
-



Module B
Refrigeration System Installation and Commissioning

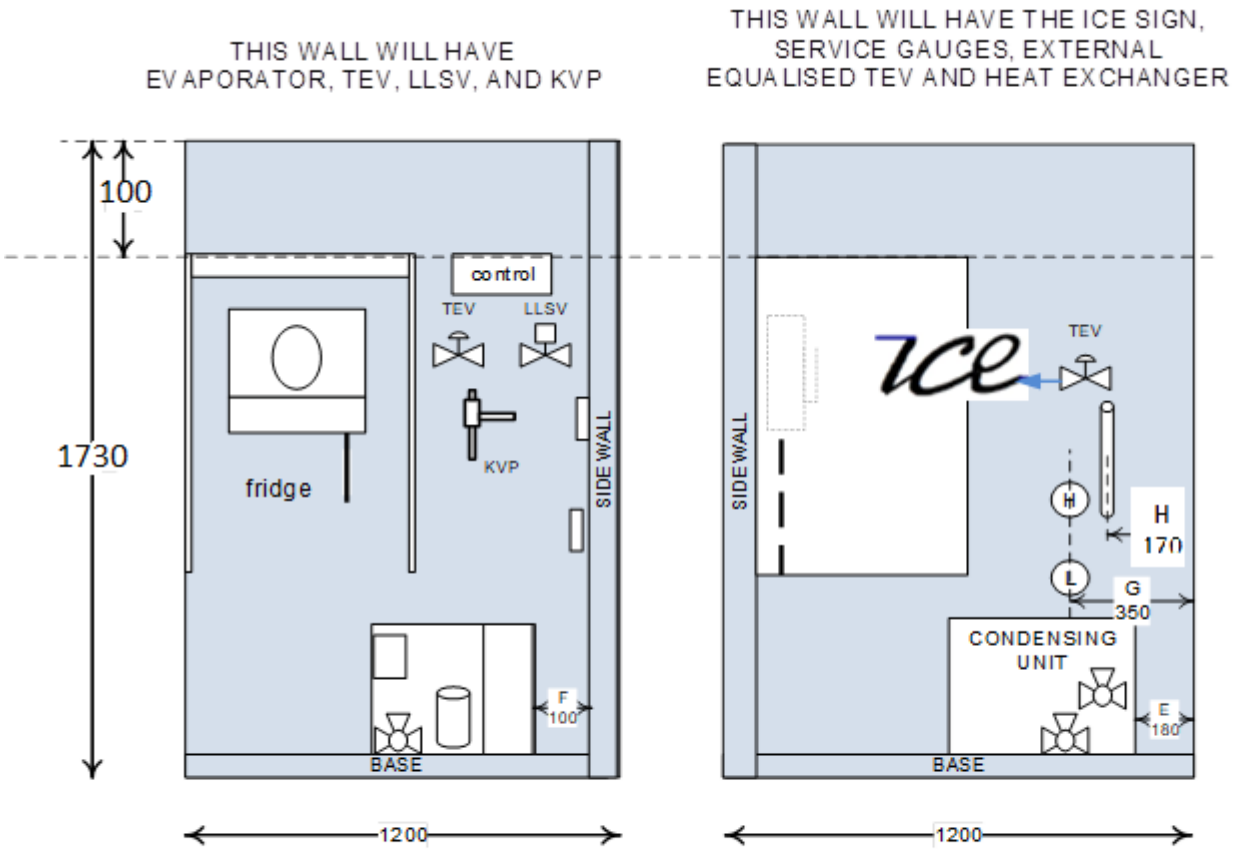
- **SCNC2025_TP38_BB_A4_03_EN.pdf - Refrigeration system piping diagram**



Item	Description	Translation
1	COMPRESSOR -	
2	AIR COOLED CONDENSER	
3	COMPRESSOR PRESSURE REGULATOR - KVL15	
4	LIQUID RECEIVER	
5	FILTER DRIER	
6	MOISTURE INDICATOR	
7	TEV - internally equalized - fridge	
8	TEV - externally equalized - ICE COIL	
9	ICE COIL - special shape see diagram	
10	TEMPERATURE SENSORS - air and coil	
11	CHECK VALVE - NVR12S	
12	LIQUID SUBCOOLER - special shape see diagram	
13	LIQUID LINE SOLENOID VALVE	
14	EVAPORATOR PRESSURE REGULATOR - KVP12	
15	HAND ISOLATION VALVE	
16	PRESSURE GAUGES - Low and High	
17	DUAL LP / HP PRESSURE CONTROL	
18	SHRADER CONNECTION on KVP valve	

worldskills	Skill 38 Refrigeration and Air Conditioning		
	Refrigeration Piping Diagram 01	WSUK Pressure test	Date:18.06.2024 Version 1.1

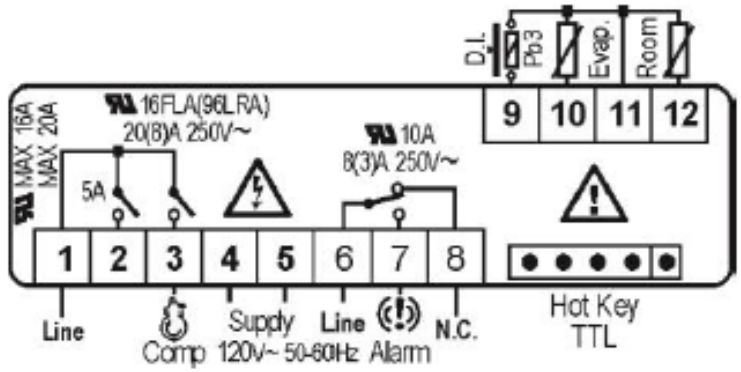
SCNC2025_TP38_BB_A4_04_EN.pdf –
Refrigeration system components layout



Drawing – not to scale

worldskills	Skill 38 Refrigeration and Air Conditioning		
	Refrigeration Component Layout	WSUK Pressure Test	Date: 23.06.2024 Version 1.0

SCNC2025_TP38_BB_A4_05_EN.pdf - Electrical circuit diagram



SCNC2025_TP38_BB_A4_06_EN.pdf - Refrigeration system installation specifications

- A crankcase pressure regulator is used to prevent excessive compressor current on start up.
- An evaporator pressure regulator is used to control chill room saturation pressure at the design temperature.
- Competitors are required to connect all components to a control box.

SYSTEM DESIGN SPECIFICATIONS

The following system design specifications for the installation should be used for commissioning and control setting and are as follows:

- Refrigerant = R513A
- Maximum ambient temperature = 32°C Db, 28°C Wb
- Medium temperature chill room saturated temperature (ST) = 0 °C
- ice coil saturated temperature (ST) = -13 °C

CONTROL AND SAFETY SETTINGS

- Dual Pressure Control
    - Low Pressure cut off -17°C and cut in at -7°C saturated suction temperature
    - High Pressure cut out when the condensing temperature reaches 55°C. The differential is factory set.
- Crankcase Pressure Regulator is to limit the compressor current to a maximum of 4 amps.

PRESSURE TEST

Note: The wall mounted low pressure gauge is rated at 120 PSIG and the low side of the Dual Pressure Control is rated at 100 PSIG

- The hermetic compressors must be included during the pressure test.
- The low-pressure gauge must be tested to 32°C saturation temperature.
- The low-pressure gauge is to be isolated when the remaining system is pressure tested to the equivalent to 55˚C saturation temperature.

Pressure test must be satisfied before the evacuation can commence.

Insulation cannot be fitted until the pipework has been marked by experts.

EVACUATION

- Evacuate the complete system including the compressor to achieve a vacuum of at least 1000 microns
- After the vacuum pump is isolated from the system, wait for the deep vacuum to settle below 1000 micron and then start the vacuum rise test for ten (10) minutes.
- The evacuation pressure MUST NOT rise above 1500 microns in the Ten (10) minutes.

Evacuation rise test must be satisfied before refrigerant charging can be carried out.

Example,

Start test below 1000 micron,

Vacuum level after 10 minutes = 1501 micron

Test has failed

Module C Refrigeration system demonstration

Competitor is to demonstrate the operational function and controller settings.

Set point +10°C

Control differential 1K

Defrost duration 10 minutes

Defrost frequency 4hrs

High temperature alarm +15°C

Low temperature alarm +5°C

Fan delay not applicable

Room temperature sensor

Coil temperature sensor