TECHNICAL DESCRIPTION

Information Network Cabling

world skills international

TD02 v3.0 – WSC2011

WorldSkills International, by a resolution of the Technical Committee and in accordance with the Constitution, the Standing Orders and the Competition Rules, has adopted the following minimum requirements for this skill for the WorldSkills Competition.

The Technical Description consists of the following:

Effective 31.03.10

Liam Corcoran
Technical Committee Chair

1. INTRODUCTION

1.1 Name and description of skill

1.1.1 The name of the skill is Information Network Cabling.

1.1.2 Description of skill
Competitors in this skill area will understand the requirements of communications cabling design and installation at Layer 1 of the ISO standard. The Competitor will be required to install Fibre Optic and Copper cabling to International standards.

1.2 Scope of application

1.2.1 Every Expert and Competitor must know this Technical Description.

1.2.2 In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

1.3 Associated documents

1.3.1 As this Technical Description contains only skill-specific information it must be used in association with the following:

- WSI - Competition Rules
- WSI - Competition Manual
- WSI - Online resources as indicated in this document
- Host Country - Health and Safety regulations

2. COMPETENCY AND SCOPE OF WORK

The Competition is a demonstration and assessment of the competencies associated with this skill. The Test Project will consist of practical work only.

Competitors will be required to demonstrate installation and troubleshooting skills to a professional standard.

2.1 Competency specification

The Competitor must be competent in completing the following modules to ISO En 11801 and equivalent TIA/EIA cabling standards:

- Single and multi mode fibre installation
- Fibre splicing
- Connect copper cables
- Building cabling (include backbone and horizontal)
- Demonstrate knowledge of ISO and TIA/EIA 568 standards
- Residential cabling (office and house cabling)
- Connecting F connectors
- Speed quality and test for both copper and fibre cabling systems
- Troubleshooting
- Fibre installations both single and multi mode
- Measurement of channel and permanent links
- Copper installations including but not limited to Cat5, Cat5e, Cat6, Cat6e and Co-ax.

2.2 Theoretical knowledge

2.2.1 Theoretical knowledge is required but not tested explicitly.

- The theoretical knowledge is limited to that necessary to carry out the practical installations.
- Preparation and execution of Network Cabling's exercises must be to ISO En and TA/EIA standards.
- The Competitor must have an appropriate level of knowledge and understanding of both the industry and Competition safety standards.
- The Competitor must have the knowledge to select the appropriate materials and consumables during the Competition.

2.2.2 Knowledge of rules and regulations is not examined.

2.3 Practical work

The Competitor has to carry out the following tasks:

Cable Termination

- Terminate balanced-twisted pair cables in: outlets, patch panel, termination blocks
- Terminate RJ modular plugs and jacks
- Terminate a coaxial cable
- Terminate optical fibre
- Optical fusion splicing
- Optical fibre mechanical splicing.

Installation

- Install both floor and wall mounted cable distribution racking systems
- Install fibre cables, single and multi mode
- Installations of distribution boxes
- Install FO closures
- Install FO rack mounted distribution panels
- Install FO wall mounted distribution boxes and outlets
- Install copper cable, multi pair, co-ax and category rated cables

Testing and troubleshooting

All testing shall be done with a cable analyser based on the standards in the Test Project for both copper and fibre cabling:

- Certification test of copper cable circuits
- Certification test of optical fibre cable circuits

3. THE TEST PROJECT

3.1 Format / structure of the Test Project

The format of the Test Project is a series of standalone modules.

3.2 Test Project design requirements

Module 1: Install campus backbone cabling

- Plan and design cabling system
- FO distribution box
- Outside plant FO enclosures
- FO patch panels
- Cable management systems
- Install FO cabling

Module 2: Install Building Cabling

- FO distribution box
- Outside plant FO enclosures

- Install FO cabling
- FO connection with splicing techniques
- Install copper cabling
- Copper patch panels
- Cable management systems
- Multi pair blocks

Module 3: Residential cabling for copper and fibre

- Multimedia cabling to include:
  - Voice cabling
  - Data
  - Television / multimedia
- FO connection using splicing techniques
- FO distribution box
- Install copper cabling

Module 4: Speed test

- Speed and quality test of fibre optic splicing
- Speed and quality test of copper connections

Module 5: Troubleshooting for copper and/or fibre cabling

- Closed task
- Every Expert brings a closed task. The task will be selected by voting among Experts. The material used in the closed task will be sourced from the provided materials.

3.3 Test Project development

The Test Project MUST be submitted using the templates provided by WorldSkills International (http://www.worldskills.org/competitionpreparation). Use the Word template for text documents and DWG template for drawings.

All Test Project proposals shall comply with this Technical Description and the Test Project checklist. Test Project submission is optional for first-time Experts.

3.3.1 Who develops the Test Project / modules

The Test Project / modules are developed and validated by all eligible Experts.

3.3.2 How and where is the Test Project / modules developed

The Test Project/modules are developed independently until 4 days before the Competition and then jointly with other Experts, the Chief Expert and the Deputy Chief Expert as per the timeline shown below.

This is done by creating four groups each of at least three (3) Experts (if possible) to be responsible for the development of each module. Each team will be allocated a day's module to design. Each team will be allocated a team leader.

3.3.3 When is the Test Project developed

The Test Project/modules are developed according to the following timeline:

Time	Activity
12 months before the Competition Chief Expert, Deputy Chief Expert and Jury President	Test Project groups (a minimum of 2) will be selected at the previous Competition. The function is to take responsibility of modules and create Test Project scripts and marking schemes required for the Competition. Agreement will be made through the use of the forum. The 50% +1 rule will apply. In the event of these sub-groups failing to produce the required projects a team consisting of the CE, DCE and team leaders will produce the Test Project.
Not less than 12 months before the Competition	Chief Expert, Deputy Chief Expert and Jury President will contact all available Experts for submission of proposals. The Infrastructure List will be developed in consultation with the Host Country.
Not less than 6 months before the Competition	The Test Project is finalised by all Experts and sent to the Technical Director. The Test Project will be circulated by the Technical Director on the WSI website.
At the Competition	Experts will be required to bring proposed changes to the Test Project to the Competition for selection for the final Test Project. By C-4 all Experts will agree on a 30% change to the Test Project. Only material included in the Infrastructure List may be used for the 30% change.

3.4 Test Project marking scheme

Each Test Project must be accompanied by a marking scheme proposal based on the assessment criteria defined in Section 5.

3.4.1 The marking scheme proposal is developed by the person(s) developing the Test Project. The detailed and final marking scheme is developed and agreed by all Experts at the Competition.

3.4.2 Marking schemes should be entered into the CIS prior to the Competition.

3.5 Test Project validation

The CE, DCE and the WSS will decide together that it is possible for all modules to be completed. Time, competitor skill and materials will be taken into consideration.

3.6 Test Project selection

The Test Project is selected by vote of Experts at the current Competition.

Any Expert who fails to submit a Test Project as a proposal shall not be eligible to vote on the Test Project selection.

3.7 Test Project circulation

The Test Project will be circulated 6 months before the current competition on the WSI website.

3.8 Test Project coordination (preparation for Competition)

Coordination of the Test Project will be undertaken by the Chief Expert and the Deputy Chief Expert.

3.9 Test Project change at the Competition

As documented in 3.3.3 a 30% change will be made to the Test Project at the Competition.

3.10 Material or manufacturer specifications

Material and manufacturer specifications are available on the Infrastructure List which can be viewed by going to this link - http://www.worldskills.org/index.php?option=com_td&Itemid=444

4. SKILL MANAGEMENT AND COMMUNICATION

4.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration and decision making regarding the skill must take place on the skill-specific Discussion Forum (http://www.worldskills.org/forums). All skill-related decisions and communication are only valid if they take place on the forum. The Chief Expert (or an Expert nominated by the Chief Expert) will be moderator for this forum. Refer to Competition Rules for the timeline of communication and competition development requirements.

4.2 Competitor information

All information for registered Competitors is available from the Competitor Centre (http://www.worldskills.org/competitorcentre).

This information includes:

- Competition Rules
- Technical Descriptions
- Test Projects
- Other Competition-related information

4.3 Test Projects

Circulated Test Projects will be available from worldskills.org (http://www.worldskills.org/testprojects) and the Competitor Centre (http://www.worldskills.org/competitorcentre).

4.4 Day-to-day management

The day-to-day management is defined in the Skill Management Plan that is created by the Skill Management Team led by the Chief Expert. The Skill Management Team comprises the Jury President, Chief Expert and Deputy Chief Expert. The Skill Management Plan is progressively developed in the six months prior to the Competition and finalised at the Competition (agreed by Experts and submitted to the Chair/Vice Chair of the Technical Committee). The Chief Expert is to regularly share updates of the Skill Management Plan via the Forum.

5. ASSESSMENT

This section describes how the Experts will assess the Test Project / modules. It also specifies the assessment specifications and procedures and requirements for marking.

5.1 Assessment criteria

This section defines the assessment criteria and the number of marks (subjective and objective) awarded. The total number of marks for all assessment criteria must be 100. Each module will be assessed as follows:

Section	Criterion	Marks		
		Subjective (if applicable)	Objective	Total
A	Design	5	5	10
B	Cabling		35	35
C	Functionality		15	15
D	Process	10	10	20
E	Speed		15	15
F	Safety		5	5
	Total =	15	85	100

5.2 Subjective marking

Scores are awarded on a scale of 1 to 10.

5.3 Skill assessment specification

The skill assessment criteria are clear concise aspect specifications which explain exactly how and why a particular mark is awarded. The following aspects will be assessed in each of the criterion.

A – Design
- Design of a structured cabling system to a given customer specification and complying with current cabling standards.

B – Cabling
- Closure of cabling
- Patch panel cabling
- Rack cabling
- Method/treatment of cabling
- Fixation of cable
- Cable management

C – Functionality
- Verification of the cabling correctly connected

D – Process
- Work tasks performed in a professional manner

E – Speed
- Number of successful connections (to required standard)
- Completion of the task in the allocated time

F – Safety
- All tasks performed in accordance with relevant Health and Safety standards.

5.4 Skill assessment procedures

Process of marking
- The Experts that attend the Competition will be divided into marking groups to deal with each section of the marking criteria.
- Every completed module will be marked on the same day in which it was completed.
- To ensure transparency, each Competitor is provided the same evaluation sheet as used by the Experts.
- The Experts agree that a majority vote is needed to:
  - Change scoring system (within limits specified in the Technical Description)
  - Change Competition sequence or content
  - Agree on a solution for disputes concerning points awarded etc.

6. SKILL-SPECIFIC SAFETY REQUIREMENTS

Refer to Host Country Health & Safety documentation for Host Country regulations.
Skill-specific safety requirements are:

- All Competitors must use safety glasses when using any hand, power or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes.
- A first-aid kit must be available throughout the Competition.
- Experts will use the appropriate personal safety equipment when inspecting, checking or working with a Competitor's project.

7. MATERIALS & EQUIPMENT

7.1 Infrastructure List

The Infrastructure List lists all equipment, materials and facilities provided by the Host Country.

The Infrastructure List is online (http://www.worldskills.org/infrastructure/).

The Infrastructure List specifies the items & quantities requested by the Experts for the next Competition. The Host Country will progressively update the Infrastructure List specifying the actual quantity, type, brand/model of the items. Host Country supplied items are shown in a separate column.

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. Experts must advise the Technical Director of any increases in space and/or equipment.

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition.

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring – they are specified below.

7.2 Materials, equipment and tools supplied by Competitors in their toolbox

- In an attempt to reduce the Competition carbon footprint tool boxes should not exceed a volume of 0.13 cubic metres, approximately 570mm x 570mm x 400mm in size.
- All Competitors are allowed to bring their own hand tools including small storage boxes.
- Items identified in the Infrastructure List may not be brought to the Competition.
- See point in section 7.4 about fabrication of jigs and special fixtures.

7.3 Materials, equipment and tools supplied by Experts

None

7.4 Materials & equipment prohibited in the skill area

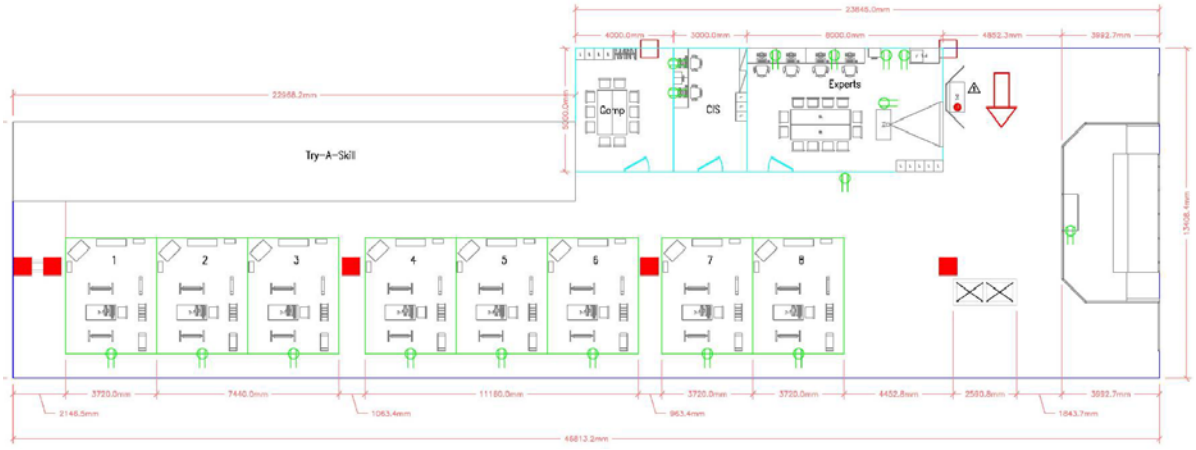
The Competitors are not allowed to bring their own tables, chairs and special jigs or fixtures.

Jigs and special fixtures may be fabricated by the Competitor from materials supplied in the Infrastructure List during Competition time.

7.5 Sample workshop layouts

Workshop layouts from Calgary are available at:
http://www.worldskills.org/index.php?option=com_halls&Itemid=540

Workshop layout from previous Competition:



8. MARKETING THE SKILL TO VISITORS AND MEDIA

8.1 Maximising visitor and media engagement

The following is a list of possible ways to maximise visitor and media engagement for this skill.

- Try a trade
- Display screens
- Test Project descriptions
- Enhanced understanding of Competitor activity
- Competitor profiles
- Career opportunities
- Daily reporting of competition status

8.2 Sustainability

- Recycling
- Use of 'green' materials
- Use of completed Test Projects after Competition