

NATIONAL SKILLS COMPETITION

Competitions Sub-Committee

PLUMBING (BCP#6)

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INTRODUCTION

WorldSkills Jamaica , by a resolution of the National Organizing 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 National Skills Competition.

The Technical Description consists of the following:

- Section 1 – Technical/Competition Description (TD)
- Section 2 – Project Design Criteria (PD)
- Section 3 – Skill Management Procedures (SM)
- Section 4 – Workshop Setup (WS)
- Section 5 – Infrastructure List (IL)
- Section 6 – Appendices

Effective 01.04.07

Grace Mclean (GM)

Chairman, Competition Committee

01.04.07

Daphne Simmonds

Co- chair

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The National Skills Competitions Sub-Committee has adopted the following minimum requirements for applicants' entry in the WorldSkills Jamaica Competition.

The effective date will be that date on which this document is issued, and is subject to change by the WorldSkills Jamaica Competition National Organizing Committee.

1. NAME AND DESCRIPTION OF SKILL

1.1 The name of the skill is:

1.1.1. Plumbing

1.2 Plumbing covers the construction of sanitary facilities, and their maintenance and repair; the installation of gas, water and effluent pipes using commercial materials and the appropriate accessories and appliances.

1.3 **This technical description must be known to every candidate.**

1.4 Words implying masculine gender only shall include the feminine gender.

2. SCOPE OF WORK AT COMPETITION

2.1 The test project consists only of practical work.

2.2 The theoretical knowledge is limited to that necessary to carry out the practical work. Knowledge of rules and regulations is not examined.

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3. PRACTICAL WORK

2.3.1 The competitor has to carry out, independently, two of the following tasks using the appropriate technical skills:

2.3.2 Processing commercial materials into a simple installation according to drawings, making use of the necessary technical skills

2.3.3 Building up part of a gas, water or effluent pipe

2.3.4 Constructing a sub-assembly of an installation on prescribed framework

2.3.5 Complying with the standard dimensions drawn up

2.3.6 The project will comprise:

2.3.7 Two (2) modules to be installed over a two day period.

2.3.8 There shall also be a fault-finding demonstration of half hour duration.

2.3.9 Competitors will undertake the fault-finding module in rotation, under the supervision of 2 experts in an isolation booth, viewed by the general public.

2.3.10 The appropriate technical skills are:

- Measuring and marking of appliances and pipe work
- Bending of pipes by machine and by hand (refer project design criteria), sand or spring
- Silver/soft soldering, crimping (PE/PB/CU), fusion joints (PE)
- Connecting by threading, clamping, compression joints
- Assembly of pipes, appliances and accessories, at a workstation fixed by means of adjustable clipping system keeping dimensions and alignment as indicated
- Pressure test using water and air

2.3.11 ipe Bending Schedule

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- Heat bend – 1 only for each pipe size to 22mm copper/steel
- Machine bend – up to 25mm copper and up to 32mm black mild steel
- Fittings – used as required
- No steel above 1 1/4"
- Radius of hand bends in copper and steel not to exceed four times the outside diameter of the pipe.

4. SKILL MANAGEMENT PROCEDURES (SM)

4.1. DOCUMENTS REQUIRED

3.1.1 The Chief Expert will have available a current copy of all documents associated with this skill for the Competition.

3.1.2 The documents required are:

- Technical Description
- Competition Rules
- Health and Safety documents
- QAMS – all documents
- Any other documents referred to in the documents listed above.

3.1.3 While it is understood that the Chief Expert will have a copy of these documents in there shall also be a complete set that is available for the experts and other competition workers.

3.1.4 The Chief Expert is expected to have a sound knowledge of the requirements and procedures specified in the documentation.

3.1.5 The Jury President is expected to have a thorough knowledge and understanding of the requirements and procedures specified in the documentation.

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4.2 PRE-COMPETITION RESPONSIBILITIES

3.2.1 In the period between one National Skills Competition and the next, the elected Chief Expert is responsible to ensure that the requirements of Section 2 – Project Design Criteria are complied with.

4.3 SKILL MANAGEMENT PROCEDURES FOR THE CHIEF EXPERTS

The following speaks to the procedures prior to and during the Competition:

3.3.1 The procedures specified below must be adhered to.

3.3.2 On arrival at the Competition site for the first time, the Chief Expert must:

- Welcome the experts and ensure introductions are made
- Inform them of their duties and responsibilities in terms of the Competition Rules and Standing Orders
- Ensure that the project is endorsed by all the experts and that a copy is signed by all the experts

3.3.3 The Chief Expert will then divide the experts into teams for the following activities:

- Verify that the material on site is appropriate and sufficient
- Verify again that the quantities of material as specified on the material list is accurate
- Develop a program for the competitors to complete the modules
- Develop timetables for activities
- Set up equipment
- Confirm that the layout, work areas and equipment are in accordance with the workshop setup requirements
- Confirm that all machinery/equipment is in a safe working order
- Confirm that all workstations/machinery/equipment are in accordance with the plan, and that they are numbered
- Confirm that there is sufficient illumination

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- Confirm that there is sufficient space for the competitors to work efficiently
 - Confirm that the barriers are far enough removed from the competitors to ensure that there will be no interference, and if they are not, set up a roster among the experts to police the area during the Competition
 - If necessary, set up duty rosters for activities during the Competition – e.g. keeping watch during lunch, preventing access of unauthorised persons, etc
- 3.3.4 The Chief Expert will then divide the experts into teams for purpose of marking and setting up marking schedules in accordance with the requirements.
- 3.3.5 Suggestions and comments for the revision and improvement of the Technical Description are to be provided to the Deputy Chief Expert in writing. The Deputy Chief Expert will reduce the information to a single typed document ready for discussion by all experts. Prior to leaving the Competition site, the Chief Expert, the Deputy Chief Expert and the Jury President will facilitate the discussion and revision of the Technical Description.
- 3.3.6 At any time that a unanimous decision is not achieved within a reasonable time, the Chief Expert will put the matter under discussion to the vote. A majority will be 50% of the experts present plus one. This decision will be final. In the event that an expert is absent at the time that the vote takes place, he/she has the right to be informed of the decision but the matter will not be raised again or voted upon again. The exception to this majority rule will be in the case of approval of the changes to the Technical Description, where the majority of 80% is required.
- 3.3.7 In the event that an extension of time is requested for the Competition to exceed the allotted hours, the matter must be discussed with the Jury President. All possible alternative solutions must be investigated before approval of an extension of time is requested, or will be approved.

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- 3.3.8 Prior to the end of the Competition, the Jury President will facilitate the selection of the Chief Expert and Deputy Chief Expert for the next national Skills Competition.
- 3.3.9 Experts are eligible for selection as a Chief Expert if they:
- Have attended the National Skills Competition at least twice before (if less than 4 experts have been to the National Skills Competition before, this criterion may be relaxed at the discretion of the Jury President)
 - Demonstrate a high degree of expertise in the skill
 - Demonstrate leadership qualities.
 - Are competent using a computer and the Internet – specifically to facilitate the Discussion Forum for their skill category.
- 3.3.10 The process by which selection will take place is by secret ballot and is as follows:
- Each expert present will list their choice of three experts in order of preference
 - The Jury President will allocate a score of three (3) points to each experts first preference, two (2) points to the second preference and one (1) point to the third preference
 - The Jury President will then calculate total scores and announce the three highest scoring experts
 - The expert with the highest score will be appointed Chief Expert for the next National Skills Competition
 - If the first choice cannot attend, then the second choice will be Chief Expert
 - If the first and second choice cannot attend, then the third choice will attend
 - If none of the choices can attend, then the jury president will appoint, or facilitate the appointment of a Chief Expert
 - The names of the selected experts will be entered into the provided documentation and signed by the Jury President and returned to the co-chair of the competitions committee.

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- 3.3.11 Changes to the method of Competition design or suggestions offered for the next Competition design process or tasks must be written down and signed by 80% of the experts.
- 3.3.12 The Deputy Chief Expert's primary role is to ensure that the Technical Description is updated to reflect the technological advances of the skill category and include overall improvements for the preparation and running of the Competition. He/she will ensure that all changes to the Technical Description are entered, that all experts sign it, and that it is delivered to the co-chair of the competitions committee as a hard copy and digitally.
- 3.3.13 The Deputy Chief Expert also assists in the distribution and collection of the QAMS Audit Questionnaires and assists the Chief Expert where necessary.

4.4 HONESTY AND TRANSPARENCY

- 3.4.1 The competitors that attend the National Skills Competition have the right to expect fair and honest treatment during the Competition in terms of the following:
- Instructions that are clear and unambiguous
 - Marking schedules that provide no advantage to an opposing competitor
 - All necessary equipment and material specified within the skill documentation that are required to complete the Competition
 - The assistance necessary from judges and officials to ensure that he is able to complete the project. (The assistance deemed necessary will be provided equally and at the same time to all competitors present)
 - No undue interference by officials or spectators that may hinder them in the completion of their project

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- 3.4.2 Every competitor has the right to expect and demand that no opposing competitors will receive undue or unfair assistance or intervention that may provide that opposing competitor with an unfair advantage.
- 3.4.3 All officials and judges present on the Competition site are expected to ensure that paragraphs 3.4.1 and 3.4.2 above are complied with and maintained.
- 3.4.4 It is the responsibility of the Chief Expert or his Deputy to ensure that all competitors, interpreters, officials and judges comply with and maintain the integrity of the Competition, and additionally ensure that all necessary steps are taken to ensure that:
- Outside influences do not unduly improve or decrease competitors' abilities to provide a worthy performance.
- 3.4.5 A briefing will be provided to all experts and competitors on the requirements for integrity during the Competition.
- 3.4.6 Additionally, the Chief Expert is expected to identify these and any other factors that may exist on the Competition site that may result in the contravention of paragraphs 3.4.1 and 3.4.2 above, and reduce them to a checklist for continuous reference.
- 3.4.7 In the event that any competitor, judge, official, observer or competitor compatriot is found to be attempting to gain or provide assistance in any form that may result in an unfair advantage, the Chief Expert is to immediately refer the matter to the Jury President.
- 3.4.8 The Chief Expert will receive nominations and appoint a Security Officer whose responsibility it will be to ensure that these requirements are carried out.
- 3.4.9 It will be explained to all experts and competitors that nothing is to come in or out of the site unless specified by the Chief Expert as being allowed after being briefed on this topic.

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3.4.10 Security checks will be carried out each day on experts and competitors (by experts and competitors) upon entry and exit to the site.

4.5 INFORMATION POLICY

3.9.1 During the competition a modified project plan without measurements is to be made available to the public.

5. THEORETICAL KNOWLEDGE

4.1 Interpretation and execution of drawings, sketches and diagrams according to industry standards.

4.2 Ability to understand the drawing supplied by experts and manufacturer's Specifications

4.3 Knowledge of plumbing materials and how to process them.

6. MATERIAL

Materials (local materials and fabrications - glazed clays and ceramic materials)

5.1 Appliances: WC assembly, washbasin, bath, shower, washbowl, hot water heater (electric, gas) with their accessories and safety devices.

5.2 Materials: Galvanized and black steel pipes, copper pipes, plastic pipes for drinking water and waste, commercial fittings as required, sealing and fixing materials.

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7. WORKSHOP INSTALLATIONS

6.1 A workstation on which the competitor will assemble the project to comply with the accepted project.

- General requirements

The following will be made available for competitors:

- Emery wheel 1 for 4 competitors

6.3 As a guide, the workstation should be 3.5m long by 2 m high. The workstation may be in any configuration to suit the pipe-work design. The work area should be sufficient to contain the workstation and the equipment and requirements specified in Sec 6.4 below.

6.4 The following machines and equipment will be made available to each competitor:

- 1 work bench with engineers vice and pipe vice, of standard size
- 1 gas-welding equipment, with torch etc. for welding and brazing
- 1 soft soldering equipment and soldering material
- 1 electrical connection (type to be specified before the Competition)
- 1 small step-ladder (optional – refer accepted workstation)
- 1 layout block of wood
- 1 box with sand for tube bending (fine sand)
- 1 water pot (bucket or drum)
- 1 bending machine for copper and steel tubes – appropriate
- Vertical drilling machine

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- 1 pressure test pump per competitor
- 1 air-testing device per competitor for testing gas-pipe work
- Anvil
- 1 hand bending machine for cooper tubes
- 1 set pipe-threading dies
- 1 pipe cutter machine for steel tubes and soil pipe in plastic
- 1 sizer for copper tubes
- 1 control and measuring equipment

6.5 The following list of tools, which the competitor could bring, is provided for guidance.

- 1 x 2m measuring tape
- 1 x torch pliers
- 1 x 500 mm steel rule
- 2 x engineers' squares
- Several adjustable spanners
- 2 x engineers' try squares
- 1 x screw wrench
- 1 450 try square
- 1 x L-pipe tongs 1,5"
- 1 x bevel square
- 1 x pipe-tongs 10"
- 1 x 600 mm spirit level
- Screw-drivers 1 - 6
- 1 x pipe cutter for copper pipes
- 1 x compass
- 1 x pipe cutter for PVC pipes
- 1 x marking awl
- 1 x de-burrer for copper pipes
- 1 x gas-lighter

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- 1 x welders' goggles
- 1 x safety glasses
- 1 x 300 g hammer
- 1 x steel-wire brush
- 1 x 500 g hammer
- Several files
- 1 x plate shears
- 1 x metal-cutting saw

Each competitor must be equipped with the appropriate personal safety equipment.

6. The following equipment will be made available to each group of experts –

Maximum 4:

- 1 x 2 metre engineer rule
- 1 x 1 metre engineer rule
- 1 x 500 mm/300 mm engineer rule
- 1 x engineer square 200 mm x 300 mm
- 1 x engineer square 150 mm x 150 mm
- 1 x spirit level 2 m / 1.8 m
- 1 x spirit level 600 mm
- 1 x spirit level 300 mm
- 1 x digital level

8. TEST PROJECT MARKING

8.1. METHOD

The experts will decide together on the test project, the marking criteria and the dimensional tolerances on forms provided. and will prepare the material list for the project.

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8.2. MARKS

All marking will be objective (At no time will subjective marking be used).

- Objective marking will be as follows:
 - Specific dimensional tolerances - +/- 2mm and +/- 4mm
 - All remaining aspects will be marked with a YES or NO response.

Example – Skill component – Joints

Q1	Has the joint been properly prepared?	Y	N	(1 Mark)
Q2	Is the joint even and consistent?	Y	N	(1Mark)
Q3	Has the joint been pressure tested?	Y	N	(1 Mark)
		Possible Total		3 Marks
		Actual Total		

- Deductions will be made from the total mark as follows:
 - For each additional meter of pipe – 1.0%
 - For each additional fitting or joint used – 0.5%
- Dimensional tolerance will be:
 - Full dimension mark +/- 2mm
 - Half dimension mark +/- 4mmFor all linear dimensions and bend radii
- Pressure Test
 - Gas pipes will be air tested to 100kPa
 - Waste and vent will be air tested to 20kPa

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- Hot and cold water pipes will be hydraulically tested to 3 Bar for 2 minutes

Pressure test scoring will be:

- No leaks – Full mark for pressure test factor
- 1 leak – 60% of full mark for pressure test factor
- 2 leaks – 20% of full mark for pressure test factor

8.3. RATING

Section	Item	Maximum Points
A	Dimensions	36
B	Pressure Test	11
C	Time	5
D	Joints	12
E	Bend, Angles and Radii	11
F	Quality, Health and Safety	7
G	Plumb and Level	11
H	Material Usage	7

9. COMPETITION PROCEDURE

8.1 The competition will be worked on over two days. Modules will be completed on each day for all competitors so that progressive marking can take place, and for results to be made available each day.

8.2 Competitors will have time made available to familiarize themselves with material and processes. Where processes are particularly difficult, the judges

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will provide a subject matter expert to demonstrate the process and the competitors will be given the opportunity to practice.

8.3 The competitors will be given all competition documents including the marking criteria prior to the commencement of the competition so that they may study the requirements.

8.4 Prior to the start of the competition, each competitor will receive a detailed timetable reflecting the timing for completion of modules.

10. JUDGING PROCEDURAL REQUIREMENTS

9.1 The experts that attend the competition will be divided into marking groups to deal with each section of the marking criteria.

9.2 Every completed module will be marked on the same day in which it was completed.

11. GENERAL SAFETY REQUIREMENTS

10.1 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.

10.2 All competitors must wear appropriate clothing and regulation safety footwear.

10.3 All competitors must wear hearing protection when necessary.

10.4 All machinery, equipment and safety clothing must comply with the safety rules indicated.

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- 10.5 Competitors must keep their workspace clear of obstacles and the floor space clean of material and equipment - any items likely to cause the competitor to trip, slip or fall.
- 10.6 Failure by the competitor to comply with safety directions or instructions will incur loss of marks for safety.
- 10.7 Judges will wear the appropriate personal safety equipment when inspecting, checking or otherwise working with a competitor's project.