Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

STEEL BAR WORKS

PWOSB401 Perform steel bar works

RQF Level: 4

Learning Hours 40

Credits: 4

Sector: Construction and Building Services

Trade: Public Works

Module Type: Specific

Curriculum: CBSPWO4001-TVET Certificate IV in Public Works

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<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes the knowledge, skills, and attitudes required to perform steel bar works. It is intended for learners pursuing RQF level IV in Public Works. At the end of this module the learners will be able to prepare works, make steel frames and perform closing works activities.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">Technical Drawing</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group work and presentation</td><td>30%</td></tr>
<tr><td>• Individual work</td><td>40%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competence	Performance criteria
1. Perform steel bars preliminary works	1.1. Drawings are properly interpreted according to the work to be done.
	1.2. Materials are properly identified according to the work to be done
	1.3. Quantities required are efficiently determined in accordance with the work to be done
	1.4. Tools and equipment are appropriately selected in accordance with the work to be done.
	1.5. Steel bar bending bench is appropriately installed as per work to be done
2. Make steel frames	2.1. Steel bars are appropriately cut in accordance with the work to be done.
	2.2. Steel bars are appropriately bended in accordance with the work to be done.

	2.3. Steel bars are appropriately fixed in accordance with the work to be done.
	2.4. Steel frames are appropriately installed in accordance with the work to be done.
3. Perform closing activities	3.1. Workplace is properly cleaned as per environmental requirements
	3.2. Tools and equipment are properly cleaned according to regulation manual.
	3.3. Tools and equipment are properly stored according to regulation manual.

Intended Knowledge, Skills and Attitude

Knowledge	Skills	Attitude
✓ Identify test methods and standards on steel bar works ✓ Classify Steel tools and equipment ✓ Describe characteristics of steel bars ✓ Discuss on reinforcement bars types and properties ✓ Identify units of measurement	✓ Install steel bar bending bench ✓ Cut steel bar ✓ Tie steel bars ✓ Bend steel bar ✓ Fix steel bar ✓ Install steel frame	✓ Communicate actively at workplace ✓ Demonstrate professionalism in cutting steel bars

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Prepare works 2. Make steel frames 3. Perform closing works
Learning outcome 1: Perform steel bars preliminary works	**Learning hours: 10 Hours**
Indicative content	

- **Interpretation of drawings**
  - ✓ Read working drawings
  - ✓ Identify dimension values
- **Identification of materials**
  - ✓ Types of steel
  - ✓ Properties of steel
  - ✓ Uses of steel
  - ✓ Defects of steel
- **Determination of required quantities**
  - ✓ Provide bar bending schedule
  - ✓ Calculate the required quantities of reinforcement bars
- **Selection of tools and equipment**
  - ✓ Types of tools
  - ✓ Types of equipment
  - ✓ Uses of tools and equipment
- **Installation of steel bar bending bench**
  - ✓ Setting out bench
  - ✓ Determination of spacing
  - ✓ Fixing of small rods

Resources required for the learning outcome	
Equipment	▪ Angle grinder, projector, computer
Materials	▪ Timber, reinforcement bar of different size, flip chat, board, chalk, paper, pen
Tools	▪ Hack saw, pincer, tape measure, ruler, hammer, vernier calliper, chisel, wooden saw
Facilitation techniques	▪ Brainstorming, demonstration and simulation, individual and group work, practical exercise, trainer guided and group discussion, Four steps
Formative assessment methods /(CAT)	▪ Written assessment, oral presentation, performance assessment, Project based assessment

Learning outcome 2: Make steel frames	**Learning hours: 20 Hours**
Indicative content	

- **Cutting of steel bars**
  - ✓ Types of steel bars
  - ✓ Measuring steel bars
  - ✓ Cutting techniques
- **Bending of steel bars**
  - ✓ Basic calculations on bending
  - ✓ Straightening of steel bar
  - ✓ Bending methods
- **Fixing of steel bars**
  - ✓ Tying methods
  - ✓ Steel bar overlapping
- **Install steel frame**

Resources required for the learning outcome	
Equipment	▪ Steel bar bending machine, steel bender, angle grinder, projector, computer, straightening machine
Materials	▪ Timber, Binding wires, reinforcement bar of different size, flip chat, board, chalk, paper, pen
Tools	▪ Hack saw, plier, pincer, tape measure, ruler, hook, hammer, vernier calliper, chisel, calculator
Facilitation techniques	▪ Brainstorming, demonstration and simulation, individual and group work, practical exercise, trainer guided and group discussion, Four steps
Formative assessment methods /(CAT)	▪ Written assessment, oral presentation, performance assessment, Project based assessment

Learning outcome 3: Perform closing activities	**Learning hours: 10 Hours**

Indicative content

- **Cleaning the workplace**
  - ✓ Types of waste materials
  - ✓ Cleaning methods
- **Cleaning tools and equipment**
- **Storing of tools and equipment**

Resources required for the learning outcome	
Equipment	▪ Air compressor, projector, computer, straightening machine

Materials	▪ Oil, water, wiper
Tools	▪ Metallic brush, plastic brush
Facilitation techniques	▪ Brainstorming, demonstration and simulation, individual and group work, practical exercise, trainer guided and group discussion, Four steps
Formative assessment methods /(CAT)	▪ Written assessment, oral presentation, performance assessment, Project based assessment

Integrated/Summative assessment

Integrated situation

ABC Enterprise gave a subcontract of steel bar work to a competent steel bar worker, on their construction site of modern super market located at Kimironko in Gasabo District. The work includes steel bar framework for columns and slabs. As a steel bar technician, you are asked to make steel bar framework for one column within 2 hours and slab within 4 hours:

1. The height of column is 1.5m; it is in square form of 20cm, the main bars 4ϕ12, stirrups ϕ8 @ 200mm and hook of 90^0.
2. The size of slab is 2m*2m*0.20m, the bottom bars of ϕ10@200mm, the top bars of ϕ8@ 200mm and hook of 90^0.

Additional information:

The concrete spacers for column and slab shall be 25 mm and they are available at the workplace.

Make a steel bar framework for one column and make a steel bar framework for slab.

Resources

Tools	▪ Hack saw, plier, pincer, tape measure, ruler, hook, hammer, vernier calliper, chisel, calculator
Equipment	▪ Steel bar bending machine, steel bender, angle grinder, straightening machine, PPE
Materials/ Consumables	▪ Steel bars, Binding wire, pen, paper

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	

1. Perform steel bars preliminary works **(25%)**	Drawings are properly interpreted according to the work to be done.	Dimensioning units are identified			4
		Scale used is interpreted			5
		Dimension values are identified			4
		Material symbols are identified			4
	Materials are properly identified according to the work to be done	Steel bars are selected			3
		Welding rods are selected			4
		Binding wire is selected			
	Quantities required are efficiently determined in accordance with the work to be done	Quantity of steel bar required is calculated			4
		Quantity of rods required is calculated			3
		Quantity of wire required is calculated			3
	Tools and equipment are appropriately selected in accordance to the work to be done.	Tools are selected			3
		Equipment are selected			3
2. Make steel frame **(50%)**	Steel bars are appropriately cut in accordance with work to be done.	Steel bar length is measured			5
		Steel bar pieces are cut			5
	Steel bars are appropriately bended in accordance with work to be done.	Steel bar pieces are straightened			5
		Steel bar pieces are bent			5
	Steel bars are appropriately fixed in accordance with work to done.	Steel bar pieces are tied			5
		Steel bar pieces are overlapped			5

	Steel frame are appropriately installed in accordance with work to done.	Concrete spacers are fixed on the frame			5
3. Perform closing works (25%)	Workplace is properly cleaned as per environmental requirement	Workplace is cleaned			5
	Tools and equipment are properly cleaned according to regulation manual.	Tools are cleaned			5
		Equipment are cleaned			5
	Tools and equipment are properly stored according to regulation manual.	Tools are stored			5
		Equipment are stored			5
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

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