

MATERIAL TESTING

UNIT CODE: CON/CU/CET/CR/01/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Conduct material testing

Duration of Unit: 150 Hours

Unit Description

This unit specifies the competencies required to Conduct Material Testing. It involves preparing for material testing, sampling construction materials, performing tests on alignment soils, concrete, structural steel, bitumen materials and timber. It also includes documenting test results.

Summary of Learning Outcomes

- 1 Prepare for material testing
- 2 Sample road construction materials
- 3 Undertake tests on the alignment soils
- 4 Perform concrete tests
- 5 Carry out structural steel tests
- 6 Perform bitumen tests
- 7 Perform timber tests

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare for material testing	<ul style="list-style-type: none">• Preliminary site investigations• Construction material laboratory• Material testing manuals and contract documents• Material testing tools and equipment• Construction material laboratory personnel• Development of sampling procedures• Determination of various types of material tests	<ul style="list-style-type: none">• Written tests• Observation• Oral questioning• Third party report•

2. Sample road construction materials	<ul style="list-style-type: none"> • Sources of road construction materials • Sampling procedures and standard manuals • Sampling tools and equipment • Material sample analysis • Storage of samples • Handling of material samples 	<ul style="list-style-type: none"> • Written tests • Observation • Oral questions • Third party report
3. Undertake tests on the alignment soils	<ul style="list-style-type: none"> • Alignment soil tests i.e. <ul style="list-style-type: none"> ○ Shear test ○ Trial axial ○ CBR • Standard manuals and procedures • Material test laboratory • Soil testing tools and apparatus. • Obtaining soil samples • Conducting Soil tests <ul style="list-style-type: none"> ○ CBR ○ Atterberg limit <ul style="list-style-type: none"> ▪ Liquid limit ▪ Plastic limit ○ Proctor/compaction ○ Field density ○ Particle size distribution • Analysis of soil tests results • Preparation and presentation of test report 	<ul style="list-style-type: none"> • Written tests • Observation • Oral questions • Third party report •
4. Perform concrete tests	<ul style="list-style-type: none"> • Concrete tests <ul style="list-style-type: none"> ○ Crushing test ○ Compressive strength ○ Slump ○ Cleanliness ○ Particle size distribution • Standard manuals and procedures 	<ul style="list-style-type: none"> • Written tests • Observation • Oral questions • Third party report •

	<ul style="list-style-type: none"> • Concrete testing tools and apparatus • Obtaining test samples • Preparation of concrete samples <ul style="list-style-type: none"> ○ Casting cubes ○ Curing cubes • Test for concrete • Recording of tested cubes • Analysing and reporting of test result 	
5. Carry out structural steel tests	<ul style="list-style-type: none"> • Structural steel samples • Identification and calibration of tensile testing machines • Testing of samples for tensile strength • Recording and analysing of results • Preparation and presentation of test reports 	<ul style="list-style-type: none"> • Written tests • Observation • Oral questioning • Third party report
6. Perform bitumen tests	<ul style="list-style-type: none"> • Identification of Bitumen tests • Standard manuals and test procedures • Identification and gathering of testing tools and apparatus • Obtaining of test samples • Preparation of Samples. • Conducting bitumen test <ul style="list-style-type: none"> ○ Penetration ○ Cleanliness ○ Viscosity ○ Ductility ○ Flash and Fire Point ○ Float Test ○ Loss on Heating ○ Specific Gravity 	<ul style="list-style-type: none"> • Written tests • Observation • Oral questioning • Third party report

	<ul style="list-style-type: none"> ○ Softening Point ○ Spread Rate ● Recording and analysing of test results ● Preparation and presentation of report 	
7. Perform timber tests	<ul style="list-style-type: none"> ● Timber samples ● Identification and calibration of tensile testing machines ● Testing of samples for tensile strength ● Recording and analysing of results <ul style="list-style-type: none"> ○ Preparation and presentation of test reports 	<ul style="list-style-type: none"> ● Written tests ● Observation ● Oral questioning ● Third party report

Suggested Methods of Instruction:

- Direct instruction
- Project
- Case studies
- Field trips
- Discussions
- Demonstration by trainer
- Practice by the trainee

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Recommended Resources:

- Computers
- Software
- Cameras
- Construction manuals
- Projectors
- Flip charts
- Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Drawing sheets
- Internet
- Relevant videos