

## Unit 23: Advanced Measurement for Construction

**Unit code:** T/601/1283

**QCF level:** 5

**Credit value:** 15

- **Aim**

This unit provides learners with an opportunity to develop skills in applying measurement techniques to the production of quantities for complex construction projects, in accordance with standard methods and rules.

- **Unit abstract**

This unit has been designed to enable learners studying construction, civil engineering and building services engineering to apply, analyse and measure a range of components and elements found in large-scale buildings or structures, and produce approximate and detailed quantities. The application of measurement and its use in the various stages of the lifecycle of construction projects are also examined in some detail, in terms of the design, production and maintenance of the completed structure. This unit covers the techniques used to produce preliminary items, take-off of quantities and the rules that must be followed when producing a bill of quantities. Learners will investigate the use of measurement in interim and final account valuations with regard to contract payments.

- **Learning outcomes**

**On successful completion of this unit a learner will:**

- 1 Be able to apply measurement techniques
- 2 Be able to produce measured quantities for elements and components of large-scale commercial structures
- 3 Be able to prepare preamble and preliminary items
- 4 Be able to produce measured bills of quantities.

## Unit content

---

### 1 Be able to apply measurement techniques

*Application of measurement in the construction lifecycle:* design; production; maintenance

*Measurement techniques:* production of bills of quantities; measurement of variations; production of supply and sub-contract packages; final account; maintenance; refurbishment works

### 2 Be able to produce measured quantities for elements and components of large-scale commercial structures

*Produce take-off and approximate quantities:* complex foundations; substructures (including brick and concrete basement); sloping site excavations; underpinning

*Components of a large-scale commercial structure:* concrete and steel framed buildings; in-situ; pre-cast; pre-stressed concrete structures; brick and masonry structures; complex flat and pitched roof construction; roof coverings; internal and external finishes and treatments; internal components eg doors, windows, panelling staircases and kitchen units; differing types of floor system eg raised access floors, floating floors

*Building engineering services:* plumbing; heating; ventilation; electrical installations; above-ground and below-ground disposal systems

*Measurement techniques:* interim payments; final account work; forms of procurement; types of contractual arrangement

### 3 Be able to prepare preamble and preliminary items

*Preamble clauses:* standard method of measurement requirements; preamble clauses eg workmanship, materials specification; inclusion in a bill of quantities

*Preliminary clauses:* items eg time related, unmeasurable items, supervision, plant

### 4 Be able to produce measured bills of quantities

*Methods:* traditional; cut and shuffle; computer-aided systems; computer-aided design (CAD) software eg measurement software, estimating software

*Production:* working up processes; method of producing of bills of quantities (for a major work section or trade section of a construction project)

*Payment:* production of interim and final accounts

## Learning outcomes and assessment criteria

<b>Learning outcomes</b>  <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b>  <b>The learner can:</b>
LO1 Be able to apply measurement techniques	1.1 compare the different uses of measurement in the lifecycle of complex construction projects 1.2 demonstrate the role of measurement in the design, production and maintenance stages of complex construction projects
LO2 Be able to produce measured quantities for elements and components of large-scale commercial structures	2.1 apply appropriate techniques to obtain approximate quantities for different elements of complex projects 2.2 produce take-off quantities in accordance with the requirements of a standard method(s) of measurement 2.3 determine appropriate measurement techniques and processes for particular contracts or stages
LO3 Be able to prepare preamble and preliminary items	3.1 produce specific and appropriate draft preamble clauses 3.2 produce draft preliminary clauses for inclusion in a bill of quantities
LO4 Be able to produce measured bills of quantities	4.1 demonstrate the different methods of producing bills of quantities 4.2 produce bills of quantities for complex work sections 4.3 produce interim and final account valuations and certificates for payment

## Guidance

---

### Links

This unit links with other Edexcel BTEC HN Construction and the Built Environment units, for example:

- Unit 3: Applied Mathematics for Construction and the Built Environment
- Unit 7: Construction and Maintenance of Buildings
- Unit 8: Technology of Complex Buildings
- Unit 18: Measurement Processes for Construction
- Unit 21: Specification and Contract Documentation for Construction.

The content of this unit has been designed and mapped against the current CIC National Occupational Standards and the current NVQs at levels 4 and 5. Completion of the learning outcomes will contribute knowledge, understanding and skills towards the evidence requirements of the NVQs.

- See *Annexe B* for summary of mapping information to NVQs.

This unit has also been mapped to illustrate the links to the NQF units.

- See *Annexe D* for summary of mapping information to NQF units.

### Essential requirements

It is important that learners have access to the appropriate standard methods of measurement. These should be current or include amendments where appropriate. Learners require access to relevant IT facilities and software packages to assist the measurement process.

It is essential that a culture of health and safety is embedded in all the units to ensure that the learners understand the importance and relevance of health and safety issues. Therefore there should be clearly signposted aspects of current legislation and health, safety and welfare implications throughout the delivery and assessment of this unit.

### Employer engagement and vocational contexts

Tutors should organise presentations by visiting speakers, for example quantity surveyors on computer-aided measurement techniques.