

BILLS OF QUANTITIES (BoQ)

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cidb's **inform practice notes** provide guidance and clarity in achieving client objectives in construction procurement and delivery. Practice notes inform clients and practitioners on how to embrace best practice and to deal with issues that may arise. They are aligned with, but do not replace regulation.

Synopsis:

Bills of quantities (BoQ) are the most common form of pricing strategy used where the contractor undertakes construction works on the basis of full designs issued by the employer. This practice note outlines what a bill of quantities is and provides a recommended procedure for evaluating tenders where the prices are based on a BoQ. The recommended procedure suggests that a priced BoQ is not included in the tender submission and is only called for from the highest ranked or scoring tenderer during the tender evaluation process so that the acceptability of the rates can be confirmed prior to the award of a contract.

1. What is BoQ?

ISO 6707-2 defines a bill of quantities as a document for tendering, usually prepared in standard form, comprising both a descriptive list of quantities of works and a description of the materials, workmanship and other matters required for construction works.

Bills of quantities (BoQ) are the most common form of pricing strategy used where the contractor undertakes construction on the basis of full designs issued by the employer.

A BoQ (sometimes referred to as a schedule of quantities) is a list of items giving the measured or estimated quantities and a brief description of the work to be performed under the contract. The quantities and descriptions are derived and measured from the drawings and specifications. The BoQ allows for the insertion of a rate against each item and the extension and totalling of the prices.

A BoQ has a dual purpose: It

- presents information to tenderers to enable them, by pricing each individual item as it relates to the contract data (and associated conditions of contract), the scope of work (including the specifications and drawings), the site information, to arrive at a total of prices, all of which are founded on a basis common to all tenderers.

Typical format for a Bill of Quantities

Item no	Description	Unit	Quantity	Rate	Amount

- allows those responsible for evaluating tenders to understand how the works have been priced.

Once a contract is awarded, the priced bill of quantities provides:

- the means by which the works can be valued and paid for during construction, and
- depending upon the form of contract that is used, the basis for determining the changes in prices arising from changes to the scope of work or delays and disruptions.

The contractor is paid an amount for the item of work in a bill (which is the rate for the work multiplied by the quantity completed).

2. Why use a BoQ?

The use of a BoQ on construction works contracts permits four important objectives to be achieved, these being:

- tenderers are provided with adequate information regarding the extent of the work required to enable them to accurately and confidently prepare responsive tenders,
- tender prices can be objectively compared as they have been submitted using the same information,
- employers, provided that all the work has been measured, can pre-determine the costs of contracts (and the impact of

possible variations to the works) with a high degree of accuracy, and

- the value of work carried out at any stage of a contract can be objectively determined.

Bills of quantities will be more effective in achieving the foregoing objectives if they:

- comprehensively and accurately reflect the nature of the work proposed and the circumstances under which it will be executed;
- are prepared in a standard manner for all contracts; and
- are brief and simple to use, while still being itemised in sufficient detail to distinguish between different classes of work, and between work of the same nature carried out in differing circumstances and locations.

A BoQ is usually prepared in accordance with a standard system of measurement that provides rules and procedures for describing, measuring and documenting the works in a standard manner.

3. Pricing a BoQ

The total of a tender price typically include:

- **General items:** being the items to cover the charges for compliance with contractual obligations as well as costs not directly related to construction activities
- **Construction (work) content:** being the estimates of the cost of all the items that are to be constructed or built either using own resources or subcontracted resources (i.e.. cost of people, plant, equipment and materials costs based on data gathered from previous projects, manufacturers of products and suppliers of equipment, trade associations and technical publications.)
- **Overheads:** being the operating (every day) expenses incurred in the upkeep of the business and its offices that are not attributable to individual contracts including total cost of office personnel and finance changes.
- **Risk allowance:** being an allowance to cover the perceived risks associated with the contract and the works.
- **Profit:** being the amount of profit that is added on by a construction business that does not include any of the above.

Estimates of costs are often made for groups of activities, trades or elements in relation to a construction programme. These costs

The standard systems of measurement currently used in South Africa include:

- Standard system of measuring building work published by ASAQS
- Standard System of Measuring Building Work for Small or Simple Buildings published by ASAQS
- Clause 8 of SABS 1200 standardised specifications for civil engineering construction read in conjunction with Civil Engineering Quantities 1990 published by SAICE
- COLTO Measurement and payment clauses of the Standard Specification for Road and Bridge Works for State Authorities
- Model Bills of Quantities for Mechanical Work published by ASAQS
- Model Bills of Quantities for Electrical Work published by ASAQS
- Measuring Quantities for Structural Steelwork published by SAISC

ICE-SA are in the process of finalising a South African version of ICE's Civil Engineering Standard Method of Measurement

Bills of quantities in building works are based on more precise information and details and cover more items than is the case with civil engineering works. Consequently building works are subjected to more detailed measurement. Most building contracts, with the exception of sub-structural drainage and external works, are, in the absence of changes to the scope of work, not subject to remeasurement. In civil engineering contracts, the bills of quantities are regarded as estimates of the work and are as such subject to remeasurement.

Further information on estimating and pricing a tender is provided in the CIDB publication Contractor Management Guidelines (CMG 101) – Section 2 Operating a Construction Business – Topic 9 Pricing a tender.

Rates are built up by looking at what makes up the item

include subcontract prices submitted by numerous subcontractors who usually submit a lump sum prices for inclusion in the tender. These costs are then converted into rates. Overheads, risk and profit may be spread across all the rates or included in only some of the rates, depending upon the method of operation that is employed by the contractor.

It is more important to get the total price correct for a project (rather than the individual rates where bills of quantities are used) as the total of prices determines competitive position. The rates in bills of quantities should nevertheless be a realistic assessment of the price for an item as any variations in quantities will:

- affect the total amount paid by the employer; and
- depending upon the form of contract that is used, form the basis for assessing the variations to the contract price arising from any changes to the scope of work.

Excessively high prices can cause a tenderer to be overlooked for the award of a contract due to un-competitiveness, whilst too low a price may be construed as a serious risk to a tenderer. Tenderers often analyse their tenders prior to submission and increase or decrease rates where they feel that quantities may increase or decrease in order to be more competitive or to manage risk. They may also decrease their profit. This practice may lead to unbalanced rates and present an undue risk to clients.

4. Evaluation of tenders where a BoQ forms the basis for price

The completion of a BoQ by a tenderer is a onerous task which needs to be completed within relative short time frames. Many decisions need to be made including what is the total tender price, what is the overheads and risk allowance and profit that is to be applied and what are the rates for each item. The rates that are tendered may also need to be determined from the estimated costs for groups of activities linked to a programme. Once a decision regarding the total tender price has been reached, the rates for each and every item need to be finalised. This can be a time consuming exercise.

The marking up of individual rates for overheads, risk allowance and profit as well as the request to subcontractors for individual rates usually only occurs once the tender has been submitted and is obviously not required if the tender is unsuccessful. The preparation of fully priced bills of quantities, particularly for building work, for unsuccessful tenders adds unnecessarily to the cost of tendering. This cost is passed on to the client indirectly in the form of an increase in overhead costs.

The requirement to submit a bill of quantities together with a tender can discourage tenderers from submitting tenders, particularly when work is plentiful. Tenderers may not have the time to prepare and finalise a BoQ prior to the closing time for

A decision as to what the tender price should be submitted to a client can only be undertaken when estimates of all costs, the risk allowance, the allowance for price escalation, if any, and profit has been established.

In the last analysis, the tender price that is submitted is a business decision that is based on knowledge of the market, knowledge of the construction business's likely competitors and what the effect of being awarded the contract will have on the construction business.

A transparent procurement process is one in which the criteria upon which decisions are to be made are publicized. Decisions (award and intermediate) are made publicly available together with the reasons for those decisions. It is possible to verify that the published criteria were applied in the tender evaluation process.

tenders. Tenderers may prefer to submit tenders to clients who do not require a completed BoQ to be submitted with their tender and only request a BoQ when there is a likelihood that they may be awarded the contract.

In compliance with the constitutional imperatives for transparency in procurement, the CIDB Standard Conditions of Tender requires that the competitive position of tenderers be determined by the total of prices that are submitted i.e. the prices that are read out at the tender opening. This effectively means that the rates contained in a BoQ are not considered when tenders are ranked according to tendered price. Rates only become a factor during the evaluation process when confirming the correctness of what was offered i.e. the arithmetical correctness of the extensions and the totalling of prices in the bill of quantities with the highest ranked or scoring tenderer. Errors in the computed tender price can, in some circumstances lead to the situation in which the competitive position of tenderers change. In such cases the procedure needs to be repeated. (See cidb Inform Practice Note #2 – Correcting arithmetical errors in tenders)

An analysis of rates becomes critical when considering whether or not to recommend the most competitive tenderer for the award of a contract i.e. when the evaluator ascertains if unduly high or low tendered rates, unbalanced rates or amounts in the tender offer present an unacceptable commercial risk to the employer. (See cidb Inform Practice Note #3 – Evaluating tender offers.)

5. Submitting a BoQ with a tender

The cidb standard conditions of tender permit the employer to request a tenderer to submit a bill of quantities after the closing time for tenders.

Employers may request tenderers to just complete the summary of the BoQ for each component of the BoQ and include this summary with their tender submission. These summaries, which are not onerous to complete, provide sufficient information regarding the breakdown of the prices to identify potential anomalies and allow any unrealistically priced tenders to be detected. Tenderers may, in terms of the cidb Standard Conditions of Tender (clause F.2.17), be requested to provide a breakdown of rates in order to clarify their pricing structure or to motivate their pricing of a component of the BoQ.

cidb Standard Conditions of Tender

F.3.9 Arithmetical errors, omissions and discrepancies

F.3.9.2 Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with F.3.11 for:

- a) the gross misplacement of the decimal point in any unit rate;
- b) omissions made in completing the pricing schedule or bills of quantities; or
- c) arithmetic errors in:
 - i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or
 - ii) the summation of the prices.

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Summary of bill of quantities		
Bill No	No	Amount
1	Preliminaries	
2	Earthworks	
3	Concrete formwork and reinforcement	
4	Masonry	
5	Roof coverings etc	
6	Carpentry and joinery	
7	Ceilings, partitions and access flooring	
8	Floor covering	
9	Plastering	
10	Tiling	
11	Plumbing and drainage	
12	Electrical work	
13	Glazing	
14	Paintwork	
15	External works	
Total		
Vat @14%		
Total of prices carried forward to the form of offer and acceptance		

We would like to hear from you about your progress, challenges and ideas.

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In summary, the cidb recommends that in general:

- 1) Tenderers are not required to include priced BoQs with their tender submissions at the closing time for tenders. (Tenders may, where necessary, be required to complete the summary of the BoQ and include this in their tender submission).
- 2) During the evaluation process, the highest ranked or highest scoring tenderer should be requested in terms of clause F.2.17 and F.2.18 to submit a fully priced BoQ.
- 3) The acceptability of the rates in the BoQ should be confirmed before recommending the award of the contract to the tenderer.
- 4) The accepted BoQ may be incorporated into the contract that is entered into.

cidb Standard Conditions of Tender

F.2.17 Clarification of tender offer after submission

Provide clarification of a tender offer in response to a request to do so from the employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.

F.2.18 Provide other material

F.2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.