



## ELECTRICAL AND INSTRUMENTATION WORKS

### PREAMBLE TO BILL OF QUANTITIES

#### A. GENERAL

1. The schedules of quantities set out the work in accordance with the rules described herein.
2. Unless otherwise stated, the description of each item shall be deemed to include manufacturing, conveying and delivering, unloading, storing, unpacking, hoisting, setting, fitting and fixing in position, cutting, waste, patterns, models and templates, plant, temporary works, return of packings, establishment charges, profit and other obligations arising from the conditions of contract.
3. Unless otherwise stated all work shall be **measured net** as fixed in position. All wants shall be deducted and no allowance shall be made for waste, nor passings and laps except where otherwise stated.
4. Quantities shall be rounded off to the nearest whole unit, unless the value of fractional quantities is of relative significance, in which circumstances one decimal may be added.
5. Quantities have been measured **provisionally** in the schedules of quantities for tender.
6. **Variations** resulting from an Engineer's instruction, shall be measured and valued as follows:
  - 6.1 Items of additional work of similar character and executed under similar conditions shall be priced at the rates in the schedules of quantities.
  - 6.2 Items of additional work not of a similar character or not executed under similar conditions shall be priced at comparable rates adjusted to suit the changed circumstances.
  - 6.3 Where rates are not applicable and cannot be adjusted in terms of 6.2 above to value a variation for additional work, the items of work shall be priced at new rates which take into account the labour, material and plant necessary for executing the work as well as an allowance for contractor's overheads and profit which overheads and profit shall relate to those included in the contract sum for items of a similar character.
  - 6.4 In exceptional cases and following agreement with the Engineer prior to the execution of the works, additional works may be valued on dayworks, but then only if dayworks sheets are duly submitted, agreed on and signed on a daily basis.
7. Rates are to include for supply and installation, unless otherwise noted. Separate rates for supply and installation shall be given where provision had been made in the schedules:

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**S** Supply portion including for procurement, transport, storing, wastage and everything necessary to supply the item.

**E** Installation portion including for installing the item in position and any testing, commissioning or other obligations associated with rounding off the installation of the item.

8. Rates shall be tendered for proprietary equipment as stated or to clearly specified alternatives of proposals for items not fully specified. In all instances the Contractor, as a specialist in security systems, must ensure and advise on the compatibility and integration of equipment to form a fully functional overall system.

**B. PRELIMINARIES AND GENERAL**

1. The Contractor is to allow in this section for all costs that cannot be suitably included in the unit rates for measured works elsewhere in the schedules of quantities.

2. Tenderers will submit a detailed breakdown of the lump sum prices for items in this schedule if so requested by the Engineer.

3. Payment will be made as and when obligations for a particular item has been fulfilled. Generally payment will be calculated as follows:

**3.1 Fixed Charge**

Payment against each item as and when obligations are fulfilled.

**3.2 Time-related**

Payment against each item as and when obligations are fulfilled and proportioning the value to the contract period elapsed to the total contract duration.

**3.3 Value-related**

Payment against each item as and when obligations are fulfilled and proportioning the value to the value of measured works completed to the contract sum excluding Preliminaries and General, Provisional Sums, Prime Cost amounts and dayworks.

4. Descriptions are brief since it is the contractor’s responsibility to decide on and assure that sufficient infrastructure, management and resources are employed to fulfil all contractual obligations.

5. The value for Preliminaries and General will fully take into account the nature of the works being in an existing plant and high security area.

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**C. ELECTRICAL AND INSTRUMENTATION INSTALLATION**

**1. Alterations**

1.1 Descriptions for alterations work will be deemed to include for working with care, making good afterwards, waste disposal at a place to be determined by the Mine and cleaning up.

1.2 Rates for work in existing plant measured as alterations or in other parts of the schedules are to allow for liaison with Mine personnel, lock-out procedures and anything necessary and procedures required by the Mine.

**2. Cables**

2.1 Cables' lengths shall be measured in metre as the net route on the centre line of racking and other cable support from gland entry to gland entry, with allowances for joining into equipment added as follows:

- **0,5 m** for entering motors or other equipment.
- **1,0 m** for entering junction boxes, fields isolators, stop/start stations and the like.
- **2,0 m** for motor control centers, transformers, PLC cubicles, power cubicles and the like.

Descriptions for cables shall include the fixing method and numbering requirements.

Separate items shall be measured for different cable specifications according to core thickness, number of cores, armouring, insulation, screening and any characteristics influencing the cable cost.

Rates for cables shall allow for snaking, threading, slacking and waste.

2.2 Cable terminations shall be measured in number. Rates shall include for neat cutting and making off cable, careful preservation of inner insulation as required, lugs, pins, shrouds, attaching to terminals, numbering and loop testing.

2.3 Conductors for small power shall be measured in metre. No terminations shall be measured: fixing ends of conductors shall be deemed to be included in the rate for the equipment into which it is affixed.

**3. Racking, trunking and secondary cable support**

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- 3.1 Racking shall be measured in metres as the actual installation on site in accordance with the construction drawings. The length shall be measured on the centre line over fittings and offsets. Rates shall include for all necessary patent and purpose-made brackets and fixing materials. Support steel longer than 600 mm plus the rack width shall be classified as sundry supports and measured separately under the relevant steelwork items.
- 3.2 Racking fittings shall be patent fittings as available from the supplier, unless otherwise agreed with the Engineer.
- 3.3 Racking fittings shall be measured extra over racking length in number. Offsets shall be measured only if unavoidable in the opinion of the Engineer and requiring the use of patent fittings to effect the offset. Racking rates per metre shall include for all other offsets.
- 3.4 Secondary support shall be measured in metre. Rates shall include for all necessary cutting, welding, bolting, saddles as well as painting complete to specification. Labour items to bend angle sections or conduit shall be measured separately.
- 3.5 An additional allowance for installing racking where there is “restricted access” shall be measured only if personnel are required to work in a non-vertical position to perform installation. The application of this item shall be at the sole discretion of the Engineer.

#### 4. Equipment

- 4.1 Equipment shall be measured by number. Descriptions shall briefly distinguish between different fixing options, but shall be deemed to include for all necessary fixing materials and preparation such as drilling and making good of structure to which it is fixed.
- 4.2 Rates for installing heavy equipment shall include for receiving and checking the goods, providing plant and equipment to move in position, executing quality and control procedures as prescribed by the supplier and/or the Engineer and all associated paperwork and reporting.

Fixing materials and bracketry associated with the item shall be included in the rate, but support structures shall be measured separately.

- 4.3 Instruments will be measured by number. Separate items shall be measured for different instruments and different installations. Descriptions shall be deemed to include for everything stated on the relevant hook-up drawings as well as supply and installation of cable junction boxes, terminations of tail cables, labelling and compliance with the instructions of the instrument supplier. The length of tail cables and secondary cable supports shall be measured separately.

Installation of pneumatic tubing shall be measured in metre for each diameter and type of tubing. Installation of tubing fittings shall be measured separately in number, without distinction for fitting type or diameters for fittings not exceeding 10 mm diameter. Rates for fitting installations shall include for cutting and fitting end of tubing.

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4.4 Drip covers shall be measured in number. Approximate overall sizes shall be stated. The actual dimensions and exact shapes shall be obtained from the Engineer prior to fabrication of this item.

4.5 Rates for equipment installation shall include for cold commissioning, preparation of data sheets and quality and correctness of installation procedures.

4.6 Light fittings shall be measured in number and referenced to the supplier's code numbers. Descriptions shall be deemed to include for all fixing materials and fixing to surfaces and structures as visible on the drawings or on site in existing structures. Rates shall include for supply and installation of lamps.

4.7 Switches and socket outlets shall be measured in number. The equipment supplied shall be equal to or exceeding specifications and is subject to the approval of the Engineer.

4.8 Distribution boards shall be measured as complete units in number.

## 5. Support Structures

5.1 Steel for support structures shall be measured in kilogram in accordance with the latest issue of the *Structural Steel Tables* as published by the *South African Institute of Steel Construction*. Where a mass is not specifically tables, a mass of **7 850 kg/m<sup>3</sup>** shall apply.

5.2 Steel in support structures shall be separated according to mass per metre of the sections used, in the following categories:

- Not exceeding 10 kg/m
- Exceeding 10 kg/m but not exceeding 15 kg/m
- Exceeding 15 kg/m but not exceeding 20 kg/m
- Exceeding 20 kg/m but not exceeding 30 kg/m
- Exceeding 30 kg/m

5.3 The mass of sundry elements such as foot plates or stiffeners shall be added to the mass of the main element.

5.4 Painting complete to specification shall be included in the rate for steel.

5.5 Patent steel shall be measured separately in the unit it is usually supplied.

5.6 Rates for steel shall include for drilling, welding, mitring, bolting (including supply of bolts).

5.7 "Vastrap" plate in trench covers shall be measured in square metre. The nominal thickness (under-pattern) shall be stated. Rates shall include for all necessary cutting,

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fitting and waste as well as painting to specification. Structural steel in support work and stiffeners shall be measured separately.

- 5.8 Expansion bolts shall be measured separately in number. Rates shall include for letting into concrete or brickwork.
- 5.9 Footings shall be measured in number. Rates shall include for the full depth of excavation, backfilling and compacting, levelling, carting away and for working space and formwork where necessary.
- 5.10 Sleeves shall be measured in metre and description may include for draw wires. Fittings to sleeves shall be measured extra over in number and shall be deemed to include for jointing materials.
- 5.11 Excavation shall be measured in cubic metre. Special excavation such as for rock or searching shall be measured extra over to normal excavation. Backfilling shall be separated according to source and be measured in cubic metre. Excavation quantities shall be calculated as the smallest of actual excavation or assuming a trench **600 mm wide x 1 000 mm deep**, unless otherwise noted.
- 5.12 Cutting and fitting access flooring around cubicles installed in substations and control rooms shall be measured in metre being the circumference around the bottom of equipment installed.
- 5.13 Holes and slots through brickwork or concrete shall be measured in number. Descriptions shall state the size and general finishes. Rates shall include for neatly finishing of around hole or slot to match existing finishes and to grout up after cables had been installed.

## 6. Earthing

- 6.1 Earthing wires shall be measured according to the principles for cable measurement.
- 6.2 Earth bars, spikes and earth mats shall be measured in number and described as required in the schedules. Such descriptions shall be read with the specifications.

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