West Bank and Gaza

Avian Influenza Prevention and Control Project (AIPCP)

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VOLUME I-B: Methods of Measurements
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DIVISION 1 - GENERAL REQUIREMENTS

1. **Introduction**
   1.1 This method of measurement provides a uniform basis for measuring Bill of Quantities (Volume I-2) for works of construction. More detailed information than is required by this document may be given to define the precise nature of works or the circumstances under which it is to be carried out.
   1.2 All works included in the Bills of Quantities (Volume I-2) shall be executed according to the technical specifications (volume II), drawing (volume III) and engineer's instructions and approval.

2. **Principles of Measurement**
   2.1 The measured items and units of the measurement thus establish the method of measurement for the Contract in the Bills of Quantities (Volume I-2). No other measurement method shall be used to measure the executed works.

3. **Measurement:**
   3.1 Works shall be measured net as fixed in position and each measurement shall be taken to nearest 10 millimeters; this principle shall not apply to dimension stated in descriptions.
   3.2 Unless otherwise stated, no deduction shall be made from items required to be measured by specifications for voids of less than 0.01 m$^2$.
   3.3 Minimum deductions of void shall refer only to voids within the edges of measured areas; voids which are at the edges of measured area shall always be deducted, irrespective of size.

4. **Units of measurement**
   4.1 The units of measurement used in Bills of Quantities (Volume I-2) are those of the International System of Units (SI).
   4.2 Abbreviations used in the bill of quantities are to be interpreted as follows:
     - mm means Millimeter
     - cm means Centimeter
     - m means meter
     - MS means Square meter
     - Kg means Kilograms
     - MC means cubic meter
     - L.S. means Lump sum
     - MR means Meter run
     - I means liter
     - % means per cent
     - m/d means man-day
     - TON means Ton (1000 kg)

5. **Setting up the Site:**
   5.1 Setting out of the buildings, yards, car parks, guardroom, retaining walls if required & boundaries fencing, also appointing the property lines and set backs are to be appointed by licensed authorized surveyor at the contractor’s expense and responsibility.
DIVISION 2 - SITE WORKS

1. Excavation
1.1 Excavation is given in the net cubic meter same as blinding area and to the depth approved by the engineer.
1.2 The unit rate is deemed to include:
   - Any method of excavating and working.
   - Excavating in any material whatsoever encountered including rock.
   - Variations to bulk.
   - Commencing excavating at any level, and excavation to any depth.
   - Any width of trench and any number of pits.
   - Curved excavation.
   - Excavating below ground water level (irrespective of any difference between the post-contract and pre-contract level).
   - Excavating next to existing services and around existing services crossing excavations including temporary support, temporarily re-routing, sealing and removing services as required.
   - Breaking out existing materials and hard paving including concrete, reinforced concrete, brickwork, block work, stone work, drains, and coated macadam or and the like.
   - Extra excavation for working space and to accommodate earthwork support including additional disposal, back filling, and work below ground water level, breaking out and earthwork support.
   - Earthwork support (including interlocking steel piling) including support below ground water level, to unstable ground, next to roadways, next to existing buildings and support left in
   - Disposal of ground water and surface water.
   - Disposal of excavated material, on site or off site, including spreading and leveling or depositing in spoil heaps, providing tip and paying fees and multiple handling.
   - Back filling to excavations around foundations with material arising from excavations or with imported filling material including depositing and compacting in layers and multiple handling.
   - Surface treatments including compacting surface of ground and bottoms of excavations, leveling and grading to falls, trimming slopping surfaces and trimming vertical surfaces to sides of cuttings (including trimming in rock) and applying herbicides and pesticides.
   - Preparing all relative surveying drawings illustrating all levels, slopes, counter maps, leveling grid map with squares of 5x5 m, notify the engineer in writing of any discrepancies. Do not proceed with excavation works until discrepancies have been corrected and are acceptable to the engineer.

2. Filling:
2.1 Each kind of filling material is given separately.
2.2 Filling is given in cubic meters measured as equal to the void filled after compaction (unless otherwise specified in the description).
2.3 The unit rate is deemed to include:
   - Preparing surfaces to receive filling. Preparing surfaces to receive filling.
   - Using material arising from excavations including selecting and treating or using imported filling material.
   - Filling of any thickness
   - Multiple handling
   - Variations to bulk
   - Filling below ground water level.
   - Filling and compacting in layers including leveling and grading to falls and slopes filling, including disposal.
   - Blinding Surfaces of filling with sand, gravel, as or other fine material.
   - Providing protective filling and removing on completion.
   - Rock Filling and Hard-Core
2.4 Hard core is given in square meters
2.5 The unit rate is deemed to include:
   - Preparing surface to receive filling
   - Filling of any thickness
   - Leveling, ramming, trimming and grading bottoms of excavations in rock.
   - Multiple handing.
   - Filling and compacting in layers including leveling and grading to falls and slopes
3. **Precast Concrete Curbstone:**
   3.1 Precast concrete curbstone is given in linear meters.
   3.2 The unit rate is deemed to include:
       - Concrete works, formwork, and all necessary related materials and works.
       - Excavation works.
       - Backfilling, leveling, watering and compacting.
       - Pointing and grouting.

4. **Precast Concrete Tiles:**
   4.1 Precast concrete tiles are given in square meters.
   4.2 The unit rate is deemed to include:
       - Cement and sand mortar bed.
       - Sand fill material.
       - Cuttings, fixings, trims and accessories.

5. **Asphaltic Concrete Paves:**
   5.1 Asphaltic concrete paves are given in square meters.
   5.2 The unit rate is deemed to include,
       - All necessary compaction and all necessary prime coats and tack coats.
       - Providing all required samples and tests according to technical specification (volume II) and as approved by the engineer.

6. **Pavement Marking:**
   6.1 Pavement line marking is given in linear meters.
   6.2 The unit rate is deemed to include:
       - Preparation works, undercoats and all necessary related materials and works.

7. **Planting:**
   7.1 Planting such as trees, shrubs... etc. as stated in bill of quantities (Volume I-2)
   7.2 The unit rate is deemed to include:
       - Galvanized steel stake with P.V.C coating and all necessary watering and all related materials and works.
DIVISION 3 - CONCRETE WORKS

1. **Bar reinforcement:**
   1.1 Bar reinforcement shall not be measured separately but shall be deemed included with concrete works.
   
   1.2 Bar reinforcement is deemed to include:
   - Fixing bars in any position, at any height, and in any member.
   - Fixing bars horizontally, vertically and sloping.
   - Any diameter, section and length of bars.
   - Forming straight bent and curved bars and links.
   - Cutting, lapping and jointing (including special joints).
   - Dowels fixed with epoxy used in existing structures and in any member as shown on drawing (volume III) and up to the engineer’s instruction.
   - Hooks, tying wire, clips, spacers, chairs, bar supports, bolsters, and the like.
   - Internal clips used in shear walls as specified on drawing (volume III), and to engineer’s instruction.
   - U shape bars of 6 mm diameter, for fixing adjacent isolite blocks as specified on drawing (volume III), and engineer’s instruction.
   - Bunching shear reinforcement.
   - Weight of surface treatments and rolling margin.
   - Submit workshop drawing (volume III) with bar bending schedule for steel works.

2. **Expansion and Construction Joints:**
   2.1 Contraction joints and water stops are included in the items of slabs, and shall not be measured separately (no extra rate will be paid for construction joints).
   2.2 Expansion Joint filler, and covers are each given separately
   2.3 Expansion Joint filler is given in square meters
   2.4 The unit rate is deemed to include:
   - All fixings.

3. **In Situ Concrete:**
   3.1 Any extra concrete, which was cast due to the Contractor’s negligence and is not marked specifically on Drawing (volume III), shall not be measured for payment
   3.2 Columns are only measured as such when their length on plan is not exceeding four times their thickness.
   3.3 Hidden columns (including protruding parts) are included in the items of reinforced walls, and shall not be measured separately (no extra rate will be paid for hidden columns
   3.4 Projections, nibs and the like are included with the measurement of the adjacent member
   3.5 Wall and column kickers are included with the measurement of walls and columns respectively.
   3.6 Each class of concrete is given separately, stating the kind of cement and whether plain or reinforced
   - Concrete of blinding under foundations, footings and tie beams shall be net measured by squared meter according to that thickness described in the Bills of Quantities.
   - Ground beams shall be net measured by cubic meter between the outer faces of columns.
   - Slabs on grade shall be net measured (between ground beams) by squared meter after deducting all recesses openings for areas more than 0.1 m².
   - Ribbed slab (include drop and hidden beams) shall be measured in squared meter, after deducting all voids which its area more than 0.1 m², from center of beams if interior otherwise from outer faces of beams.
   - Solid slabs shall be measured in squared meter, after deducting all voids which its area more than 0.1 m².
   - (Hidden and drop) beams are included in the items of slabs, and shall not be measured separately (no extra rate will be paid for hidden or drops beams).
   - Fairface finish, broom and surface hardener finishes are given in square meters as an extra over.
   - Columns shall be measured in cubic meter from top of slab to soffit of beams or slab above.
   - No items are to be measured twice under separate headings.
   3.7 In situ concrete are measured net ,as described above or as stated in Bill of Quantities (Volume I-2), except that deductions are not made for the following:
   - Reinforcement.
   - Steel sections of area not exceeding 0.50m²
   - Cast in accessories.
   - Voids not exceeding 0.05 m³ volume.
3. In Situ Concrete (Cont’d)
3.8 The rate is deemed to include:
- Reinforcement, as stated under bar reinforcement.
- Supply and apply two coats of hot bituminous coating (solvent base) complete as per technical specification (volume II) horizontally and vertically to buried parts.
- Any thickness, cross-sectional area or number of members.
- Form work to all surfaces edges sloping tops, grooves, chamfers, end of walls, sides of voids, opening and the like.
- Formwork, lift in formwork or other form of temporary support to top of sloping upper surfaces of blinding beds.
- Supply of all materials, additives, plant, and equipment, tools and admixtures
- Designing mixes.
- Mixing and placing in position
- Minimum of 2 vibrators, and according to engineer’s instructions.
- Any method of pouring, placing, compacting and curing.
- Grading, tamping and toweling.
- Pouring on or against earth or unblended hard-core.
- Horizontal, sloping, vertical and curved work
- Forming mortises and grouting.
- Forming grooves, throats, holes, chases, rebates, chamfers, splayed angles, moldings and the like.
- Hollow blocks or any other material used for ribbed slabs including supply, storage, laying and arranging as required.
- Preparing of supported beams in existing structures.
- Protruding parts of columns and beams.
- Day joints (construction joints) and joints required in the forming of bays including
- Form work and treatment of reinforcement crossing the joint
- All labors on concrete include working around pipes or cables, cutting channels, chases, mortices, pockets and holes and including subsequent grouting or filling and making good.
- Fixings and cuttings

4. Cement and sand screed and toppings:
4.1 Concrete screed of the roof shall be measured in square meter as laid horizontally from faces of parapets; no extra over will be given for materials laid vertically on wall parapets.
4.2 The unit rate is deemed to include:-
- Supply and storage of all necessary materials, additives, plants, equipment, and tools.
- Preparing of surfaces to receive the screed and topping.
- Wire mesh (where required).
- Hunching, lining to the edge of roof screed, parapet and columns.
- Hacking concrete, applying cement slurry or raking out joints of block work to form key.
- Mechanical trawled “Helicopter” Finish to surface.
- Fillets and the like and for making good around pipes, sleeves, ducts, etc
- Skirting and flashing including dressing over angle fillets, bending, tucking-in edges and for all laps, ends, angles and intersections, etc.
- laying in bays, if necessary, including temporary formwork and dividing strips
DIVISION 4 - MASONARY WORKS

1. Concrete Masonry Unit-Block work and Brickwork:
   1.1 Each type of block work is given separately and measured net in square meters unless other wise stated. No deductions will be made for voids or openings of less than 0.1-squared meter in area.
   - Walls are measured in square meter on the centerline of material.
   - Cavity hollow block walls shall be net measured in squared meter. No deduction will be made for voids or openings of less than 0.5-squared meter in area.
   1.2 Work is deemed to be vertical unless otherwise described
   1.3 Thickness of wall is stated in descriptions. Thickness stated is the nominal thickness unless otherwise described.
   1.4 Curved work is to be measured separately.
   1.5 Lintels are included in the measurement of the same item.
   1.6 Masonry unit rate is deemed to include:
   - Supply and storage block, cement, aggregate, water of all necessary materials
   - Mortar for bedding and jointing
   - Type of bond and method of pointing
   - Raking out joints or leaving rough joints to form key.
   - Battering work (i.e. sloping with parallel sides),
   - Extra materials for curved work, tapering work and for work bonded at back to other work.
   - Building against or typing to other work (i.e. not bonded), including extra material.
   - Temporary strutting to work used as Formwork.
   - Joint reinforcement in reinforced work.
   - Overhand building.
   - Forming cavities in hollow walls and between wall and other work, including providing wall ties, and closing cavities at ends, tops and around openings including extra materials.
   - Bonding ends of walls to other work including providing ties reinforcement and anchorage or other fixings and extra material in bonding.
   - Pinning up load bearing walls to structural soffits and filling voids with mortar.
   - Galvanized angles butterfly ties (T) joints and between walls in cavity walls.
   - Reveals, angles and intersections.
   - Rough and fair cutting.
   - Grooves throats, mortices, chases, rebates, holes, stops, miters and the like.
   - Weather fillets and like and pointing in flashing including cutting grooves or chases.
   - Building in or cutting and pinning ends of lintels, sills, bearing bars, steps, timbers, steel sections and the like.
   - Templates for forming openings and lift shafts, centering, and temporary supported protection to built-in frames.
   - Fixings in position.
   - Admixtures with cement and sand mortar upon the approval of the engineer.
   - Bond beams lintels, sills, and jambs around doors and windows, in addition to their Formwork and steel bars reinforcement.

2. Natural Stone works:
   2.1 Given thickness refers to the nominal thickness or the thickness shown on the Drawing (volume III).
   No allowance will be made for any additional thickness due to uneven or bad workmanship or to variations in the stone thickness.
   2.2 Measurements will be only for the facade surfaces; no extra rate will be considered for opening edges or sloping surfaces.
   2.3 The stone length shall not be less than 1.5 times its height and not exceeding twice its height either.
   2.4 Composite stone walls and stone cladding including recessed (Jambs. Sills, heads and special stones) work shall be measured in square meters and as net surface area built in position for the various thickness specified, no deduction is made for voids not exceeding 0.1m².
   2.5 Stonework facing for drop beams of the suspended slabs will be measured same as the item of composite stone walls unless otherwise specified in the Bill of Quantities (Volume I-2).
   2.6 The unit rate is deemed to include:
   - Supply and storage of stone, aggregates, water and other materials.
   - All special stone pieces such as corners, jambs, pieces around windows and doors, stone wall coping to terrace and roof, and the like.
2. **Natural Stone works (Cont’d)**
- Supply and storage of stone, cement, aggregate, water and all necessary materials
- Shaping of the apparent faces of stones per drawings (volume III).
- Fabricated wire mesh, dowels, metal anchorage, hangers, and all tying, fixing tools and related accessories for stone cladding works, in accordance with drawings (volume III), specification, and upon engineer’s instructions.
- Stainless steel mechanical fixations.
- Movement joints, cleaning, sealing and polishing.
- Work at any height above floor level.
- Any width, height, girth, size or shape of slab or feature
- Bedding and fixing including edging mortars, adhesives and fixing materials.
- Additives, materials and admixtures for concrete backing.
- All cuttings internal and external angles, intersections and joints.
- Layout treatment of joints including grouting.
- Overhand working.
- Pointing including cleaning of stones, scaffolding and dismantling the same and all incidentals.
- Lintel s and other reinforced concrete elements including reinforcement except those elements specified in separate items in the Bills of Quantities.
- Providing samples according to specification, and upon engineer’s instructions.

2.7 Stone coping are measured in square meters.

2.8 The unit rate is deemed to include:
- Supply and storage of stone, cement, aggregate, water and all necessary materials
- Cutting.
- Pointing and jointing.

3. **Natural Marble Tiles and Stone Work:**
3.1 Work items in this section shall be measured as the net area covered
- Work to narrow widths shall be incorporated in the measurement
- Marble floors are measured in square meters
- Marble skirting are deemed included in the measurement of marble floors
- Marble treads and risers are measured in square meters. The measurements includes the stair case flight’s staircase and water stop
- Marble stair landings are net measured in squared meter from the face of plastering to the other face of it.
- Marble sills, thresholds, and other openings are net measured in square meters for the apparent parts or as stated in the Bill of Quantities (Volume I-2).
- Marble Sills are measured in square meters
- Marble vanity units are measured in linear meters

3.2 The unit rates are deemed to include
- Supply and storage of tiles, cement, aggregate, water and all necessary materials
- Skirting.
- Setting beds, mixtures, sealant ... etc. as specified.
- White and/or colored cement for jointing and grouting as specified.
- Marble curtains - fascias or screens.
- Grouting and sealant
- Polishing including powders and/or paste materials.
- Forming expansion and contraction joints.
- Galvanized steel anchors, stainless steel brackets and all related accessories.
- Straight and curved cutting.
- Making good around steel sections, pipes, tubes, bars, brackets, outlets and the like,
- Marble back splash
- Formed insets to receive wash hand basins.
- Chamfered edges.
- scaffolding
**DIVISION 5 - METALS**

1. **Miscellaneous Metals:**
   1.1 Steel gutter shall be measured in linear meter.
   1.2 The unit rate shall be deemed to include:
      - Fixing accessories
      - Decoration
      - All necessary related works
   1.3 Entrance mats are enumerated.
   1.4 The unit rate is deemed to include
      - Fixing, fittings and accessories
   1.5 Chimney cover is enumerated.
   1.6 The unit rate is deemed to include:
      - Steel pipes, flashing, hood, and angle frame, fixings, fittings, accessories and all necessary related works.
      - Fiberglass insulation
   1.7 Ladders are enumerated,
   1.8 The unit rate is deemed to include
      - To be galvanized after manufactured.
      - All necessary fixings, fittings, accessories, welding, decorations and all necessary related works.
   1.9 Gates are enumerated,
   1.10 The unit rate is deemed to include
      - All necessary fixings, fittings, accessories, decoration, hardware and all necessary related works.

2. **Handrails and Railings:**
   2.1 Steel stair rail and balustrades are measured in linear meters
   2.2 The unit rate is deemed to include:
      - Steel section and pipes
      - Handrails.
      - Drilling, countersinking, screwing, bolting and riveting
      - Preparing surfaces for painting one coat of primer before fixing
      - Bedding and painting.
      - All necessary fixings, fittings accessories, incidentals, glazing, decoration required completing the work.
      - Providing samples and catalogs for all needed accessories according to specifications.
DIVISION 6 - WOOD AND PLASTIC

Finish Carpentry

1. Wooden Counters:
   1.1 Size of carpentry works given in Bill of Quantities (Volume I-2) is finished size and shall be as per drawings (volume III).
   1.2 Wooden counters are measured upon its type in linear meters, from the outer face (edge to edge).
   1.3 Curves, angles, circles and the like are measured linearly from outer face (edge to edge) from both sides.
   1.4 The unit rate is deemed to include:
      - Shop and coordinated drawings.
      - Allowance for plastering, tiling, skirting and the like.
      - Plugging concrete, block works, and the like.
      - Two coats of lacquer paint over one prime coat.
      - Drawers, keep openings, fake panels, movable and fixed cabinet.
      - All necessary fixings, fittings, accessories, decoration and any needed materials to complete the works.
DIVISION 7 - THERMAL AND MOISTURE PROTECTION WORKS

1. Thermal and moisture protection:
   1.1 Each kind of thermal and moisture protection items is given separately stating the type of material.
   1.2 The thermal and moisture protection items are given in square meters unless otherwise stated. Measurements will be made only for area in contact with the base. No deduction will be made for voids or openings of less than 0.01-squared meter in area.
   1.3 The unit rate is deemed to include:
      - Primers, bonding compounds, adhesives and keying mixes.
      - Applying coatings by brush or spray
      - Sloping and curved work to coatings.
      - Work of any width, height or girth
      - Work laid to falls and cross falls, and intersections on sloping work
      - Extra material for lapping membranes including adhesive tape.
      - Internal and external angles, fillets and the like
      - Edges, arises and turning into grooves or channels and sealing.
      - Cutting, notching and bending membranes.
      - Holes for pipes and the like, forming collars and sealing.
      - scaffolding

2. Bituminous Membrane Waterproofing for Under Ground Works:
   2.1 Bituminous membrane waterproofing is measured in square meters as the net area covered measurement to include overlaps, sealing mastic and priming.

3. Elastomeric water proofing:
   3.1 Elastomeric water proofing layer is measured in square meters as the net area covered

4. Rockwool Insulation:
   4.1 Rockwool Insulation is measured in square meters and as the net area covered,
   4.2 The unit rate is deemed to include
      - All necessary fixings, fittings, accessories and all necessary related works

5. Modified Bitumen Membrane Roofing:
   5.1 Modified Bitumen Membrane Roofing is measured in square meters.
   5.2 The unit rate is deemed to include,
      - All overlaps, preparation of surfaces, priming, a rich coat of hot bitumen and necessary Torch Application.

6. Flashing and Sheet Metal:
   6.1 Metal steel flashing is given in linear meters,
   6.2 The unit rate is deemed to include:
      - Sealant filler, rubber packing rods, and all necessary material to complete the work as per drawings (volume III) and specifications.
      - All necessary fixings, fittings and accessories.

7. Sealants:
   7.1 Sealants are measured in linear meters.
   7.2 The unit rate is deemed to include.
      - All preparations and fixing all as per specifications.
DIVISION 8 - DOORS AND WINDOWS

1. **Steel Doors & Frames:**
   1.1 Doors are enumerated.
   - The unit rate is deemed to include:
     - Shop drawings
     - Frames and fixing accessories
     - Paint works as specified.
     - Providing and installing all required door furniture, hardware, accessories, door closures, handles and doorstops, etc.
     - Glass and glazing including cutting to size, putty and rubber.
     - Sealing
     - Make openings for louvers
     - Decoration as specified.
     - Fire insulation for fire rated doors.
     - **Master key system cylindrical locks (UNION or equivalent).**

2. **Wooden Doors & Frames:**
   2.1 Doors are enumerated.
   2.2 The unit rate is deemed to include:
     - Shop drawings
     - Seasoned wood
     - Paint works as specified.
     - Frames (including main frames and sub-frames) and fixing materials as well as architect approval.
     - For doors providing and installing hardware including locks, handles, keys doorstops, hinges, etc.
     - For windows providing and installing hardware including spaniolate closing opening mechanism and all other accessories of approved quality (EC made).
     - Glass and glazing including cutting to size, putty and rubber.
     - Decoration as specified.
     - Architraves.
     - Make openings for louvers
     - Fire insulation for fire rated doors.
     - **Master key system cylindrical locks (UNION or equivalent).**

3. **Access Doors:**
   3.1 Doors are enumerated.
   3.2 The unit rate is deemed to include:
     - Shop drawings
     - Frames and fixings accessories
     - Make openings for louvers
     - Paint works as specified.
     - Providing and fix hardware as specifications
     - Sealants
     - Decoration as specifications
     - Master key system cylindrical locks (UNION or equivalent).

4. **Hardware:**
   4.1 Hardware shall not be measured separately but shall be deemed included with related measured work, all samples, what so ever, should be turned for the architect approval prior commencing any work.

5. **Glazing:**
   5.1 Unless indicated otherwise glazing shall not be measured separately but shall be deemed included with the related measured work except mirrors.
   5.2 The unit rate is deemed to include:
     - Glass and glazing.
     - Frames and hardware.
     - All necessary related works.
DIVISION 9 - FINISHES

1. **Portland Cement Plaster:**
   1.1 Plastering to all areas shall be net measured as the area covered. No deduction will be made for voids or opening of less than 0.1 squared meter in area.
   Work to reveals of openings and all other narrow widths shall be included in the measurement.
   1.2 Plastering under tiles shall not be measured separately but shall be deemed included with related measured works (Tiles works)
   1.3 The unit rate is deemed to include:-
   - Cement sand plaster materials as per technical specification (volume II) (plaster guides should be used for the walls and ceilings).
   - Metal accessories, expansion joints and anchorage
   - Completion of the work as specified.
   - Scaffolding and tools
   - Providing expanded metal lath, corner mesh, angle beads at all corners and plaster stops at openings, edges, expansion joints, sills, etc. and where ever needed according to the instructions of the supervising engineer and the detailed drawings (volume III).
   - Supply all the required waterproof additives, complete as per Technical specification (volume II) and engineer’s instruction.
   - Finishing around steel sections, pipes, tubes, bars, brackets, outlets and the like.
   - Making samples of plastering to be approved by the engineer.

2. **Gypsum Boards:**
   2.1 Fire Rated Gypsum Boards cladding is given in square meters
   2.2 The unit rate is deemed to include:-
   - Metal studs standing frame, steel channels, bolts, screws, accessories and all necessary related materials and works.

3. **Ceramic Tiles:**
   3.1 Ceramic tiles are measured as the net area covered. No deduction is made for voids not exceeding 0.01-square meter in area. Work to narrow widths shall be incorporated in the measurement.
   3.2 Floors, walls and gutters are measured in square meters.
   - The unit rate is deemed to include:
     - Supply, store and cure of tiles.
     - Adhesive and grouting as specifications
     - Expansion and contraction joints.
     - Plastering, according to specifications.
     - Glazed edge tiles.
     - Providing samples according to specifications.
     - Scaffolding.

4. **Terrazzo Tiles, Stone Tiles and Carpeting:**
   4.1 Work items in this section are measured net in square meters. No deduction is made for voids not exceeding 0.01-squared meter in area. Work to narrow widths shall be incorporated in the measurement.
   4.2 The unit rate is deemed to include:
   - Supply, store and cure of tiles.
   - Skirting.
   - Preparing subsurface as specifications
   - Mortar bed and grouting.
   - Expansion and contraction joints.
   - Appropriate sand bed underlay
   - Grinding with carborandum machine and polishing.
   - Adhesive for resilient tiles.
   - Underlay for carpet.
   - Providing samples according to specifications.
   - Price for antistatic PVC to include supply and install of 30*30cm terrazzo tiles.
5. **Acoustic Ceilings:**

5.1 Acoustic tiles false ceiling shall be measured in square meters for the net area covered.

5.2 The unit rate is deemed to include:
- The approved hanging system as specifications
- Cut to size where required.
- All accessories, fixings and anchorage as specified Completion of the work.
- Forming of Electro-mechanical openings.
- scaffolding

6. **Metal Tiles False Ceiling System:**

6.1 Metal false ceiling shall be measured in square meters for the net area covered.

6.2 The Unit rate is deemed to include:
- The approved hanging system as technical specification (volume II) and as shown on drawings (volume III)
  cut to size where required
- All accessories, fixings and anchorage as specifications
- completion of the work as specifications
- forming of Electro-mechanical openings
- scaffolding

**Anti Bacterial False ceiling System:**

Anti Bacterial false ceiling shall be measured in square meters for the net area covered.

The Unit rate is deemed to include:
- The approved hanging system as technical specification (volume II) and as shown on drawings (volume III)
  cut to size where required
- All accessories, fixings and anchorage as specifications
- completion of the work as specifications
- forming of Electro-mechanical openings
- scaffolding

7. **Painting:**

7.1 Painting is net measured in square meters after deducting of all voids and openings. Work to narrow widths will be incorporated in the measurement.

7.2 Painting for all metal and wooden works shall not be measured separately, but shall be deemed included with the related measured works.

7.3 The unit rate is deemed to include:
- Supply of all materials, workmanship, samples, primers, surface preparation, protection of painted surfaces, application to all heights as required of works with color approved by supervising engineer, repair of all damaged surface at the contractor's expenses, and all other requirements as stated in the specifications
- Preparation of surface including puttying, sealing and priming, Any area or width, Any location, Work in multicolor, Cutting in edges
- Under coats as per specifications.
DIVISION 10 - SPECIALTIES
(Not Applicable)

DIVISION 11 - EQUIPMENT’S
(Not Applicable)

DIVISION 12 - FURNISHING
(Not Applicable)

DIVISION 13 - SPECIAL CONSTRUCTION
(Not Applicable)

DIVISION 14 - CONVEYING SYSTEMS
(Not Applicable)
DIVISION 15 - MECHANICAL WORKS

1 Principle of Measurements:
The following items should be measured as follows unless otherwise specified in the bill of quantities (volume I-2):

1.1 Galvanized, black steel, copper and PEX pipes shall be taken net according to their actual length and measured in meter run for each individual diameter and material including all needed fittings.

1.2 U.P.V.C, and Cast Iron pipes shall be taken net according to their actual length and measured in meter run for each individual diameter and material including all needed fittings.

1.3 Galvanized sheet metal ducts shall be taken net according to their actual weight. Including all needed fittings.

1.4 Thermal insulation of pipes shall be taken net according to their actual length and measured in meter run for each individual size and material including all needed accessories.

1.5 Thermal insulation of ducts shall be taken net according to their actual meter square area. Including all needed accessories.

2 Rates Pricing Methods:
The unit rate of each item mentioned in the bill of quantities (volume I-2) shall include the following:

2.1 Provide 3 sets of each of workshop drawings.

2.2 Provide spare parts and components for ideal running of all services and equipment.

2.3 Thermal insulation for external and internal pipes, ducts, equipments, fittings and where required.

2.4 Acoustic and anti vibration insulation for chillers, boilers, pumps, air handling units, fans and where required.

2.5 Civil work required and related to mechanical installations such as:
- Excavation and back filling.
- Cutting and making holes through walls and slabs for passage of pipes conduits and ducts.
- Equipment’s concrete bases and supports.
- Pipe sleeves, fixing of pipes, duct hangers, wooden frames.
- Water proofing, cleaning, protection and painting.

2.6 Cleaning and proper protection for all equipment plants, electrical installations and structures during mechanical works.

2.7 Identifications, tags, labels, nameplates, and charts for mechanical systems.

2.8 Disposal of waste materials resulting from mechanical works.

2.9 Electrical and control connections for the mechanical equipment where required between equipment MCC's.

In addition to the items mentioned above the unit rate shall include the following:

a) Water Meter Installation:
Include municipal fees, pipes, connection to domestic cold water network, protection box with box, water meter, isolating valves, pressure reducing valve, excavation, back filling and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

b) Sanitary Fixtures:
Include connection to domestic hot & cold water supply and drainage network and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

c) Manholes, Interceptors and Trenches:
Include all works and materials such as excavation, backfilling, reinforced concrete, blinding, base, walls, cover, benching, iron steps, plastering, caulking, framework shuttering etc and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

d) Water Manifolds:
Domestic Water Manifold Cabinet
include the cold & hot water manifolds, cabinet, two isolating valves, all pipe fittings and joints including sockets, nipples, compression fittings, nuts, O rings, hangers and supports,
fixing bands, automatic air vents with isolating valves, terminal valves, adapters and dielectric unions for connecting dissimilar materials, excavation and back-filling, chasing in walls, painting, pipe protection. Testing, cleansing, flushing and commissioning system and accessories needed to complete the work as shown on drawings (volume III) and as per specifications—all manifolds and accessories to be manufactured by the same manufacturer.

e) Expansion Tank:
Include isolating valves, relief valve, nitrogen filling connection, pressure regulating valve, base frame, pressure gages and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

f) Pumps:
Include electrical and mechanical connections, isolating valves, globe valves, check valves, strainers, pressure gauges, pressure relief vent air release valves, flexible connections, concrete base, anti vibration pad, control panels and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

g) Fire Hose Cabinet:
Include hose reel, globe valve, 6kg portable fire extinguisher, and cabinet and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

h) Hot Water Storage:
Include mechanical and electrical connections, fibrous glass 50 mm thermal insulation, isolating valves, shell tube heat exchanger, pressure relief valve, automatic air vent, drain valve, temperature sensor, control system and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

i) Galvanized, Black Steel and Copper Pipes
Include all pipe works, fittings and joints such as isolating valves, elbows, bends, tees, reducers, unions, expansion joints, flanges, anchoring, sleeves, puddle flanges, safety valves, balancing and measuring taps, sockets, hangers and supports, expansion joints, automatic air vents with isolating valves, excavation and back filling, chasing in walls, painting, pipe protection against corrosion, as required per technical specification (volume II) and drawings (volume III).

j) PEX Pipes:
Include pipe sleeves (pipe in pipe), all pipe fittings and joints such as brass elbows with its UPVC housings, nuts, O rings, nipples and sockets, fixing, hangers, supports, adapters, excavation and back filling, chasing in walls, as required per technical specification (volume II) and drawings (volume III).

k) Cast Iron, and U.P.V.C Pipes:
Include all pipe works, “Y” branches, elbows, bends, tees, adaptors, reducers, unions, anchoring, sleeves, hangers and supports, excavation and back filling, chasing in walls and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

l) Protection for Embedded Pipes:
Include protection for all embedded galvanized pipes and fittings (cold water and fire fighting pipes) either in walls or underground and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

m) Insulation for Embedded and Concealed Pipes:
Include insulation for all embedded and concealed black steel and galvanized pipes in shafts and false ceiling voids and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

n) Insulation and Cladding for piped located on roof and in boiler room:
Include insulation and galvanized sheet metal 0.7 mm thick cladding for all black steel and galvanized pipes located on roof and boiler room and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

o) Ducts:
include metal sheets ducting with all joints, sealant compound, fire retardant sealants for all ductwork passing through fire rated structures, hangers and supports and brackets, acoustic liners, reinforcing angles, flexible connections, volume access doors and panels, all vanes, volume splitter damper (VSD), volume control and regulating damper, fire dampers, smoke dampers, fire and smoke dampers, expansion with rod and lock screws, coating, painting all joints plenum boxes volume damper adapter and coupling and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

Ductwork weight shall be calculated based on the dimensions and length of actual installed
ducting and according to the approved shop drawings.

p) Concealed duct Insulation:
Include insulation for all concealed ducts and fitting either in false ceiling voids or shafts and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

q) Exposed duct Insulation:
Include insulation and cladding for all exposed ducts and fitting on roof and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

r) Chimney Stack and Breaching
Include prefabricated double wall chimney consist of 1mm thick stainless steel inner wall and 0.7mm thick aluminized steel outer case complete with 25 mm thick rock wool insulation in between, elbow, tees, draught regulators, clean outs, wall sleeves, condensate, rain caps, joints, captive fasteners, holding bands hangers and supports, bracing bracket, base plates, flexible connections, draft regulating and relief dampers, expansion with rod and lock screws, concrete foundations and coating, painting and all required fittings and accessories needed to complete the work as per specification.

s) Heating Water Boilers:
Include burners and boilers, control panel, safety valves, air release vents, lockable right angle cast steel stop valve with valve operating chain, drain valves, gauge glasses with protectors, pressure gauge with combined shut off and drain cock and siphon water, boiler thermostats and thermometers on supply and return headers, inspectors test gauge connection with cock, water level isolation valves, level controllers, C-channel support with vibration isolation, insulation, labeling, hangers, supports, all related pipe work, electrical and controls connection and civil works and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

t) Chillers:
Include electrical and mechanical connections, valves, gate valve, commissioning set, strainers, flexible connections, flow switch, pressure gauges, thermometers measuring orifice, vibration isolators on factory skid and on the chiller base anti vibration absorbent, and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

u) Air Handling Units:
The unit price shall include electrical and mechanical connection, air dampers manual or motorized (as required), silencers and sound attenuators, all kinds of filters, condensate drain arrangement, vibration isolators, flexible connection on fan discharge, orifice plates, manometer across each bag filter and fan, anti vibration pad and concrete or steel base, and all other components (heating / cooling coils, etc.), gate valves, commissioning set, strainer, flexible connections, pressure gauge, thermometers, orifice regulating valve, dielectric unions, control panel and digital wall thermostat and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

v) Fan Coil Units:
The unit price shall include, a cleanable filter, a flexible connection on fan discharge, set vibration isolators and hangers, drain pans under the unit and under the valves and strainers, and cooling coil. Each coil shall include two gate valve, strainer, three way control valve, modulating type actuator, digital wall thermostat, testing point, automatic air vent, commissioning set and flexible connections and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

w) Digital Thermostat /Humidity control:
Digital thermostat / humidity LCD room control complete with room temperature, desired temperature display, room relative humidity, desired relative humidity, programmable, trouble indicator, clean filter indicator. Include electrical connections and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

x) Supply and Exhaust Fans:
Include vibration isolators resilient mountings, skids and hangers, flexible connections on fan inlet and outlet, filters where required, insect screen, back draft dampers or automatic shutter, pulleys with taper locks, inlet guards, belt guards, lubrication points, sound attenuators to achieve the NC for served space and outdoor, one set of spare belt drives per each fan and all required fittings and accessories needed to complete the work as shown on
drawings (volume III) and as per specifications.

y) External Fuel Oil Tank:
Include fuel oil tank, air vents, overflow line, filling lines and valves dislodge suction line, main feeding suction line with isolating valves, oil content gages, level gage, painting, and corrosion resist coating, earthing, anchoring, concrete base and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

z) Daily Fuel Oil Tank:
Include tank, air vents, overflow line, filling lines and valves, dislodge drain line and valve, main feeding suction line with isolating valves, return lines from served equipment with isolating valves, oil content gages, one access opening with covers, all painting, and corrosion resist coating, earthing, anchoring and steel base frame and support and all required fittings and accessories needed to complete the work as shown on drawings (volume III) and as per specifications.

aa) Water Softeners:
include twin softener, brine tank, all face piping, isolating valves, check valves, automatic back wash flow controller, cycle controller and flow control, multi-port motor valve, brine injector, automatic electronic water meter, timer, hardness monitor and controller, mixing and balancing valve, pressure gages, monitoring connection, and all required fittings and accessories to complete the work as shown on drawings (volume III) and as per specifications.

ab) Gas Leak Detection:
include control module and detection head such as: remote detectors, individual meters, electronic gas leak detector, solenoid valves, sirens, connection to main alarm panel, electrical wiring, and all required fittings and accessories to complete the work as shown on drawings (volume III) and as per specifications

ac) Gas Manifold Assembly:
include all filled duty and stand by cylinders, the manifold header, cylinder connections, manifold control panel, gas flow meters, pressure gages, automatic changeover valve, safety shut-off valves and safety relief valves on the manifold and the main supply pipe, two pressure regulating valves, manifold heater, cylinders rack chain and locks, steel box, and all required fittings and accessories to complete the work as shown on drawing (volume III) and as per specifications
DIVISION 16- ELECTRICAL WORKS

1. General:
   1.1 Electrical Connections:
   Connections of all cables and electrical accessories including switchboards, lighting fixtures, etc., shall be included in the installation prices for these elements, and will merit no separate payment. Connection to motors or electrical installations supplied by other contractors shall be measured separately, complete.
   1.2 Painting & Coating:
   The prices for painting and coating of the various equipment items and installations, including paint touch-up and repairs shall be included in the supply and/or installation prices of these equipment items and installations.
   1.3 Reference to Product Brand-Names
   Any references made to specific product brand-names are merely intended to indicate the quality standards of the required product, and must not be regarded as compulsory or binding. The contractor will be allowed to suggest products which he considers to be on a par with those specified; however in any event, the project manager approval must be obtained.
   The various items of the Bill of Quantities (Volume I-2) and/or Technical specification (volume II) do not include the definition “or approved equivalent” following the specific manufacturer or brand-name specified. The paragraphs where manufacturer or brand-names have been specified should be read as inclusive of the suffix “or approved equivalent” following the brand-name or manufacturer's name specified.
   When suggesting an equivalent product, the contractor must submit, in addition to an actual sample, relevant catalogues and brochures, and any other certificates as required by the project manager.
   1.4 Prices of all required junction boxes and pull boxes used to facilitate electrical connections are to be included in the unit rates of the points with no additional cost, the contractor should note that he must arrange all electrical installation in a proper way so as to use the minimum number of such junction boxes and pull boxes.
   1.5 Prices of the main feeder cables connected to the existing main distribution boards should include investigating an approved path and all associated works at the existing building. Moreover, any damages result upon installation of these cables is the responsibility of the contractor.

2. Electrical Switchboards:
   2.1 Switchboard prices must include switches circuit breakers and all switchboard structural elements, bus-bars, terminal strips, "press-on" type aluminum - copper conductor terminals, tapping insulators, bus - bar system insulators, complete signing for the switchboard, installation, connection of all cables and leads to the switchboard, as well as piping covers at switchboard entrance. All prices of switchboard accessories must include installation and connection of said accessories in the switchboard.
   2.2 Socket Panels:
   Prices of socket panels must include all details as specified in the Technical specification (volume II) and drawing (volume III), with all accessories thereof. Socket panels may be measured as units or complete.

3. Installations:
   3.1 Profiles:
   Profile prices must include all details as specified in the Technical specification (volume II). The Bill of Quantities (Volume I-2) specifies the profile length. Profiles shall be measured in units. Profiles and various reinforcing/attaching hardware items which are included in the Technical specification (volume II) and unit prices for other items or completes shall not be measured separately.
   3.2 Connection of Electrical and/or Telephone Piping to the Building
   3.2.1. Piping prices must include all details as specified in the Technical specification (volume II), as well as installation.
   Pipes shall be measured in meters (length) long their axis - No. separate or additional
payment may be allowed for bends of any type

3.2.2 Prices include excavations for piping and consists of:
   a. Excavation to the depth and width as specified in the drawing (volume III).
   b. 20 cm thick sand bedding around the pipes.
   c. Refilling and placement of marker tape (danger).

3.2.3 Connections of pipes to underground manholes must be included in the piping prices.

3.2.4 Connections of pipes to buildings must be included in the piping prices.

3.3 Pipes:
All pipes for the electrical and communication installation and all parts thereof must be of the heavy, bendable, self-extinguishing type. Pipes of the same type shall be measured as part of the same item, without differentiating between pipes attached to structural elements and those installed inside cast concrete elements. Pipe prices must include the supply, installation and Nylon drawstrings in "reserved" or pre-assigned pipes. The above shall only apply if the pipes are not expressly included in the prices of specific points or completes.

3.4 Cables and Leads:
Prices of cables and leads must include all details as specified in the Technical specification (volume II), as well as all testing, connectors, reinforcing attaching hardware, terminals, cable shoes, clamps, etc., required for their installation. All cables shall be measured in meters (length). The above shall only apply if the cables are not expressly included in the prices of specific points or completes.

3.5 Passage Sleeves in Concrete Walls:
Prices must include all details as specified in the Technical specification (volume II). Measurement shall be complete for each sleeve/pipe, or in meters (length).

3.6 Underground Manholes:
Prices for underground manholes must include all operations and materials required in order to install each manhole, including B-300 type reinforced concrete (in accordance with the General Technical specification (volume II) for On-Site Cast concrete Works), frames and covers, excavation, bottom bedding, drainage pits and sealing of piping connections.

3.7 Digging and/or Excavation Operations:
Digging and/or excavation operations for underground cables or piping shall be included in the prices of the pipes and cables which are to be installed in these excavations, the depth and width specified, including sand bedding, covering with bricks, refilling, marker tapes, compacting, removal of excess earth and restoration of area to its previous condition.

3.8 Testing of Installation:
Work prices must include all details as specified in the "Installation Testing, Trial Run and Acceptance" section of the General Technical specification (volume II). Testing and approval by the Electrical Co. and all other tests must be included in the relevant unit prices, with no additional cost.

3.9 Ducts:
Ducts shall be measured in meters (length). Duct prices must include the covers and all profiles, supports and reinforcements required in order to install these ducts in any way required.

4. Points:

4.1 Wall, Ceiling or False Ceiling Mounted Lighting Point Normal or Water Proof or Halogen Spot Light:
Each outlet for the installation of a lighting fixture on the ceiling or wall or truss shall be measured as one point. Price is to include a 16 mm or 23 mm diameter pipe and leads with a cross-section of 1.5 sq.mm, or 3x1.5 NYY type cable, installed under the plastering, leading from the applicable electrical board to the point, regardless of the distance between the board and the point, an outlet for the lighting fixture in the form of an under-plaster junction box, as well as a plastic light switch of any type, either single, double, two-way, changeover, water-tight, a push - button to activate a step relay, or switch panels. Accessories shall be as manufactured by "Gewiss" 20 Eurosysten range type. All auxiliary accessories, including common passage boxes, must be included in the point price. For halogen spot lights same as above is said except that prices shall include wires of different sizes up to a cross section of 10sq.mm so as to be enough for the 12V supplied to such points depending on the number of these halogen lamps fed from the same line.

4.2 Lighting Point in Boiler, Laundry Rooms and Kitchen:
Each outlet for the installation of a lighting fixture in the boiler room, laundry room and the kitchen shall be measured as one point. Price is to include a 16 mm or 23 mm diameter pipe and leads with a cross-section of 1.5 sq.mm, or 3x1.5 NYY type cable, installed inside a
METHOD OF MEASUREMENTS

designated profile for the installation of fluorescent lighting fixture (Measured separately), leading from the applicable electrical board to the point, regardless of the distance between the board and the point, mounted over the plastering, down to armored, water-tight light switches, including co-ordination of the final location of the lighting fixture outlets in accordance with the actual placement of the equipment and machinery in the room (i.e. air-conditioning system, sanitary installations, generator, etc...).

4.3 Outdoor Lighting Point:
Each outlet for the installation of an outdoor light point or on one of the external walls of the building as indicated in the drawing (volume III) shall be measured as one point. Price is to include a 23mm diameter pipe or sections of PVC (MERIRON) or galvanized pipes where the cables cannot be routed through the normal piping, plus armored, water tight passage boxes and 3x2.5 NY, or 5x2.5 NY cables. Prices must include connection to switch panel and to the switchboard regardless of the distance between the switch panel, switchboard and the point. Switches are also included in the unit price as manufactured by “Gewiss” 20 Eurosystem range.

4.4 External Lighting Point For Lighting Poles:
Each outlet for the installation of a light pole into the external pavement or into the external basket court as indicated in the drawing (volume III) shall be measured as one point. Price is to include a 23mm or 29mm, 2 inch or 3 inch flexible spiral pipe and 3x4 NYY, 5x4NYY, 5x6 NYY or 5x10 NY cables to be buried in the ground. Prices include excavation, laying, and backfilling in the way described into the Technical specification (volume II). Connection to switchboard and connections between switchboard and switch panel concerning external lighting regardless of the distance, switches as manufactured by “Gewiss” 20 Eurosystem range are all included in the point price.

4.5 Lighting Point for Operating Lamp in Operating Theater:
Each outlet for an operational lamp is to include a 23 mm diameter pipe and 3x6 sq. mm leads, or 3x6 NYY cable, leading from the applicable electrical board to the point, a 25A 2 pole switch installed under the plastering inside the operating theater. Each outlet for an operating lamp in the ceiling must include all installation accessories and attaching hardware in accordance with the manufacturer’s instructions, as well as any other auxiliary accessories and materials required in accordance with the manufacturer’s instructions.

4.7 Standard Wall-Mounted Socket Outlet Point, Normal or Water Proof, or UPS Connected
Each outlet for a 16A 3-contact wall-mounted socket accessory shall be measured as one point. Price is to include 16 mm diameter pipe and 3 x 2.5 sq. mm leads installed under the plastering, or a 3 x 2.5 NY cable routed, in part, through cable duct (measured separately) and in part through 16mm or 23 mm diameter protective piping installed under the plastering, leading form the point to the applicable electrical board, regardless of the distance between the point and switchboard, and including a 16A 3-contact plastic socket outlet accessory such as manufactured by “Gewiss” 20 Eurosystem range type, standard or water-tight or special for UPS sockets, installed under the plastering at any height as required, and attached to the wall by means of screws, all connected, ready for use.

4.8 Wall Mounted Socket Outlet Point for Electric Shaver
Same as listed above for the standard wall-mounted socket outlet point, but with a specially designed electric shaver socket and an isolation transformer.

4.9 Three Phase Socket Outlet Point
Each outlet for connection of a three phase 16A wall mounted socket shall be measured as one point. Price is to include a 5x2.5 NY cable inside 23mm diameter conduit leading from the point to the applicable electrical switchboard, regardless of the distance between the point and switchboard. Price also includes a socket panel such as Nisko NI516 including a miniature automatic circuit breaker and on-off switch, or such as “Gewiss” Eurodin 66/67 IB range with three phase 16A industrial socket and on-off rotary switch.

4.10 Supply Point for Automatic Door
Point price is to include a 23mm diameter pipe and 3x2.5mm leads installed under the plastering, leading from the applicable electrical switchboard to an under-plaster junction box above the door, and 23mm diameter passage piping as well as the junction boxes required, all as indicated in the drawing (volume III).
4.11 Supply Point for External Fan, 1 Phase
Each outlet for connecting a single phase exhaust fan shall be measured as one point. Price includes a 3x2.5 NYY cable leading from the switchboard up to the roof inside a 23mm diameter pipe then through the cable duct on the roof then using a metal flexible pipe leading from the cable duct on the roof till the applicable point of exhaust fan regardless of the distance. Point also includes a double pole switch with an indication lamp including main line and switch connection to associated switchboard. Point is to terminate with armored, watertight 16A 2-pole circuit breaker, installed near the fan. All the above mentioned parts are included into the unit price except the cable duct on roof which is to be measured separately.

4.12 Supply Point For Exhaust Fan, 3 Phase
Ditto as item 11 above but, but 5x2.5 NYY cable instead of 3x2.5 and a single pole switch to activate contractor with indication lamp instead of the double pole switch with indication lamp.

4.13 Single Phase Floor Power Supply Point for Machines
Each main line coming from the switchboard until a floor outlet in the building shall be measured as one point including the outlet. Price includes a 3x2.5 NYY cable passing through 23mm diameter conduit from the switchboard till the machine which is to be connected or till the working table which is to be supplied with power from the floor.

4.14 Three Phase Floor Power Supply Point For Machines
Ditto, as single phase above but 5 x 2.5 NYY cable instead of 3 x 2.5.

4.15 Fan Coil Socket Outlet Point
Same as listed above in item 7 for the standard wall-mounted socket outlet point, but ceiling mounted and a 16A 3-contact surface mounted socket outlet accessory such as manufactured by Nisko.

4.16 Socket Outlet Point in Communication Cabinet
Point price is to include 16 mm diameter heavy, bendable type piping installed under plastering, with 3 x 2.5 sq.mm leads, or 3 x 2.5 NYY cable, leading from the switchboard to the point. Point is to terminate with a water -tight socket installed in communications cabinet.

4.17 Emergency Shut-off Push -Button Point
Point price is to include 16 mm diameter heavy, bendable type piping installed under the plastering, with 3 x 2.5 sq.mm leads, or 3 x 2.5 NYY cable, leading from the switchboard to the push-button such as model XAS - E25 by “ Telemechanique ”, red colored.

4.18 Telephone Connection Point
Each outlet for telephone connection shall be measured as one point. Price is to include a 16 mm diameter pipe with a 2 x 2 x 0.5 telephone cable installed under the plastering, leading to telephone distribution frame in the communication cabinet or to the main communications duct, as well as an outlet with a plastic socket Gewiss 20 Eurosystem range type.

4.19 Preparatory Point for Computer Terminal Connection
Each outlet for computer terminal connection shall be measured as one point. Price is to include a 23 mm diameter pipe with a 2 mm diameter Nylon drawstring, installed under the plastering, leading to the computer section in the communications cabinet, or to the main computer hub. Point is to terminate with a junction box installed under the plastering with “ Gewiss “ Eurosystem 22-24 range plates and supports.

4.20 Preparatory Point for Public Address System Connection
Each loudspeaker outlet of the public - address system shall be measured as one point. Price is to include a 16 mm diameter pipe with Nylon drawstring, leading to the Public-Address section in the communications cabinet, as well as the preparation of an under-plaster junction box at the outlet, including terminal boxes as required.
4.21 Preparatory Point For Fire Detection & Fire Alarm System Connection
Each outlet for fire/smoke detector, detector indicator lamp, outlet for emergency push-button or alarm horn, shall be measured as one point. Price is to include 16 mm diameter heavy, bendable type piping under the plastering with drawstrings, leading from the fire detection section in the communications cabinet to the point, as well as the preparation of an under-plaster junction box at the outlet, including terminal boxes as required.

4.22 T.V Antenna Connection Point
Each outlet for TV antenna connection shall be measured as one point. Point price is to include a 23 mm diameter pipe with a 75 ohm coaxial cable drawn in the pipe under the plastering leading from the TV section of the communications cabinet to the point. Point is to terminate with an under-plaster junction box, which is to accept a TV antenna socket. T.V antenna socket shall be Gewiss 20 Eurosysten range type.

5. Grounding and Protective Devices:

5.1 The price of the foundation earthing welding for the building is to include all details as specified in Technical specification (volume II) and drawing (volume III), and shall be measured complete, for entire building.

5.2 Connection of a potential-equalizing bus-bar to the outlets from the foundation grounding is to be included in the price for the bus-bar.

5.3 Installation Grounding System:
The price of the grounding system is to include all the materials and operations necessary to ensure proper grounding, such as: leads with the cross-section specified, protective piping, terminals, clamps, excavation (in the event that connection to underground water piping is carried out outside the building), etc. Grounding conductor length- as required. Grounding system shall be measured complete, regardless of the actual length of the piping and leads.

5.4 Grounding of Electrical Switchboards or Grounding Bus-bars to Water Piping or Other Metal Elements:
The price of the grounding system is to include all the materials and operations, necessary to ensure proper grounding such as: leads with the cross-section specified, protective piping, terminals, clamps, etc. Grounding length- as required, including connection & signing, all to be measured complete, regardless of actual length of the piping and leads.

6. Lighting Fixtures:
Prices for lighting fixtures shall include all details as specified in the Technical specification (volume II), with all parts and accessories thereof, including lamps, tubes and all auxiliary operations and materials required for the operation and perfect installation of the lighting fixtures to ceilings, walls or metal structural elements, including any required cross beams or hangers used to fix or support light fixtures into areas where there are trusses as the workshops areas, or for their incorporation in acoustic ceilings, as well as hangers to attach the lighting fixtures to the ceilings. Lighting fixtures shall be measured separately in units. If otherwise specified, the supply and installation of the lighting fixtures shall be measured and priced separately.

7. Low Voltage Systems:
Price of items of any of the LV systems is to include all details as specified in the Technical specification (volume II) and drawing (volume III). And also to include a detailed submittal and actual shop drawing including wiring diagram for the particular system.