



University of the Philippines Mindanao

**INSTALLATION OF CEILING OF THE  
ADMINISTRATION BUILDING ATRIUM**

UP Mindanao Campus, Mintal,  
Tugbok District, Davao City

June 2024

**PROJECT MANUAL**

**TECHNICAL SPECIFICATIONS  
- Construction -**

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**Campus Planning and Development Office  
OFFICE OF THE VICE CHANCELLOR FOR ADMINISTRATION**

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## INTRODUCTION

The Drawings and the Specifications are complementary to each other. Drawings are graphic means of showing work to be done. They are particularly suited to showing where materials are located. Thus, drawings exist essentially to show size, location and placement. Not all works, however, can be presented in the drawings. Generalized works are usually in statement form and hence the Contractor is strongly advised to read the specifications carefully.

Specifications, on the other hand, are used to describe the materials, construction techniques, samples, shop drawings, guarantees, and other contract requirements. Together, the drawings and Specifications are used to inform the Contractor. In cases where the specified brand carries with it the manufacturer's specifications, the manufacturer's specification shall hold precedence over this Specifications.

The specifications herein are presented in three sections as follows:

1. Summary of Materials and Finishes
2. Items for Submission by the Contractor for the Engineer's Approval prior to Order, Purchase, Work, and Manufacture.
3. Technical Specifications:

SECTION 1.0 – Indicates in a concise form the scope of work and the materials for the project, as well as mentioning in a general way the location or placement of construction elements within the project.

SECTION 2.0 – Is a listing of materials and construction documents for the Engineers appreciation to ensure that the design objectives for the intended class of construction are met, as well as to avoid waste such as when a Contractor installs specific materials or systems which are not acceptable for the project.

SECTION 3.0 – TECHNICAL SPECIFICATIONS consists of the standard procedures for the testing and application of specified materials and systems. As a general guide and in the spirit for which the technical specifications are prepared, works and materials necessary for the project, and which may, or may not be, included of traditional ad established institutes, societies or associations for specific materials and work trades, and as per the procedures proposed by pertinent governmental construction bodies, whenever applicable.

### THE LANGUAGE OF THE SPECIFICATIONS

The specifications are of the abbreviated type and include complete sentences.

The selection of sentence structure depends on the underlying principles of specifications:

- a. That the technical specifications are only one part of the Contract Documents;
- b. That the contract is between the Owner and the General Contractor; and
- c. That the General Contractor is the only party responsible for completing the work in accordance with the Contract Documents. Therefore:

- a. Only the General Contractor is referred to in the Specifications so as not to violate the intent of the contract and so as not to undermine the proper chain of command.
- b. Any reference to Specialty Trade Contractors in the technical specifications is made in relation to the selection or appointment of such contractors under the bidding guidelines. Once the Specialty Trade Contractors are selected and assigned to the General Contractor, the General Contractor assumes all responsibilities for the execution of the whole project in accordance with the Contract Documents. Therefore, in the contract between the Owner and the General Contractor, the Specialty Trade Contractor is not referred to. In all the Contract Documents, the word "Contractor" is meant the General Contractor.
- c. The omission of the phrase, "The Contractor shall" is intentional because the whole specification is directed to the Contractor. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the drawings.
- d. Where "as shown", "as directed", "as detailed", or words of similar import are used, it shall be understood that reference to the drawings accompanying the specifications is made unless otherwise stated.
- e. Where "as directed", "as required", "as permitted", "as authorized", "as approved" or words of similar import are used, it shall be understood that the direction, requirement, permission, authorization, approval, or acceptance of the Engineer is intended unless otherwise stated.
- f. As used herein, "provided" shall be understood to mean "provided complete in place", that is furnished and installed.
- g. Most sentences are in the imperative mood. This style is especially suited for instructions covering installation of products and equipment.

#### **INTENT AND APPLICATION OF THE PROVISIONS OF THIS SECTION**

- a. This Section is prepared in a concise manner, the intention of which is to save time and effort in locating important contents within the Specifications.
- b. The execution of this Section shall be coordinated and correlated to each corresponding elaborated section of this same Specifications.
- c. In case discrepancies exist between this Section and its corresponding elaborated sections, notify the Architect immediately for clarification; his decision shall be final.
- d. The Contractor shall bear the responsibility to check all the numbers and units as may be indicated on the Specifications. It is understood that the Contractor shall supply and install the actual required units as approved on the Plans and Specifications.
- e. Substitution of materials or equipment of makes other than those specified in the Contract will be approved by the Engineer for the following reasons only:

- i. That the materials or equipment proposed for substitution is equal or superior to the materials or equipment specified in construction efficiency and utility.
  - ii. Or that the materials or equipment's specified cannot be delivered to the job site in time to complete the work of the other Contractor due to conditions beyond the control of the Contractor.
- f. In case of a difference in price, the Owner shall receive all benefits of the difference in cost involved in any substitution and the Contract shall be altered by Charge Order to credit the Owner with any savings so obtained.
- g. To receive consideration, request for substitution shall be accompanied by documentary proof of quality or difference in price and delivery, if any, in the form of certified quotations and guaranteed date of delivery from suppliers of the proposed substituted materials or equipment.
- h. All applicable provision of the divisions of the technical specifications for each trade in the ensuing pages shall apply for all items cited in this Summary.
- i. Materials deemed necessary to complete the work but not specifically mentioned in the Specifications, Working Drawings or in the other Contract Documents are inferred, and shall be supplied and installed by the Contractor without extra cost to the Owner. Such materials shall be of highest quality available, and installed and applied in workmanlike manner at prescribed or appropriate locations.
- j. Materials specifically mentioned in this Summary shall be installed following efficient and sound engineering and construction practice, and specifically as per Manufacturer's application or installation specifications which shall govern over all works alluded to in this Specification.
- k. When specified for the project, equipment, materials, and finishes for on-site improvement and facilities as listed below are part of the scope of the work and shall be supplied, applied and installed by the Contractor without extra cost to the Owner.
- l. The Contractor shall conduct thorough inspection of the existing jobsite conditions.
- m. The Scope of Work shall include all demolition and additions necessary in order to implement the whole set of approved Plans, Working Drawings, and Specifications.
- n. All demolition and removal shall be approved by the Architect or his Authorized representative. Demolished materials shall be removed and disposed of from the site.
- o. Demolish existing slabs and walls where required and additional construction of wall footings, slabs and beams in order to implement the Plan concerned.
- p. The Contractor shall secure and pay for all pertinent permits for construction works.
- q. All items which are so shown on the Plans and not mentioned in the Specifications shall be included. Discrepancies in these items are to be verified with the Engineer in Charge.
- r. Miscellaneous: All temporary lighting, power and water supply within the premises shall be shouldered by the General Contractor and sufficient enough to supply the requirements of

the other Trade Contractors. The billing of the local water supply and electric company shall be prorated by General Contractor and all Trade Contractors based on the Contract Cost.

**ITEMS FOR SUBMISSION BY THE CONTRACTOR.**

The following Specs is a listing of materials and construction documents for inspection to ensure that design objective for the intended class of construction are met. It is designed to avoid waste such as when the Contractor install specific materials or system which are not acceptable for the project.

**SAMPLES**

**1. METALS**

- a. All specified sizes of structural steel sections..... 1000 mm length
- b. All specified sizes of steel reinforcement pre bulk delivery... 1000 mm length
- c. Steel decking (if needed)..... 300 mm length
- d. All aluminum & stainless steel section..... 150 mm length
- e. Others (if required by Architect's..... 1 unit each

**2. FINISHES**

- a. All plaster types..... 1 panelmock-up
- b. Fiber cement board..... 1 panel each
- c. Gypsum board..... 1 panel each
- d. All paints and lacquers for sample swatches all types and colors..... 300mmx300mm
- e. Other (if required by Architect) ..... 1 unit each

**3. SPECIALTIES**

- a. All Mechanical Fans..... 1 unit each
- b. Other (if required by Architect)..... 1 unit each

**4. ELECTRICAL**

- a. All conduits, fittings, wires, cables, and accessories..... 1 of each type
- b. All junction box, pull box and accessories..... 1 of each type
- c. All lighting fixtures, switches and convenience outlets... 1complete set  
each (if Applicable)
- d. All telecommunication and internet connectivity boxes  
And accessories (if Applicable)..... 1 of each type
- e. CCTV and MATV devices (if Applicable)..... 1 piece each
- f. All fire alarm wiring devices (if Applicable)..... 1 of each type
- g. Other (if required by Architect)..... 1 unit each

**5. MOCK-UPS**

NOTE: All mock-ups are for ARCHITECT'S approval before final installation.

- a. Aluminum horizontal devices assemblies
- b. All waterproofing materials in place
- c. All types of ceiling board assemblies

- d. All types of wall and floor tile and other finish
- e. All paint finishes
- f. Other (if required by Architect's)

**6. TECHNICAL CATALOGUES AND BROCHURES**

- a. Ceiling finishes and assemblies
- b. Lighting fixture system
- c. Ventilation fans
- d. Other (if required by Architect)

**LABORATORY TEST CERTIFICATES**

- 1. Non-destructive Welding test
- 2. Other (if required by Architect)

**GUARANTEES / WARRANTIES**

Submittals for environmental performance

- 1. Wood treatment (if Applicable)
- 2. Ventilation Fans
- 3. Other (if required by Architect)

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**DIVISION I - GENERAL REQUIREMENTS**

1.0 SCOPE OF WORK: The work shall include the following:

1. BONDS AND INSURANCE
  - a. Performance Bond
  - b. Guarantee Bond
  - c. Contractor's All-Risk Insurance
  - d. Down Payment Surety Bond
2. SIGNAGES
  - a. ECC Signage
  - b. Building Permit Signage
3. SAFETY
  - a. Safety Officer
  - b. Personal Protection Equipment
  - c. Proper Uniform
  - d. Clinic
  - e. First Aid

- a. RELATED SECTIONS: All applicable provisions of the different divisions of the Specifications for each work trade shall apply for all items cited in this Summary.
- b. INFERRED ITEMS AND WORK: Materials and workmanship deemed necessary to complete the works but NOT specifically mentioned in the Specifications, Working Drawings, or in the other Contract Documents, shall be supplied and installed by the Contractor without extra cost to the Owner. Such materials shall be of the highest quality available, and installed or applied in a workmanlike manner at prescribed or appropriate locations.
- c. SPECIFICATION: Materials specifically mentioned in this Summary shall be installed following efficient and sound engineering and construction practice, and especially as per manufacturer's application for installation specifications which shall govern all works alluded to in these Specifications.
- d. APPROVAL NOTE

All materials and woks writing on this section should approve by Architect or Engineer-in-charge.

1. Materials: provide sample for approval by Architect or Engineer-in-charge
2. Working: provide mock-up for approval by Architect or Engineer-in-charge



**DIVISION 5 - METALS**  
**Structural Steel, Shutters, Windows, Ventilators**

*Steel work riveted, welded, in built up sections, framed work including cutting, hosting fixing in position and applying two priming coats of epoxy primer grey paint. In beam and joints, channels, angles tees, flats, with connecting plates or Angle cleats as in main & cross beams, Hop and jack fallers, pralines connected to common rafters and the like.*

**SECTION 2 - MISCELLANEOUS METALS**

- A. STANDARD SOLID SECTION: Conform to ASTM 611 with specified yield point of 228 Mpa (33,000 psi). Mild steel flat bars, square bars, overhead anchorage of roll-up doors, grill work, miscellaneous fabricated mounting brackets, straps, dowels, frames and connectors. Upgrade to next higher / bigger size and thickness if specified sizes & thickness are unavailable.
- B. BRACING RODS: Standard structural grade steel rods with turnbuckles whenever required ex. for roof framing.
- C. PAINTING: Use only approved brand of epoxy zinc chromate paint and linseed oil for all architectural steel components only. For field painting, use only approved brand of enamel paints.
- D. GALVANIZED IRON:  
Yard Hose Bibbs: G.I. Pipes: schedule 40, painted with Epoxy Enamel Paint.
- E. SPANDRELS: Use Aluminum Spandrels powder coated light reddish brown
- F. FASTENINGS: Commercial types, except where special types are shown or required. Fastenings for all exterior work shall be non-ferrous, unless otherwise shown. Fastening for stainless steel and aluminum and other interior work, where exposed shall match the fastened metal.

**2.0. Workmanship**

2.1. The steel sections as specified or required, shall be cut, square and to correct lengths, as per drawings and design. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member, except as indicated in the drawing or as directed. All straightening and shaping to form shall be done by application of pressure and not by hammering. Any bending or cutting shall be carried out in suet] a manner as not to impair the strength of the metal. All operations shall be done in cold state unless otherwise directed/permited.

2.2. Steel riveted or bolted in built up sections, frame work.

- A. The steel structure as shown in the drawings or as per direction of the Engineer-in-charge shall be laid out on a level platform to full scale and to full size in parts. A steel tape shall be used for measurements to ensure maximum accuracy.
- B. Wooden templates 12 mm. to 19 mm. thick or metal sheet template shall be made to correspond to each connecting gusset plate and rivet holes shall be accurately marked on them and drilled. The templates shall be laid on the steel members and holes of the steel members shall also be marked for curing. The base of steel column and the position of Anchor bolts shall be carefully set out

C. Riveting:

The parts assembled for riveting shall be in close contact with each other and the bearing stiffeners shall bear tightly both at top and bottom without being drawn or caulked. Members to be riveted shall be properly pinned or bolted and rigidly held to gather while riveting. Drifting of holes shall not be permitted. Except to draw the parts together and the drifting tools so used shall have maximum diameter not exceeding the nominal diameter of rivets or bolts. Drifting done during assembling shall not distort the metal or enlarge the holes. The shanks of rivets shall project beyond the plate-surface sufficiently so as to fill hole thoroughly and form the required head after riveting. The riveting shall be done by hydraulic or pneumatic process. However, where such facilities are not available, hand riveting may be permitted. The rivet shall be heated red hot, care being taken to control the temperature of heating so as not to burn the steel. Rivets of diameter less than 10 mm. may be fitted cold. Rivets shall be of heat finish with heads full and of equal size. All loose, burnt or badly formed rivets with concentric or deficient heads shall be cut out and replaced. The heads of rivets shall be central to shanks and shall grip the assembled member firmly. In cutting out rivets, care shall be taken so as not to injure assembled members, caulking or re-equipping shall not be permitted. For testing rivets, a hammer weighing approximately 0.25 kg shall be used. Both heads of the rivets shall be tapped, slack rivets will give a hollow sound and a jar. All rivet heads shall be painted with red lead paint within a week of their fixing.

- D. All bolt heads and nuts shall be hexagonal and of equal size unless specified otherwise. The screwed heads shall conform to standard and the threaded surface shall not be tapered. The bolts shall be of such length so as to project two clear threads beyond the nuts when fixed in position and these shall fit in the holes without any shakes. The nut shall be fit in the threaded ends of bolts properly. Where turned and fitted bolts are required to be used in place of rivets shall be provided with washers not less than 6 mm thick so that the nut when tightened shall not bear on the unthreaded body of the bolt. Tapered washers shall be provided for all heads and nuts bearing on leveled surfaces. The threaded portion of the bolt shall not be within the thickness of the parts bolted together, the faces of the bolt heads and nuts abutting against steel members shall be machine finished. Where there is a risk of the nut being removed or becoming loose due to vibrations or reversal of stresses, these shall be secured from slackening by the use of locknuts, spring washers, cross-cutting or hammering down of threads as directed. Bolts, nuts, and washers shall be thoroughly cleaned and dipped in double boiled linseed oil before use. The whole steel work shall be painted with a coat of priming coat of red lead, as per relevant specification of painting.

**3.0 Mode of measurements & payment**

- 3.1. The steel work shall be measured in general as under:

- A. All work shall be measured on the basis of finished dimensions as fixed at site and measured net unless specified otherwise.
- B. The weight of steel sections, steel rods, and steel strips in finished work shall be calculated in standard weight on the same basis on which steel is supplied.
- C. The weight of steel plates and strips shall be taken from relevant calculation of 7840 kg/cu.m.
- D. Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts, nuts, washer, distance pieces, separators, diaphragm gusset (taking overall square

dimensions) fish plates etc. shall lie added to the weight of respective items.

- E. In riveted work allowance is to be made for weight of rivet hands. No deductions shall be made for rivet or bolts holes excluding holes for anchor or holding down bolts.
- F. For forged steel and steel castings, weight shall be calculated on the basis of 7840 kg/cum.
- G. Unless otherwise specified, no allowance shall be made for the weld metal in case of welded steel structure.
- H. Dimensions other than cross sections and thickness of plates shall be measured to nearest 0.001m
- I. Mill tolerance shall be ignored when weight is determined by calculation.

3.2. The rate includes cost of all material, labor, erection, hoisting scaffolding, and protective measure, required for proper completion of the item of work. This shall also include conveyance and delivery handling, loading, unloading and storing etc. required for completing the item described above including necessary wastage involved.

3.3. The rate shall be for a unit of one kilogram.

## DIVISION 9 - FINISHES

### Ceiling and Eaves

*Providing and fixing cement board ceiling with long lied and grooved jointing and metal screws.*

#### 1.0. Materials

1.1. Metal Furring, stud and brace angles shall be of standard thickness sufficient to carry the load of ceiling.

A. FIBER CEMENT BOARD: Use 6.0mm thick for ceiling boards Install as per manufacturer's instructions.

B. FIBER CEMENT SOFFIT: Wood-grain, 300mm wide x indicated length. Install and paint per manufacturer's instructions. Fixings shall be rust-proof screws or nails. For all roof eaves or any approved soffit material by Engineer in charge

C. HARDWARE AND FASTENERS: Use metal nails, screws, plates, straps, miscellaneous fasteners or anchorage; concealed or countersunk whenever called for, with size, shape and type to ensure a rigid connection for laminated items.

D. ASSEMBLY MATERIALS: Approved water-resistant glue, and nails, screws and bolts of appropriate type, shape and size for all types of joints.

E. EAVES: Aluminum spandrels powder coated light brown on GI furrings

#### 2.0. Workmanship

##### 2.1. General

The board shall be clean prior to installation, cut square and straight. Each board shall have grooved for jointing. On exposed faces, it shall be planed for full face.

2.2. The frame for supporting the ceiling is metal and the size and the other details of frame work shall be as directed, Suspenders of M.S. angles or other sections may be used for suspending the frame. The bottom surface of the frame shall be checked and corrected to true surface and slope.

2.3. Fixing: Board of a specified thickness shall be used. The board shall be of uniform width except in the first and last lines of planks adjacent to the two walls where remaining additional odd width shall be adjusted equally on both sides. The minimum, length of board in finished work shall be such that it will span at least two spacing of the supporting frame work except where shorten lengths are unavoidable. The board shall be planed true on the exposed sides.

2.4. The longitudinal edges of the board shall be jointed with grooved type joints as described in the item.

2.5. The outer lines of planks shall be accurately fixed parallel and close to be wall. Each subsequent board shall be carefully jointed up. The board shall be fixed to the frame above with two screws at each and joints of frame and one at every intermediate joint. The screws shall be counter sunk and the screw holes filled with putty or-sloping out way.

#### 3.0. Mode of measurement & payment

- 3.1. The supporting frame, cover fillets, and suspenders shall not be included in rate of ceiling.
- 3.2. No deductions in measurements shall be made for opening not exceeding 0.46 sq. m. and no extra payment shall be made for forming such openings.
- 3.3. Each type of work in ceiling shall be measured separately.
- 3.4. The rate shall be for a unit of one sq. meter.

### **Paintings & Polishing**

13.0 *Use one brand all throughout. All exposed finish hardware, lighting fixtures and accessories, plumbing fixtures and accessories, glass surfaces and the like shall be adequately protected against stains from paint and other painting materials prior to painting works. All other surfaces which would be endangered by stains or paint marks should be taped and covered with craft paper or equal. Painting two coats (excluding priming coat) on new surface and other metal surfaces, brushing, interior to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.*

#### **1.0. Materials**

The enamel paint shall conform to all materials and workmanship as directed.

##### **1.1 EXTERIOR:**

###### **A. ACRYTEX PLAIN FINISH; for all Ceiling Finishes**

1st Coat: Acrytex Primer or approved equal

2nd and 3rd Coats: Acrytex Topcoat Semi-gloss Finish or approved equal.

##### **1.2 METAL SURFACES:**

EPOXY ENAMEL, or approved equal; for ferrous surfaces such as all structural steel surfaces, steel grille, steel louvers, steel and roof framing and other exposed steel surfaces unless otherwise specified.

*Surface Preparation: Masonry Neutralizer #44 or equal*

1st Coat: Epoxy Red Lead Primer #2270 or Zinc Chromate Primer #2260 or equal

2nd and 3rd Coats: Epoxy Enamel or equal. Tint to get the required color.  
Thinner: Epoxy Reducer or equal

#### **2.0. Workmanship**

2.1. General : The materials required for work of painting work shall be obtained directly from approved manufactures or approved dealer and brought to the site in maker's spools; kegs. etc. with seal unbroken.

- A. All materials not in actual use shall be kept properly protected, lids of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin. The materials which have become state or flat due to improper and long storage shall not be used. The paint shall be

stirred thoroughly in its container before pouring into small containers. While applying also, the paint shall be continuously stirred in smaller container. No leftover paint shall be put back into stock tins. When not in use the containers shall be kept properly closed. If for any reasons, things is necessary, the brand of thinner recommended by the manufacturer shall be used.

- B. The surface to be painted shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed part o the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surfaces shall be thoroughly dry before painting work is started.

2.2. Application of paint:

- A. Brushing operations are to be adjusted to the spreading capacity advised by the manufacture of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the -laying off is finished. The full process of crossing and laying off will constitute one coat.
- B. Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand-paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from Engineer-in-charge before next coat is started.
- C. Each coat the last shall be lightly rubbed down with sand paper of fine pumice stone and cleaned of dust before the next coat is applied. No hair marks from the brush of clogging of paint puddles in the corners of panels, angles of moldings etc. shall be left on the work.
- D. Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.

**3.0. Mode of measurements and payment**

3.1. The relevant specifications of this item shall be followed for mode of measurements and payment.

3.2. The rate shall be for a unit of one sq. meter.

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**DIVISION 23 – AIR CONDITIONING AND VENTILATION**

**Air Conditioning and Ventilation**

**Scope of Work**

The work includes furnishing and installation of air conditioning unit and ventilation fans but not limited to materials, tools, supervision and all other items indicated in the drawings necessary to complete the works in accordance with the specifications.

**Material requirements:**

HVLS Industrial 24 Ft. Diameter Fan , direct-drive overhead fan purpose-built for harsh industrial conditions, with an IP66 rating against tough elements like dust and water. Two-set safety cable system made from aircraft-grade galvanized steel. Built-in accelerometer for automatic fan shutdown upon impact or if a shift in building structure is detected. Steel retainers and Airfoil Restraint System for robust hub and airfoil security

**Mechanical Materials, Assemblies and Systems:**

Unless otherwise shown on the Drawings, specified or approved by the Engineer the Mechanical Materials, Assemblies and Systems shall conform to the following requirements:

Be the Manufacturer's first quality line of standard and/or series of factory fabricated items.

Be essentially the standard specified catalogue products of an approved manufacturer, or approved equal. Designs incorporating components which are considered by the Engineer to be prototype in nature shall not be accepted.

Where two or more units of same class, type or kind are required, the units shall be products of a single manufacturer. However, component parts of a system are not required to be products of same manufacturer.

Like mechanical and like electrical parts and components shall be identical throughout each system and readily interchangeable.

All materials, and equipment supplied by the Contractor shall comply with the applicable Standards of the Specification and be suitable in all respects for the purpose intended.

All materials and equipment supplied and installed shall be new and of the best type for

each particular purpose and of the first quality with regards to the design, manufacture and performance.

The equipment and materials shall be suitably designed and constructed for safe, proper and continuous operation under all conditions described or implied in these Specifications without undue heat, strain, vibration, corrosion or other operating difficulties.

Equipment and equipment components shall be designed and supported to permit free expansion and contraction without causing excessive strains, distortion or leakage.

Parts subject to wear, corrosion or other deterioration, or requiring adjustment, inspection or repair shall be accessible and capable of reasonably convenient removal, replacement and repair. All such parts shall be of suitable material for keeping maintenance to a minimum.

The equipment shall be designed to permit interchangeability of parts and ease of access during inspection, maintenance and repair.

Vibration, noise, mechanical and thermal stresses and susceptibility to corrosion and erosion shall not be greater than with similar plant of first class design and workmanship operating under similar conditions.

All works shall be carried out in accordance with the best engineering practice by experienced tradesmen of appropriate grades to the approval of the Engineer.



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**DIVISION 26 – ELECTRICAL**

**Lighting**

**1.0 Materials**

Light fixtures as mentioned in the BOQ with the catalogue no's and makes shall be installed. The fixtures shall be complete with ballast and shall be prewired by the manufacturer. Fans of the Proposed makes and size shown in the drawing shall be used and install in the hook type M.S. box used by the CLIENT.

**2.0 Workmanship**

The fixture shall be installed on wall / ceiling as directed and as per manufacturer's instruction, with necessary accessories for surface, concealed, suspended from ceiling, bracket mounting etc. The job also includes connection of fixture with respective outlet point with heat resistant wires through heat resistance sleeve and PVC connector. The exhaust fan

shall be installed complete with M.S. angle iron mounting frame/ ring, G.I. louvers, wire mesh and plug at the end of the cord including wiring & earthing etc. Proper earthing shall be provided to the fixtures.

**3.0 Mode of Measurement**

The unit rate shall be considered for fitting one fixture. The rate shall include following

All fixing accessories, mounting bracket, ballast condensers and control gear wherever applicable. Supplying and fixing Ball and socket joints wherever required.

Earthing of fittings.

Electrical connections to fittings/fans from the junction box/ceiling rose.

Installation and interconnection of Electronic regulators for ceiling fans.

Supplying and fixing 300 mm. GI down rod for ceiling fans.