

PROJECT SPECIFICATION FOR MODULAR STRUCTURES

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DETAILED TECHNICAL SPECIFICATION

1. KNOWLEDGE

1.1. The construction of modular structures such as classrooms, administration buildings, toilets, general siteworks associated with the foundations, etc at various locations as described in the Scope of Works. The modular structures and associated equipment shall be complete and functional and shall be as a minimum according to this specification and the latest revisions of the following standards and specifications:

- i) SANS 10400: The Application of the National Building Regulations
- ii) SANS 10160: Basis for Structural Design and Actions for Buildings
- iii) Occupational Health and Safety Act and Regulations
- iv) Regulations Governing Hazardous chemical substances R1179 as amended by R930
- v) Department of Public Works specification PW371-A (Edition 2.0): Construction Works: General Specification.
- vi) SANS 10142: The Wiring of Premises Part 1: Low Voltage Installations
- vii) SANS 10252: Water supply and drainage for buildings
- viii) SANS 10162: Structural use of steel
- ix) SANS 121/ISO 1461 and SANS 32/ISO 10240 Hot dip galvanizing
- x) SANS 14713/ISO 14713 Protection against corrosion of iron and steel in structures.
- xi) SANS 10163: Structural use of Timber
- xii) SANS 204: Energy efficiencies in buildings
- xiii) SANS 10082: Timber frame buildings
- xiv) SANS 517: Light steel frame buildings
- xv) National Environmental Management: Waste Act (59/2008) and regulations
- xvi) National Environmental Management Act (107/1998) and regulations
- xvii) All other relevant specifications, standards and documents whether referenced in the above documents or not.

This specification is supplemental to the above and more specific. Any conflicting information must be referred to the Principal Agent for clarification.

1.2 The modular structures and site facilities are intended for use on a daily basis at the schools.

1.3 The appointed contractor to design, manufacture, deliver, install and commission all the facilities shall be responsible for the proper and safe functioning of the installation and any claim on the grounds of want of knowledge will not be entertained.

2. BID DOCUMENT

- 2.1. Tenderer to submit proof of full Agrément Certificate for proposed modular building system.

3. LEGAL REQUIREMENTS

- 3.1. During the supply, installation and commissioning all work shall be carried out according to the requirements of the Occupational Health and Safety Act and regulations. After completion the site and complete school and surrounding site shall comply with the Occupational Health and Safety Act as well as the national building regulations as per SANS 10400.
- 3.2. All registration certificates, written local authority approvals, test certificates and certificate of compliance shall be submitted to the Principal Agent before the installation will be accepted for first delivery.

4. WARRANTY

- 4.1. The contractor is to guarantee the new buildings, site works associated with the foundations and workmanship for a period of 90 days against any defects (latent or obvious), non-conformance and/or failure from date of works completion.
- 4.2. In the event that the contractor does not attend to such defects after being notified, the Principal Agent / The Client and/or user reserve the right to effect the rectification of the defect and recover the costs thus incurred from the contractor. This guarantee period in no way affect the latent defect liability period as specified in the JBCC contract.

5. SITE

- 5.1. The classrooms, admin offices, ablution blocks, etc and site works associated with the foundations are to be installed at the schools listed in the Scope of Works
- 5.2. The sites are located within rural areas and the security, safety and compliance with all legal requirements form part of this contract.
- 5.3. The areas have a high incidence of un-employment and it is a condition of this contract that local labour be employed.

6. CONSTRUCTION PERIOD

- 6.1. The construction period is as indicated in the Contract Data.

7. MAKING GOOD TO TRADES AND CLEARING SITE

- 7.1. After completion of the installation the site and all trades shall be made good and left in a clean and neat condition. All packaging material, rubble, crates and items used for commissioning shall be removed from the site and disposed of in a correct and legal manner.

8. SUMMARY OF SCOPE OF WORK

- 8.1. This specification is for the design, manufacture, supply, delivery, installation, painting, testing and commissioning of modular structures and site works associated with the foundations must be in accordance with the approved Agreement South Africa Certificate. The supply and installation require the following main actions with the following main requirements as well as any ancillary equipment mentioned below:
- 8.1.1. Prepare construction drawings and submit to Principal Agent for approval of work associated with the project prior to commencement.
 - 8.1.2. Comply with all health and safety requirements as per Occupational Health and Safety Act as well as this specification.
 - 8.1.3. Provide a health and safety plan for approval complete with all the requirements of the OHS Act and this specification.
 - 8.1.4. Obtain the services of a registered professional engineer to design the foundations and issue a conformance certificate of the installation after completion.
 - 8.1.5. Roofs to walkways 2,2m wide along the length of the front facades of all units.
 - 8.1.6. Complete electrical installation with all fittings, cables, DB's for a complete functional school, including the supply, installation and connection to a complete weather proof electrical kiosk on a concrete plinth with sleeves for housing the electrical controls. Kiosk shall be lockable complete with key alike locks as specified above, from 3CR12 and powder coated as provided to ESKOM.
 - 8.1.7. Complete plumbing installation including rainwater disposal, sanitary fittings, sanitary plumbing, water supplies, fire appliances, etc. inside the units. Connections to sewer and water main points to be provided by others.
 - 8.1.8. Fire extinguishers and associated signage.
 - 8.1.9. All test certificates, compliance certificates, local authority approvals including structural engineers certificate confirming that buildings and foundations conform to the engineers design and is suitable for the loads and electrical COC for the system.
 - 8.1.10. Full maintenance of the buildings and internal plumbing during the 3 month defects liability period.
 - 8.1.11. All other items and requirements, whether specifically mentioned or not, for a complete, functional, safe and durable schools complying with all the relevant codes and specifications.
 - 8.1.12. All safety notices, health and safety plan and safety equipment.
 - 8.1.13. Set of three keys per lock.
 - 8.1.14. A 100 liter direct solar geyser for sink in staff room. Geyser to be mounted inside roof space with access for maintenance. All to be done according to SANS 10400 and SANS 1052
 - 8.1.15. Three sets of data books each with all data sheets, as built drawings, engineers certificate, municipal approval, occupation certificate and inspection sheets with electrical COC and dismantling and re-location procedures.
 - 8.1.16. Two sets of as built drawings in the following format:
 - a) One set electronic drawings in autocad .dwg format, and

b) One set pdf's of all drawings.

8.1.17. The contractor must include for all items that may be required to ensure a functional building to comply with the building regulations. If the contractor is unsure of what is required, he must contact the Principal Agent.

8.1.18. All Tenderers must submit a detailed construction schedule, defining the construction Materials and Methods used to manufacture and install their product.

8.1.19. Tenderers must be available to present their proposed product to the evaluation committee on a date to be arranged. Factories and previous constructed structures must be accessible for an on-site inspection by representatives of the evaluation committee.

9. GENERAL

9.1. All buildings offered shall comply with all aspects of the National Building Regulations as interpreted in SANS 10400 and SANS 204. Compliance with SANS 204 shall be achieved without the use of mechanical ventilation and/or air-conditioning.

9.2. The following design criteria must be taken into account in the design of the structure:

9.2.1. The buildings shall be designed and constructed in such a way that each building can be relocated to another site without major dismantling.

9.2.2. The interior walls are to be painted with light coloured paint above 1200mm to ensure that the interiors are clean and bright. The area below 1200 should be painted in a colour that does not show dirt easily. The wall paint should be of a high quality to enable easy cleaning and a highly vandal resistant surface.

9.2.3. Ample windows are encouraged to provide adequate ventilation as well as light to be installed in accordance with requirements of SANS 204.

9.2.4. All windows are to be openable with clear glass and burglar proofing installed.

9.2.5. The building should be vermin and vandal proof and built with high quality material and workmanship to ensure longevity of the structure.

9.2.6. All material chosen should be rust proof and used in such a way that where contact with water is inevitable the necessary precautions is taken to ensure durability.

9.3. The finished floor level of all the buildings shall be a maximum of 250mm above the general surrounding ground level. The edges all-round the raised buildings shall be sealed off with a corrosion proof material capable of withstanding impact that can be expected at a school e.g. kicked with a boot or banged with a school bag with a 10kg load. The skirt shall be totally vermin and insect proof but any water that may accumulate during high rain fall, must be able to drain away.

9.4. All supports and adjusting mechanisms shall be hot dipped galvanised after manufacture in accordance with SANS 121 / ISO1461.

9.5. Prior to submitting building plans and SANS 10400 calculations to local authority for approval, the plans must be submitted to the Principal Agent / Department of Basic Education for comment and acceptance.

- 9.6. All materials and workmanship are to be of the highest quality and must comply with the latest edition of all relevant SANS specifications and standards as required by SANS 10400: The application of National Building Regulations) and the DPW Construction Works Specification (PW371-A), which is obtainable from the Department of Public Works, and shall be read in conjunction with this tender document and shall be referred to for the full descriptions of work to be done and materials to be used.
- 9.7. AGRÉMENT SOUTH AFRICA:
- 9.7.1. Any alternative building method employed to construct the proposed modular structures will be required to have an approved AGRÉMENT SOUTH AFRICA CERTIFICATE.
- 9.7.2. The contractor must submit with his tender a certified copy of relevant and valid CSIR Agrément Certificate and all other SANS approval certificates.
- 9.7.3. The certificate is required to be still valid and registered by referring to the agreement south Africa website: www.Agrément.co.za or by contacting the Agrément South Africa office on 012 841 3708.
- 9.7.4. Any variations from the certificate needs to have been approved by the ASA in writing.
- 9.7.5. The party responsible for the supply and erection of the system is the certificate holder or a licensee of the certificate holder who is registered with the ASA. The party responsible for the erection must also be registered with the CIDB register of contractors <http://registers.codb.org.za/reports/contractorslisting.asp>
- 9.7.6. The name of the certificate holder is printed on the certificate. In the case of licensees all enquiries must be made with ASA. Certified proof of license with certificate holder to be submitted together with tender.
- 9.7.7. Copies of the full ASA certificate for the system to be submitted with the tender and be made available on each site where the system is to be implemented. Please note that the full certificate is approximately 20 to 30 pages long. The front cover will not be accepted as the full certificate.
- 9.7.8. The terms and conditions of the Agrément South Africa certificate are to be adhered to completely to ensure approval at completion.
- 9.7.9. Please note that any unsatisfactory service and problems with the erection of the system will be reported to the Agrément South Africa board. This could affect the validity of the certificate in future.
- 9.7.10. Please also note that the ultimate responsibility for satisfactory work done by any licensee will still be with the original certificate holder and it is therefore in his best interest to ensure that the system is used and erected satisfactory.
- 9.8. On completion of the project, the contractor must issue to the employer the following certificates:
- 9.8.1. Certificate from a Registered Civil/Structural Engineer as to the suitability of design of the foundations.
- 9.8.2. An electrical certificate of compliance for the complete installation (COC)
- 9.8.3. All certificates required to be issued to the local Municipality.
- 9.8.4. Certificate from a Registered Engineer that the design and construction of the buildings comply with the requirements of SANS 10400 and SANS 204

- 9.8.5. The contractor must supply certificates for the treatment of all timber against termites and dry rot.
- 9.8.6. Engineers certificate for roof construction.
- 9.9. Care must be exercised not to damage private property or local authority property on the outside of the fence line or in any servitude. Any claim for such damage is for the contractor's account. The contractor must arrange with the owner of such property for mutually acceptable construction before commencing the work.
- 9.10. All repairs, reworks and making good shall match original in all respects.
- 9.11. Boundary pegs shall not be disturbed. If accidentally disturbed, it should be returned to its exact original position.
- 9.12. Bidders to ensure that they acquaint themselves with the work to be done and make allowance in the tender price for the proper completion of the work although not all items may be specified.
- 9.13. The successful bidder shall not take any instructions from anyone other than the Principal Agent. No verbal instruction shall be entertained by the Contractor without a follow up written Site Instruction from the Principal Agent.
- 9.14. Contractor to inform the Principal Agent of any cost implications associated with an instruction prior to commencement of the work.

10. CLASSROOMS, OFFICE, GRADE-R AND STORE

- 10.1. Classrooms shall be a minimum of 60m² in size and the length to breadth ratio must be able to fit a total of 40 school desks (1000 x 450mm), 1 teachers' desk, 1 standard steel stationary cabinet, with adequate space for chairs and circulation. The floor to ceiling height shall not be less than 2.70 m above finished floor level. Provision must be made for extended eaves overhang along the entire length of the entrance side of the building to adequately cover the 1,8m wide walkways/ verandahs (constructed by others) which shall connect all classrooms, offices and ablution blocks.
- 10.2. Office and Store shall have a combined minimum area of 25m². A wall with a semi-solid door should divide the rooms. The floor to ceiling height shall not be less than 2.70 m above finished floor level.
- 10.3. Supply and fit 1800mm melamine cupboard with post form top complete with drop in stainless steel single bowl sink with 15mm hot and cold-water pillar taps in kitchen area.

11. FOUNDATIONS

- 11.1. No soil tests are available. The contractor shall undertake his own soil testing to determine the size and type of foundations required below the building supports. All foundations must be designed by a Registered Engineer, who must issue an approval certificate at completion. The soil around the foundations where the building supports are mounted must be protected from erosion. The walkway/ verandah cover support require foundations adequately sized to comply with the relevant SANS standard and soil conditions.
- 11.2. Depending on the type of construction offered, three foundation construction methods are recommended, a) Strip footings and b) Raft foundations and c) adjustable pedestal foundations. The contractor to supply foundations details with his tender.
- 11.3. Contractor to provide standard concrete test cubes for foundation concrete. Testing must be done by a SANAS accredited testing laboratory for all structural and foundation concrete. Location of batch in structure to be identified with each test cube. Test results as well as identified positions to be recorded in data book.
- 11.4. Irrespective of type of construction, special care shall be taken to ensure that uplift and lateral wind forces as calculated according to SANS 0160 and that all buildings and structures can resist such forces. In the case of pedestal foundations, the buildings must be secured to prevent wind movement.
- 11.5. The general minimum requirements for foundations are as described below:

11.5.1. STRIP FOOTINGS

- a) The minimum size of a strip footing shall be 700 x 250mm. The average depth of excavation from formation level is 600mm, and this average depth will stand (no adjustments will be made after completion). Actual dimensions shall however be to the design prepared by a registered Professional Engineer.
- b) All concrete in footings to have a minimum 28 day strength of 20MPa and the contractor must supply test cube results to comply for every 24m³ of concrete cast. The first set of cubes to be tested at 7 days with the minimum required 7 day test strength of 13 MPa and if the tests comply with these specifications then the remaining cubes to be tested at 28 days confirming a strength of 20MPa.
- c) All foundation brickwork to be 220mm wall of well burnt bricks, with a minimum strength of 14MPa. Foundation walls to project a minimum of 340mm above the finished platform level or natural ground level. Brick force to be supplied in every course and shall be galvanised welded fabric formed of two hard drawn wire of diameter not less than 2.8mm and not more than 3.55mm held apart by cross wires at 300mm centres.
- d) The exposed plinth to be constructed with hard burnt face bricks, quality of a FBS brick, of an approved colour and a minimum strength of 14 MPa.
- e) The damp proof course to be 375 micron embossed waterproof sheeting. Damp proof shall be installed against a mortar filled raked edge sloping down and outwards.
- f) All backfilling of trenches to be of suitable granular materials in maximum 150 thick layers and compacted to 95% mod AASHTO.

11.5.2. RAFT FOUNDATIONS

- a) The foundations to be constructed according to the Engineer's specification and Design.
- b) The Design to comply fully with the National Building Regulations as per SANS 10400, SANS 10161, the Joint Structural Division (SAICE/IstructE)'s Code of Practice, and the NHBRC's Home Building Manual.
- c) All concrete to be a minimum of 25MPa and the design of the Raft Foundation to cater for the required differential heave as determined by the Soils Investigation.
- d) The contractor to provide details of a raft foundation designed for a differential heave of

15mm. The details provided must include beam sizes, beam spacing, floor slab thickness and reinforcing. The cost of any deviation from this due to an increased or decreased differential heave will be adjusted based on the schedule of rates. Top of raft, to project a minimum of 340mm above the finished platform level or natural ground level.

12. CONCRETE PIERS/BASES

- 12.1. The supports of each building shall be mounted on concrete bases/piers. The minimum size of each base shall be 600 mm X 600 mm X 150 mm thick.
- 12.2. The maximum load per base shall be 750 kg. Each base shall be cast on compacted platforms consisting of a 150 mm layer of G7 and top layer of 150mm of G5. Layers to be individually compacted to 95% mod AASHTO.
- 12.3. The platform size below the concrete bases shall be at least 1.5m X 1.5m.
- 12.4. 250-micron DPC to be placed between the concrete and compacted platform.

13. FLOOR CONSTRUCTION

- 13.1. As the required buildings must be of the pre-fabricated type that can be easily relocated, the floor construction shall be an integral part of the building design and shall also be of the pre-fabricated type that can be easily relocated.
- 13.2. The minimum requirement for the floor is as follows:
 - 13.2.1. Floor construction to comply with the requirements of SANS 10400. Floors to be constructed out of 19mm thick shutter board or similarly approved material, on an engineered designed galvanized steel structure. The underside of the floorboards must be treated with two coats of carbolineum, or an equally approved product. The construction method used, must be completely removable, transported and re-erected on an alternative site.
 - 13.2.2. The floor construction shall be such that the hardness and deflection fall within the requirements of the vinyl floor tile manufacturer's minimum specification.
 - 13.2.3. All floors to be finished with semi flexible vinyl floor tiles size 300 x 300 x 2.5mm thick (colour samples submitted to Principal Agent for approval) laid with an adhesive to pattern and two coats approved sealer to be applied prior to handover.
 - 13.2.4. Skirting to be 19 x 69mm hardwood screwed to framework and finished with three coats polyurethane suede varnish all-round. If the contractor wishes to use an alternative, he must supply the information with his tender as an alternative. Tender price must however be based on 19 X 69mm hardwood skirting as specified.

13.2.5. Details of the galvanised support structure must be approved by a registered engineer as well as the Principal Agent prior to manufacture.

13.2.6. All thresholds to be grano with reeding or an approved alternative.

13.3. The area under the floor structure of the raised modular structures shall be closed with a durable and corrosion proof side wall material. The material shall be capable of withstanding impact that can be expected at a school e.g. kicked with a boot or banged with a school bag with a 10kg load. The skirt shall be totally vermin and insect proof but any water that may accumulate during high rain fall, must be able to drain away.

13.4. All surfaces under buildings including v-joints to external walls must be treated with termite proofing. Guarantee Certificates from a registered applicator must be provided.

14. EXTERNAL AND INTERNAL WALLING

14.1. The wall construction method contemplated must allow for the dismantling, transportation and re-location on an alternative site, estimated not further than 200km. A re-location manual, detailing the dismantling and re-erection of the structure must be submitted with the tender.

14.2. All walling to comply with the requirements of approved Agreement South Africa certificate.

14.3. All internal walls to have a dado rail of a minimum dimension of 19 x 100mm, fitted at a) 500mm centre line above finished floor level for Grade R, b) 575mm centre line above finished floor level for grades 1 to 6 and c) 750mm centre line above finished floor level for grades 7 to 12 (height to be adjusted to the table chair height for primary or secondary schools). Dado rail to be manufactured from hardwood or an approved durable impact resistant material, twice angle rounded and finished with an acceptable finish. Dado rail to be secured to the walls with minimal holes into the wall surface.

14.4. All buildings shall have two gable ends. The full gable end construction shall be from the same material as the walls and comply to the requirements of Agreement South Africa certificate. The gable trimming shall match the roof sheeting.

15. DOORS

15.1. All doors shall bear the SABS mark of approval and shall be manufactured by a SABS permit holder.

15.2. External Doors:

15.2.1. All external doors to be 44mm x 813 x 2032mm meranti framed ledged and braced doors formed of 44 x 220mm top and bottom rail, 22 x 100mm bracing rail and stiles, 22 x 69mm tongued grooved and V jointed one side boarding, twice countersink screwed at intersection with internal panels rebated and filled with 6mm Sapele veneered plywood or similar approved.

15.2.2. All joints between rails and stiles shall be of mortise and tenon construction with min.3mm brass pins.

15.2.3. All doors fitted with an approved corrosion proof durable door handle and a barrel type lockset, three brass butt hinges, standard profile weather drip and rubber doorstop fixed to floor.

15.3. Internal Doors:

15.3.1. Internal doors shall be semi-solid flush type. The bottom of the doors shall be at least 150mm above finished floor level.

16. WINDOWS

16.1. Window areas and windows shall comply with the requirements of SANS 10400 and SANS 402. The roof overhangs shall be such that the thermal performance of the building comply with SANS 402.

16.2. The glazing thickness to be 6,4mm or to approval translucent safety glazing to prevent breakage and shall comply with the requirements of SANS 10400.

16.3. Where steel windows are used, members must be constructed out of FX7 sections and shall be hot dipped galvanised. Other window types will be considered for approval. All dissimilar metals shall be isolated to prevent galvanic corrosion. Earth bonding shall however be maintained as required by SAN 1042

16.4. Outwards opening bottom pivot type window shall be used on the walkway side of the classrooms and offices. (see vi below). This is to ensure that no opening sections open onto the walkway at a head height level.

16.5. The following window sizes shall be used for tendering purposes. Window sizes shall however comply with the requirements of SANS 10400 and SANS 402 with respect to lighting, ventilation, safety and thermal performance. The proposed minimum sizes are as follows:

16.6. Three 889w x 854h mm of which the top half is open able with bottom hung section(on the walkway side) and four 889w x 1248h mm (on the opposite side) are used per classroom, two 889 x 1248h mm for the Office and two 889w x 854h mm for the Store. Windows in the toilet areas shall be frosted and sized according to SANS requirements for lighting and ventilation. Provide at least one 600 X 600 open-able window in each toilet and additional windows in the circulation space in order to comply with SANS requirements.

16.7. All windows to be fully burglar proofed with an approved burglar bar system manufactured from corrosion proof material. Burglar bars shall however not restrict the opening capability so that the fresh air requirements according to SANS 10400 are satisfied.

17. ROOF CONSTRUCTION AND COVERING

17.1. The construction of the roof can be conventional prefabricated timber trusses with bracings (to SANS 10163), or a steel construction (to SANS 10162). The design and erection to be approved by a Registered Engineer and a certificate of compliance issued on completion.

17.2. The roof pitches to be not less than 15° and the Live and Wind Loads to be in accordance with SANS 10160.

17.3. The minimum roof covering must be pre-painted zinc aluminium AZ150 with a minimum thickness of 0,6mm 500 MPa corrugated iron roof sheeting in single lengths fixed to purlins. IBR profile and concealed fixing roofs will be considered and preferred. If the contractor wishes to use an alternative, he must supply the information with his tender for consideration. All cut ends shall be re coated with an approved paint that match the original colour.

- 17.4. All capping, eaves closure, barge boarding etc to be included and comply with the specifications.
 - 17.5. All roofs to have a min. of 600mm eaves overhang, and min. 300mm verge overhang. The overhang dimensions may be increased to comply with the requirements of SANS204.
 - 17.6. 15 x 225 Fibre cement or other similar approved fascia boards shall be fitted and painted to paint manufactures specifications. Only brass screws shall be used to fit fascia boards. 38 X 76 backing timber shall be installed between the trusses. Fascia boards shall not fixed by screwing into the end grain of any timber.
 - 17.7. The roofs to be fitted with 125 x 150 x 125mm x 0.80mm thick powder coated pre-painted zinc aluminium AZ150 500MPa sheet steel or other similar approved gutter with 75mm wide laps fixed to falls to fascia with brackets not exceeding 1000mm centres, including all ends, outlets, etc.
 - 17.8. Powder Coated Pre-painted rainwater downpipe must be allowed for at each corner of each class modular unit. Down pipes to be fitted with leaf filters before water is allowed to flow into the rainwater harvesting tanks. Final number off downpipes will be adjusted after contract award according to flow calculations based on the maximum rainfall of the area and actual roof area.
 - 17.9. All roofs to have 38 x 228mm gang boarding along entire length of building if an attic is created.
 - 17.10. Roofs ties to be provided in order to ensure that the roof structure is correctly tied to the supports or alternatively to the slab as per the requirements to the Engineer.
18. CEILINGS
- 18.1. All classrooms, offices and stores must be fitted with ceilings. Ceilings could be an integrated system with the roof sheeting or a conventional ceiling construction. Ceiling construction shall be such that the thermal performance of SANS 204 as well as structural and fire performance as per SANS 10400 are fully satisfied.
 - 18.2. A typical ceiling construction shall consist of 6,4mm Gypsum board sheets with hardwood cover strips or pre painted 'H' profile metal jointing strips, continuous in one direction and cut in between in the other direction, between sheets and fixed to 38 x 50mm brandering at 400mm centers including additional brandering at outer edge of rooms and along joints of ceiling plates. Ceiling supports and roof construction shall be designed to include the loading imposed by the Insulation requirement according to SANS 204.
 - 18.3. If the contractor wishes to use alternative, e.g. suspended ceilings, he must supply the information with his tender for consideration.
 - 18.4. An approved painted cornice at junction of wall and ceilings must be provided.
 - 18.5. All ceilings to be insulated with a SABS approved insulation material and shall comply with the thermal performance required by SANS 402 and fire performance required by SANS 10400
 - 18.6. Provide one trap door in conventional ceilings per block.
19. PAINTING
- 19.1. If not pre-painted with a system equal or similar to "Colorbond", all exposed surfaces and un exposed surfaces subjected to corrosion shall be painted using an approved standard painting system. The painting system shall be designed and guaranteed by the paint manufacturer for a minimum period of five years. All paint and painting systems shall be certified by independent certifying body(ies) such as SABS, SANS, ISO, ASTM and BS. Un-certified paint and paint systems shall not be accepted.

19.2. The following basic guidelines shall form the basis on which the painting system is chosen:

19.2.1. Internal Walls:

- a) One coat sealer/undercoat and two coats topcoat.

19.2.2. Timber Doors:

- a) One coat sealer/undercoat and two coats topcoat (Varnish will not be acceptable)

19.2.3. External fibre-cement sheeting:

- a) One coat sealer/undercoat and two coats topcoat

19.2.4. Windows:

- a) Windows that are not pre-painted according to an approved painting system or anodised/ galvanised, shall be painted on site. One under coat/etch primer shall be applied prior to installation. The full painting system shall then be applied after installation.

19.3. All painting systems together with ISO, ASTM, SANS, SABS or BS certificates to be submitted for approval prior to commencement of work.

20. SUNDRIES

20.1. Writing Boards

20.1.1. Supply and fit two standard baked enamel writing boards each size 2 400 x 1 200mm high per class room. Each writing board to be complete with a chalk rail. Writing boards to be secured to the walls with minimal number of holes into the wall surface, chalk rail not to be more than 900mm above FFL.

20.2. Pinning Boards

20.2.1. Supply and fit 12mm thick x 1,2m high soft board, or similarly approved pinning board across the full width of the rear of each classroom. Pinning boards to have a 44 x 22mm rebated hardwood surround, finished with three coats polyurethane suede varnish. Pinning boards to be secured to the walls with minimal number of holes into the wall surface.

20.3. Fire Extinguishers

20.3.1. Supply and fit one (1) 4,5kg DCP fire extinguishers per room, fixed to a hardwood backing with minimum size of 380mm X 180mm X 22mm with 4 X 5mm chamfer around exposed edges. Fire extinguisher handle to be 1200mm above FFL. Inside of wall shall be complete with internal bracket to carry fire extinguisher and hardwood backing. Fire extinguisher and hardwood backing to be secured to the wall through the reinforcing bracket.

20.4. Long-arms

20.4.1. Should windows be of pivot type, supply and fit one 1 200mm long-arm per classroom and admin office, fitted behind the door with two brackets.

20.5. Cupboards

20.5.1. Supply and fit one pre-painted steel stationary cabinet size 900x450x1800mm, painted in a light approved paint colour, to each classroom and office. Screw cupboard to the wall.

20.6. Signage: Supply and install the following minimum signage:

- 20.6.1. Revere engraved clear 5mm thick acrylic plastic above each external door giving room number. Numbers shall be min. 50mm high and acrylic size shall be 70 high by 70 wide. All number signs shall be of equal size.
- 20.6.2. Standard SANS fire extinguisher and arrow signs. One pointing down arrow and one fire extinguisher sign shall be mounted above each fire extinguisher and above each door of the room where the fire extinguisher is mounted.
- 20.6.3. Each sign shall be fixed with four min. 3mm diameter stainless steel screws. Signs on the tanks shall be pre glued and no screws shall be used. Where screws penetrate wall covering, polyurethane sealer shall be applied to prevent moisture penetration into the wall.

21. ELECTRICAL INSTALLATION

- 21.1. All fittings and accessories shall bear the SABS / SANS mark of approval and must be presented to and approved by the Principal Agent / Departmental Representative prior to installation.
- 21.2. Fluorescent fittings shall be twin-tube, or as specified elsewhere, broad open-channel, fitted with electronic ballasts (Professional). Timber must be provided to secure fittings where necessary. Fittings must be mounted flush with the ceiling and cover-strips must be neatly cut to accommodate the fittings.
- 21.3. The fittings shall be properly secured with plated wood screws, screwed into timber. "Butterfly" screws will not be accepted. Timber supports to be provided between the steel beams in a steel roof construction, the fittings shall not to be screwed to the suspended ceiling frame-work.
- 21.4. The minimum luminance required at a level of 750mm from the floor level is 250 lux.
- 21.5. The supply and installation at ceiling height of the following minimum quantities shall be allowed for in the tender price:
 - 21.5.1. Classrooms: 6 of 2 x 58 Watt open channel fluorescent fittings similar or equal approved to ILM/ATL/FMII/258 in each class room.
 - 21.5.2. Offices: 2 of 2 x 58-Watt open channel fluorescent fittings similar or equal approved to ILM/ATL/FMII/258 in each office.
 - 21.5.3. Store areas: 1 of 2 x 58-Watt open channel fluorescent fittings similar or equal approved to ILM/ATL/FMII/258 in each storeroom.
 - 21.5.4. External Lighting:
 - a) All lighting will be LED fittings inside and out and hand switched on and off.
 - b) Inside light fittings will be the 'double fluorescent' type.
 - c) Outside lights will be of an approved waterproof type.
 - d) External lighting shall be done with white deep base round die cast aluminium fittings with 2 x PL9 lamps and two ballasts. The fitting shall be complete non-discolouring polycarbonate lens secured with three stainless steel screws.
 - e) Allow one luminaire above each external door, one luminaire above each exposed gable end and one luminaire per two class rooms on the north and south boundary elevations.
 - f) All external lighting shall be switched with photo cell detectors and contactor. Allow two photo cells and contactors for this project. One each for the north wing and one for the south wing. The maximum number of luminaires switched by a photo cell and contactor combination shall be 10. The contactor rating shall be at least 30% more than the maximum current of all the luminaires switched by the contactor.
 - g) All external luminaires shall be properly sealed to prevent water, dust and insect ingress.

Special care shall be taken when fitting the electrical wiring to maintain the seal. The minimum IP rating shall be IP56.

- 21.6. The round 2 x PL9 luminaire shall be either by Beacon lighting BL/RD-NB 2 X PL9W or any other equal and approved type and make. Fluorescent tubes and lamps are to be of the highest quality. No inferior or "no-name" brands will be accepted only that which comply with the applicable SABS/SANS . All fitting/s requested must be provided complete with tubes. Contractor must allow for, Phillips or Osram, tri-phosphor lamps colour: White
- 21.7. The single-lever light switches are to be equal or other approved to Crabtree type 2471, complete with steel cover-plates and steel screws. The contractor must allow for 1 x single lever switch complete with 50mm x 100mm box and white faceplate per classroom, per office, per store. The light switch is to be mounted next to the door and at 1200mm above floor level to the centre of the switch.
- 21.8. Socket outlets are to be equal or other approved to Crabtree type 6861 complete with steel cover-plates and steel screws. Bidders must allow for the supply and installation of 1 x duo 16A socket outlet complete with 100mm x 100mm box and white faceplate per classroom. The socket outlet is to be mounted adjacent to the classroom blackboard and at 1200mm to the centre of the outlet box. In the office areas, 2 of Socket outlets must be allowed for mounted adjacent to the desk position. The Store Areas will also require 1No. Socket outlet mounted adjacent to the door.
- 21.9. All socket outlets, switches etc. shall be fitted with powder coated steel cover plates and plated steel screws. The use of pop-rivets will be agreed upon on site.
- 21.10. New DB's where required shall be custom-made and installed complete with switch gear. Colour: White. DB to be installed externally to the ablution block. Allowance must be made for at least six (6) spare MCB spaces. The spares shall be fitted with blanks. The circuit breakers shall be labelled. Labeling and legends shall be fully descriptive i.e give the exact location of the outlets e.g. "Socket outlet: class room 2"
- 21.11. A danger sign is to be fitted to the face-plate. An engraved label is to be screwed to the outside of the door, identifying the DB as "SDB-B fed from SDB-A" etc. The Contractor must allow for one DB for each classroom block or where a classroom is constructed as a single unit at any particular site.
- 21.12. The socket outlets shall be wired with three 3 of 20A MCB's. One per class room wing and one for the office and store. A separate 20A MCB shall be provided for the sewage treatment plant.
- 21.13. Lighting shall be wired with four of 10A MCB's. One for offices and stores, one for south wing, one for north wing, one for toilet blocks and two for external lighting.
- 21.14. Lighting and socket outlet circuits shall be connected to two separate earth leakage units. Each circuit per circuit breaker shall be wired with a separate neutral back to the relevant DB. Neutrals shall be clearly marked as to what circuit it is connected to.

- 21.15. Cables must be drawn through 'galvanized kick-pipes' for all surface entry/exits to buildings. 'Kick-pipes' to be neatly saddled at intervals not exceeding 1m. Kick-pipes to extend at least 300mm below ground and part the entry point into the building. All openings shall be sealed with expanding fire stop foam, neatly trimmed once cured and covered with 1mm galvanised cover plate.
- 21.16. The installation is to be properly tested and commissioned on completion and an 'original' Certificate of Compliance issued for the installation.
- 21.17. The Contractor must ensure that the premises are left in a clean, neat and tidy condition on completion of the installation. All expended materials no longer required must be removed from site unless specifically requested by the Departmental Representative not to do so.
- 21.18. On completion of the contract, the successful contractor shall notify the Principal Agent at least 7 days in advance before delivery will be taken.
- 21.19. All materials used must as a minimum conform to the relevant SANS standards and must bear the SABS mark.
- 21.20. Expended hazardous materials e.g. Fluorescent tubes, etc must be removed from site and disposed of in the legally required manner as prescribed by the Occupational Health and Safety Act.
- 21.21. The use of 'twin & earth' will NOT be permitted. 'Surfix' will be permissible with the approval from the Departmental Representative or Consulting Engineer.
- 21.22. The minimum wire sizes shall be:
- a) Each lighting circuit: 1,5mm² multi strand copper conductors with PVC insulation + 2,5mm² multi strand earth (with 10A.MCB)
 - b) Each plug circuit: 2,5mm² multi strand copper conductors with PVC insulation + 2,5mm² multi strand earth (with 20A MCB)
- 21.23. The use of PVC flexible hose as a substitute for PVC or any other type/s of conduit will not be permitted. However, in situations where the use of regular conduit is either impractical/impossible, written permission must be obtained from the Departmental Representative/Consulting Engineer prior to the installation thereof.
- 21.24. With all 3 phase supply installations, it is the responsibility of the Contractor to ensure that the load is 'balanced' over the 3 phases.
- 21.25. All wiring shall be done in conduit and sleeves. All materials used shall comply to the relevant SANS standard.