PART 3

QUALITY SPECIFICATION

3.1 CONDUIT AND CONDUIT ACCESSORIES

3.1.1 GENERAL

This section covers the requirements for conduit and conduit accessories for general installations under normal environmental conditions.

3.1.2 SCREWED CONDUIT

Conduits shall comply with SANS 162 and shall bear the SANS mark.

All conduit shall be heavy gauge, welded or solid drawn, hot-dip galvanised or black enamelled, screwed tube.

Galvanised conduit shall be hot-dipped inside and outside in accordance with SANS 763.

All conduit ends shall be reamed and threaded on both sides and delivered with a coupling at one end and a plastic cap on the other end.

3.1.3 METAL CONDUIT ACCESSORIES

All metal conduit accessories shall be malleable cast iron or pressed steel with brass bushes in accordance with SANS 162. Alloy or pressure cast metal accessories or zinc base alloy fittings are not acceptable. All fittings whether galvanised or black enamelled, shall be fitted with brass screws.

Accessories must be hot-dip galvanised to SANS 763.

3.1.4 CIRCULAR TYPE BOXES

The boxes shall be of the long spout pattern, manufactured of malleable cast iron or pressed steel and stove enamelled jet black or galvanised as required. The two cover fixing holes shall be diametrically opposite each other, drilled and tapped at 50 mm centres.

Junction, draw-in and inspection boxes shall be of adequate size and shall be supplied with heavy gauge metal cover plates.

Boxes shall comply with SANS 162.

3.1.5 SWITCH BOXES AND SOCKET-OUTLET BOXES

All switch boxes and socket-outlet boxes shall be manufactured of pressed galvanised steel of at least 1 mm thickness. All boxes shall be fitted with the necessary lugs to suit standard flush mounted switches and socket-outlets manufactured in accordance with SABS 518 and SANS 1085.

Only galvanised or metal wall boxes will be acceptable to the Engineer and or the Client's Engineer and or the Client's Department, even if the tenderer offered to use non metallic conduit and accessories. Light switch boxes shall be 100 x 50 x 50 mm with two 20 mm knocks-outs on the sides and a single knock-out on the top, bottom and back.

Socket-outlet boxes shall be 100 x 100 x 50 mm with two 20 mm knock-outs each on the top, bottom, sides and back.

Where cavity walls are encountered tenderers must allow to install deep back to back (one end closed) wall boxes. Switch and socket-outlet cover plates shall comply with SANS 1084.

3.1.6 FLEXIBLE CONDUIT

Flexible steel conduit and adaptors shall comply with BS 731, Part 1 where applicable. Flexible conduit shall be of galvanised steel construction and plastic sheathed. Flexible conduit shall only be used as specified and shall then be installed in accordance with SANS 0142.

3.1.7 PLAIN-END METALLIC CONDUIT

As an alternative to the threaded conduit, plain-end (unthreaded) metallic conduit with accessories may be used under the conditions stated in the Standard Specification for "INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES".

Unthreaded conduit shall be manufactured of mild steel with a minimum thickness of 0,9 mm and shall comply with the SABS 1007. Bending and setting of conduit shall be done with the correct apparatus recommended by the manufacturer of the conduit.

The Contractor or Supplier shall be responsible for obtaining the approval of local authorities for the use of this system.

All conduit and accessories used in areas within 50 km of the coast shall be hot-dip galvanised to SANS 763.

3.1.8 NON-METALLIC CONDUIT

Non-metallic conduit shall comply fully with SANS 950 and shall be installed in accordance with Appendix C of the same specification as well as the Standard Specification for "INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES".

3.1.9 EARTH CLAMPS

Earth clamps shall consist of copper strips at least 1,2 mm thick and not less than 12 mm wide secured with a brass bolt, nut and washer and shall be so constructed that the clamp will fit firmly to the conduit without any additional packing.

3.2 PVC-INSULATED CABLES - 600/1000 V GRADE

3.2.1 GENERAL

This section covers the requirements for PVC-insulated cables for general installations under normal environmental conditions.

3.2.2 CONSTRUCTION

Cables shall be manufactured in accordance with SABNS 1507, shall come only from fresh stocks, and shall be constructed as follows:

(a) Unarmoured cables	-	PVC-insulated/PVC-sheathed
(b) Armoured cables	-	PVC-insulated/PVC-bedded/armoured/black extruded PVC outer sheath
(c) Single core cables	-	PVC-insulated/unsheathed

The conductors shall be of high conductivity annealed stranded copper and the cores may be shaped or circular.

The insulation shall be general purpose PVC, 600/1000 V Grade.

The bedding shall consist of a continuous impermeable sheath of PVC extruded to fit the core or cores closely and in the case of multi-core cables, to fill the interstices between the cores.

Where armouring is specified it shall consist of one layer of galvanised steel wire in the case of multi-core cables and non-magnetic metallic wire in the case of single core cables. Aluminium strip or tape armouring is not acceptable.

Where specified, an earth continuity conductor shall be provided in the armouring in accordance with SABS 1507.

3.2.3 PVC-SHEATHED ALUMINIUM-COVERED CABLES

Aluminium covered cables shall comprise PVC-insulated copper conductors protected by an aluminium foil tape screen and a PVC sheath.

Cable ends shall be made off with compression glands fitted with a neoprene ring to seal the end.

Aluminium sheathed cable shall be installed on surface only, using matching saddles installed at suitable intervals to prevent sagging.

Where exposed to sunlight, the cable shall have a stabilised black outer sheath.

3.2.4 LENGTHS

Cable shall be manufactured and supplied in one length to the lengths specified unless these lengths exceed a standard drum length in which case a ruling shall be obtained from the Engineer.

3.2.5 TESTS

At the option of the Engineer, acceptance tests shall be carried out on production runs of the cable in accordance with SANS 1507.

3.3 GLANDS FOR PVC-INSULATED CABLES

Glands to be used for terminating PVC/PVC/SWA/PVC cables shall be of the adjustable type.

Glands shall be suitable for general purpose 600/1000 V Grade cable with steel armouring.

The glands shall be made of nickel-plated bronze or brass.

The glands shall consist of a barrel carrying a cone bush screwed into one end and a nickel-plated brass nipple carrying a nickel-plated brass or a heavy galvanised steel locknut screwed into the other end. The galvanising shall comply with SANS 763.

Non-watertight glands must be easily converted to watertight glands by means of a waterproofing shroud and inner seal kit. On the cable entry side of the barrel a concave groove shall be provided to accommodate the top rim of the waterproofing shroud.

The shrouds shall be made of non-deteriorating neoprene or other synthetic rubber, and shall be resistant to water, oil and sunlight. The shrouds shall fit tightly around the glands and cable.

Glands shall be provided with ISO threads and shall be suitable for the specified cable sizes.

Flameproof glands shall comply with SANS 808, Groups 1, 2a and 2b.

Suitable accessories shall be provided with glands to be used on ECC armoured cables to

facilitate a bolted lug connection of the earth continuity conductors. Grooves cut into the barrel or cone bush to accommodate the earth continuity conductors are not acceptable.

For unarmoured cables the cone bush and compression ring of the gland shall be replaced with a synthetic rubber compression bush and ring to provide the required grip on the outer sheath of the cable.

3.4 CABLE TERMINATIONS AND JOINTS

3.4.1 HEAT-SHRINKABLE MATERIALS

3.4.1.1 General

The complete kit shall be packed in a container that is marked for the type of cable insulation and construction as well as the voltage range for which the materials are suitable.

An illustrated set of instructions for the installation of the materials shall accompany every kit.

The joints and terminations shall make minimal, if any, use of insulating or stress relieving tapes. The use of electrical stress control and insulating tubing that is heat-shrunk onto the termination or joint, is preferred above other methods.

The materials shall comply with VDE 9278 and the supplier shall be called upon to confirm this aspect before acceptance of the materials or installation.

The heat-shrinkable and other materials used for the terminations and joints shall be of a high quality and shall retain their electrical and mechanical properties without deterioration.

3.4.1.2 Terminations with Heat-Shrinkable Materials

Terminations shall be made of a material that gives lasting protection against ultraviolet radiation.

The cores of all cables terminated outdoors and the cores of 3,3 kV and higher voltage cables terminated indoors, shall be completely covered with a shrunk-on protective layer against surface tracking, ultraviolet radiation and weathering.

3.5 LIGHT SWITCHES

3.5.1 GENERAL

This section covers the requirements for switches for use in general installation under normal environmental conditions.

Light switches of one manufacturer only, will be accepted per project.

3.5.2 FLUSH AND SURFACE MOUNTED SWITCHES

All switches shall be suitable for mounting in 100 x 50 x 50 mm boxes, shall comply with SANS 163 and shall bear the SANS mark.

Switches shall be of tumbler operated micrograph type rated at 16 A, 220/250 V.

Switches shall have protected terminals for safe wiring.

Contacts shall be of silver material.

On multi-lever switches, it shall be possible to individually change any of its switches.

The yoke strap shall be slotted to allow for easy alignment.

The covers of surface mounted switches shall have toggle protectors.

Where light switches are installed in partitions, they shall, where possible, be of the special narrow type intended for installation into the mullions.

3.5.3 WATERTIGHT SWITCHES

Watertight switches shall be of the micrograph type suitable for surface mounting and shall bear the SANS mark.

The housing shall be of galvanised cast iron or die-cast aluminium with watertight cover plate and toggle.

The switch shall have a porcelain base and a quick acting spring mechanism and shall be rated at 16 A, 220/250 V.

The ON/OFF positions shall be clearly marked on the switch housing.

3.5.5 COVER PLATES

Cover plates shall be finished in ivory coloured baked enamel, anodised bronze or aluminium unless otherwise specified.

Cover plates shall overlap the outlet to cover wall imperfections.

Cover plates shall comply with SABS 1084.

3.6 UNSWITCHED AND SWITCHED SOCKET-OUTLETS

3.6.1 GENERAL

This section covers the requirements for unswitched and switched socket-outlets for use in general installations under normal environmental conditions.

Switch sockets of one manufacturer only, will be accepted per project.

3.6.2 FLUSH AND SURFACE MOUNTED SWITCHED SOCKETS

All switched socket-outlets shall be suitable for mounting in 100 x 100 x 50 mm or 100 x 50 x 50 mm boxes, shall comply with SANS 164 and shall bear the SANS mark.

Switches shall be of the tumbler operated micrograph type rated at 16 A, 220/250 V.

Terminals shall be enclosed for safe wiring.

Contacts shall be of silver material.

Safety shutters shall be provided on live and neutral openings.

The yoke strap shall be slotted to allow for easy alignment.

The covers of surface mounted switched sockets shall have toggle protectors.

Miniature circuit-breakers shall be used in lieu of a switch where specified.

Where 13 A flat pin switched socket-outlets are specified, these shall comply with BS 1363.

3.6.3 WATERTIGHT SWITCHED SOCKETS.

The housing of watertight switched socket shall be of galvanised cast iron or die-cast aluminium with watertight machined joints.

The switch shall have porcelain base and a quick-acting spring mechanism and shall be rated at 16 A, 220/250 V.

The ON/OFF positions shall be clearly marked on the switch housing.

The socket openings shall be rendered watertight by means of a gasketed cover plate which is screwed onto the body of the unit. The cover plate shall be secured to the body of the unit by means of a chain.

3.7 TUBULAR FLUORESCENT LAMP LUMINAIRES FOR INTERIOR APPLICATIONS

3.7.1 GENERAL

Luminaires, associated equipment and control gear shall be new and unused and shall be supplied complete with lamps, control gear, diffusers, mounting brackets, etc. as applicable, and shall be delivered to site in a protective covering.

Lamps shall be delivered separately.

Tenders shall be accompanied by full descriptive information of the luminaires offered. Photometric data, i.e. polar curves and coefficients of utilization certified by the SABS shall be submitted with tenders for all luminaires offered.

3.7.2 GENERAL TECHNICAL REQUIREMENTS

3.7.2.1 General

Tubular fluorescent lamp luminaires shall comply fully with SANS 1119 and all amendments as well as the additional requirements of this specification. Luminaires which bear the SABS mark are preferred.

The Engineer reserves the right to have samples of luminaires offered tested by the SANS for compliance with SANS 1119. If a sample luminaire is found not to comply with SANS 1119 the cost of such tests shall be borne by the Tenderer.

3.7.2.2 Construction

A luminaire shall consist of a ventilated body manufactured of cold rolled sheet steel not less than 0,8 mm thick, suitably braced or stiffened to prevent distortion. The body shall be of sufficient strength for the mounting of the entire luminaire.

The luminaire body shall be designed to accommodate the control gear, wiring, lamp holders and, where applicable, the diffuser. It shall be possible to reach the control gear without disconnecting wiring or removing the luminaire.

Except for mounting holes and/or slots and the required openings in air-return luminaires, the back of the body channel shall be closed over the full length of the luminaire.

Suitable knockouts shall be provided in the rear of the luminaire body for wire entry.

All components, including screws, bolts and nuts utilised in the construction of the luminaire or fixing of its components, shall be corrosion proof.

3.7.2.3 Internal Wiring

Luminaires shall be completely wired internally, Conductors shall be protected with grommets where they pass through holes in the body.

The wiring shall be totally metal enclosed to prevent any possible contact with live components while changing lamps.

The conductor insulation shall be rated to withstand the temperature inside the luminaire body without deterioration.

The wiring shall terminate on a suitable terminal block. There shall be no joints in the internal wiring.

An earth terminal, welded to the luminaire body, shall be provided. To ensure good earth continuity the earth terminal shall not be spray painted. The earth conductor shall be connected to this terminal by means of a crimped lug.

3.7.2.4 Lamp Holders

Lamp holders shall be of the telescopic spring loaded type only.

3.7.2.5 Control Gear

The control gear, ballasts, capacitors and starters shall be designed and manufactured to suit the control circuitry adopted and shall bear the stamp of approval by the SABS.

Ballasts shall comply with SANS 890 and 891, suitable for operation on 220/250 V, 50 Hz supplies.

Ballasts shall further be suitable for the particular luminaire to ensure that the thermal limits specified in par. 3.5 of SANS 1119 are not exceeded.

Noisy ballasts will not be accepted and shall be replaced at no cost to the Client.

Starters shall comply with BS 3772. Starters with metal cans shall contain integral earthing facilities to earth the can upon insertion.

Starters shall be accessible from the outside of the luminaire, and the replacement of the starter shall not necessitate the removal of lamps.

3.7.2.6 Capacitors

Capacitors shall comply with SANS 1250. The power factor of each complete fitting shall be corrected to at least 0,85.

3.7.2.7 Lamps

Fluorescent lamps shall be suitable for the control circuitry used. Lamps shall comply with SANS 1041.

If no colour is specified in the Project Specification, the light colour shall correspond to colour 2 (4300 K) of SANS 1041.

Lamps of the same colour shall be provided for an entire installation unless specified to the contrary.

There shall be no visible flicker in the lamps and lamps shall readily strike when switched on. Faulty lamps or ballasts shall be replaced at no cost to the Client.

3.7.4 INDUSTRIAL LUMINAIRES

Industrial type luminaires shall consist of a basic channel luminaire fitted with detachable side reflectors.

The reflectors shall be manufactured of cold rolled steel, not less than 0,8 mm thick.

The reflectors shall be designed to improve the downward light output ratio and decrease the upward light output ratio to a value of less than 2%.

3.7.5 FLOODLIGHTS WITH TAMPERED GLASS DIFFUSER

GENERAL:

The luminaire must be compact type mini floodlight of the wall mounted type for use with 2 no of 26 W PL Comact Fluorescent Lamps and must be designed for the functional area lighting around buildings.

CONSTRUCTION DETAILS

DIFFUSER:

The diffuser must be of a precise injection moulding with prisms for optimum light control and manufactured in either tough Ultra-violet resistant acrylic or in highly vandal resistant UV-stabilised polycarbonate.

DIFFUSER FRAME:

The diffuser frame must be a die-cast powder coated corrosion resistant aluminium casting incorporating the diffuser of which both can be removed from the body by utilising one captive stainless steel screw.

LUMINAIRE BODY:

The luminaire body must be manufactured from black epoxy coated aluminium which can incorporate all the electrical components, the reflector and the gasket which seals the diffuser frame and body. A back entry hole suitable for a 20 mm dia. conduit must be provided to accommodate the wiring entry and two mounting holes suitable for 6 mm diameter screws must be provided as a standard feature.

REFLECTOR:

The reflector must be manufactured from ultra pure pre-anodised aluminium for maximum reflection.

ELECTRICAL:

The terminal block and lampholder must be manufactured from porcelain and the wiring must be coated with heat resistant silicone rubber. All control gear shall be suitable for the supply voltage of 220/230 volt –50 Hz and shall bear the SABS mark of approval or equivalent.

3.8 EARTHING ELECTRODES

3.8.1 GENERAL

This section covers uncoated, coated and metal clad circular rod electrodes intended to provide an earth in soil for electrical and lightning arrestor systems.

3.8.2 CATEGORY AND TYPE

3.8.2.1 Only the following type of earthy rods shall be used:

1(a) - Solid copper

(b) - Solid stainless steel

2(a) - Solid steel with bonded copper protection

(b) - Solid steel with plated copper protection

(c) - Solid steel with a shrunk-on copper jacket

3. - Solid steel with a shrunk-on stainless steel jacket

4. - Galvanised steel

3.8.2.2 Bare aluminum is not acceptable as an electrode material.

3.8.2.3 All rods shall be solid and of circular cross section with length as specified in the Project Specification.

3.8.2.4 The nominal diameter of the earthing rods shall not be less than 16 mm unless the rods are specified for placing in pre-drilled holes in which event the minimum nominal diameter shall not be less than 12 mm.

3.8.3 COUPLINGS AND CONDUCTOR CLAMPS

Earthing electrodes shall be provided with (n-1) couplings where n = number of rods supplied.

Rods designed for coupling by means of external sleeves shall be provided with an adequate quantity of hydrocarbon or silicon grease to be applied to the coupling before the joint is made.

Rods designed for coupling by means of internal pins or splines shall be provided with thin-walled tubes and hydrocarbon or silicon grease to seal the joint.

Conductor clamps shall be provided to suit the type and size of rods provided and the type and size of conductor specified in the Project Specification.

The material of the clamps shall be electrolytically compatible with the rod and conductor materials.

Where brazed or welded connections are specified, the supplier of the rods shall stipulate at least two types of metals which are compatible with the rod and conductor materials.

An adequate number of driving caps of bolts shall be supplied with the rods to protect the ends of the earthing rods whilst being driven into hard soil.

3.10 SWITCHBOARDS (Up to 1 kV)

3.10.1 GENERAL

3.10.1.1 Scope

This section covers the manufacturing and testing of flush mounted, surface mounted and floor standing switchboards for general installations in normal environmental conditions and for system voltages up to 1 kV.

3.10.1.2 Size

All switchboards shall be of ample size to accommodate the specified switchgear and provide space for future switchgear. For every four (4x) or part of four (4x) 5 kA circuit-breakers on a switchboard, space for an additional 5 kA circuit-breaker shall be allowed unless future space requirements are clearly specified. For circuit-breakers above 5 kA, this factor shall be 15%. The clearance between adjoining switchgear openings shall be as specified.

3.10.1.3 External Dimensions

The maximum allowable height of free standing switchboards is 2,2 m. Where, due to space restrictions, a board exceeds 2,2 m in height, equipment not normally requiring access, shall be installed in the top section, enabling equipment normally requiring access to be installed lower down in the board, All other specified external dimensions for switchboards shall be strictly adhered to. If the clearances specified cannot be adhered to as a result of restricting external dimensions, the Contractor shall obtain the approval of the Engineer before manufacturing the switchboards.

3.10.1.4 Moisture and Vermin

All switchboards shall be rendered moisture-proof and vermin-proof and shall be adequately ventilated.

3.10.1.5 Load Balance

The load shall be balanced as equally as possible across multi-phase supplies.

3.10.2 CONSTRUCTION OF FLUSH MOUNTED SWITCHBOARDS

3.10.2.1 Standard

Flush mounted switchboards shall comply fully with SABS 1180, Part I. Unless the depths of the switchboards are specified, the depths shall be determined in accordance with par. 3.10.4.

3.10.2.2 Expanded Metal

Where switchboards are to be built into 115 mm thick walls, expanded metal shall be spot-welded to the rear of the bonding trays. The expanded metal shall protrude at least 75 mm on each tray side to prevent plaster from cracking.

3.10.2.3 Knock-Outs

Knock-outs shall be provided in the top and bottom ends of each switchboard tray to allow for the installation of conduits for the specified and future circuits. Knock-outs shall be provided for an equal number of 20 mm and 25 mm dia. conduits.

3.10.2.4 Panel

Front panels shall have machine punched slots for housing the specified and future flush

mounted switchgear. The distance between the inside of the closed doors and the panel shall not be less than 20 mm. No equipment may be mounted on the panel unless the panel is permanently hinged to the switchboard frame.

3.10.2.5 Fixing of Front Panels

The front panel shall be secured to the architrave frame by means of captive fasteners. Alternatively the panel may be secured to the architrave frame by means of two pins at the bottom and a latch or lock at the top of the panel. Self-tapping screws will not be allowed.

3.10.2.6 Door Handles and Catches

Switchboard doors shall be equipped with handles and catches. Locks shall only be provided when specified. In all cases where lockable doors are higher or wider than 450 mm, handles consisting of a pushbutton-and-handle combination with spring-loaded catch or rotary handle-and-catch combination shall be installed. Switchboard doors smaller than 450 mm in height and width may be equipped with spring-loaded flush mounted ring type latches. Square key operated catches are not acceptable unless specified.

3.10.3 CONSTRUCTION OF SURFACE MOUNTED SWITCHBOARDS

3.10.3.1 Standard

Surface mounted switchboards shall comply with SABS 1180, Part II.

3.10.3.2 Switchboard Tray

Surface mounted switchboards shall be equipped with a 1,6 mm minimum sheet steel reinforced tray, suitably braced and stiffened to carry the chassis, door and equipment. Lugs to secure the switchboard to a vertical surface shall be provided.

3.10.3.3 Construction

All joints shall be welded or securely bolted. The tray shall be square and neatly finished without protrusions. The front tray sides shall be rounded with an edge of at least 20 mm to accommodate flush doors.

3.10.3.4 Chassis

A sheet steel chassis for the mounting of equipment shall be bolted to the tray and shall comply with the requirements of par. 3.10.4.

3.10.3.5 Front Panel and Door

The front panel and door shall comply with the above. Doors shall fit flush in the tray when closed.

3.10.3.6 Dimensions

Unless the depth of the switchboards is specified, the dimensions shall be determined in accordance with the requirements of par 3.10.4.

3.10.4 MOUNTING OF EQUIPMENT

3.10.4.1 The mounting of equipment shall comply with SABS 1180 where applicable. Equipment to be mounted on the chassis shall be mounted by bolts, washers and nuts or by bolts screwed into tapped holes in the chassis plate.

In the latter case the minimum thickness of the chassis plate shall be 2,5 mm. The latter method shall not be used where boards will be subject to vibration or mechanical shocks. Self-tapping screws will not be accepted.

3.10.4.2 Mounting of Chassis

The chassis of flush mounted and smaller surface mounted boards shall be mounted in accordance with SABS 1180. For all free standing switchboards and surface mounted switchboards where the main switch rating exceeds 100 A (triple-pole), space for wiring shall be provided between the chassis and tray. This space shall be adequate to install the supply cable behind the chassis and terminate on the main switch without sharp bends in the cable cores.

3.10.4.3 Grouping of Equipment

Equipment shall be arranged and grouped in logical fashion.

Where earth leakage units are required, the associated circuit-breakers shall be installed adjacent to the unit.

3.10.4.4 Mounting of Circuit Breakers

All moulded-case circuit-breakers shall be flush mounted with only the toggles protruding. Miniature circuit-breakers may be installed in clip-in trays mounted on the frame. All other circuit-breakers shall be bolted to the chassis. Special provision shall be made for large main switches when designing the framework. Care shall be exercised that the rear studs of circuit-breakers are properly insulated from the steel chassis. Where necessary, insulating material shall be installed between the rear studs and the chassis. Circuit-breakers shall be installed so that the toggles are in the up position when "ON" and down when "OFF".

3.10.4.5 Instrumentation

All metering instruments shall be flush mounted in the front panel or door. The rear terminals of instruments mounted on doors shall be covered with an insulating material to prevent accidental contact. Current transformers for metering shall be mounted so that the rating plate is clearly visible. Fuses for instrumentation shall be mounted in an easily accessible position and clearly marked.

3.10.4.6 Mounting of Fuses

Fuse holders shall be mounted semi-recessed in the front panel so that fuses can readily be changed without removing the front panel. Busbar mounted fuses for instrumentation shall be used as far as possible.

Where equipment requiring fuses is specified on a board (fuse switches etc.), a ruling shall be obtained from the Engineer on the quantity of spare fuses to be provided.

3.10.4.7 Equipment in Main Boards

Equipment in main low voltage switchboards and sub-main boards shall be grouped in individual compartments.

3.10.5 WIRING

3.10.5.1 Cabling

Cables connected to incoming or outgoing circuits shall be terminated on a gland plate supplied for this purpose. Power cables up to and including 70 mm□ may terminate on clamp type terminals where the clamping screws are not in direct contact with the conductor. Connection to the equipment can then be made with cables that are similarly connected to the clamp terminal. All power cables larger than 70 mm□ shall terminate on busbars that are connected to the associated equipment. Parallel incoming or outgoing cables shall be connected to a collector busbar without crossing the conductors.

3.10.5.2 Current Ratings

The current rating of conductors for the internal wiring shall be sufficient for the maximum continuous current that can occur in the circuit. This value shall be determined from the circuit-breaker or fuse protection of the circuit.

3.10.5.3 Internal Wiring

(a) Standard 600/1000 V grade PVC-insulated stranded annealed copper conductors to SANS 1507 shall be employed for the internal power wiring of switchboards. The smallest conductor size to be used for power wiring in switchboards shall be 2,5 mm□. Flexible cord of minimum size 1,0 mm□.

(b) Where heat generating equipment is present and the internal temperature of the board is likely to exceed 50□C, silicon-rubber insulated stranded conductors shall be used.

(c) Wiring shall be arranged in horizontal and vertical rows and shall be bound with suitable plastic straps or installed in PVC wiring channels. Under no circumstances may PVC adhesive tape be used for the bunching of conductors or for the colour identification of conductors.

(d) Bunched conductors shall be neatly formed to present a uniform appearance without twisting or crossing the conductors. Conductors leaving the harnesses shall be so arranged that they are adjacent to the chassis.

(e) Conductors to hinged panels and doors shall be secured on both the door and the frame and shall be looped between the two points. the loop shall be arranged to produce a twisting notion when the door is opened or closed. A flexible protection sleeve shall be installed over the conductors.

(f) Where wiring channels are used, they shall be installed horizontally and vertically. Under no circumstances may power and control circuit wiring be installed in the same wiring channel. Channels shall not be more than 40% full.

(g) All wiring between different panels within the same switchboard shall be installed in wiring channels.

(h) Grommets shall be installed in each hole in the metalwork through which conductors pass.

(i) All wiring shall be installed away from terminals, clamps or other current carrying parts. Wiring shall also be kept away from exposed metal edges or shall be protected where they cross metal edges.

(j) Conductors may be jointed at equipment terminals or numbered terminal strips only. No other connections are allowed.

(k) Where conductors change direction, smooth bends shall be formed with a radius of at least 5 times the outside diameter of the conductor or harness.

(l) Where screened cables are specified, the screening shall be earthed in the switchboard or control board only unless clearly specified to the contrary.
Screened cables entering control boxes through pressed knock-outs, shall terminate in compression glands. Conductors shall as far as possible remain inside the screening at terminations. Where conductors have to separate from the screen, the braiding shall be separated and the conductors drawn through the braid without damaging the braiding. The conductors shall then be connected to their respective terminals and the screening smoothed and connected to the earth terminal.

(m) Where neutral connections are looped between the terminals of instruments, it is essential that the two conductor ends be inserted into a common lug or ferrule and are crimped or soldered together in order that the neutral connection is not broken when the conductors are removed from one of the instruments.

(n) Wiring should as far as possible be confined to the front portions of switchboards for ease of access. This requirement is important for wiring between smaller circuit-breakers and the associated main circuit-breaker as well as the wiring from circuit-breakers to lighting and socket-outlet circuits.

(o) A maximum of two conductors will be allowed per equipment terminal. Where more conductors must be connected to the same equipment terminal (e.g. main circuit-breaker feeding other circuit-breakers), stub busbars shall be provided for the various conductors.

3.10.5.4 Load End Connections

The supply end connections to all equipment shall under all circumstances be at the top and the load end connections at the bottom.

3.10.5.5 Wiring to Circuit Breakers

Equipment with a rating exceeding the current rating of 70 mm□ conductors shall be connected by means of busbars to the main busbars. Looped connections may only be installed for a maximum of two outgoing circuits. Where there are more than two outgoing circuits, busbars shall be used and equipment connected individually to the busbars.

3.10.5.6 Conductor Terminations

Conductors connected to terminals complying with the Standard Specification for "WIRING TERMINALS", need not be soldered or ferruled. Connections to circuit-breakers, isolators or contactors shall be made by one of the following methods:

(a) A ferrule of the correct size,

(b) Winding a conductor strand tightly around the end to totally cover the end. All conductors terminating on meters, fuse holders and other equipment with screwed terminals shall be fitted with lugs. The lugs shall be soldered or crimped to the end of the conductor.

The correct length of insulation shall be stripped from the end to fit into the terminal. Strands may not be cut from the end of the conductor.

3.10.5.7 Identification

The colour of the conductors for all 220/250 V circuits shall correspond to the colour of the supply phase for that circuit. Neutral conductors shall be black.

3.10.6 PAINT FINISH

Metal components of the framework, panels and chassis shall be painted in accordance with the Standard Specification "STANDARD PAINT SPECIFICATION".

3.10.7 LABELLING

3.10.7.1 Care shall be taken to ensure that all equipment is fully labelled and that accurate descriptions and safety warning notices appear in English.

3.10.7.2 Material

Engraved plastic or ivory sandwiched strips shall be used throughout. The strips shall bear white lettering on black background for normal labels and red letters on a white or yellow background for danger notices.

3.10.7.3 Switchboards

All equipment on switchboards shall be identified with the necessary labels. The circuit numbers shall appear at grouped single-pole circuit-breakers. The circuit numbers shall correspond to the circuit numbers on the final installation drawings. The abovementioned circuits shall be identified on a legend card, which shall be installed on the inside of the switchboard door, or in any other position where it can conveniently be observed. All fuses, including instrument fuses, shall have labels stating function, fuse rating and duty or type where applicable. All other equipment shall be identified separately and their functions shall be clearly indicated.

3.10.7.4 Fixing of Labels

Labels shall not be fixed to components or trunking but to doors, panels, chassis or other permanent structures of the switchboard.

Engraved strips shall be secured to facilitate a neat future alteration of the designation of the labels. Sufficient fixing points shall be provided to prevent labels from warping. Labels in slotted holders shall be secured in position to prevent unauthorised removal. Labels may be secured by the use of brass bolts and nuts, self-tapping screws, slotted label holders or pop-rivets.

3.10.8 TESTS

The Engineer shall be notified when the mechanical construction of the switchboard, i.e. frame, panels and baseframe, is complete in order that it may be inspected at the factory.

Function tests of all equipment, control and interlocking circuits shall be conducted to the satisfaction of the Engineer. Testing equipment and facilities including instruments, dummy loads and additional switchgear and cables shall be provided by the Contractor at no extra cost. The Engineer shall be notified in writing two weeks in advance of any test to be conducted, to allow him to be present at such tests. A complete report on the tests shall be handed to the Engineer.

3.10.9 DRAWINGS

3.10.9.1 Drawings for Approval

A set of three prints of the shop drawings for the switchboards shall be submitted to the Engineer for approval before the boards are manufactured. The following information shall be presented:

(a) A complete wiring diagram of the equipment on the boards.

(b) A complete layout of the arrangement of the switchboards indicating all equipment dimensions and the construction of the boards. The positions and method of fixing and sizes of busbars shall be shown.

(c) All labelling information on a separate sheet.

(d) The make, catalogue number and capacity of all equipment such as isolators, circuit-breakers, fuses, contactors, etc.

The approval of drawings shall not relieve the Contractor of his responsibility to the Client to supply the switchboards according to the requirements of this Specification.

3.10.9.2 Completion

The supply contract shall be regarded as incomplete until all tests have been conducted successfully and all information have been handed to the Engineer.

3.11 LOW VOLTAGE DISTRIBUTION CUBICLES (KIOSKS)

3.11.1 GENERAL

This specification covers the manufacture of distribution kiosks for general reticulation and distribution systems in normal environmental conditions for three-phase, four wire, 400/231 V, 50 Hz systems.

3.11.2 SIZE

Kiosks shall be of ample size to accommodate the specified equipment and provide space for future requirements as specified.

3.11.3 MOISTURE AND VERMIN

Kiosks shall be weatherproof. To prevent the ingress of water onto live equipment, the door entry surrounds shall have a channel shape, at least 12 mm deep, to accommodate the door edge.

The roof shall be constructed with an overhang above non-continuous panelling and shall be provided with a drip-edge.

3.11.4 VENTILATION

Two ventilation grilles or slots, approximately 150 x 125 mm, vermin-proofed and insectproofed by means of 1,5 mm brass mesh or perforated steel plate spot-welded on the inside, shall be provided on the top and bottom of both side panels.

The construction of the grilles shall prevent the ingress of rain or water.

3.11.5 FIBREGLASS CANOPIES

3.11.5.1 Applications

Where specified and for all kiosks to be installed within 50 km of the coast and in corrosive industrial atmospheres, the canopy and doors shall be manufactured of fiberglass.

3.11.5.2 Construction

The laminate shall be constructed to SABS 141.

An outer isopthalic resin gelcoat with a minimum thickness of 0,4 mm and ultraviolet absorption properties to prevent degradation of the surface from exposure to the sun shall be provided.

The gelcoat shall be backed by multiple layers of chopped strand mat glass rendering not less than 1,2 kg/m□. The strength shall be increased to 1,35 kg/m□ on kiosks with panelling larger than 500 x 500 mm.

The fibreglass shall be thoroughly impregnated with polyester resin. The resin should preferably be clear.

The resin to fibreglass ratio shall not be less than 2,5 : 1 and not more than 3,0 : 1.

Air entrapped between the glass mat layers shall be thoroughly worked out. The laminate must be free of air bubbles and voids.

All edges shall be reinforced with an additional 700 g/m□ of fibreglass.

All large surfaces, wider than 300 mm, shall be reinforced or panelled to improve stiffness and rigidity.

A resin coat shall be applied to the inside of the kiosk to cover the fibre pattern.

Brass or steel backing plates shall be laminated into the fibreglass at hinge points, locking mechanism catch support areas, door restraint fixing points and all other points which will be subjected to mechanical stresses.

Doors shall be adequately braced, reinforced, ribbed or double laminated with an air gap between the two layers of laminate to ensure rigidity.
The fibreglass canopy shall be fixed to the internal equipment support frame with bolts accessible through the door only.

3.11.5.3 Finish and Colour of Fiberglass Kiosks

The outside surface of the kiosk shall have a glossy, smooth finish to ensure good weathering. To obtain this the manufacturer shall ensure that the mould is smooth, free of voids, hairline cracks, pores or other defects.

Compound rubbing or sanding of the outside surface will not be permitted.

Pigments shall be added to the outer gelcoat to obtain a matching colour to SABS 1091 "BISCUIT" colour B64 or "LIGHT STONE", colour C37.

Fiberglass kiosks shall not be painted.

3.11.6 SHEET STEEL CANOPIES

Where specified the canopy and doors shall be manufactured of steel to the following requirements:

A metal framework shall be manufactured from solid angle iron, channel iron or 2,5 mm minimum folded sheet steel.

Joints shall be non-continuously butt welded. Welds shall be ground smooth and the joints wiped with plumber's metal in order to provide a smooth finish.

Side panels, doors and the roof shall be manufactured from 2 mm minimum sheet steel. The panels shall have upturned edges which are recessed in the frame or which fit over lips on the frame. The side panels may be either bolted or welded to the frame or form part of the folded metal frame.

The roof of the cubicle shall be removable and shall be fitted by means of bolts which shall be accessible from inside the cubicle only.

All panels and doors shall be suitably braced and stiffened to ensure rigidity and to prevent warping.

The steel canopy and framework shall be fixed to the base frame by four M16 high tensile steel bolts.

3.11.6.2 Finish and Colour of Sheet Steel Kiosks

Metal components of the framework, panels and doors shall be painted in accordance with the Engineer and or the Client’s Engineer and or the Client’s Department's "STANDARD PAINTING SPECIFICATION".

The colour shall be "BISCUIT", colour B64 or "LIGHT STONE", colour C37 of SABS 1091. A tin of matching touch-up paint (not smaller than 500 ml) shall be provided with each consignment.

3.11.7 DOORS

Doors shall be fitted to the front and to the rear of each cubicle. The doors shall provide free

access to equipment which has to be operated and shall provide a full view of all meters. Cubicles wider than 700 mm shall be provided with double doors.

Doors shall have well returning edges to fit into the channel of the door entry surrounds. Doors shall swivel through 135□.

Brass hinges shall be used to hang the doors. The hinges shall be bolted to the canopy with brass bolts and nuts. Bolt heads or nuts shall not protrude beyond the outer surface of the kiosk. Nylon, aluminium or piano hinges are not acceptable.

Doors shall be fitted with lever locks with a 135□ movement. The locking mechanism shall have a catch on the rear which catches behind the frame or door entry surround. The locking mechanism as well as the catch support area shall be backed with brass or galvanised steel plates. The locking mechanism shall be pad-lockable. Padlocks will be proved by the Engineer and or the Client's Engineer and or the Client's Department, unless otherwise specified in the Project Specification.

The locking mechanism shall be made of brass or stainless steel.

Door restraints shall be provided. Cloth or canvas straps are not acceptable. The fixing points of the restraint at both the door and canopy shall be reinforced.

At least three hinges shall be supplied on steel doors higher than 1,2 m.

Doors shall be fitted with neoprene or equivalent seals.

Metal doors shall be earth bonded to the frame by means of a copper braided strap, tooth washers, bolts and nuts.

3.11.8 EQUIPMENT SUPPORT FRAME

A free standing, angle iron or similar type rigid support framework shall be provided.

The frame shall be bolted down on the base by four M16 high tensile steel bolts. The holding-down bolts shall be accessible from the inside of the cubicle only. The frame of sheet steel canopies may be bolted to the canopy framework.

A galvanised steel cable gland plate shall be bolted to the bottom of the frame across the full width of the cubicle to cover the cable entry opening in the base.

The gland plate shall be suitably punched to accept the number and size of cables specified.

All steelwork shall be hot-dip galvanised in accordance with SABS 753.

A panel of resin bound synthetic wood or other suitable dielectric material shall be provided for the mounting of all equipment and busbars. Impregnated hardboard, other treated or untreated wood products are not acceptable.

Alternatively, all equipment and busbars shall be flush mounted within a purpose-made sheet metal frame enclosed by a machine punched removable front panel through which the operating handles of the equipment protrude. Care shall be exercised that the rear studs of circuit-breakers are properly insulated from the steel chassis. Miniature circuit-breakers may be installed in clip-in trays mounted on the frame.

3.11.9 CONCRETE BASES AND BASE FRAMES

To ensure stability of the kiosk after installation, it shall be mounted on a base frame which, in turn, shall be bolted to a concrete base cast onto the bottom of the cable trench.

The base frame shall be constructed of angle iron, at least 50 x 4 mm thick and small be of welded construction hot-dip galvanised and coated with epoxy resin tar.
The vertical height of the box frame shall be at least 900 mm and the construction shall be such as to provide a rigid support for the kiosk.

The base frame shall protrude to a maximum height of 200 mm above ground level. Provision shall be made for the protection and concealing of the cables entering the kiosk and to prevent access of animals and vermin.

The base frame shall be secured by at least four M16 bolts to the support frame of the kiosk and four M16 bolts and nuts to the concrete base. The bolts, nuts and washers shall be galvanised and supplied with the kiosk.

All galvanising shall be to SABS 763.

The kiosk manufacturer shall supply a detailed drawing of the base frame and the concrete base required.

Alternative designs and materials for the base (or root) of the kiosk will be considered but full details must be submitted for approval by the Engineer and or the Client's Engineer and or the Client's Department.

3.11.11 WIRING

3.11.11.1 Cabling

Incoming and outgoing cables shall be terminated on the gland plate. Cables up to 70 mm□ may terminate on clamp type terminals where the clamping screws are not in direct contact with the conductor. All cable sizes larger than 70 mm□ shall terminate on busbar stubs which shall be connected to the associated equipment. Parallel incoming or outgoing cables shall be connected to a collector busbar without crossing the conductors.

3.11.11.2 Current Rating

The current rating of conductors for the internal wiring shall be sufficient to carry the maximum continuous current that can occur in the circuit. This value shall be determined from the circuit-breaker or fuse protection of the circuit. The smallest conductor size to be used for power wiring shall be 2,5 mm□.

3.11.11.3 Internal Wiring

Standard 600/1000 V Grade PVC-insulated stranded annealed copper conductors to SABS 1507 shall be used for the internal wiring.

Wiring shall be installed away from terminals, clamps or other current carrying parts. Wiring shall also be kept away from exposed metal edges or shall be protected where they cross metal edges.

Joints in the wiring are not acceptable.

Where conductors change direction, smooth bends shall be formed with a radius of at least 5 times the outside diameter of the conductor.

3.11.11.4 End Connections

The supply end connections to equipment shall be at the top and the load end connections at the bottom.

3.11.11.5 Conductor Terminations

All conductors terminating on equipment with screwed terminals shall be fitted with lugs. The lugs shall be soldered or crimped to the end of the conductor with the correct amount of insulation removed from the end to fit into the lug. Strands may not be cut from the end of the conductor.

Connections to circuit-breakers, isolators or contactors shall be made by one of the following

methods:

(a) A ferrule of the correct size,

(b) soldering the end of the conductor, or

(c) winding a conductor strand tightly around the end to totally cover the end.

3.11.11.6 Identification

The colour of the conductors of all 220/250 V circuits shall correspond to the colour of the supply phase for that circuit. Neutral conductors shall be black. All other conductors in the cubicle for control circuits, etc., shall be coded in colour codes in colours other than those specified above. The devised colour codes shall be shown on a wiring diagram. Coloured PVC or other tape will not be acceptable for colour coding.

3.11.12 Mounting of Equipment

The mounting of equipment shall comply with SABS 1180 where applicable. Equipment shall be fixed to the support panel with bolts, nuts, washers and spring washers. Self-tapping screws are not acceptable.

Equipment shall be arranged and grouped in a logical fashion.

All equipment shall be flush mounted behind panels with only circuit-breaker and isolator toggles and meter faces protruding. The front panels shall be secured in position by suitable and approved fasteners. Self-tapping or similar screws are not acceptable.

Blanking plates shall be fitted over slots intended for future equipment. These plates shall be fixed so that fixing holes do not need to be drilled through the front panel.

3.11.13 ACCESS

All equipment, busbars and wiring shall be completely accessible with the door open and the back door and front panel removed. In the case of fiberglass kiosks, the complete canopy shall be removable.

3.11.14 LABELLING

All equipment shall be fully labelled and accurate descriptions shall be given in English.

Engraved brass shall be used for labels. The labels shall be riveted to the kiosks.
The following labels shall be supplied as a minimum requirement:

(a) Number and allocation of kiosk,
e.g. KIOSK B26

(Lettering: At least 10 mm high. Label on the outside in a prominent position).

(b) Designation of circuit i.e. circuit-breaker, isolator, meter, etc.
e.g. ADMIN BLOCK
ADMIN BLOK

POMPTOEVOER
PUMP SUPPLY

(Lettering: At least 5 mm high. One label installed directly below each item of equipment pertaining to the particular circuit shall be provided).

(c) The main switch shall be marked in accordance with the regulations.

(d) The function and circuits of all other equipment shall be clearly identified. Flush mounted equipment within the front panel shall be identified by labels fixed to the

front panel. The labels for all equipment installed behind panels shall be fixed to the support panel close to the equipment.

(e) The labels shall be secured by means of rivets. Self-tapping screws are not acceptable. Labels shall not be glued to their mounting positions. Sufficient rivets shall be provided to prevent labels from warping.

(f) All label designations shall be confirmed with the Engineer and or the Client's Engineer and or the Client's Department before manufacture.

3.11.15 NOTICES

At least one skull crossbones notice with the words "GEVAAR.DANGER.INGOZI" shall be mounted outside on the front of the kiosk. This notice shall be riveted to the steel door so that it cannot easily be removed. Brass rivets shall be used. The notice shall be laminated into the fibreglass door in the case or fibreglass kiosks.

3.11.16 INSPECTIONS

The Engineer and or the Client's Engineer and or the Client's Department shall be notified at least two weeks in advance of the completion of the kiosks in order that an inspection may be carried out before delivery.

3.11.17 DRAWINGS

3.11.17.1 Drawings for Approval

A set of three prints of the shop drawings of the cubicles shall be submitted to the Engineer and or the Client's Department for approval before the cubicles are manufactured. The following information shall be presented:

(a) Schematic and wiring diagrams of the cubicles.

(b) A complete layout of the arrangement of the cubicles showing all equipment dimensions and constructional details. The positions and methods of fixing of busbars shall be shown.

(c) All labelling information in English on a separate sheet.

(d) The makes, catalogue numbers and capacities of all equipment.

(e) A detail drawing of the concrete plinth, showing concrete mixes, dimensions, opening sizes, steel reinforcing details and holding-down bolt fixing details.

The approval of drawings shall not relieve the Contractor of his responsibility to the Engineer and or the Client's Department to supply the cubicles according to the requirements of this Specification.

3.11.17.2 Final Drawings

A complete set of "record" drawings of the cubicles shall be submitted to the Engineer and or the Client's Department within two weeks after delivery of the kiosks.

The information contained in Par. 3.11.17.1 shall be provided.

3.11.17.3 Completion

The supply contract shall be regarded as incomplete until all drawings have been handed to the Engineer and or the Client's Department.

3.12 MOULDED-CASE CIRCUIT-BREAKERS AND AIR CIRCUIT BREAKERS

This section cover single or multi-core moulded case circuit-breakers for use in power distribution systems, suitable for panel mounting, for ratings up to 6000 A, 600 V, 50 Hz.

The circuit-breakers shall comply with SABS 156, SANS 60947-2 and 60947-3 and IEC 60947-2:

The continuous current rating, trip rating and rupturing capacity shall be as specified.

The contacts shall be silver alloy and shall close with a high pressure wiping action.

Where specified, the circuit-breaker shall be capable of accommodating a factory fitted shunt trip or auxiliary contact units or similar equipment.

The operating handle shall provide clear indication of "ON", "OFF" and "TRIP" positions.

The mechanism shall be of the TRIP-FREE type preventing the unit from being held in the ON position under overload conditions.

All moulded-case circuit-breakers in a particular installation shall as be as far as is practical be supplied by a single manufacturer.

The incoming terminals of single-pole miniature circuit-breakers shall be suitable for connection to a common bus-bar.

The circuit-breaker shall have a rating plate indicating the current rating, voltage rating and breaking capacity. Extension type operating handles shall be provided for units of 600 A rating and above.

3.13 EARTH LEAKAGE RELAYS

Earth leakage relays shall be single or three-phase units with a sensitivity of 30mA, on-load switch type or circuit breaker type for use on 220/250 V single phase or 380/433 V three-phase, 50 Hz, supplies.
The units shall be suitable for installation in switchboards in clip-in trays or bolted to the chassis.

The earth leakage relay shall comply with SABS 767 as amended, and shall bear the SABS mark. Integral test facilities shall be incorporated in the unit.

Circuit-breakers with trip coils used integrally with earth leakage units (two-pole for single-phase units and three-pole for three-phase units) shall comply with SABS 156.

On-load switches used integrally with earth leakage units (two-pole for single-phase units and three-pole for three-phase units) shall comply with SABS 152.

The fault current rating of the unit shall be 2,5 kA or 5 kA as required, when tested in accordance with SABS 156.

3.14 ON-LOAD ISOLATORS

This section covers switches suitable for panel mounting for use in power distribution systems up to 600 V, 50 Hz. Switches for motor isolation are included.

The switches shall be of the triple-pole, hand operated type complying with
SABS 152.

The switches shall have a high speed closing and opening feature.

The switches shall be suitably rated for the continuous carrying, making and breaking of the

rated current specified as well as the through-fault current capacity as specified.

To distinguish the switches from circuit-breakers the operating handles shall have a distinctive colour and/or the switch shall be clearly and indelibly labelled "ISOLATOR".

3.15 STANDARD PAINT SPECIFICATION

3.15.1 FINISH REQUIRED

Metalwork of electrical equipment such as switchboards, equipment enclosures, sheet steel luminaire components, purpose-made boxes, etc. shall be finished with a high quality paint applied according to the best available method. Baked enamel, electro-statically applied powder coating or similar proven methods shall be used.

3.15.2 CORROSION RESISTANCE

Painted metal shall be corrosion resistant for a period of at least 168 hours when tested in accordance with SABS Methods 155.

3.15.3 EDGES

Care shall be taken to ensure that all edges and corners are properly covered.

3.15.4 SURFACE PREPARATION

Surface preparation shall comply with SABS 064. Prior to painting, all metal parts shall be thoroughly cleaned of rust, millscale, grease and foreign matter to a continuous metallic finish. Sand or shot blasting or acid pickling and washing shall be employed for this purpose.

3.15.5 BAKED ENAMEL FINISH

Immediately after cleaning all surfaces shall be covered by a rust inhibiting, tough, unbroken metal-phosphate film and then thoroughly dried.
Within forty eight (48) hours after phosphating, a passivating layer consisting of a high quality zinc chromate primer shall be applied, followed by two coats of high quality alkyd-based baked enamel.

The enamel finish on metal luminaire components shall comply with SABS 783, Type III.

Other metal parts e.g. switchboard panels, etc., shall comply with SABS 783, Type IV with a minimum paint thickness after painting of 0,06 mm. In coastal areas, the dry film thickness shall be increased to at least 0,1 mm.

The paint shall have an impact resistance of 5,65 J on cold-rolled steel plate and a scratch resistance of 2 kg.

3.15.6 POWDER COATED FINISH

Immediately after cleaning the metal parts shall be pre-heated and then covered by a microstructured paint powder applied electrostatically.

The paint shall be baked on and shall harden within 10 minutes at a temperature of 190 C.

The minimum paint thickness after baking shall be 0,05 mm. The dry film thickness shall be increased in coastal areas. The paint cover shall have an impact resistance of 5,65 J on cold-rolled steel plate and scratch resistance of 2 kg.

3.15.7 TOUCH-UP PAINT

In the case of switchboards and larger equipment enclosures, a tin of matching touch-up

paint not smaller than 1 litre shall be provided.

3.15.8 COLOURS

The colour of LV switchboards and equipment enclosures in buildings shall be "WHITE" colour G80 or "BISCUIT" B64 of SABS 1091.

The colour of LV distribution kiosks and miniature substations shall be "BISCUIT", colour B64 or "LIGHT STONE", colour C37 of SABS 1091.