

TENDER DATA

Project title:	Appointment of A Panel of Service Providers for the Supply, Delivery, Installation and Commissioning of Low Voltage Electrical Distribution Boards (DB) at various SENTECH Transmitter Sites, on an as-and-when-required basis for a period of three (3) years.
Bid no:	SENT/059/2024-25

1. BACKGROUND

Sentech is a state-owned company and is the largest broadcasting signal distributor in South Africa. Sentech is a licensed Electronic Communications Network Service provider in South Africa. It currently operates many telecommunication networks for Satellite, Television, Radio, Internet and more. As such, Sentech is a global enabler of broadcasting and digital content delivery.

Sentech, therefore, invites bids for the Manufacture and Supply of Low-Voltage Distribution Boards at various Transmitter Sites, as-and-when required for a three (3) year period.

The requirements for this tender are intended to support Sentech's strategic Capex, FM, and ATV replacement projects. The Low Voltage distribution board designs will vary from site to site based on the different load requirements of each transmitter station.

Sentech intends to appoint a panel of service providers with successful bidders. It is imperative to state that Sentech promises no quantum of work to any successful bidder.

The required components and functionality of the low-voltage distribution boards are described in the Scope of Work.

2. SUBMISSION OF BIDS and CLOSING

- 2.1 This Bid closes on the date and time stipulated on the Notice and Invitation to Bid (SBD1). Bids can be submitted electronically via the eTender Portal and/or by hand to the tender box at Sentech Offices, Octave Road, Radiokop Ext 3, Honeydew, Johannesburg.
 - a) Bidders that opt to deposit their bid documents in the tender box must do so on or before the closing date and time, during working hours only (08:30-15:30). No late submissions will be accepted.
 - b) Bidders who opt to submit via the Sentech eTender Portal ("the eTender Portal") are advised that the eTender Portal has a files size limit of 30MB. Bidders must upload their tender documents timeously. The eTender Portal is available 24hrs a day. No late submissions will be accepted.
 - c) It is incumbent on the bidder to ensure that their bids are submitted timeously via the selected method before the closing date and time. Sentech will not take any responsibility of any incomplete submissions or late tenders, for any reason whatsoever.
 - d) Telegraphic, telephonic, telex, facsimile, e-mail and late Bids will not be accepted.
- 2.2 This is a two-envelope system for Bid Evaluation. Bidders must submit their proposal and all supporting documentation in a sealed envelope, clearly marked as follows:
 - a) For manual submissions, Envelope One must consist of "Original Technical Proposal together with a soft copy in PDF format of an electronic medium e.g. USB etc. The soft copy will consist of a single PDF document containing the complete response. The envelope must contain all information and documents relating to the Bid. (Refer to list of returnable documents).
 - b) No Financial Information must be included in Envelope One.
 - c) Envelope Two "Original Financial Proposal" (Contract Date and Pricing schedule/schedule of rates as applicable) together with 1 copy of "Financial Proposal" together with a soft copy in PDF format of an electronic medium e.g. Compact Disk (CD), USB etc. The soft copy will consist of a single PDF document containing the complete Financial Proposal.
 - d) Bidders are required to place the sealed Envelope One together with the sealed Envelope Two into one sealed envelope or container. The sealed envelope or container must be marked with the following information:

For Attention:

- HEAD OF SUPPLY CHAIN MANAGEMENT
 - BID REFERENCE NO: SENT/059/2024-25
 - TECHNICAL AND FINANCIAL PROPOSALS
 - INSERT CLOSING DATE AND TIME
 - BIDDER'S NAME AND ADDRESS
- e) Bidders that combine their Technical Proposal with the Financial Proposal (or any financial information) will be automatically disqualified and not be evaluated further.
- f) The financial proposal will only be opened and evaluated should the technical proposal be found to be responsive, being that the technical proposal has met the minimum technical evaluation criteria that are set out in the Bid Documents.
- g) The Bidders shall insert a table of contents and bind (ring bind or similar method) the proposal documents and verify the page numbers, as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.
- h) Bidders are required to complete and sign all the returnable documentation (refer to list of returnable documents) and initial all pages, drawings and brochures which are included in the reply as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.
- i) Late submissions will not be considered.
- j) For online submissions via the e-Tender portal, submission requirements are directed by the system. Bidders must follow instructions in the Bidder's manual.

3. SIGN AND INITIAL

Bidders are required to complete and sign the Bid Forms where required and initial the bottom of all pages, drawings and brochures which are included in the submission as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.

Only original signatures will be accepted.

4. COMPLETION OF BID DOCUMENTS

Bidders must ensure that they complete all sections of the Bid Documents as per the requirements in the Bid.

Bidders must use only the Bid documents provided by Sentech. Photocopying of the Bid document is permitted however Bidders must not retype or redraft the Bid documents.

5. COSTS OF PREPARING THE BID SUBMISSION

Bidders shall bear all costs associated with the preparation and submission of the proposals. Sentech shall under no circumstances be held responsible or liable for any costs incurred during the bidding process.

6. ADMINISTRATIVE RESPONSIVENESS CRITERIA

Bidders are required to ensure that they meet all the Administrative Responsiveness Criteria.

7. BBBEE CODES AT SENTECH

Sentech complies with the codes of good practice as prescribed by the DTI, to advance Broad Based Black Economic Empowerment.

8. SUBCONTRACTING AS A CONDITION OF BID

The successful Bidder must subcontract a minimum of **0 %** of the value of the contract to **N/A** (specify the designated group targeted).

9. TRANSFORMATION PLAN

A transformation plan is a record of activities an entity intends to undertake to improve its BBBEE Level through Ownership, Management and Control; Skills Development; Enterprise and Supplier Development and Socio-Economic Development.

Sentech reserves the right to request a BBBEE transformation plan with clearly defined timelines and milestones if the recommended Bidder does not meet Sentech's transformation goals. These milestones must be achieved over the term of the contract. This transformation plan must be submitted within 10 working days from the written request, failing which Sentech reserves the right to withdraw its appointment of the preferred recommended Bidder.

10. LOCAL PRODUCTION AND CONTENT

In the case of designated sectors, where in the award of Bids, local production and content is of critical importance, such Bids will contain a specific bidding condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Does this requirement fall under any designated sector as prescribed by the DTI?	Yes	No
If yes, specify the sector		
Specify minimum threshold applicable		

*Bidders must fill in the SBD6.2 for Local Content and Production

11. EVALUATION CRITERIA

The evaluation criteria are stipulated in 18 below. It is the Bidder's responsibility to ensure that it has responded to the evaluation criteria. Failure to meet the evaluation criteria will result in the Bidder not being evaluated further. Bidders must ensure that they have included all supporting documentation required to support their response to the Bid.

12. OBJECTIVE CRITERIA

Sentech reserves the right not to consider proposals from Bidders who are currently involved in litigation with Sentech. Sentech further reserve the right not to award this tender to any Bidder based on the proven poor record of accomplishment of the Bidder in previous projects with Sentech. Bidders who are blacklisted or have committed any acts of fraud and/or misrepresentation of facts e.g. tax compliance, BBBEE, company financials, etc. will be eliminated from the bid.

13. AWARD OF BID/S

Sentech may appoint one or more suppliers, in whole or in part, or not appoint any supplier/s at all, and/or cancel the bid in its entirety, at Sentech's sole and exclusive discretion, in order to satisfy various needs which may be identified, and to manage certain risks associated with the supply of goods or services specified in respect of the Bid.

14. ALTERNATIVE/SUBSTITUTE PRODUCTS

In the case of contracts and/or panels which are in excess of 12 (twelve) months, Sentech shall be entitled to consider alternative products and product upgrades during the tenure of the contract and/or panel in order to accommodate new products and upgrades in the market. Bidders are required to bring all such developments to the attention of Sentech for approval. No alternative products may be supplied without Sentech's prior written approval.

15. BRIEFING SESSION

Should there be a compulsory briefing session for this Bid, Bidders must ensure that they attend the briefing session and sign the attendance register, as non-attendance or failure to sign the attendance register will automatically disqualify a Bidder from submitting a proposal for this Bid.

All questions raised by Bidders post the briefing session will be consolidated and shared with all Bidders at least seven (7) calendar days prior to closing.

16. CLARIFICATION

Enquiries related to Bid documents may be addressed to the Bid Administrator and Supply Chain Official as stated in SBD 1 Notice and Invitation to Bid.

17. BID EVALUATION METHOD

This Bid will be evaluated as described in the table below.

An 80/20 system will be followed for Technical and Price offer	1. Stage 1 – Administrative Responsiveness Evaluation All the Technical Proposals will be evaluated against the administrative responsiveness requirements as set out in the list of returnable documents. 2. Stage 2 –Technical Evaluation <u>Mandatory Criteria:</u> All Proposals that qualify based on the administrative responsiveness requirements will be evaluated against the Mandatory Evaluation Criteria. Bidders must COMPLY TO ALL the Mandatory Evaluation Criteria in order to qualify for further evaluation <u>Functional Criteria:</u> Bidders qualifying in Mandatory criteria will be evaluated against the Functional Criteria. Bidders must score 40 points or more out of a total 60 points allocated. Bidders that score less than 40 points will not be evaluated further. Bidders who obtain the required threshold points of 40 points or more will qualify for further evaluation: 3. Stage 3 – Appointment Bidders who comply with all the Mandatory Criteria may be appointment onto the Panel of Service Providers for the Supply, Delivery, Installation, Commissioning, and Maintenance Support of Industrial Uninterruptible Power Supplies (UPS).
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18. ADMINISTRATIVE RESPONSIVENESS REQUIREMENTS

To be administratively responsive, Bidders must ensure that they meet all the below mentioned criteria. Bidders that do not meet all the below mentioned criteria may not qualify to be awarded the Bid. Sentech reserves its rights in respect of the below criteria.

- Complete and return all documentation stipulated in the LIST OF RETURNABLE DOCUMENTS.
- All correspondence must be in English.
- Bidders must fill in all sections of this document (where applicable).
- **BLACK INK** must be used when completing the Bid documents.
- Bidders must use only the Bid documents provided by Sentech. Photocopying of the Bid document is permitted however Bidders must not retype or redraft the Bid documents.
- All corrections must be initialled. The use of corrective fluid is strictly prohibited.
- Bidders are required to fill in and sign the Bid Forms and initial all pages, drawings and brochures which are included in the reply as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.
- Bidders must complete an attendance register at each compulsory site meeting attended.
- Appointment of a Bidder will be subject to signing, declaration and submission of SBD 1, 3.1, 3.2, 3.3, 4, 5, 6.1, 6.2 8, and 9 depending on applicability.
- Complete and sign the Contract Data.
- Should this be a 2 envelope or 2 stage system, Bidders MUST separate the technical proposal from their financial proposal. The technical and financial proposals must be placed in two separate sealed envelopes.

19. AUTOMATIC DISQUALIFICATION

Sentech reserves the right to automatically disqualify Bidders from being awarded this Bid. The following will lead to automatic disqualification:

- Failure to submit a financial proposal, if required.
- The Bidder is or has been involved in any act of corruption or fraud or bribery or collusion or attempt to influence any employee of Sentech to award this Bid or any other Bid to it.

20. TECHNICAL RESPONSIVENESS COMPLIANCE

The Technical Evaluation will encompass the evaluation of:

- Mandatory Criteria
- Functional / Technical Criteria
- **TECHNICAL EVALUATION CRITERIA**

20.1 Mandatory Eligibility Criteria

The following criteria are mandatory for all bidders:

Mandatory Eligibility Criteria	Attach evidence	Provide the reference page number in your proposal
1. The bidder must have accreditation / Certification for Distribution Board Manufacturing from the OCM (Original Component Manufacturer).	Attach a valid certificate/accreditation or a signed letter from the OCM on a company letterhead	
2. The bidder must provide a commitment letter that stipulates they will abide by the regulatory standards including but not limited to the standards listed in Section 3 of the scope of work in the document	A signed letter of commitment on company letterhead (Note: The relevant regulatory standards should be explicitly mentioned in the letter)	

NOTE: Bidders that do not comply with all the above criteria will not be evaluated further.

20.2 Functional Criteria

Functionality criteria	Proof Required	Points
1. Track Record: The company must supply references for manufacturing of Distribution Board (DB) with a minimum of 100 A, three-phase. Points will be allocated based on the number of relevant references supplied. 1 - 2 reference.....0 3 references.....20 4 references.....25 5 references.....30 <i>Note: Bidder to complete the reference table</i>	Signed reference letters or Factory acceptance test letters	30
2. Overall Experience - years in manufacturing and supplying Low Voltage Distribution Boards. Number of years of experience Less than a year.....0 1 - 3 years.....5 More 3 - 6 years.....10 More than 6 - 9 years.....20 9 years and more.....30	Signed reference letters or Factory acceptance test letters (<i>Earliest date will be used to measure the years of experience</i>)	30
Total Points:		60

Table 1: Functional Criteria

The total minimum qualifying functional score is 40 points.

21. Evaluation of Price and Preference

This Bid will be evaluated on a points system based on weighted average score for Price and Preference as per Preferential Procurement Framework Act of 2000 (Act 5 of 2000).

22. Preference Point allocation – 80/20

Price / Preference	Weighting percentage
Preference:	20%
Price:	80 %
Total must equal:	100%

Sentech will award preference points as follows:

Goal	Points	Evidence required
Historically disadvantaged by unfair discrimination on the basis of Race	10	A valid BBBEE Certificate showing at least 51% black ownership
	5	A valid BBBEE Certificate showing at least 25.1 – 50% black ownership
	3	Black owned company showing at least 5 – 25% black ownership
	0	Below 5%
Historically disadvantaged by unfair discrimination on the basis of Gender (women)	8	A valid BBBEE Certificate showing at least 51% women ownership
	4	A valid BBBEE Certificate showing at least 25.1 – 50% women ownership
	2	A valid BBBEE Certificate showing at least 5-25% women ownership
	0	A valid BBBEE Certificate showing at less than 5% women ownership
Historically disadvantaged by unfair discrimination on the basis of disability	2	A doctor's note confirming disability, confirmation of disability from the Department of Labour, BEE certificate or equivalent confirmation
Total Points	20	

23. Price Calculation 80/20

The following formula will be used to calculate the points for price.

$$P_s = 80 \left[1 - \frac{(P_t - P_{min})}{P_{min}} \right]$$

Where:

P_s	=	Points scored for price of bid under consideration
P_t	=	Rand value of bid under consideration
P_{min}	=	Rand value of lowest acceptable bid

24. Declaration of Authority

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this Bid Data is understood and all requirements will be adhered to.

Name of Bidder	Signature	Date	Designation

SCOPE OF WORK

PURCHASER'S GOODS INFORMATION

Appointment of A Panel of Service Providers for the Supply, Delivery and Commissioning of Low Voltage Electrical Distribution Boards (DB) at various SENTECH Transmitter Sites, on an as-and-when-required basis for a period of three (3) years.

1. Background

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This document describes the extent of work expected from the successful bidder and the minimum technical and physical requirements for the equipment.

2. SCOPE

This specification covers the manufacture, testing at works, and deliveries of Low Voltage Distribution Boards to Sentech, Honeydew.

3. STANDARDS AND REGULATIONS

The Low Voltage Distribution Boards shall be designed to fully meet the requirements of the latest revisions and amendments of the following Acts, Regulations, Standards, and Recommendations.

3.1. Occupational Health and Safety Act (No 85 of 1993)

3.2. SANS 10142-1: Latest Edition

The wiring of Premises Part 1: Low Voltage Installations

3.3. SANS IEC 60439 -1: Latest Edition

Low-voltage switchgear and control gear assemblies

Part1: Type-tested and partially type-tested assemblies

3.4. SANS 1765: Latest Edition

Low-voltage switchgear and control gear assemblies

(Distribution Boards) with a rated short-circuit withstand strength up to and including 10kA

3.5. SANS 1973-1: Latest Edition

Low-voltage switchgear and control gear ASSEMBLIES Part 1: Type-tested ASSEMBLIES with stated deviations and rated short-circuit withstand strength above 10 kA

3.6. SANS 60529: Latest Edition

Degrees of protection provided by enclosures (IP Code)

3.7. SANS 1091: Latest Edition

National colour standard

3.8. SANS 1507-1: Latest Edition

Electric cables with extruded solid dielectric Insulation for fixed installations (300/500V to 1 900/3 300V).

3.9. SANS 1195: Latest Edition

Busbars.

3.10. SANS 767-1:Latest Edition

3.11. SANS 6004-1:Latest Edition

3.12. SANS 60269-1:Latest Edition

3.13. IEC 60051 - :Latest Edition

Earth leakage protection units Part 1: fixed earth leakage protection circuit breakers.

Instrument Transformers Part 1: Current transformers

Low Voltage fuses Part 1: General requirements.

Direct acting indicating analogue electrical measuring instruments and their accessories.

4. PERFORMANCE REQUIREMENTS

4.1. Electrical Performance Requirements (Operating at full rating).

The temperature of any component or compartment, under the following power and environmental conditions, shall not exceed the lesser of either the maximum temperature recommended by individual equipment suppliers, or the maximum temperature indicated in the relevant SANS, or IEC standard.

4.2. Power Supply Details:

Nominal supply Voltage	400V	3 phase 4 wire
Variation		+10% to – 10% on nominal voltage
Frequency		50Hz
Variations on frequency		+/-2%
Total harmonic distortion		<6%
Fault level		10Ka

5. VENTILATION AND OPERATING ENVIRONMENT

Boards fitted with equipment generating heat shall be arranged to prevent heat. Boards fitted with equipment generating heat shall be arranged to prevent heat from building up to a temperature that could damage any equipment or cable on the board. Any openings provided for ventilation purposes shall be suitably vermin-proofed using expanded metal or wire mesh screens. Where distribution boards are supplied for coastal areas, such vermin-proofing shall not be secured using spot welding.

Distribution boards shall be cooled using radiation and conventional cooling only. Fans shall not be used for cooling purposes unless otherwise specified in the detailed specification

Environmental Operating Conditions:

Altitude (for design purposes)	2000m above sea level
Maximum air temperature	+ 40 degrees Celsius
Minimum air temperature	-10 degrees Celsius
Relative Humidity	Between 20% and 90% non-condensing
Location	Indoors unless otherwise specified

6. MECHANICAL CONSTRUCTION

All switchboards shall have either front, back, or side access only. Extreme care must be taken to ensure that all equipment, including busbars are mounted in such a way that they are readily accessible from the front.

All holes for fixing screws are to be tapped or captive nuts must be used. No self-tapping screws may be used.

Pan-type doors shall be used for all compartment housing terminals, contactors, and selector switches.

Removable fascia panels with machine-punched slots must be fitted over all circuit breakers.

All meter and selector switches must be flush mounted in the doors.

Terminals must be sized to accommodate the incoming cables and must be arranged for ease of connection.

Blank-off or removable fascia panels shall consist of blank plates in vacant MCB positions and shall be firmly secured. Easily removable metal covers to be alternatively used where applicable.

All distribution boards and their components shall be constructed to withstand fault currents in accordance with any specified and/or implied values.

7. PAINTING

The interior mounting panels of all switchboards shall be white powder-coated.

The following colors of powder coating finish shall be applied to the exterior of the boards:

Frames and architrave frames	SANS 1091: 2004 Electric Orange B26
Doors	SANS 1091: 2004 Red A11
	SANS 1091: 2004 Blue F28

All drilling, cutting and other metal work must be completed before the painting process is commenced.

All distribution board finishes shall be made good to the satisfaction of Sentech before final handover.

8. LABELLING

All labelling shall be in English

All distribution boards shall be labelled in the sequence shown on the drawings and as specified.

The electrical manufacturer shall obtain final information from Sentech before labelling any boards.

All grouped single-pole circuit breakers on distribution boards shall be numbered by means of suitable engraved printed plastic or ivorene plates.

A legend card, covered by a removable glass or 2mm transparent acrylic plastic

(Perspex) or equivalent panel shall be installed on the door of the distribution boards or cubicles and circuits shall be designated on this card. All other equipment shall be individually labelled, indicating function. All plates shall be fixed to panels by means of screws or channelling.

Black letters on a white background shall be used for all normal labels and red letters on white or yellow background for danger notices.

The main isolating switch or switches shall be clearly labelled in accordance with the regulations. Where more than one incoming feed is utilized, or supplies obtained from other sources for purposes of control, danger notices shall be provided.

Labels shall not be secured to components or trunking covers, but shall be fixed onto doors, panels, chassis or other permanent structures of the boards, as the case may be.

The reference name of the distribution board, and the origin of supply cables shall be clearly labelled on all boards.

All equipment situated inside the board, e.g. contactors, relays, timers, and time switches shall be clearly marked, indicating function and circuit control.

The layout of the board with its components and wiring facilities shall be such that the labels are not obscured, but visible at all times.

9. DOORS

All Distribution Boards shall be equipped with doors unless otherwise specified

Where doors are required, they shall be manufactured of the same gauge material as the remainder of the panels.

Doors shall be suitably braced to ensure stiffness and shall have a smooth flat finish.

Door hinges shall be heavy-duty and shall be constructed to permit the removal of doors.

Doors shall open 180 degrees.

10. REMOVABLE PANELS

Removable front panels of sheet steel, finished in a color to be specified, shall be suitably stiffened, with machine-punched slots to allow for flush mounting of equipment.

All removable front panels shall be secured using quick-release fasteners similar and equivalent to suitable size DZUS type.

Front panels carrying instruments shall be hinged and secured with quick-release fasteners as specified above.

Where nuts are visible, chromium-plated dome nuts and washers of adequate size shall be used.

11. ACCESS

Sufficient removable panels shall be provided to afford access to all equipment for Maintenance purposes. Access on LV Boards will be specified by Sentech using single line diagrams, the construction thereof and orientation of C'T's and other equipment shall be such that all connections, circuit breakers, etc. shall be accessible only from the front of the board.

12. FAULT CURRENTS

The fault level rating of each board shall be specified and indicated on the single-line diagrams.

All distribution boards and their components shall be constructed to withstand fault currents in accordance with any specified and/or implied values.

Factory-built Distribution Boards, with short-circuit ratings less than 10kA, shall comply with the requirements as set out in SANS 1765:Latest Edition and SANS 10142-1: Latest Edition as amended.

Factory-built Distribution Boards, with short-circuit rating greater than 10kA, shall be either type-tested or type-tested with deviations or specially tested assemblies, in accordance with SANS 1973-1 and SANS 10142-1.

Tests of the main busbar only shall not be acceptable, but all busbars, cabling, and wiring from the main busbars to the input side of all switchgear shall be included.

Small wiring direct from busbars shall be protected by means of protection fuses mounted directly onto busbars. Busbar-mounted fuses shall be provided with insulated back plates to afford complete safety from hand contact with live parts.

13. BUSBARS

Busbars shall be installed in all distribution boards and may run either horizontally or vertically

All terminations onto busbars and busbar interconnections shall be bolted with cadmium-plated high tensile bolts, washers, spring washers, and nuts.

Busbars shall be mounted on substantial porcelain or other approved insulators. Bare conductors shall be so spaced that with all clamps, lugs, and lead-off in position, the spacing between any conductor and earth shall not be less than 40mm. Busbars, spacing between busbars, and connections thereto shall comply with SANS 1195: Latest Edition

Connections to the busbars shall be effected by means of the correct clamps or lugs with soldered connections or with connections crimped with the correct equipment. The following colors shall be used:

NUMBER OF PHASES	PHASE COLOUR	NEUTRAL COLOUR		SPECIAL PURPOSE COLOUR
1.	Red	Black	Green / Yellow	Orange
2.	Red and White	Black	Green / Yellow	Orange
3.	Red, white and blue	Black	Green / Yellow	Orange

Where busbars are mounted horizontally the longer dimensions shall be designed to withstand the mechanical and thermal stresses of any possible short circuit that could occur at that point in the system.

Busbars shall be high purity, hard-drawn tinned copper only, of an adequate size such that the current density of the busbars shall not exceed 1,5A/mm². Neutral busbars shall have the same cross-section as phase bars. The current carrying capacity of the busbars shall in all instances not be less than the current carrying capacity of the main isolator specified for the distribution board.

Busbars shall be pre-drilled to allow 25% future connections.

The busbars and any insulated connection busbars shall be sleeved with heat shrink-type material by the manufacturers of the board over their entire length, except at joints. Color coding of the busbars shall be strictly observed.

14. EARTH BAR

A 50mm x 6mm solid earth bar with sufficient ways for all the earth conductors and 30% spare space shall be provided in an easily accessible position near the cable entry points as specified. On small sub-distribution boards, 25 x 6mm solid earth bars shall be provided.

15. WIRING

Adequate space must be provided for the accommodation of internal wiring. All internal wiring shall either be laced or run in wiring channels and shall be clearly marked with numbered ferrules and color coded.

1Stranded wire shall comply with SANS 1507 -1:Latest Edition and have a minimum cross- section of 2,5mm². The minimum size of wire to switchgear shall be 10 mm² in sub-boards and shall be phase color-coded. For Distribution Boards where the short-circuit rating exceeds 10 kA the minimum cross-sectional area of conductors used for connection between the busbar and the functional unit shall be 16mm². Looping from the terminal of a switch, circuit breaker, or isolator will be allowed for a maximum of two outgoing circuits only. More than two circuits must be connected to busbars. All wiring cross-sectional areas shall be sized according to the SANS 10142-1:Latest Edition wiring regulations.

All internal wiring to the board shall be carried out in PVC insulated conductors of adequate size. The insulation color shall correspond to the phase color code. All jumpers between busbars and circuit breakers rated over 150 amperes shall be solid copper, insulated by means of heat shrink sleeving.

All wiring shall be kept free and away from any exposed terminals or other insulated current-carrying parts.

PVC trunking with slotted sides shall be the preferred method of housing wiring.

Only hexagon crimping on all wiring shall be used.

Wires shall be marked at all termination points and circuit breakers by the numbering of the distribution board manufacturer's wiring diagram using a suitable marker.

An emergency notice shall be provided to indicate "In emergency switch off" over mains incoming MCB. Where two inputs are required i.e. Mains & STG, the notice shall indicate "In emergency switch off mains & STG incoming MCBs simultaneously"

A common Din rail type 15 ampere terminal strip shall be provided for the connection of external control wiring. The terminal strip shall be of robust construction, and firmly secured to the boards, and all terminals shall be clearly marked by the distribution board manufacturer's working drawings and wiring diagrams.

16. CLEARANCE

Sufficient space shall be left inside panels for incoming and outgoing cable connections and for interconnections and control wiring, taking into account the sizes and quantities of cables and wires involved.

Equipment on distribution boards may be installed abutting. Undue cramping of equipment and wiring shall, however, not be permitted and the following clearances shall be maintained:

Clearance of not less than 75mm between sides, top and bottom of architrave, and any equipment mounted on the chassis.

Clearance of not less than 75mm between rows of equipment (measured between terminals)

17. FREE STANDING DISTRIBUTION BOARDS.

Free-standing boards shall be of the free-standing pedestal type with or without doors as specified and shall be so designed as to enable the board to be extended without undue difficulty

The switchboard shall be constructed of 2mm sheet steel suitably stiffened and reinforced and shall be complete with all equipment, internal wiring and labelling.

A suitable removable gland plate for mounting cables shall be provided for termination of cables. Cables and busbars can enter and leave boards from both above and below as specified.

Minimum height of gland plate shall be not less than 300mm unless specified elsewhere.

18. FLUSH AND SURFACE MOUNTED DISTRIBUTION BOARDS

Both flush and surface mounted distribution boards shall consist of an architrave frame which shall carry the chassis for equipment, panel and door and a bonding tray onto which the architrave frame shall be secured.

Bonding trays for flush-mounted boards shall be designed to be built into the wall and shall have expanded metal spot welded to the rear and sufficient metal strap on the sides.

The trays shall be rust-proofed.

The tray shall be constructed of a minimum of 1,2mm sheet steel suitably braced by means of gussets and shall be of adequate size to accommodate specified equipment without congestion.

Bonding trays for surface-mounted boards shall be designed to be slightly larger than the architrave frame and returned to present a flat surface onto which the architrave frame shall fit.

The finish of the tray shall match the finish of the board.

The architrave frame shall be constructed of a minimum of 1,2mm sheet steel and formed with bevelled edges, which shall accommodate panel, chassis and door(s). The frame shall be fixed to the tray in such a manner as to allow for adjustment for depth and out-of-plumb.

The chassis shall be of rigid construction for mounting of equipment and shall be fixed to the architrave frame of tray and provided with the necessary means for fixing of the required equipment.

19. BARRIERS

Non-combustible barriers between sections of the distribution boards shall be provided in the following instances:

- To separate section of boards which are fed from different transformers or sources of supply.
 - To isolate each main incoming circuit breaker where the expected level of fault current exceeds 15kA.
- A group of 3-phase and neutral or single phase and neutral busbars or single core conductors crossing a ferrous metal barrier shall do so through a common opening only, which shall be suitably bushed or insulated.

20. LIGHTING SURGE ARRESTORS

Lightning surge arrestors shall be provided as specified on attached single line diagrams Appendix 1 for each phase and for the neutral in all boards. Lightning surge arrestors shall be Class 1 for Main Distribution Boards and Class 2 for Sub Distribution Boards.

Lightning surge arrestors shall be connected to the phase, neutral and earth busbars by means of the shortest possible leads, which shall in any event not exceed 450mm in length per arrestor and as per supplier's installation procedures.

21. SWITCHES AND SELECTOR SWITCHES

All switches and selector switches shall be capable of breaking the full load current.

The fault level of the switches and selector switches shall be equal to or higher than the prospective fault levels at the associated busbars, but in any case not less than 5kA.

Voltmeter selector switches shall be suitable for a three-phase, 400V/230V, and 50Hz system and shall be so arranged that voltage between phases and phases to neutral can be read. Voltmeter selector switches shall be of the break-before-make type

The voltmeter selector switch shall have one "off" and six "metering" positions suitable for panel mounting in such a way that the operating knob and indicator plate can be mounted on the front of a panel and the switch itself at the back of the panel

Ammeter selector switches shall be of the make-before-break type with one "off" and three "metering" positions. When in the "off" position the metering circuits shall be short-circuited.

The physical construction of ammeter selector switches shall conform to that of voltmeter selector switches.

The operating knob and indicator plate of the selector switches shall be manufacturer of insulating material with the switch positions clearly and indelibly marked thereon. The switches shall be provided with substantial contacts with the terminals clearly marked and arrange for easy wiring.

The voltmeter or ammeter selector switch shall be mounted directly below the associated voltmeter or ammeter.

A V R and/or UPS by-pass switches shall be mounted within the switchboard doors. By-pass switches shall be of break-before-make type.

22. CONTACTOR AND RELAYS

All contactors and relays shall have coils to suit continuous operation at the operating voltages.

All contactors and relays shall be able to withstand the prospective short circuit current that can occur at the point where the contactor or relay is installed.

All relays and contactors used in normal supply/standby supply changeover circuitry shall be electrically and mechanically interlocked.

All contactors, unless otherwise specified, shall have two normally open and two normally closed auxiliary contacts.

All contactors and relays shall be clearly marked.

23. PROTECTION RELAYS

All overload relays shall be adjustable manual reset units.

All protection devices shall be capable of withstanding the fault current that could occur at the point in the system where the unit is installed.

24. EARTH LEAKAGE RELAYS

All earth leakage relays shall comply with SANS 767 -1: Latest Edition.

25. AMMETERS

The ammeters shall be of the flush-mounted type

All instruments shall comply with the requirements of IEC 60051-1:Latest Edition. The ammeters shall be 5 ampere instruments of 96mm square format or otherwise as approved by Sentech.

Ammeters shall be of the MISC movement with both instantaneous and thermal demand indication, having an integrating lag of 15 minutes or otherwise specified by Sentech.

The ammeter scale shall be direct reading with a full-scale deflection corresponding to approximately 120% of the rated circuit current

If separate ammeters are required each ammeter shall be marked with the appropriate phase colour to which it is connected and ammeters shall be mounted in groups of three in a horizontal line clearly marked to indicate to which feeder they are connected. The ratio of the current transformer associated with the ammeter shall be clearly indicated on the ammeter scale.

All ammeters shall be fitted with zero-adjustments screws.

26. CURRENT TRANSFORMERS

Current transformers for the LV switchgear shall be of the ring type, complying with the requirements of SANS 60044-1:Latest Edition.

Current transformers for indication circuits shall be Class 1 rated in accordance with SANS 60044-1: 2003 dependent upon primary current.

The current transformer ratio shall match the rating of the circuit to which it is connected.

Each current transformer shall be provided with a robust mounting bracket and proper terminal studs on the circumference of the coil for the connections

A nameplate shall be fixed to each current transformer on the circumference of the coil in such a position that it can be easily read from outside the board after removal of the access panels. The nameplate shall

clearly indicate the class, rating, ratio, P1, P2, S1 and S2 connections and the function of the current transformers.

The current transformers shall be mounted on rigid supports above or below the relevant switchgear in a manner as to facilitate the threading through of the interconnecting wiring to the relevant switchgear. Current transformers shall only be installed on the load side of feeder circuit breaker.

The current transformers shall be insulated for 660 volt between phases and shall be capable of withstanding for the duration of time taken by the circuit breaker to clear the fault (with protective devices set at the maximum settings), the fault currents that could occur at the point in the system where the current transformers are installed.

27. VOLTMETERS

Voltmeters shall be of the flush panel mounting, moving iron, suppressed zero type scaled from 0-500 Volt or otherwise specified by Sentech.

The voltmeter shall be of the 96mm square format or otherwise as approved by Sentech and shall match the ammeters previously specified. It shall also comply with requirements laid down in IEC 60051-1:Latest Edition.

All voltmeters shall be fitted with zero adjustment screws.

28. POWER METERING

Where power metering is required a PM 5500 (Schneider Electric) unit or approved equivalent shall be supplied.

29. PILOT LIGHTS

Where pilot lights are specified, they shall be of LED type suitable for 230 VAC operations. The pilot lights shall have either circular (25mm minimum) or rectangular (20mm x 25mm) lenses.

The colours used for the lenses shall be as follows:

Pilot lights indicating "Run" status	- Green
Pilot lights indicating "Stop" or "Off" status	- Red
Pilot lights indicating "Tripped" or "Alarm" conditions	- Amber

The pilot light shall be suitable for mounting through cubicle doors, with connections to the wiring occurring at the rear of the doors. The ring nuts and lamp holders shall allow quick installation and removal of the pilot lights and shall be fitted with lock washers or other suitable means of locking in position and to prevent the pilot lights from shaking loose under the influence of vibration.

It shall be possible to replace the LED lamp from the front of the panel, without the use of special tools or equipment.

The function of the pilot light shall be clearly indicated either by means of a separate label or thorough engraving on the lenses of the pilot lights.

30. TERMINAL BLOCKS

Terminal blocks shall be of the line-up type, suitable for clipping into a mounting channel. The terminal bodies and screws shall be of non-corrosive metal, enclosed in fire resistant, moulded plastic insulating bodies. Terminal bodies or screws shall not project beyond the insulation material and shall afford suitable protection against accidental contact by personnel and against short circuits and tracking. The minimum size of terminal blocks shall be 4 mm².

The construction of the terminal block and mounting rail shall be such as to ensure a firm and positive location of the terminal block. It shall be possible to add additional terminal blocks within the terminal sequence without having to disconnect or dismantle the terminal strip. The terminal blocks shall be held in position by means of standard end clamps.

It shall be possible to intermix terminals of various sizes, i.e. for different sizes of conductors, whilst utilising the same mounting rail. Where smaller terminal block occur adjacent to large terminal blocks, suitable shielding barriers shall be inserted in between the cover the terminals that might otherwise be exposed.

The terminal bodies and clamping screws shall be so constructed as to ensure that conductors are not nicked or severed when clamping screws are tightened.

Terminals shall be sized and rated to match the conductors that are connected to them. All lighting and small power circuits shall be installed with a double set of terminals.

Each terminal block shall have provision for clip-in numbering or labelling sheets to be installed, together with protective, clear caps over the sheets in a manner so as to ensure that physical damage or damage to paint work due to impact or chafing during transport is prevented.

31. DRAWINGS TO BE SUBMITTED FOR APPROVAL BEFORE CONSTRUCTION

The Contractor shall submit a detailed programme in respect of manufacturing & delivery, immediately after being awarded the Contract.

Prior to the commencement of manufacture of the Distribution Boards, the following drawings shall be submitted to Sentech for approval

- Panel general arrangement drawing(s) showing overall dimensions and positions and dimensions of busbars.
- Panel layout drawings showing mounting positions of equipment and free space between equipment.
- Panel door layout showing relative positions and dimensions of equipment mounted on the panel doors.
- Schedule of all labels showing size of label and letters and the wording of the label.

Failure to comply with this requirement timeously may result in rejection of the Distribution Board.

32. QUALITY ASSURANCE REQUIREMENTS

Inspection during Manufacture -Sentech or his appointed representative shall be permitted to carry out, during normal working hours, periodic inspections of the Distribution Boards and equipment covered by this specification. Immediately before delivery-Sentech or his appointed representative shall be permitted to witness final Factory Tests of the Distribution Boards and equipment before delivery will be permitted. The manufacturer shall provide all power supplies, testing equipment, means of simulating related remote devices and competent personnel to conduct the tests.

Equipment may not be delivered to Sentech until the manufacture has cleared all defects listed by Sentech

33. ROUTINE TESTS

The following tests shall be carried out on all Distribution Boards in the manufacturer's works and if Sentech so requires must be witnessed by the company.

All tests shall be carried out in accordance with the procedure laid down in SANS 1973-1, SANS 1765 and/or SANS 10142-1, as applicable.

- A high voltage test of 2000 Volts, 50Hz, and AC for one minute between each phase and in turn with the remaining phase earthed.
- A 1000 Volt megger test on all insulated sections, from phase-to-phase and phase- to-earth. Resistance readings shall exceed 1.0 Meg ohms.
- Full operational tests of any relay gear or switchgear installed on the board.
- A trip test on all earth leakage units by creating an earth fault of appropriate magnitude.
- A current injection trip test on all main breakers to ensure that they trip at their set currents.
- Such other tests as may be laid down in the Detailed Requirements.

All test results shall be recorded on the manufactures standard test certificate, three copies of which, duly approved, shall be supplied to Sentech within one week of the factory test being completed.

Price List (not for evaluation purposes, all the content is below)

SCHEDULE 1: Distribution Board Diagram Costing Table (not for evaluation purposes)

Item	Description	Unit	Quantity	Rate	Amount
1	Main DB Board (1000A/800A/630A)				
1.1	<u>Single Line Diagram (DwgN13400 /E/201) sh1 & sh2</u>				
1.1.1					
1.1.2					
1.1.3					
1.1.4					
1.1.5					
1.1.6					
1.1.7					
1.1.8					
1.1.9					
1.1.10					
1.1.11					
1.1.12					
1.1.13					
1.1.14					
	<i>Insert more lines if required</i>				

Item	Description	Unit	Quantity	Rate	Amount
1.2	General Arrangement Diagram (<u>DwgN13400 /E/202</u>)				
1.2.1					
1.2.2					
1.2.3					
1.2.4					
1.2.5					
1.2.6					
1.2.7					
1.2.8					
1.2.9					
1.2.10					
1.2.11					
1.2.12					
1.2.13	<i>Insert more lines if required</i>				
TOTAL CARRIED FORWARD		R			

SCHEDULE 1: Distribution Board Diagram Costing Table

Item	Description	Unit	Quantity	Rate	Amount
1	Main DB Board (400A)				
1.1	<u>Single Line Diagram</u>				
1.1.1					
1.1.2					
1.1.3					
1.1.4					
1.1.5					
1.1.6					
1.1.7					
1.1.8					
1.1.9					
1.1.10					
1.1.11					
1.1.12					
1.1.13					
1.1.14					
	<i>Insert more lines if required</i>				

Item	Description	Unit	Quantity	Rate	Amount
1.2	General Arrangement Diagram				
1.2.1					
1.2.2					
1.2.3					
1.2.4					
1.2.5					
1.2.6					
1.2.7					
1.2.8					
1.2.9					
1.2.10					
1.2.11					
1.2.12					
1.2.13					
1.2.14	<i>Insert more lines if required</i>				
TOTAL CARRIED FORWARD		R			

SCHEDULE 1: Distribution Board Diagram Costing Table

Item	Description	Unit	Quantity	Rate	Amount
1	Main DB Board (250A)				
1.1	<u>Single Line Diagram</u>				
1.1.1					
1.1.2					
1.1.3					
1.1.4					
1.1.5					
1.1.6					
1.1.7					
1.1.8					
1.1.9					
1.1.10					
1.1.11					
1.1.12					
1.1.13					
1.1.14					
	<i>Insert more lines if required</i>				

Item	Description	Unit	Quantity	Rate	Amount
	General Arrangement Diagram				
1.2.1					
1.2.2					
1.2.3					
1.2.4					
1.2.5					
1.2.6					
1.2.7					
1.2.8					
1.2.9					
1.2.10					
1.2.11					
1.2.12					
1.2.13					
1.2.14	<i>Insert more lines if required</i>				
TOTAL CARRIED FORWARD		R			

SCHEDULE 1: Distribution Board Diagram Costing Table

Item	Description	Unit	Quantity	Rate	Amount
1	Main DB Board (100A)				
1.1	<u>Single Line Diagram</u>				
1.1.1					
1.1.2					
1.1.3					
1.1.4					
1.1.5					
1.1.6					
1.1.7					
1.1.8					
1.1.9					
1.1.10					
1.1.11					
1.1.12					
1.1.13					
1.1.14					
	<i>Insert more lines if required</i>				

Item	Description	Unit	Quantity	Rate	Amount
1.2	General Arrangement Diagram				
1.2.1					
1.2.2					
1.2.3					
1.2.4					
1.2.5					
1.2.6					
1.2.7					
1.2.8					
1.2.9					
1.2.10					
1.2.11					
1.2.12					
1.2.13					
1.2.14	<i>Insert more lines if required</i>				
TOTAL CARRIED FORWARD		R			

TABLE 1: REFERENCES

Please complete the customer reference table and relevant Contact telephone number and attach reference letters. LIST A MAXIMUM OF 5 REFERENCES

Customer		Service Provided	Contact Person	Contact tel. no.	Contractual commencement date	Contractual completion date
1						
2						
3						
4						
5						

Name of Tenderer	Signature	Date