

TENDER DOCUMENT GOODS AND SERVICES		 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD
SUPPLY CHAIN MANAGEMENT		
SCM - 542	Approved by Branch Manager: 03/04/2020	Version: 8 Page 76 of 181

TENDER NO: 21S/2021/22

TENDER DESCRIPTION: SUPPLY AND DELIVERY OF TELECOMMUNICATIONS MATERIALS AND EQUIPMENT

CONTRACT PERIOD: PERIOD OF 36 MONTHS FROM THE COMMENCEMENT DATE OF THE CONTRACT

VOLUME 3: DRAFT CONTRACT

TENDERER	
NAME of Company/Close Corporation or Partnership / Joint Venture/ Consortium or Sole Proprietor /Individual	
TRADING AS (if different from above)	

NATURE OF TENDER OFFER (please indicate below)	
Main Offer (see clause 2.2.11.1)	
Alternative Offer (see clause 2.2.11.1)	

VOLUME 3: DRAFT CONTRACT (7) SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract, referring to the National Treasury – Conditions of Contract (revised July 2010), are applicable to this Contract:

1. Definitions

Delete Clause 1.15 and substitute with the following

- 1.15 The word 'Goods' is to be replaced everywhere it occurs in the GCC with the phrase 'Goods and / or Services' which means all of the equipment, machinery, materials, services, products, consumables, etc. that the supplier is required to deliver to the purchaser under the contract. This definition shall also be applicable, as the context requires, anywhere where the words "supplies" and "services" occurs in the GCC.

Delete Clause 1.19 and substitute with the following

- 1.19 The word 'Order' is to be replaced everywhere it occurs in the GCC with the words 'Purchase Order' which means the official purchase order authorised and released on the purchaser's SAP System

Delete Clause 1.21 and substitute with the following:

- 1.21 'Purchaser' means the **City of Cape Town**. The address of the Purchaser is **12 Hertzog Boulevard, Cape Town, 8001**.

Add the following after Clause 1.25:

- 1.26 'Supplier' means any provider of goods and / or services with whom the contract is concluded
- 1.27 "Intellectual Property" means any and all intellectual property rights of any nature anywhere in the world whether registered, registerable or otherwise, including patents, trademarks, registered designs and domain names, applications for any of the foregoing, trade or business names, copyright and rights in the nature of copyright, design rights, rights in databases, know-how, trade secrets and any other intellectual property rights which subsist in computer software, computer programs, websites, documents, information, techniques, business methods, drawings, logos, instruction manuals, lists and procedures and particulars of customers, marketing methods and procedures and advertising literature, including the "look and feel" of any websites

3. General Obligations

Delete Clause 3.2 in its entirety and replace with the following clauses.

- 3.2 The parties will be liable to each other arising out of or in connection with any breach of the obligations detailed or implied in this contract, subject to clause 28.
- 3.3 All parties in a joint venture or consortium shall be jointly and severally liable to the purchaser in terms of this contract and shall carry individually the minimum levels of insurance stated in the contract, if any.
- 3.4 The parties shall comply with all laws, regulations and bylaws of local or other authorities having jurisdiction regarding the delivery of the goods and give all notices and pay all charges required by such authorities.
- 3.4.1 The parties agree that this contract shall also be subject to the CCT's Supply Chain Management Policy ('SCM Policy') that was applicable on the date the bid was advertised, **save that if the Employer adopts a new SCM Policy which contemplates that any clause therein would apply to the contract emanating from this tender, such clause shall also be applicable to that contract.** Please refer to this document contained on the CCT's website.
- 3.4.2 Abuse of the supply chain management system is not permitted and may result in cancellation of the

contract, restriction of the supplier, and/or the exercise by the City of any other remedies available to it as described in the SCM Policy.

3.5 The supplier shall:

3.5.1 Arrange for the documents listed below to be provided to the Purchaser prior to the issuing of the order:

- a) Proof of Insurance (Refer to Clause 11) or Insurance Broker's Warrantee
- b) Letter of good standing from the Compensation Commissioner, or a licensed compensation insurer (Refer to Clause 11)
- c) Initial delivery programme
- d) Other requirements as detailed in the tender documents

3.5.2 Only when notified of the acceptance of the bid by the issuing of the order, the supplier shall commence with and carry out the delivery of the goods in accordance with the contract, to the satisfaction, of the purchaser

3.5.3 Provide all of the necessary materials, labour, plant and equipment required for the delivery of the goods including any temporary services that may be required

3.5.4 Insure his workmen and employees against death or injury arising out of the delivery of the goods

3.5.5 Be continuously represented during the delivery of the goods by a competent representative duly authorised to execute instructions;

3.5.6 In the event of a loss resulting in a claim against the insurance policies stated in clause 11, pay the first amount (excess) as required by the insurance policy

3.5.7 Comply with all written instructions from the purchaser subject to clause 18

3.5.8 Complete and deliver the goods within the period stated in clause 10, or any extensions thereof in terms of clause 21

3.5.9 Make good at his own expense all incomplete and defective goods during the warranty period

3.5.10 Pay to the purchaser any penalty for delay as due on demand by the purchaser. The supplier hereby consents to such amounts being deducted from any payment to the supplier.

3.5.11 Comply with the provisions of the OHAS Act & all relevant regulations.

3.5.12 Comply with all laws relating to wages and conditions generally governing the employment of labour in the Cape Town area and any applicable Bargaining Council agreements.

3.5.13 Deliver the goods in accordance with the contract and with all reasonable care, diligence and skill in accordance with generally accepted professional techniques and standards.

3.6 The purchaser shall:

3.6.1 Issue orders for the goods required under this Contract. No liability for payment will ensue for any work done if an official purchase order has not been issued to the supplier.

3.6.2 Make payment to the **supplier for the goods as set out herein.**

3.6.3 Take possession of the goods upon delivery by the supplier.

3.6.4 Regularly inspect the goods to establish that it is being delivered in compliance with the contract.

3.6.5 Give any instructions and/or explanations and/or variations to the supplier including any relevant advice to assist the supplier to understand the contract documents.

3.6.6 Grant or refuse any extension of time requested by the supplier to the period stated in clause 10.

- 3.6.7 Inspect the goods to determine if, in the opinion of the purchaser, it has been delivered in compliance with the contract, alternatively in such a state that it can be properly used for the purpose for which it was intended.
- 3.6.8 Brief the supplier and issue all documents, information, etc. in accordance with the contract.

5. Use of contract documents and information; inspection, copyright, confidentiality, etc.

Add the following after clause 5.4:

- 5.5 Copyright of all documents prepared by the supplier in accordance with the relevant provisions of the copyright Act (Act 98 of 1978) relating to contract shall be vested in the purchaser. Where copyright is vested in the supplier, the purchaser shall be entitled to use the documents or copy them only for the purposes for which they are intended in regard to the contract and need not obtain the supplier's permission to copy for such use. Where copyright is vested in the purchaser, the supplier shall not be liable in any way for the use of any of the information other than as originally intended for the contract and the purchaser hereby indemnifies the supplier against any claim which may be made against him by any party arising from the use of such documentation for other purposes.

The ownership of data and factual information collected by the supplier and paid for by the purchaser shall, after payment, vest with the purchaser

- 5.6 **Publicity and publication**
The supplier shall not release public or media statements or publish material related to the services or contract within two (2) years of completion of the services without the written approval of the purchaser, which approval shall not be unreasonably withheld.
- 5.7 **Confidentiality**
Both parties shall keep all information obtained by them in the context of the contract confidential and shall not divulge it without the written approval of the other party.
- 5.8 **Intellectual Property**
- 5.8.1 The supplier acknowledges that it shall not acquire any right, title or interest in or to the Intellectual Property of the Employer.
- 5.8.2 The supplier hereby assigns to the Employer, all Intellectual Property created, developed or otherwise brought into existence by it for the purposes of the contract, unless the Parties expressly agree otherwise in writing.
- 5.8.3 The supplier shall, and warrants that it shall:
- 5.8.3.1 not be entitled to use the Employer's Intellectual Property for any purpose other than as contemplated in this contract;
- 5.8.3.2 not modify, add to, change or alter the Employer's Intellectual Property, or any information or data related thereto, nor may the supplier produce any product as a result of, including and/or arising from any such information, data and Intellectual Property, and in the event that it does produce any such product, the product shall be, and be deemed in law to be, owned by the Employer;
- 5.8.3.3 not apply for or obtain registration of any domain name, trademark or design which is similar to any Intellectual Property of the Employer;
- 5.8.3.4 comply with all reasonable directions or instructions given to it by the Employer in relation to the form and manner of use of the Employer Intellectual Property, including without limitation, any brand guidelines which the Employer may provide to the supplier from time to time;
- 5.8.3.5 procure that its employees, directors, members and contractors comply strictly with the provisions of clauses 5.8.3.1 to 5.8.3.3 above;

unless the Employer expressly agrees thereto in writing after obtaining due internal authority.

- 5.8.4 The supplier represents and warrants to the Employer that, in providing goods, services or both, as the case may be, for the duration of the contract, it will not infringe or make unauthorised use of the Intellectual Property rights of any third party and hereby indemnifies the Employer from any claims, liability, loss, damages, costs, and expenses arising from the infringement or unauthorised use by the supplier of any third party's Intellectual Property rights.
- 5.8.5 In the event that the contract is cancelled, terminated, ended or is declared void, any and all of the Employer's Intellectual Property, and any and all information and data related thereto, shall be immediately handed over to the Employer by the supplier and no copies thereof shall be retained by the supplier unless the Employer expressly and in writing, after obtaining due internal authority, agrees otherwise.

7. Performance Security

NOT APPLICABLE

8. Inspections, tests and analyses

Delete Clause 8.2 and substitute with the following:

- 8.2 If it is a bid condition that supplies to be produced or services to be rendered should at any stage during production or execution or on completion be subject to inspection, the premises of the bidder or contractor shall be open, at all reasonable hours, for inspection by a representative of the purchaser or an organisation acting on behalf of the purchaser.

10. Delivery and documents

Delete clauses 10.1 and 10.2 and replace with the following:

- 10.1 Delivery of the goods shall be made by the supplier in accordance with the terms specified in the contract. The time for delivery of the goods shall be the date as stated on the order. Orders for the supply and delivery of goods may be raised up until the expiry of a framework agreement bid, provided that the goods can be delivered within 30 days of expiry of the framework contract. All orders, other than for the supply and delivery of goods, must be completed prior to the expiry of the contract period.
- 10.2 The purchaser shall determine, in its sole discretion, whether the goods have been delivered in compliance with the contract, alternatively in such a state that it can be properly used for the purpose for which it was intended. When the purchaser determines that the goods have been satisfactorily delivered, the purchaser must issue an appropriate certification, or written approval, to that effect. Invoicing may only occur, and must be dated, on or after the date of acceptance of the goods.

11. Insurance

Add the following after clause 11.1:

- 11.2 Without limiting the obligations of the supplier in terms of this contract, the supplier shall effect and maintain the following additional insurances:
- a) Public liability insurances, in the name of the supplier, covering the supplier and the purchaser against liability for the death of or injury to any person, or loss of or damage to any property, arising out of or in the course of this Contract, in an amount not less than **R20 million** for any single claim;
 - b) Motor Vehicle Liability Insurance, in respect of all vehicles owned and / or leased by the supplier, comprising (as a minimum) "Balance of Third Party" Risks including Passenger Liability Indemnity;
 - c) Registration / insurance in terms of the Compensation for Occupational Injuries and Disease Act, Act 130 of 1993. This can either take the form of a certified copy of a valid Letter of Good Standing issued by the Compensation Commissioner, or proof of insurance with a licenced compensation insurer, from either the bidder's broker or the insurance company itself (see **Proof of Insurance / Insurance Broker's Warranty** section in document for a pro forma version).

In the event of under insurance or the insurer's repudiation of any claim for whatever reason, the CCT will retain its right of recourse against the supplier.

- 11.3 The supplier shall be obliged to furnish the CCT with proof of such insurance as the CCT may require from time to time for the duration of this Contract. Evidence that the insurances have been effected in terms of this clause, shall be either in the form of an insurance broker's warranty worded precisely as per the pro forma version contained in the **Proof of Insurance / Insurance Broker's Warranty** section of the document or copies of the insurance policies.

15. Warranty

Add to Clause 15.2:

- 15.2 This warranty for this contract shall remain valid for minimum of **twelve (12) months** after the goods have been delivered.

16. Payment

Delete Clause 16.1 in its entirety and replace with the following:

- 16.1 A monthly payment cycle will be the norm. All invoices which are dated on or before the 20th of a particular month will typically be paid between the 23rd and 26th of the following month. The supplier may submit a fully motivated application regarding more frequent payment to the Employer's Director: Expenditure for consideration. Requests for more frequent payments will be considered at the sole discretion of the Employer and is not a right in terms of this contract.

Delete Clause 16.2 in its entirety and replace with the following:

- 16.2 The supplier shall furnish the purchaser's Accounts Payable Department with an original tax invoice, clearly showing the amount due in respect of each and every claim for payment.

Add the following after clause 16.4

- 16.5 Notwithstanding any amount stated on the order, the supplier shall only be entitled to payment for goods actually delivered in terms of the Project Specification and Drawings, or any variations in accordance with clause 18. Any contingency sum included shall be for the sole use, and at the discretion, of the purchaser.

The CCT is not liable for payment of any invoice that pre-dates the date of delivery of the goods.

- 16.6 The purchaser will only make advanced payments to the supplier in strict compliance with the terms and details as contained on **Proforma Advanced Payment Guarantee** and only once the authenticity of such guarantee has been verified by the City's Treasury Department.

17. Prices

Add the following after clause 17.1

- 17.2 If as a result of an award of a contract beyond the original tender validity period, the contract execution will be completed beyond a period of twelve (12) months from the expiry of the original tender validity period, then the contract may be subject to contract price adjustment for that period beyond such twelve (12) months. An appropriate contract price adjustment formula will be determined by the Director: Supply Chain Management if such was not included in the bid documents.

- 17.3 If as a result of any extension of time granted the contract execution will be completed beyond a period of twelve (12) months from the expiry of the original tender validity period, then contract price adjustment may apply to that period beyond such twelve (12) months. An appropriate contract price adjustment formula will be determined by the Director: Supply Chain Management if such was not included in the bid documents.

- 17.4 The prices for the goods delivered and services performed shall be subject to contract price adjustment and the following conditions will be applicable:

NOT APPLICABLE

17.5 If price adjustment for variations in the cost of plant and materials imported from outside of South Africa is provided for in the contract, such adjustment shall be based on the information contained on the schedule titled “**Price Basis for Imported Resources**” and as below. For the purposes of this clause the Rand value of imported Plant and Materials inserted on the schedule titled “**Price Basis for Imported Resources**” (column (F)) shall be the value in foreign currency (column (A)) converted to South African Rand (column (C)) by using the closing spot selling rate quoted by **CCT’s** main banker, NEDBANK, on the Base Date (seven calendar days before tender closing date) rounded to the second decimal place (column(B)), to which shall be added any Customs Surcharge and Customs Duty applicable at that date (columns (D) and (E)).

17.5.1 Adjustment for variations in rates of exchange:

(a) The value in foreign currency inserted in column (A) shall be subject to clause (h) below when recalculating the Rand value.

(b) The rate of exchange inserted in column (B) shall be the closing spot selling rate quoted by Council’s main banker, NEDBANK, on the Base Date, rounded to the second decimal place, subject to sub-paragraph (c) below.

(c) If the rate of exchange inserted by the Tenderer differs from the NEDBANK rate referred to above, then the NEDBANK rate shall apply and the Rand value in columns (C) and (F) shall be recalculated accordingly, without altering the price in the Price Schedule for the relevant items.

(d) If a tender from a supplier or sub-contractor provides for variations in rates of exchange, the Supplier may **only** claim for variations in rates of exchange if he binds the supplier or sub-contractor to the same provision to take out forward cover as described in sub-paragraph (e) below.

(e) The Supplier (or sub-contractor) shall within five working days from the date of placing a firm order on an overseas supplier, cover or recover forward by way of a contract with a bank which is an authorised foreign exchange dealer, the foreign exchange component of the cost of any imported Plant and Materials inserted by the Tenderer on the scheduled titled “**Price Basis for Imported Resources**”.

(f) When the Supplier (or sub-contractor) so obtains forward cover, the Supplier shall immediately notify the CCT of the rate obtained and furnish the CCT with a copy of the foreign exchange contract note.

(g) Based on the evidence provided in sub-paragraph (f) above, the value in Rand inserted in column (C) of on the schedule titled “**Price Basis for Imported Resources**” shall be recalculated using the forward cover rate obtained, and any increase or decrease in the Rand value defined in this clause shall be adjusted accordingly, subject to sub-paragraph (h) below.

(h) The adjustments shall be calculated upon the value in foreign currency in the Supplier’s (or sub-contractor’s) **forward cover contract**, provided that, should this value exceed the value in foreign currency inserted in column (A) of on the schedule titled “**Price Basis for Imported Resources**”, then the value in column (A) shall be used.

17.5.2 Adjustment for variations in customs surcharge and customs duty

(a) Any increase or decrease in the Rand value between the amounts of Customs Surcharge and Customs Duty inserted in on the schedule titled “**Price Basis for Imported Resources**” and those amounts actually paid to the Customs and Excise Authorities, which are due to changes in the percentage rates applicable or to the foreign exchange rate used by the authorities, shall be adjusted accordingly.

(b) The Tenderer shall state the Customs Duty Tariff Reference applicable to each item and the Supplier shall advise the CCT’s Agent of any changes which occur.

17.5.3 Adjustment for variation in labour and material Costs

If the prices for imported Plant and Materials are not fixed, the Supplier shall in his Tender specify the formula for calculating Contract Price Adjustments normally used in the country of manufacture and the indices and relative proportions of labour and material on which his Tender prices are based. Evidence of the indices applicable shall be provided with each claim. The indices applicable 42 days before contractual dispatch date from the factory will be used for the purposes of Contract Price Adjustment.

Failure to specify a formula in the Tender shall mean that the prices are fixed or shall be deemed to be fixed.

18. Contract Amendments

Delete the heading of clause 18 and replace with the following:

18. Contract Amendments and Variations

Add the following to clause 18.1:

Variations means changes to the goods, extension of the duration or expansion of the value of the contract that the purchaser issues to the supplier as instructions in writing, subject to prior approval by the purchaser's delegated authority. Should the supplier deliver any goods not described in a written instruction from the purchaser, such work will not become due and payable until amended order has been issued by the purchaser.

20. Subcontracts

Add the following after clause 20.1:

- 20.2 The supplier shall be liable for the acts, defaults and negligence of any subcontractor, his agents or employees as fully as if they were the acts, defaults or negligence of the supplier.
- 20.3 Any appointment of a subcontractor shall not amount to a contract between the CCT and the subcontractor, or a responsibility or liability on the part of the CCT to the subcontractor and shall not relieve the supplier from any liability or obligation under the contract.

21. Delays in the supplier's performance

Delete Clause 21.2 in its entirety and replace with the following:

- 21.2 If at any time during the performance of the contract the supplier or its sub-contractors should encounter conditions beyond their reasonable control which impede the timely delivery of the goods, the supplier shall notify the purchaser in writing, within 7 Days of first having become aware of these conditions, of the facts of the delay, its cause(s) and its probable duration. As soon as practicable after receipt of the supplier's notice, the purchaser shall evaluate the situation, and may at his discretion extend the time for delivery.

Where additional time is granted, the purchaser shall also determine whether or not the supplier is entitled to payment for additional costs in respect thereof. The principle to be applied in this regard is that where the purchaser or any of its agents are responsible for the delay, reasonable costs shall be paid. In respect of delays that were beyond the reasonable control of both the supplier and the purchaser, additional time only (no costs) will be granted.

The purchaser shall notify the supplier in writing of his decision(s) in the above regard.

- 21.3 No provision in a contract shall be deemed to prohibit the obtaining of goods from a national department, provincial department, or a local authority.

22. Penalties

Delete clause 22.1 and replace with the following:

- 22.1 Subject to GCC Clause 25, if the supplier fails to deliver any or all of the goods within the period(s) specified in the contract, the purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price, as a penalty, a sum as stated herein for each day of the delay until actual delivery or performance.

The penalty for this contract shall be:

Item	Description	Breach of time to delivery and/or resolve penalty
New Critical Materials Orders	Ordering of new material/equipment listed below	10% penalty on all materials that are delivered outside the delivery time of 24 hours but within the ordered quantities.
14.1	1Gbps SFP Grey	
a	LR (10km) Single Mode – 1310nm	
b	ER (40km) Single Mode – 1550nm	
c	ZR (70km) Single Mode – 1550nm	
14.2	10Gbps XFP Grey	
a	LR (10km) Single Mode – 1310nm	
b	ER (40km) Single Mode – 1550nm	
c	ZR (70km) Single Mode – 1550nm	
14.3	10Gbps SFP+ Grey	
a	LR (10km) Single Mode – 1310nm	
b	ER (40km) Single Mode – 1550nm	
c	ZR (70km) Single Mode – 1550nm	
14.4	10Gbps XFP, 50GHz, Coloured, Fixed Wavelength	
a	LR (10km) C-Band	
b	ER (40km) C-Band	
c	ZR (70km) C-Band	
14.5	10Gbps SFP+ 50GHz, Coloured, Fixed Wavelength	
a	LR (10km) C-Band	
b	ER (40km) C-Band	
c	ZR (70km) C-Band	
14.6	10Gbps XFP 50GHz, Coloured, Tuneable Wavelength	
a	LR (10km) C-Band	
b	ER (40km) C-Band	

c	ZR (70km) C-Band	
14.7	10Gbps SFP+ 50GHz, Coloured, Tuneable Wavelength	
a	LR (10km) C-Band	
b	ER (40km) C-Band	
c	ZR (70km) C-Band	
14.8	1Gbps SFP CWDM, Fixed Wavelength	
a	LR (10km) O&E-Band	
14.9	10Gbps SFP+ CWDM, Fixed Wavelength	
a	LR (10km) O&E-Band	
14.10	40Gbps CFP 50GHz, Coloured, Fixed Wavelength	
a	LR (10km) C-Band	
b	ER (40km) C-Band	
c	ZR (70km) C-Band	

New Non-Critical Materials Orders	Ordering of new material/equipment. These include ALL materials/equipment listed in the PRICING SCHEDULE but that are NOT part of the abovelisted CRITICAL materials/equipment	10% penalty on all materials that are delivered outside the delivery time of 2 weeks but within the forecasted quantities.
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22.2 The purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price, financial penalties as contained on the **Preference Schedule** relating to breaches of the conditions upon which preference points were awarded.

23. Termination for default

Delete the heading of clause 23 and replace with the following:

23. Termination

Add the following to the end of clause 23.1:

if the supplier fails to remedy the breach in terms of such notice

Add the following after clause 23.7:

23.8 In addition to the grounds for termination due to default by the supplier, the contract may also be terminated:

23.8.1 Upon the death of the supplier who was a Sole Proprietor, or a sole member of a Close Corporation, in which case the contract will terminate forthwith.

- 23.8.2 The parties by mutual agreement terminate the contract.
- 23.8.3 If an Order has been issued incorrectly, or to the incorrect recipient, the resulting contract may be terminated by the purchaser by written notice
- 23.8.4 If a material irregularity vitiates the procurement process leading to the conclusion of the contract, rendering the procurement process and the conclusion of the resulting contract unfair, inequitable, non-transparent, uncompetitive or not cost-effective, provided the City Manager follows the processes as described in the purchasers SCM Policy.
- 23.8.5 After providing notice to the supplier, if the implementation of the contract may result in reputational risk or harm to the City as a result of (inter alia):
- 23.8.5.1 reports of poor governance and/or unethical behaviour;
 - 23.8.5.2 association with known family of notorious individuals;
 - 23.8.5.3 poor performance issues, known to the Employer;
 - 23.8.5.4 negative social media reports; or
 - 23.8.5.5 adverse assurance (e.g. due diligence) report outcomes..
- 23.9 If the contract is terminated in terms of clause 23.8, all obligations that were due and enforceable prior to the date of the termination must be performed by the relevant party.

26. Termination for insolvency

Delete clause 26.1 and replace with the following:

- 26.1 The purchaser may make either of the following elections to ensure its rights are protected and any negative impact on service delivery is mitigated:
- 26.1.1 accept a supplier proposal (via the liquidator) to render delivery utilising the appropriate contractual mechanisms; or
 - 26.1.2 terminate the contract, as the liquidator proposed supplier is deemed unacceptable to the purchaser, at any time by giving written notice to the supplier (via the liquidator).
- 26.2 Termination will be without compensation to the supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

27. Settlement of Disputes

Amend clause 27.1 as follows:

- 27.1 If any dispute or difference of any kind whatsoever, with the exception of termination in terms of clause 23.1(c), arises between the purchaser and the supplier in connection with or arising out of the contract, the parties shall make every effort to resolve such dispute or difference amicably, by mutual consultation.

Delete Clause 27.2 in its entirety and replace with the following:

- 27.2 Should the parties fail to resolve any dispute by way of mutual consultation, either party shall be entitled to refer the matter for mediation before an independent and impartial person appointed by the City Manager in accordance with Regulation 50(1) of the Local Government: Municipal Finance Management Act, 56 of 2003 – Municipal Supply Chain Management Regulations (Notice 868 of 2005). Such referral shall be done by either party giving written notice to the other of its intention to commence with mediation. No mediation may be commenced unless such notice is given to the other party.

Irrespective whether the mediation resolves the dispute, the parties shall bear their own costs concerning the mediation and share the costs of the mediator and related costs equally.

The mediator shall agree the procedures, representation and dates for the mediation process with the parties. The mediator may meet the parties together or individually to enable a settlement.

Where the parties reach settlement of the dispute or any part thereof, the mediator shall record such agreement and on signing thereof by the parties the agreement shall be final and binding.

Save for reference to any portion of any settlement or decision which has been agreed to be final and binding on the parties, no reference shall be made by or on behalf of either party in any subsequent court proceedings, to any outcome of an amicable settlement by mutual consultation, or the fact that any particular evidence was given, or to any submission, statement or admission made in the course of amicable settlement by mutual consultation or mediation.

28. Limitation of Liability

Delete clause 28.1 (b) and replace with the following:

- (b) the aggregate liability of the supplier to the purchaser, whether under the contract, in tort or otherwise, shall not exceed the sums insured in terms of clause 11 in respect of insurable events, or where no such amounts are stated, to an amount equal to twice the contract price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.

Add the following after clause 28.1:

28.2 Without detracting from, and in addition to, any of the other indemnities in this contract, the supplier shall be solely liable for and hereby indemnifies and holds harmless the purchaser against all claims, charges, damages, costs, actions, liability, demands and/or proceedings and expense in connection with:

- a) personal injury or loss of life to any individual;
- b) loss of or damage to property;

arising from, out of, or in connection with the performance by the supplier in terms of this Contract, save to the extent caused by the gross negligence or wilful misconduct of the purchaser.

28.3 The supplier and/or its employees, agents, concessionaires, suppliers, sub-contractors or customers shall not have any claim of any nature against the purchaser for any loss, damage, injury or death which any of them may directly or indirectly suffer, whether or not such loss, damages, injury or death is caused through negligence of the purchaser or its agents or employees.

28.4 Notwithstanding anything to the contrary contained in this Contract, under no circumstances whatsoever, including as a result of its negligent (including grossly negligent) acts or omissions or those of its servants, agents or contractors or other persons for whom in law it may be liable, shall any party or its servants (in whose favour this constitutes a *stipulatio alteri*) be liable for any indirect, extrinsic, special, penal, punitive, exemplary or consequential loss or damage of any kind whatsoever, whether or not the loss was actually foreseen or reasonably foreseeable), sustained by the other party, its directors and/or servants, including but not limited to any loss of profits, loss of operation time, corruption or loss of information and/or loss of contracts.

28.5 Each party agrees to waive all claims against the other insofar as the aggregate of compensation which might otherwise be payable exceeds the aforesaid maximum amounts payable.

31. Notices

Delete clauses 31.1 and 31.2 and replace with the following:

31.1 Any notice, request, consent, approvals or other communications made between the Parties pursuant to the Contract shall be in writing and forwarded to the addresses specified in the contract and may be given as set out hereunder and shall be deemed to have been received when:

- a) hand delivered – on the working day of delivery
- b) sent by registered mail – five (5) working days after mailing
- c) sent by email or telefax – one (1) working day after transmission

32. Taxes and Duties

Delete the final sentence of 32.3 and replace with the following:

In this regard, it is the responsibility of the supplier to submit documentary evidence in the form of a valid Tax Clearance Certificate issued by SARS to the CCT at the Supplier Management Unit located within

the Supplier Management / Registration Office, 2nd Floor (Concourse Level), Civic Centre, 12 Hertzog Boulevard, Cape Town (Tel 021 400 9242/3/4/5).

Add the following after clause 32.3:

32.4 The **VAT registration** number of the City of Cape Town is **4500193497**.

ADDITIONAL CONDITIONS OF CONTRACT

Add the following Clause after Clause 34:

35. Reporting Obligations.

35.1 The supplier shall complete, sign and submit with each delivery note, all the documents as required in the Specifications. Any failure in this regard may result in a delay in the processing of any payments.

36. Certification

It is compulsory for the Tenderer that this contract has been awarded to, to always maintain Original Equipment Manufacturer's certification for all the Optic Fibre materials that are listed in this contract.

COMPILER NOTE:

- a) **IF THE BSC INTENDS TO INCORPORATE FURTHER CONTRACT CONDITIONS BY WAY OF SLA'S TERMS OF REFERENCE ETC. IT IS RECOMMENDED THAT SUCH DOCUMENTS BE INCORPORATED WITH THE ASSISTANCE OF LEGAL SERVICES: PROCUREMENT LAW UNIT AND THAT THE ORDER OF PRECEDENCE BE EXPRESSLY STATED IN THE SPECIAL CONDITIONS OF CONTRACT.**
- b) **DRAFTERS NOTE: PLEASE REFER TO THE DRAFTERS NOTE WITH REGARD LOCAL CONTENT AT CLAUSE 6.7]**

(8) GENERAL CONDITIONS OF CONTRACT

(National Treasury - General Conditions of Contract (revised July 2010))

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1. Definitions

1. The following terms shall be interpreted as indicated:

1.1 'Closing time' means the date and hour specified in the bidding documents for the receipt of bids.

1.2 'Contract' means the written agreement entered into between the purchaser and the supplier, as recorded in the contract form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

1.3 'Contract price' means the price payable to the supplier under the contract for the full and proper performance of his or her contractual obligations.

1.4 'Corrupt practice' means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.

1.5 'Countervailing duties' are imposed in cases in which an enterprise abroad is subsidised by its government and encouraged to market its products internationally.

- 1.6 'Country of origin' means the place where the goods were mined, grown or produced or from which the services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembly of components, a commercially recognised new product results that is substantially different in basic characteristics or in purpose or utility from its components.
- 1.7 'Day' means calendar day.
- 1.8 'Delivery' means delivery in compliance with the conditions of the contract or order.
- 1.9 'Delivery ex stock' means immediate delivery directly from stock actually on hand.
- 1.10 'Delivery into consignee's store or to his site' means delivered and unloaded in the specified store or depot or on the specified site in compliance with the conditions of the contract or order, the supplier bearing all risks and charges involved until the supplies are so delivered and a valid receipt is obtained.
- 1.11 'Dumping' occurs when a private enterprise abroad markets its goods on its own initiative in the RSA at lower prices than that of the country of origin, and which action has the potential to harm the local industries in the RSA.
- 1.12 'Force majeure' means an event beyond the control of the supplier, not involving the supplier's fault or negligence, and not foreseeable. Such events may include, but are not restricted to, acts of the purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.
- 1.13 'Fraudulent practice' means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any bidder, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the bidder of the benefits of free and open competition.
- 1.14 'GCC' means the General Conditions of Contract.
- 1.15 'Goods' means all of the equipment, machinery, and/or other materials that the supplier is required to supply to the purchaser under the contract.
- 1.16 'Imported content' means that portion of the bidding price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or his subcontractors) and which costs are inclusive of the costs abroad, plus freight and other direct importation costs such as landing costs, dock dues, import duty, sales duty or other similar tax or duty at the South African place of entry as well as transportation and handling charges to the factory in the Republic where the supplies covered by the bid will be manufactured.
- 1.17 'Local content' means that portion of the bidding price which is not included in the imported content, provided that local manufacture does take place.
- 1.18 'Manufacture' means the production of products in a factory using labour, materials, components and machinery, and includes other, related value-adding activities.
- 1.19 'Order' means an official written order issued for the supply of goods or works or the rendering of a service.
- 1.20 'Project site', where applicable, means the place indicated in bidding documents.
- 1.21 'Purchaser' means the organisation purchasing the goods.
- 1.22 'Republic' means the Republic of South Africa.
- 1.23 'SCC' means the Special Conditions of Contract.

1.24 'Services' means those functional services ancillary to the supply of the goods, such as transportation and any other incidental services, such as installation, commissioning, provision of technical assistance, training, catering, gardening, security, maintenance, and other such obligations of the supplier covered under the contract.

1.25 'Written' or 'in writing' means handwritten in ink or any form of electronic or mechanical writing.

2. Application

2.1 These general conditions are applicable to all bids, contracts and orders, including bids for functional and professional services, sales, hiring, letting and the granting or acquiring of rights, but excluding immovable property, unless otherwise indicated in the bidding documents.

2.2 Where applicable, special conditions of contract are also laid down to cover specific supplies, services or works.

2.3 Where such special conditions of contract are in conflict with these general conditions, the special conditions shall apply.

3. General

3.1 Unless otherwise indicated in the bidding documents, the purchaser shall not be liable for any expense incurred in the preparation and submission of a bid. Where applicable, a non-refundable fee for documents may be charged.

3.2 With certain exceptions, invitations to bid are only published in the Government Tender Bulletin. The Government Tender Bulletin may be obtained directly from the Government Printer, Private Bag X85, Pretoria 0001, or accessed electronically from www.treasury.gov.za.

4. Standards

4.1 The goods supplied shall conform to the standards mentioned in the bidding documents and specifications.

5. Use of contract documents and information; inspection.

5.1 The supplier shall not, without the purchaser's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the purchaser in connection therewith, to any person other than a person employed by the supplier in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for the purposes of such performance.

5.2 The supplier shall not, without the purchaser's prior written consent, make use of any document or information mentioned in GCC clause 5.1, except for purposes of performing the contract.

5.3 Any document, other than the contract itself, mentioned in GCC clause 5.1 shall remain the property of the purchaser and shall be returned (all copies) to the purchaser on completion of the supplier's performance under the contract if so required by the purchaser.

5.4 The supplier shall permit the purchaser to inspect the supplier's records relating to the performance of the supplier and to have them audited by auditors appointed by the purchaser, if so required by the purchaser.

6. Patent rights

6.1 The supplier shall indemnify the purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from the use of the goods or any part thereof by the purchaser.

7. Performance Security

- 7.1 Within 30 (thirty) days of receipt of the notification of contract award, the successful bidder shall furnish to the purchaser the performance security of the amount specified in the SCC.
- 7.2 The proceeds of the performance security shall be payable to the purchaser as compensation for any loss resulting from the supplier's failure to complete his obligations under the contract.
- 7.3 The performance security shall be denominated in the currency of the contract or in a freely convertible currency acceptable to the purchaser, and shall be in one of the following forms:
 - a) a bank guarantee or an irrevocable letter of credit issued by a reputable bank located in the purchaser's country or abroad, acceptable to the purchaser, in the form provided in the bidding documents or another form acceptable to the purchaser; or
 - b) a cashier's or certified cheque.
- 7.4 The performance security will be discharged by the purchaser and returned to the supplier not later than 30 (thirty) days following the date of completion of the supplier's performance obligations under the contract, including any warranty obligations, unless otherwise specified in the SCC.

8. Inspections, tests and analyses

- 8.1 All pre-bidding testing will be for the account of the bidder.
- 8.2 If it is a bid condition that supplies to be produced or services to be rendered should at any stage during production or execution or on completion be subject to inspection, the premises of the bidder or contractor shall be open, at all reasonable hours, for inspection by a representative of the Department or an organisation acting on behalf of the Department.
- 8.3 If there are no inspection requirements indicated in the bidding documents and no mention of such is made in the contract, but during the contract period it is decided that inspections shall be carried out, the purchaser shall itself make the necessary arrangements, including payment arrangements with the testing authority concerned.
- 8.4 If the inspections, tests and analyses referred to in clauses 8.2 and 8.3 show the supplies to be in accordance with the contract requirements, the cost of the inspections, tests and analyses shall be defrayed by the purchaser.
- 8.5 Where the supplies or services referred to in clauses 8.2 and 8.3 do not comply with the contract requirements, irrespective of whether such supplies or services are accepted or not, the cost in connection with these inspections, tests or analyses shall be defrayed by the supplier.
- 8.6 Supplies and services which are referred to in clauses 8.2 and 8.3 and which do not comply with the contract requirements may be rejected.
- 8.7 Any contract supplies may on or after delivery be inspected, tested or analysed and may be rejected if found not to comply with the requirements of the contract. Such rejected supplies shall be held at the cost and risk of the supplier, who shall, when called upon, remove them immediately at his own cost and forthwith substitute them with supplies which do comply with the requirements of the contract. Failing such removal, the rejected supplies shall be returned at the suppliers cost and risk. Should the supplier fail to provide the substitute supplies forthwith, the purchaser may, without giving the supplier further opportunity to substitute the rejected supplies, purchase such supplies as may be necessary at the expense of the supplier.
- 8.8 The provisions of clauses 8.4 to 8.7 shall not prejudice the right of the purchaser to cancel the contract on account of a breach of the conditions thereof, or to act in terms of Clause 23 of the GCC.

9. Packing

- 9.1 The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing, case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.
- 9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the contract, including additional requirements, if any, specified in the SCC, and in any subsequent instructions ordered by the purchaser.

10. Delivery and documents

- 10.1 Delivery of the goods shall be made by the supplier in accordance with the terms specified in the contract. The details of shipping and/or other documents to be furnished by the supplier are specified in the SCC.
- 10.2 Documents to be submitted by the supplier are specified in the SCC.

11. Insurance

- 11.1 The goods supplied under the contract shall be fully insured, in a freely convertible currency, against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the SCC.

12. Transportation

- 12.1 Should a price other than an all-inclusive delivered price be required, this shall be specified in the SCC.

13. Incidental Services

- 13.1 The supplier may be required to provide any or all of the following services, including additional services (if any) specified in the SCC:
- (a) performance or supervision of on-site assembly, and/or commissioning of the supplied goods;
 - (b) furnishing of tools required for the assembly and/or maintenance of the supplied goods;
 - (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied goods;
 - (d) performance or supervision or maintenance and/or repair of the supplied goods, for a period of time agreed by the parties, provided that this service shall not relieve the supplier of any warranty obligations under this contract; and
 - (e) training of the purchaser's personnel, at the supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied goods.
- 13.2 Prices charged by the supplier for incidental services, if not included in the contract price for the goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the supplier for similar services.

14. Spare parts

- 14.1 As specified in the SCC, the supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the supplier:
- (a) such spare parts as the purchaser may elect to purchase from the supplier, provided that this election shall not relieve the supplier of any warranty obligations under the contract; and
 - (b) in the event of termination of production of the spare parts:
 - (i) Advance notification to the purchaser of the pending termination, in sufficient time to permit the purchaser to procure needed requirements; and
 - (ii) following such termination, furnishing at no cost to the purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.

15. Warranty

- 15.1 The supplier warrants that the goods supplied under the contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the contract. The supplier further warrants that all goods supplied under this contract shall have no defect arising from design, materials, or workmanship (except when the design and/or material is required by the purchaser's specifications), or from any act or omission of the supplier, that may develop under normal use of the supplied goods in the conditions prevailing in the country of final destination.
- 15.2 This warranty shall remain valid for 12 (twelve) months after the goods, or any portion thereof, as the case may be, have been delivered to and accepted at the final destination indicated in the contract, or for 18 (eighteen) months after the date of shipment from the port or place of loading in the source country, whichever period concludes earlier, unless specified otherwise in the SCC.
- 15.3 The purchaser shall notify the supplier promptly, in writing, of any claims arising under this warranty.
- 15.4 Upon receipt of such notice, the supplier shall, within the period specified in the SCC and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to the purchaser.
- 15.5 If the supplier, having been notified, fails to remedy the defect(s) within the period specified in the SCC, the purchaser may proceed to take such remedial action as may be necessary, at the supplier's risk and expense and without prejudice to any other rights which the purchaser may have against the supplier under the contract.

16. Payment

- 16.1 The method and conditions of payment to be made to the supplier under this contract shall be specified in the SCC.
- 16.2 The supplier shall furnish the purchaser with an invoice accompanied by a copy of the delivery note and upon fulfilment of any other obligations stipulated in the contract.
- 16.3 Payments shall be made promptly by the purchaser, but in no case later than 30 (thirty) days after submission of an invoice or claim by the supplier.
- 16.4 Payment will be made in Rand unless otherwise stipulated in the SCC.

17. Prices

- 17.1 Prices charged by the supplier for goods delivered and services performed under the contract shall not vary from the prices tendered by the supplier in his bid, with the exception of any price adjustments authorized in the SCC or in the purchaser's request for bid validity extension, as the case may be.

18. Contract Amendments

- 18.1 No variation in or modification of the terms of the contract shall be made except by written amendment signed by the parties concerned.

19. Assignment

- 19.1 The supplier shall not assign, in whole or in part, its obligations to perform under the contract, except with the purchaser's prior written consent.

20. Subcontracts

- 20.1 The supplier shall notify the purchaser in writing of all subcontracts awarded under this contract if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the supplier from any liability or obligation under the contract.

21. Delays in the supplier's performance

- 21.1 Delivery of the goods and performance of services shall be made by the supplier in accordance with the time schedule prescribed by the purchaser in the contract.
- 21.2 If at any time during the performance of the contract, the supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the goods and performance of services, the supplier shall promptly notify the purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the supplier's notice, the purchaser shall evaluate the situation and may at his or her discretion extend the supplier's time for performance, with or without the imposition of penalties, in which case the extension shall be ratified by the parties by amendment of contract.
- 21.3 No provision in a contract shall be deemed to prohibit the obtaining of supplies or services from a national department, provincial department, or a local authority.
- 21.4 The right is reserved to procure, outside of the contract, small quantities of supplies; or to have minor essential services executed if an emergency arises, or the supplier's point of supply is not situated at or near the place where the supplies are required, or the supplier's services are not readily available.
- 21.5 Except as provided under GCC Clause 25, a delay by the supplier in the performance of its delivery obligations shall render the supplier liable to the imposition of penalties, pursuant to GCC Clause 22, unless an extension of time is agreed upon pursuant to GCC Clause 21.2 without the application of penalties.
- 21.6 Upon any delay beyond the delivery period in the case of a supplies contract, the purchaser shall, without cancelling the contract, be entitled to purchase supplies of a similar quality and up to the same quantity in substitution of the goods not supplied in conformity with the contract and to return any goods delivered later at the supplier's expense and risk, or to cancel the contract and buy such goods as may be required to complete the contract and, without prejudice to his other rights, be entitled to claim damages from the supplier.

22. Penalties

- 22.1 Subject to GCC Clause 25, if the supplier fails to deliver any or all of the goods or to perform the services within the period(s) specified in the contract, the purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price, as a penalty, a sum calculated on the delivered price of the delayed goods or unperformed services, using the current prime interest rate, calculated for each day of the delay until actual delivery or performance. The purchaser may also consider termination of the contract pursuant to GCC Clause 23.

23. Termination for default

- 23.1 The purchaser, without prejudice to any other remedy for breach of contract, by written notice of default sent to the supplier, may terminate this contract in whole or in part:
- (a) if the supplier fails to deliver any or all of the goods within the period(s) specified in the contract, or within any extension thereof granted by the purchaser pursuant to GCC Clause 21.2;
 - (b) if the supplier fails to perform any other obligation(s) under the contract; or
 - (c) if the supplier, in the judgment of the purchaser, has engaged in corrupt or fraudulent practices in competing for or in executing the contract.
- 23.2 In the event the purchaser terminates the contract in whole or in part, the purchaser may procure, upon such terms and in such manner as it deems appropriate, goods, works or services similar to those undelivered, and the supplier shall be liable to the purchaser for any excess costs for such similar goods, works or services. However, the supplier shall continue performance of the contract to the extent not terminated.

- 23.3 Where the purchaser terminates the contract in whole or in part, the purchaser may decide to impose a restriction penalty on the supplier by prohibiting such supplier from doing business with the public sector for a period not exceeding 10 years.
- 23.4 If a purchaser intends imposing a restriction on a supplier or any person associated with the supplier, the supplier will be allowed a time period of not more than 14 (fourteen) days to provide reasons why the envisaged restriction should not be imposed. Should the supplier fail to respond within the stipulated 14 (fourteen) days the purchaser may regard the intended penalty as not objected against and may impose it on the supplier.
- 23.5 Any restriction imposed on any person by the Accounting Officer/Authority will, at the discretion of the Accounting Officer/Authority, also be applicable to any other enterprise or any partner, manager, director or other person who wholly or partly exercises or exercised or may exercise control over the enterprise of the first-mentioned person, and with which enterprise or person the first-mentioned person is or was, in the opinion of the Accounting Officer/Authority, actively associated.
- 23.6 If a restriction is imposed, the purchaser must, within 5 (five) working days of such imposition, furnish the National Treasury with the following information:
- (i) the name and address of the supplier and/or person restricted by the purchaser;
 - (ii) the date of commencement of the restriction;
 - (iii) the period of restriction; and
 - (iv) the reasons for the restriction.

These details will be loaded in the National Treasury's central database of suppliers or persons prohibited from doing business with the public sector.

- 23.7 If a court of law convicts a person of an offence as contemplated in sections 12 or 13 of the Prevention and Combating of Corrupt Activities Act, Act 12 of 2004, the court may also rule that such person's name be endorsed on the Register for Tender Defaulters. When a person's name has been endorsed on the Register, the person will be prohibited from doing business with the public sector for a period of not less than five years and not more than 10 years. The National Treasury is empowered to determine the period of restriction, and each case will be dealt with on its own merits. According to section 32 of the Act the Register must be open to the public. The Register can be perused on the National Treasury website.

24. Anti-dumping and countervailing duties and rights

- 24.1 When, after the date of bid, provisional payments are required, or anti-dumping or countervailing duties are imposed, or the amount of a provisional payment or anti-dumping or countervailing right is increased in respect of any dumped or subsidised import, the State is not liable for any amount so required or imposed, or for the amount of any such increase. When, after the said date, such a provisional payment is no longer required or any such anti-dumping or countervailing right is abolished, or where the amount of such provisional payment or any such right is reduced, any such favourable difference shall, on demand, be paid forthwith by the contractor to the State, or the State may deduct such amounts from moneys (if any) which may otherwise be due to the contractor in regard to supplies or services which he or she delivered or rendered, or is to deliver or render in terms of the contract or any other contract or any other amount which may be due to him or her.

25. Force majeure

- 25.1 Notwithstanding the provisions of GCC Clauses 22 and 23, the supplier shall not be liable for forfeiture of its performance security, damages, or termination for default if, and to the extent that, his delay in performance or other failure to perform his obligations under the contract is the result of an event of force majeure.
- 25.2 If a force majeure situation arises, the supplier shall notify the purchaser promptly, in writing, of such condition and the cause thereof. Unless otherwise directed by the purchaser in writing, the supplier shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event.

26. Termination for insolvency

26.1 The purchaser may at any time terminate the contract by giving written notice to the supplier if the supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

27. Settlement of Disputes

27.1 If any dispute or difference of any kind whatsoever arises between the purchaser and the supplier in connection with or arising out of the contract, the parties shall make every effort to resolve such dispute or difference amicably, by mutual consultation.

27.2 If, after 30 (thirty) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the purchaser or the supplier may give notice to the other party of his intention to commence with mediation. No mediation in respect of this matter may be commenced unless such notice is given to the other party.

27.3 Should it not be possible to settle a dispute by means of mediation, it may be settled in a South African court of law.

27.4 Mediation proceedings shall be conducted in accordance with the rules of procedure specified in the SCC.

27.5 Notwithstanding any reference to mediation and/or court proceedings herein,

- (a) the parties shall continue to perform their respective obligations under the contract unless they otherwise agree; and
- (b) the purchaser shall pay the supplier any monies due to the supplier.

28. Limitation of Liability

28.1 Except in cases of criminal negligence or wilful misconduct, and in the case of infringement pursuant to Clause 6:

- (a) the supplier shall not be liable to the purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the supplier to pay penalties and/or damages to the purchaser; and
- (b) the aggregate liability of the supplier to the purchaser, whether under the contract, in tort or otherwise, shall not exceed the total contract price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.

29. Governing language

29.1 The contract shall be written in English. All correspondence and other documents pertaining to the contract that is exchanged by the parties shall also be written in English.

30. Applicable Law

30.1 The contract shall be interpreted in accordance with South African laws, unless otherwise specified in the SCC.

31. Notices

31.1 Every written acceptance of a bid shall be posted to the supplier concerned by registered or certified mail, and any other notice to him shall be posted by ordinary mail, to the address furnished in his bid or to the address notified later by him in writing; and such posting shall be deemed to be proper service of such notice.

31.2 The time mentioned in the contract documents for performing any act after such aforesaid notice has been given, shall be reckoned from the date of posting of such notice.

32. Taxes and Duties

- 32.1 A foreign supplier shall be entirely responsible for all taxes, stamp duties, licence fees, and other such levies imposed outside the purchaser's country.
- 32.2 A local supplier shall be entirely responsible for all taxes, duties, licence fees, etc., incurred until delivery of the contracted goods to the purchaser.
- 32.3 No contract shall be concluded with any bidder whose tax matters are not in order. Prior to the award of a bid the Department must be in possession of a tax clearance certificate submitted by the bidder. This certificate must be an original issued by the South African Revenue Services.

33. National Industrial Participation (NIP) Programme

- 33.1 The NIP Programme administered by the Department of Trade and Industry shall be applicable to all contracts that are subject to the NIP obligation.

34 Prohibition of Restrictive practices

- 34.1 In terms of section 4 (1) (b) (iii) of the Competition Act, Act 89 of 1998, as amended, an agreement between or concerted practice by firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship and if a bidder(s) is/are or a contractor(s) was/were involved in collusive bidding (or bid rigging).
- 34.2 If a bidder(s) or contractor(s), based on reasonable grounds or evidence obtained by the purchaser, has/have engaged in the restrictive practice referred to above, the purchaser may refer the matter to the Competition Commission for investigation and possible imposition of administrative penalties as contemplated in the Competition Act, Act 89 of 1998.
- 34.3 If a bidder(s) or contractor(s) has/have been found guilty by the Competition Commission of the restrictive practice referred to above, the purchaser may, in addition and without prejudice to any other remedy provided for, invalidate the bid(s) for such item(s) offered, and/or terminate the contract in whole or part, and/or restrict the bidder(s) or contractor(s) from conducting business with the public sector for a period not exceeding 10 (ten) years and/or claim damages from the bidder(s) or contractor(s) concerned.

(9) FORM OF GUARANTEE / PERFORMANCE SECURITY**FORM OF GUARANTEE / PERFORMANCE SECURITY****GUARANTOR DETAILS AND DEFINITIONS**

"Guarantor" means:

Physical address of Guarantor:

"Supplier" means:

"Contract Sum" means: The accepted tender amount (INCLUSIVE OF VAT) of R

Amount in words:

"Guaranteed Sum" means: The maximum amount of R

Amount in words:

"Contract" means: The agreement made in terms of the Form of Offer and Acceptance for tender no _____: _____ and such amendments or additions to the contract as may be agreed in writing between the parties.

PERFORMANCE GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.
2. The Guarantor's period of liability shall be from and including the date of issue of this Guarantee/Performance Security up to and including the termination of the Contract or the date of payment in full of the Guaranteed Sum, whichever occurs first.
3. The Guarantor hereby acknowledges that:
 - 3.1 any reference in this Guarantee/Performance to "Contract" is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
 - 3.2 its obligation under this Guarantee/Performance Security is restricted to the payment of money.
4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the City of Cape Town the sum due and payable upon receipt of the documents identified in 4.1 to 4.2:
 - 4.1 A copy of a first written demand issued by the City of Cape Town to the Supplier stating that payment of a sum which is due and payable has not been made by the Supplier in terms of the Contract and failing such payment within seven (7) calendar days, the City of Cape Town intends to call upon the Guarantor to make payment in terms of 4.2;
 - 4.2 A first written demand issued by the City of Cape Town to the Guarantor at the Guarantor's physical address with a copy to the Supplier stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum has still not been paid.
5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the City of Cape Town the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the City of Cape Town to the Guarantor at the Guarantor's physical address calling up this Guarantee / Performance Security, such demand stating that:
 - 5.1 the Contract has been terminated due to the Supplier's default and that this Guarantee/Performance Security is called up in terms of 5; or

5.2 a provisional or final sequestration or liquidation court order has been granted against the Supplier and that the Guarantee/Performance Guarantee is called up in terms of 5; and

5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

- 6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.
- 7. Where the Guarantor has made payment in terms of 5, the City of Cape Town shall upon the termination date of the Contract, submit an expense account to the Guarantor showing how all monies received in terms of this Guarantee/Performance Security have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Guarantee/Performance Security shall bear interest at the prime overdraft rate of the City of Cape Town's bank compounded monthly and calculated from the date payment was made by the Guarantor to the City of Cape Town until the date of refund.
- 8. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
- 9. The City of Cape Town shall have the absolute right to arrange its affairs with the Supplier in any manner which the City of Cape Town may deem fit and the Guarantor shall not have the right to claim his release from this Guarantee /Performance Security on account of any conduct alleged to be prejudicial to the Guarantor.
- 10. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
- 11. This Guarantee/Performance Security is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee / Performance Security shall be returned to the Guarantor after it has expired.
- 12. This Guarantee/Performance Security, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.
- 13. Where this Guarantee/Performance Security is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at

Date

Guarantor's signatory (1)

Capacity

Guarantor's signatory (2)

Capacity

Witness signatory (1)

Witness signatory (2)

ANNEXURE

LIST OF APPROVED FINANCIAL INSTITUTIONS

The following financial institutions are currently (as at 18 October 2016) approved for issue of contract guarantees to the City:

National Banks:

ABSA Bank Ltd.
FirstRand Bank Ltd.
Investec Bank Ltd.
Nedbank Ltd.
Standard Bank of SA Ltd.

International Banks (with branches in SA):

Barclays Bank plc.
Citibank n.a.
Credit Agricole Corporate and Investment Bank
HSBC Bank plc.
JP Morgan Chase Bank
Societe Generale
Standard Chartered Bank

Insurance companies:

ABSA Insurance
Coface s.a.
Compass Insurance Co.
Constantia Insurance Co.
Credit Guarantee Insurance Co.
Guardrisk Insurance Co.
Hollard Insurance Company Ltd.
Infiniti Insurance Limited
Lombard Insurance
New National Assurance Co.
Regent Insurance Co.
Renasa Insurance Company Ltd.
Santam Limited
Zurich Insurance Co.

(10) FORM OF ADVANCE PAYMENT GUARANTEE

ADVANCE PAYMENT GUARANTEE

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

Physical address of guarantor:

"Supplier" means:

"Contract Sum" means: The accepted tender amount (INCLUSIVE of VAT) of R

Amount in words:

"Contract" means: The agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

"Plant and materials" means: The Plant and materials in respect of which an advance payment prior to manufacture is required, which the City of Cape Town has agreed may be subject to advance payment, such Plant and materials being listed in the Schedule of Plant and materials.

"Schedule of Plant and materials" means: A list of Plant and materials which shows the value thereof to be included in the Guaranteed Advance Payment Sum.

"Guaranteed Advance Payment Sum" means: The maximum amount of R

Amount in words:

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Advance Payment Sum.
2. The Guarantor's period of liability shall be from and including the date of issue of this Advance Payment Guarantee and up to and including the termination of the Contract or the date of payment in full of the Guaranteed Advance Payment Sum, whichever occurs first.
3. The Guarantor hereby acknowledges that:
 - 3.1 any reference in this Advance Payment Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
 - 3.2 its obligation under this Advance Payment Guarantee is restricted to the payment of money.
4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the City of Cape Town the sum advanced to the Supplier upon receipt of the documents identified in 4.1 to 4.2:
 - 4.1 A copy of a first written demand issued by the City of Cape Town to the Supplier stating that payment of a sum advanced by the City of Cape Town has not been repaid by the Supplier in terms of the Contract ("default") and failing such payment within seven (7) calendar days, the City of Cape Town intends to call upon the Guarantor to make payment in terms of 4.2;
 - 4.2 A first written demand issued by the City of Cape Town to the Guarantor at the Guarantor's physical address with a copy to the Supplier stating that a period of seven (7) calendar days has elapsed since the first written demand in terms of 4.1 and the sum advanced has still not been repaid by the Supplier.
5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the City of Cape Town the Guaranteed Advance Payment Sum or the full outstanding balance not repaid upon receipt of a first written demand from the City of Cape Town to the Guarantor at the Guarantor's physical address calling up this Advance Payment Guarantee, such demand stating that:
 - 5.1 the Contract has been terminated due to the Supplier's default and that this Advance Payment Guarantee is called up in terms of 5; or

- 5.2 a provisional or final sequestration or liquidation court order has been granted against the Supplier and that the Advance Payment Guarantee is called up in terms of 5; and
- 5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.
- 6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.
- 7. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
- 9. The City of Cape Town shall have the absolute right to arrange its affairs with the Supplier in any manner which the City of Cape Town may deem fit and the Guarantor shall not have the right to claim his release from this Advance Payment Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
- 10. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
- 11. This Advance Payment Guarantee is neither negotiable nor transferable and shall expire in terms of 2, whereafter no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
- 12. This Advance Payment Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.
- 13. Where this Guarantee/Performance Security is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at

Date

Guarantor's signatory (1)

Capacity

Guarantor's signatory (2)

Capacity

Witness signatory (1)

Witness signatory (2)

(10.1) ADVANCE PAYMENT SCHEDULE

Not applicable

(11) OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

AGREEMENT MADE AND ENTERED INTO BETWEEN THE CITY OF CAPE TOWN (HEREINAFTER CALLED THE "CCT") AND

..... ,
(Supplier/Mandatory/Company/CC Name)

IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, 85 OF 1993 AS AMENDED.

I,, representing

..... , as an employer in its own right, do hereby undertake to ensure, as far as is reasonably practicable, that all work will be performed, and all equipment, machinery or plant used in such a manner as to comply with the provisions of the Occupational Health and Safety Act (OHSA) and the Regulations promulgated thereunder.

I furthermore confirm that I am/we are registered with the Compensation Commissioner and that all registration and assessment monies due to the Compensation Commissioner have been fully paid or that I/We are insured with an approved licensed compensation insurer.

COID ACT Registration Number:

OR Compensation Insurer: Policy No.:

I undertake to appoint, where required, suitable competent persons, in writing, in terms of the requirements of OHSA and the Regulations and to charge him/them with the duty of ensuring that the provisions of OHSA and Regulations as well as the Council's Special Conditions of Contract, Way Leave, Lock-Out and Work Permit Procedures are adhered to as far as reasonably practicable.

I further undertake to ensure that any subcontractors employed by me will enter into an occupational health and safety agreement separately, and that such subcontractors comply with the conditions set.

I hereby declare that I have read and understand the Occupational Health and Safety Specifications contained in this tender and undertake to comply therewith at all times.

I hereby also undertake to comply with the Occupational Health and Safety Specification and Plan submitted and approved in terms thereof.

Signed aton the.....day of.....20....

Witness

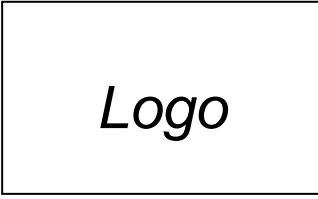
Mandatory

Signed at on the.....day of.....20

Witness

for and on behalf of
City of Cape Town

(12) INSURANCE BROKER'S WARRANTY (PRO FORMA)



Letterhead of supplier's Insurance Broker

Date _____

CITY OF CAPE TOWN
City Manager
Civic Centre
12 Hertzog Boulevard
Cape Town
8000

Dear Sir

TENDER NO.: 2013/14

TENDER DESCRIPTION: SUPPLY AND DELIVERY OF TELECOMMUNICATIONS MATERIALS AND EQUIPMENT

NAME OF SUPPLIER: _____

I, the undersigned, do hereby confirm and warrant that all the insurances required in terms of the abovementioned contract have been issued and/or in the case of blanket/umbrella policies, have been endorsed to reflect the interests of the CITY OF CAPE TOWN with regard to the abovementioned contract, and that all the insurances and endorsements, etc., are all in accordance with the requirements of the contract.

I furthermore confirm that all premiums in the above regard have been paid.

Yours faithfully

Signed: _____

For: _____ (Supplier's Insurance Broker)

(13) SPECIFICATION(S)

INTRODUCTION

The following material and equipment specifications and method statements are the City's requirements. Vendors are required to provide specification sheets that clearly show that the materials and equipment offered comply with the City's requirements. Lack of evidence of such compliance, or the inability to meet the requirements will result in the item offered being considered as non-compliant to requirements.

The City will provide the service provider with quarterly updated materials forecasts. Should the city's actual orders exceed the forecasted orders agreed upon for a particular quarter then the new order response/delivery time will no longer apply. The City will not pay any additional costs or fees should actual orders for a quarter be less (or 0) than the forecasted orders agreed upon.

1 - OPTICAL DISTRIBUTION FRAMES

1.1 High-Capacity ODF with LC-APC connectors

The frame must have six rear horizontal troughs. The frame also has twelve Fibre Termination Block mounting positions equally divided between vertical columns on the left and right sides of the frame. The frame must be 2200mm high, 600mm wide and 600mm deep (one floor tile). There must be a built-in jumper storage panel which will store up to 6 meters of jumper slack.

Fibre Termination Blocks (FTB)

The frame must feature modular fibre termination blocks which must be available in left- and right hand configurations, both of which must be available either as fully cabled and pre-terminated, or unterminated (no couplers). The termination blocks shall feature pull-out rows containing the mid-couplers, to allow easy connection of patch leads. The ODF **MUST** be configured with the following fibre colour code:

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow
5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

Unterminated FTB (no cable), duplex LC-APC midcouplers

The patch cable exit direction will either be upward or downward, but the FTB must be available in two formats: 72 or 96 duplex LC-APC midcouplers. All blocks with adapters only, shall be configured to terminate duplex patch leads on the rear of the slider row, leaving the front of the slider row for cross-connection patch leads

Pre-terminated FTB with fibre cable (G.655 spec), duplex LC-APC mid-couplers

Pre-terminated FTBs must be available with indoor-rated cable in stranded configurations. Pre-terminated FTBs may be ordered with a left or a right orientation. The cable exit direction will be either upward or downward, as specified on order. The FTB must be available in two formats: 72 OR 96 duplex LC-APC mid-couplers. The midcouplers must be fully populated with connectorised pigtails (all LC-APC with G.655 fibre strands), which are bundled into a single 144-strand (or 192-strand) cable with a HDPE sheath. All blocks with adapters only, are configured to terminate duplex patch leads on the front of the block (slider packs).

Splice Bay

A separate splice bay is required for the High-Capacity ODF, to separate the splicing and termination areas. The

splice bay must have the following characteristics:

- The splice bay cassettes must be compatible with the High-Capacity ODF Intra-Facility cables and its pigtails
- The splice bay must take 12 splices per cassette.
- The splice bay must be configured with 12 individual splice shelves with 12 cassettes (12 splices/cassette) each, for a maximum of 144 splices/shelf
- Each shelf must be supplied with pre-installed transport tubes to allow
- easy installation of fibre tubes into the shelf
- Bay dimensions: 2200mm x 600mm x 300mm
- Lockable doors
- Cable risers on either side with places to affix cables
- A tray at the bottom of the bay to transition from the cable to transport
- tubes
- Each bay must be supplied with all brackets, screws and labels to allow
- easy installation against a wall, or two bays back-to-back
- The bay must have a build-in slack management tray

1.2 Medium-Capacity ODF with LC-APC connectors

A medium-capacity ODF is required that has the following features:

- All mid-couplers and connectors **MUST** be LC-APC.
- The frame shall provide controlled access to fibres for protection and security
- The frame shall provide total front access, allowing for installation back-to back or against a wall. All mounting, maintenance, and cable access shall be done on the front of the frame
- The frame shall include front doors. It must be fully enclosed and lockable
- Metal frame components shall be corrosion resistant
- The frame shall accommodate standard OSP cables and or blown fibre entering from either above or below the frame
- The frame shall include grounding points
- The frame shall accommodate single circuit and or single element splicing
- The frame system must provide mounting locations for termination, splice, and storage
- The frame must accommodate excess jumper (slack) storage within the frame footprint
- The frame shall provide superior cable management. Minimum bend radius protection of 30 mm shall be provided
- The frame must allow for the addition of termination panels and splice modules without disruption of previously installed fibres
- Connectors shall be removable, and accessible from the front of the frame
- Patch cords shall be routed through the frame using angled adapter retainers. The angled adapter retainers must provide guidance towards the vertical cable way while ensuring that proper bend radius is protected
- A lower trough shall be provided with step-guard
- The termination modules shall accommodate SFF connectors (LC-APC)
- Termination modules shall be available with 360 SFF adapters
- Termination modules shall be available with 156 SFF adapters
- Termination modules shall be available with adapters only or pre-terminated with pigtails multi-fibre cables
- Termination modules shall be available with a left orientation (mounts on the left side of the frame) or a right orientation (mounts on the right side of the frame)
- Pre-terminated fibre pigtail modules shall be available with stranded pre-terminated fibre bundles
- Different splice cassettes shall be available for single circuit and single element applications
- The splice trays shall be labelled in the tray and from the front
- The cable and fibre entrance of the single circuit and single element trays will have a cable strain relief
- A guiding element per tray will enable proper fibre routing
- No motion of loose tubes is allowed during operation and repair after installation
- No motion of any other fibres is allowed during operation and repair with single circuit variant
- It must be possible for fibres to be routed between splice trays within the module and other splice modules
- The cable and fibre entrance of the single circuit and single element trays shall be from the side at the rear
- Single circuit splice trays shall be 5 mm in height with a maximum capacity for 4 heat shrinkable splice protectors or 4 splitters or 4 WDMs
- Single element splice trays shall be 10 mm in height with a maximum capacity for 12 heat shrinkable splice protectors or 12 splitters or 12 WDMs
- All patch cords used for cross-connection will be a standard length and will be 1.7mm SM duplex cords, with LC-APC connectors at both ends

- The connection bay must be supplied with 4 blocks with 360 connectors each and 2 blocks with 156 connectors each so that each side of the connection bay has two total of 1752 connectors)

The ODF **MUST** be configured with the

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow
5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

following fibre colour code:

ODF configurations

The ODF will be ordered in either a single- or dual-connection bay configuration. The single bay configuration will include:

- A splice bay (600x 300x 2200mm) with 150 splice cassettes of 12 splices
- A connection/termination bay (600x 300x 2200mm)
- A slack bay (300x 300x 2200mm)

The dual bay configurations will include:

- A splice bay (600x 300x 2200mm) with 150 splice cassettes of 12 splices
- Two connection/termination bays (600x 300x 2200mm each)
- A slack bay (300x 300x 2200mm)

Connection Bay

The connection/termination bay must be available in three different configurations:

- Configuration 1: All six blocks with no multi-fibre cable or unjacketed pigtails, but fully populated with midcouplers (876 duplex midcouplers)
- Configuration 2: All six blocks with duplex midcouplers, multi-fibre cable (12 strands of G.655 fibre) and unjacketed pigtails (1752 pigtails)
- Configuration 3: All left blocks with duplex midcouplers, but no multi-fibre cable or unjacketed pigtails. All right blocks with multi-fibre cable (12 strands of G.655 fibre) and unjacketed pigtails (876 pigtails)

1.3 Low-capacity ODF with LC-APC connectors

A low-capacity ODF is required that has an integrated splice bay. It shall have the following features:

- The overall dimensions shall not exceed 2200 mm x 900 mm x 300 mm in its maximum termination and splice density using SFF connectors
- All mid-couplers and connectors **MUST** be LC-APC.
- The frame shall provide controlled access to fibres for protection and security
- The frame shall provide total front access, allowing for installation back-to back or against a wall. All mounting, maintenance, and cable access shall be done on the front of the frame
- The frame shall include front doors. It must be fully enclosed and lockable
- Metal frame components shall be corrosion resistant
- The frame shall accommodate standard OSP cables and or blown fibre entering from either above or below the frame
- The frame shall include grounding points
- The frame shall accommodate single circuit and or single element splicing

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- The frame system must provide mounting locations for termination, splice, and storage
- The frame must accommodate excess jumper (slack) storage within the frame footprint
- The frame shall provide superior cable management. Minimum bend radius protection of 30 mm shall be provided
- The frame must allow for the addition of termination panels and splice modules without disruption of previously installed fibres
- Connectors shall be removable, and accessible from the front of the frame
- Patch cords shall be routed through the frame using angled adapter retainers. The angled adapter retainers must provide guidance towards the vertical cable way while ensuring that proper bend radius is protected
- A lower trough shall be provided
- The termination modules shall accommodate SFF connectors
- Termination modules shall be available with 360 SFF adapters
- Termination modules shall be available with adapters only or pre-terminated with pigtails multi-fibre cables
- Termination modules shall be available with a left orientation (mounts on the left side of the frame) or a right orientation (mounts on the right side of the frame)
- Pre-terminated fibre pigtail modules shall be available with stranded pre-terminated fibre bundles
- Different splice cassettes shall be available for single circuit and single element applications
- The splice trays shall be labelled in the tray and from the front
- The cable and fibre entrance of the single circuit and single element trays will have a cable strain relief
- A guiding element per tray will enable proper fibre routing
- No motion of loose tubes is allowed during operation and repair after installation
- No motion of any other fibres is allowed during operation and repair with single circuit variant
- It must be possible for fibres to be routed between splice trays within the module and other splice modules
- The cable and fibre entrance of the single circuit and single element trays shall be from the side at the rear
- Single circuit splice trays shall be 5 mm in height with a maximum capacity for 4 heat shrinkable splice protectors or 4 splitters or 4 WDM's
- Single element splice trays shall be 10 mm in height with a maximum capacity for 12 heat shrinkable splice protectors or 12 splitters or 12 WDM's
- All patch cords used for cross-connection will be a standard length and will be 1.7mm SM duplex cords, with LC-APC connectors at both ends
- The frame must be supplied with 2 blocks with 360 connectors each so that each side of the connection bay has two large blocks (a total of 720 connectors with unjacketed pigtails), located at the top of the bay.
- The pigtails must be bundled into multi-fibre cables of 12 strands each.
- All pigtails and multi-fibre cables must be G.655 spec
- The bay must have an integrated splice area at the bottom of the bay, fully equipped with 60 splice cassettes, each with a 12-splice capacity
- Each multi-fibre cable must be pre-inserted into its specific splice tray

The ODF **MUST** be configured with the following fibre colour code:

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow
5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

1.4 Rack-mounted ODF

The City of Cape Town requires a low-capacity ODF for mounting inside a standard 19" data centre cabinet. It shall have the following features:

- The ODF consists of a splice module mounted at the back of the cabinet and a connector module mounted at the front, along with a slack management unit.
- It must have a patch cable routing system which maintains the minimum bend radius
- It must allow for termination of cables from above or below

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- It must be a rack-mountable in a 19 inch, 20U rack compartment. The assembled ODF's dimensions must not exceed the compartment's dimensions: 600mm (w) x 600mm (d) x 1000mm (h)
- Minimum fibre bend radius must be maintained at all times
- Environmental characteristics (Operation temperature): -40oC up to 70oC
- The ODF must have one connection block holding 180 duplex midcouplers
- The ODF must be supplied with 360 connectors with unjacketed pigtails
- All midcouplers and connectors must be LC-APC
- All fibre pigtails must comply to the ITU G.655 specification
- The pigtails must be bundled into 12-strand fibre cables which are routed to the back half of the ODF, where they are spliced onto outside plant cables
- The ODF must support micro (2.4mm) and mini (6.3mm) blown fibre cables with a cable termination area

The ODF **MUST** be configured with the following fibre colour code:

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow
5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

Splice module features:

- The splice module must contain at least 30 splice cassettes of 12 splices each and must support the mounting of heat-shrink type splice protectors
- The splice module must have a rigid cover
- It must be possible to open the module cover and work on any splice cassette without endangering any fibres in other cassettes

Intended use

The optical distribution frame provides mounting locations for termination, splices and passive devices, and provides the ability to cross-connect inside- and outside plant fibres.

Long-term performance requirements

The optical distribution frame supplied in compliance with this specification shall be capable of withstanding the typical service conditions of South Africa for many years without detriment to the operation and maintenance characteristics. The optical distribution frame shall be designed, manufactured and packaged so that the physical, operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outdoor and indoor.

General requirements

The optical distribution frame is a high-density total front access system that can be installed back-to-back or against a wall. The optical distribution frame protects fibre connections through the use of angled adapter/retainers and design features that maintain correct bend radii throughout the frame. The optical distribution frame must accommodate cable and jumper management and enhancement functions, such as splitters, couplers and wavelength division multiplexers.

Accessories

The bidder must provide a full list of accessories that may be needed to implement the ODF. This may include, but not be limited to:

- Splice trays and bays
- Termination bays
- Optical splitters/combiners

- Slack bays
- Mounting brackets

1.5 Ultra-High Capacity ODF

The City requires an Ultra-High Capacity ODF for certain applications. It must consist of a wall-mounted rack with interchangeable splice/patch and patch/patch connector modules. Each rack must feature a patch slack module. The ODF must have a capacity exceeding 2688 ports per 600x300 rack footprint. The following features must be offered:

- Tool-less installation
- Ultra-high density: 4 modules of 48 ports each per 3HU
- Full front access with patch-lead management to ensure that there is no movement of fibres during opening and closing of modules
- Bend radius protection of all fibres and patch leads at all times. Trumpets and guides must be included in the module price
- Staggered drops of patch leads from modules to prevent bunching up of patch leads
- Continuous patch lead tray at the bottom of each rack to enable patch lead routing from one rack to another
- Slack-racks to enable patch lead slack management and storage
- Easy mixing and management of patch-patch and splice modules
- Different configurations of connector modules are required:
 - o 48 port patch-patch module with 24 duplex LC-APC midcouplers, no cables, for patch leads only
 - o 48 port patch-patch module with 24 duplex LC-APC midcouplers with 2x pre-installed IFC cables. Each cable with 24 fibre strand (G.657A2) cable, one end with LC-APC fan-out
 - o Splicing module with cassettes for 48 shrink splices
 - o 48 port MPO-patch module with two transition modules (MPO in and 24-port LC-APC out). No cables
 - o 96 port patch-patch module with 48 duplex LC-APC midcouplers, no cables, for patch leads only
 - o 96 port patch-patch module with 48 duplex LC-APC midcouplers with 4x pre-installed IFC cables. Each cable with 24 fibre strand (G.657A2) cable, one end with LC-APC fan-out
 - o Splicing module with cassettes for 96 shrink splices
 - o 96 port MPO-patch module with four transition modules (MPO in and 24-port LC-APC out). No cables

Modules with pre-installed IFCs **MUST** come installed in the following colour order:

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow
5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

2 - OPTIC FIBRE PATCH PANELS

2.1 - Rack-Mounted Fibre Patch Panels for OSP cables

Intended use

The patch panel provides mounting locations for terminations and splices, and provides a secure connection space for connecting customer patch leads to the network. The panel is intended for use with a 2-way blown-fibre microduct, which contains 2.4mm optic fibre micro-cables.

Long-term performance requirements

The patch panel supplied in compliance with this specification shall be capable of withstanding the typical service conditions of South Africa for many years without detriment to the operation and maintenance characteristics. The patch panel shall be designed, manufactured and packaged so that the physical, operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outdoor and indoor.

General requirements

The requirement is for a rack-mounted patch panel for installation into a data-centre environment. It will mostly be connected with a blown-fibre micro-duct which will guide the 2.4mm optic fibre micro-cable into the patch panel, where it will be fusion spliced onto pigtails.

The patch panel terminates and splices either 12 or 24 fibres and protects fibre connections through the use of angled adapter/retainers and design features that maintain correct bend radii throughout the panel. The patch panel must accommodate cable and jumper management.

The rack-mounted panel is a low-density system which contains only fibre connectors. It represents the edge of the City network in the customer premises and provides a connection facility to the City's optic fibre access network.

Technical requirements

The patch panel must have at least the following features:

- The panel must be supplied with all transport tubes, mounting brackets and screws for installation in a 19" rack
- The panel must not be greater than 1U in height (45mm)
- The panel must not be deeper than 300mm
- The panel must provide mounting locations for termination, splice, and storage
- Metal patch panel components must be corrosion resistant
- The patch panel shall provide superior cable management. Minimum bend radius protection of 30 mm shall be provided throughout the panel
- It must have a facility for installing the blown-fibre micro-ducts which will allow the panel to be pulled out like a drawer or swung out while still securing the micro-duct tubes, ensuring that the fragile fibre micro-cable is not placed under any strain while the panel drawer is moved
- Connectors shall be removable, and accessible from the front and back of the patch panel
- The patch panel must be available in 12-, 24- or 48-fibre configurations
- The panel must have duplex midcouplers (6 in the 12-fibre configuration, 12 in the 24-fibre configuration and 24 in the 48-fibre configuration)
- The panel must be available with both LC-UPC and LC-APC midcouplers and pigtails
- The midcouplers must be angled at 45 degrees to allow for bend-radius protection on the patch cables
- The patch panel must have space for at least 48 heat-shrink type splice protectors, arranged in four cassettes of 12 splices each
- It must be possible for fibres to be routed between splice trays
- All panels must be supplied with pre-terminated connectors and pigtails
- The patch panel must have enough space for at least 2.5m of fibre slack (both micro-cable and pigtail)
- The panel must accommodate at least 2x2m of micro-tube or loose tube slack
- The panel must have a bracket on the side to hold several patch cables
- No motion of loose tubes or micro-cables is allowed during operation and repair after installation
- A guiding element per tray is required that will enable proper fibre routing
- The panel must have a facility for guiding the micro-cables into the splice cassettes while maintaining the minimum bend radius

The pigtails **MUST** come installed in the following colour order:

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow
5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

2.2 - Rack-Mounted Fibre Patch Panels for ISP patch cables

Intended use

The patch panel provides mounting locations for terminations and splices, and provides a secure connection space for connecting customer patch leads to the network. The panel is intended for use with patch leads on both sides (inside and outside) and will be used to interconnect short, temporary patch leads connected to the rack-mounted active equipment with the long, permanent patch leads between the equipment rack and the ODF.

Long-term performance requirements

The patch panel supplied in compliance with this specification shall be capable of withstanding the typical service conditions of South Africa for many years without detriment to the operation and maintenance characteristics. The patch panel shall be designed, manufactured and packaged so that the physical, operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outdoor and indoor.

General requirements

The requirement is for a rack-mounted patch panel for installation into a data-centre environment. It will mostly be connected with patch leads on both sides of the mid-coupler. The rack-mounted panel is a low-density system which contains only fibre connectors. It represents the edge of the City network in the City's switching centres and provides a connection facility to the City's optic fibre access network.

Technical requirements

The patch panel must have at least the following features:

- The panel must be supplied with all mounting brackets and screws for installation in a 19" rack
- The panel must not be greater than 1U in height (45mm)
- The panel must not be deeper than 300mm
- Metal patch panel components must be corrosion resistant
- The patch panel shall have a large port on the back for easy installation of patch leads, as well as a removable lid
- Connectors shall be removable, and accessible from the front and back of the patch panel
- The midcouplers must be available in plug-in modules of the following configurations:
 - o 6x duplex LC-APC midcouplers
 - o 12x duplex LC-APC midcouplers
 - o 6x MTP midcouplers
 - o 12-strand MPO cable input at the back fanning out to 6x duplex LC-APC connectors/midcouplers
 - o 24-strand MPO cable input at the back fanning out to 12x duplex LC-APC connectors/midcouplers
- The panel must be able to house at least four plug-in modules
- The panel must be available with both LC-UPC and LC-APC midcouplers and pigtails
- The midcouplers must be angled to allow for bend-radius protection on the patch cables
- The panel must have a bracket on the side to hold several patch cables

2.3 - Wall-Mounted Fibre Patch Panels

4-, 8-, 12-, 24- and 48-fibre wall-mounted patch panels are needed.

Intended use

The patch panel provides mounting locations for terminations and splices, and provides a secure connection space for connecting customer patch leads to the network. The panel is intended for use with a 2-way blown-fibre micro-duct, which contains 2.4mm optic fibre micro-cables, as well as 6.3mm mini-cables.

Long-term performance requirements

The patch panel supplied in compliance with this specification shall be capable of withstanding the typical service conditions of South Africa for many years without detriment to the operation and maintenance characteristics. The patch panel shall be designed, manufactured and packaged so that the physical, operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outdoor and indoor.

General requirements

All mid-couplers and connectors must be LC-APC.

The requirement is for a rack-mounted patch panel for installation into rough indoor environments, such as the basement of a building. It will mostly be connected with a blown-fibre micro-duct which will guide the 2.4mm optic fibre micro-cable into the patch panel, where it will be fusion spliced onto pigtails.

The patch panel terminates and splices either 4-, 8-, 12-, 24- or 48 fibres and protects fibre connections through the use of angled adapter/retainers and design features that maintain correct bend radii throughout the panel. The patch panel must accommodate cable and jumper management.

The rack-mounted panel is a low-density system which contains only fibre connectors. It represents the edge of the City network in the customer premises and provides a connection facility to the City's optic fibre access network.

Technical requirements

- The overall dimensions of the 4 and 8-fibre panel shall not exceed 160mm x 145mm x 80mm in its maximum termination and splice density using 4 or 8 SFF connectors
- The overall dimensions of the 12-, 24- and 48-fibre panel shall not exceed 385mm x 360mm x 95mm in its maximum termination and splice density using 48 LC-APC connectors
- The panel shall provide controlled access to fibres for protection and security
- The 4- and 8-fibre panel shall have one lockable cover covering the splicing cassettes, pigtails and connectors. This will ensure that a customer can't have access to the midcouplers to connect his patch leads, or to the splicing area and pigtails on the network side of the panel.
- The 12-, 24- and 48-fibre panel shall have one lockable door covering the splicing cassettes, pigtails and network-side connectors and a second lockable door covering the customer –side connectors. This will ensure that a customer may have access to the midcouplers to connect his patch leads, but not to the splicing area and pigtails on the network side of the panel.
- The patch panel shall provide total front access, allowing for installation against a wall.
- Metal patch panel components shall be corrosion resistant
- The patch panel shall accommodate standard OSP cables and or blown fibre entering from either above or below the panel
- The patch panel shall include grounding points, if it has a metal body
- The patch panel must provide mounting locations for termination, splice, and pigtail storage
- The patch panel shall provide superior cable management. Minimum bend radius protection of 30 mm shall be provided throughout the panel
- Connectors shall be removable, and accessible from the left and right of the patch panel
- In the 12-, 24- and 48- fibre panel, the midcouplers will be fitted at an angle to ensure bend radius management for both patch leads and pigtails
- Patch cords shall be routed through the patch panel using angled adapter retainers. The angled adapter retainers must provide guidance towards the vertical cable way while ensuring that proper bend radius is protected
- All connectors will be duplex LC-UPC or LC-APC, to be specified on the order
- All panels must be available with pre-terminated connectors and pigtails
- The panel must be fitted with radius limiters to ensure that the pigtails do not exceed the minimum bend radius
- Two sets of bend-radius guides must be installed to allow separate slack management of the OSP cable tubes and the pigtails so that they do not overlap
- Different splice trays shall be available for single circuit and single element applications
- The splice trays shall be labelled in the tray and from the front and shall be in a flip-up arrangement so that each tray may be accessed without disturbing the splices in other trays
- The cable and fibre entrance of the single circuit and single element trays will have a cable strain relief
- A guiding element per tray will enable proper fibre routing
- No motion of loose tubes is allowed during operation and repair after installation
- No motion of any other fibres is allowed during operation and repair with single circuit variant
- It must be possible for fibres to be routed between splice trays within the module and other splice modules
- Single circuit splice trays shall be 5 mm in height with a maximum capacity for 4 crimp splice protectors or 4 heat shrinkable splice protectors
- Single element splice trays shall be 10 mm in height with a maximum capacity for 12 crimp splice protectors or 12 heat shrinkable splice protectors
- The entrances to the patch panel will be provided with rubber compression fittings to ensure the safety of cables and patch leads entering the panel. The fittings must be split to enable the adding of more patch leads after installation

The pigtails MUST come installed in the following colour order:

Fibre	4-Fibre Panel	8-Fibre Panel	12-Fibre and above
1	Red	Red	Red
2	Green	Green	Green
3	Blue	Blue	Blue
4	Yellow	Yellow	Yellow
5		White	White
6		Grey	Grey
7		Brown	Brown
8		Violet	Violet

9			Turquoise
10			Black
11			Orange
12			Pink

3 - OPTIC FIBRE CABLES (BLOWN FIBRE)

General

The characteristics of standard single-mode optical fibres are to be in compliance with those presented in the ITU-T Recommendation **G.655D**. The fibres shall be manufactured from high grade silica, doped as necessary to achieve the required light guiding properties, and designed with a matched-cladding, step-index profile. The fibre coating shall be a dual layer structure of ultra-violet cured acrylate resin. The lower modulus inner layer being optimised for both adhesion to the fibre surface and mechanical stripping, using the appropriate stripping tools. The outer layer shall be optimised for abrasion resistance and fibre processing properties.

Attenuation Requirements:

Wavelength	Cable Attenuation (max)	Units
1550nm	0.22	dB/km

Other Optical Requirements:

Parameter	Units	Value
Cut-Off Wavelength (cables)	nm	≤1450
PMD (Link design value)	ps /√ km	≤ 0.2
Core Concentricity	μm	≤ 0.6
Mode Field Diameter @ 1550nm	μm	8-11
Clad Diameter	μm	125 +/- 0.7
Zero Dispersion Wavelength	nm	<1530
Chromatic Dispersion (1460-1550nm)	ps/(nm.km)	$(2.91/90)*(\lambda-1460)+3.29$
Chromatic Dispersion (1550-1625nm)	ps/(nm.km)	$(5.06/75)*(\lambda-1550)+6.2$
Dispersion at 1550nm	ps/(nm.km)	≤6.2
Cladding non-circularity	%	≤1
Coating Diameter	μm	245 +/-10
Coating concentricity	μm	≤12.0
Proof Test	%	≥1

Cable drum tests

- Each cable drum must be tested before delivery.
- An approved Optical Time Domain Reflectometer, with the stipulated software, must be used for the testing

and measuring of the fibres. Records of all the results must be kept for reference purposes.

- To test the attenuation/chromatic dispersion of the cabled fibre, all the fibres on a drum must be spliced together in a tandem fashion, i.e. fibre number 1 to 2, 2 to 3, etc.
- A splice loss of <0.15 dB for 70% of the splices must be achieved. This must be achieved within 3 splice attempts (resplicing the same 2 fibres).
- The splice loss measured after 3 attempts will be logged and considered as the loss of the specific splice.
- Any single splice must not exceed a loss of 0.2 dB, when tested at 1550 nm from both directions.
- Each fibre must be tested for attenuation (1310 and 1550 nm), chromatic dispersion (1550 nm) and refractive index.
- Each unspliced fibre strand must have an overall attenuation of less than or equal to 0.22 dB/km, and the attenuation on the entire (spliced) cable must not exceed 0.25 dB/km (measured at 1550 nm)
- The cable must be delivered together with a test certificate in which the optical characteristics of each fibre in the cable must be presented. For each unique drum number, the following must be recorded for each fibre; refractive index, actual length of fibre, attenuation/km and chromatic dispersion in both the 1310 nm and 1550 nm windows.
- The test results and other relevant information must be attached to each drum.
- The OTDR test results must be submitted to the Telecommunications Branch of the City of Cape Town (in digital format).
- The City of Cape Town reserves the right to get an authorised representative to carry out or witness individual type tests if the need arises.
- Immediately after completion of optical tests the ends of the cable must be sealed by a method approved by the City of Cape Town.
- The cable end must be secured inside the cable drum to prevent it from moving during transportation.
- The City of Cape Town reserves the right to inspect the cable and drums at the manufacturer's premises before delivery and again after delivery at the addressed site.
- The City of Cape Town reserves the right to refuse accepting a cable if any one of the fibres in the cable does not meet the minimum specifications as laid out in this document

Information to be furnished by Supplier

- OTDR test results
- Nominal cable length per cable drum
- Cable diameter
- Maximum variation of cable diameter
- Installation tension under normal and worst case conditions
- Minimum installation bending radius
- Cable mass per unit length
- Maximum cable strain for zero fibre strain
- Ultimate tensile strength of the cable
- Drawing or sketch indicating cable make up
- Mechanical properties of the cable

Other Requirements: Delivery

The cables must be delivered to the City Of Cape Town on strong treated wooden drums or other approved alternatives. The manufacturer must guarantee a cable drum with a minimum lifetime of five (5) years when stored outside in typical South African weather conditions.

The drum must have the following information clearly painted on it:

- CITY OF CAPE TOWN
- The Contract No.
- Order No.
- The unique drum number
- The type of cable and number of fibres
- The length of the cable in meters
- The gross mass of the cable and drum in kilograms.
- The inside end of the cable must be at least 3 m long and must be accessible and capable of being withdrawn from the drum for inspection and testing purposes.
- The inside cable length marking must be in reverse order and printed every meter so that the remaining length of the cable on the drum is displayed at the cable end

3.1 Blown Fibre Micro Cables (G.655 2.4mm)

General

Blown fibre units are units of 4, 8 or 12 optical single mode fibres optimized for blowing into primary 5/8 mm (inside/outside diameter) micro-ducts integrated in multi-tube assemblies.

Blown fibre units shall meet the requirements of **G.655D** and all tests shall be performed in accordance with IEC 60793-1, IEC 60794-1, IEC 60068, BS EN 60068 and British Telecom specification CW1500.

Typical blowing distance of blown fibre units into standard 5/8 mm primary micro-duct shall be 500 m. The cable shall consist of an inner loose-tube with water-blocking gel containing the fibres, a Kevlar layer for pulling strength and an outer HDPE sheath (coloured yellow) proving protection and stiffness.

Colour code

The fibre colour code in blown fibre units shall be according to the table below:

Fibre	4-Fibre Panel	8-Fibre Panel	12-Fibre and above
1	Red	Red	Red
2	Green	Green	Green
3	Blue	Blue	Blue
4	Yellow	Yellow	Yellow
5		White	White
6		Grey	Grey
7		Brown	Brown
8		Violet	Violet
9			Turquoise
10			Black
11			Orange
12			Pink

Outer blown fibre unit diameter

The nominal outer diameter of blown fibre units shall not exceed 2.4mm.

Cable length requirements

The cable lengths must be delivered in excess of or equal to 4 010 meters, unless otherwise specified. The excess of 10 meters shall be used for cutback and testing and shall not be considered as part of the drummed cable length. Shorter cable lengths will only be accepted with the concession of the City of Cape Town.

Mechanical Requirements

Tensile performance

The test shall be carried out generally in accordance to IEC 60794-1-2. At a load of 1W the maximum fibre strain shall be 0.4% and after the removal of the load the residual fibre strain shall be no more than 0.05%. The mechanical strain from the tensometer may be taken as the maximum fibre strain reading.

Crush

The test shall be carried out according to IEC 60794-1-2, method E3. Total force applied shall be 100N. The duration of application of the force shall be 60 seconds. The test shall be performed three times at three different places 500mm apart, without rotating the unit. There shall be no change in attenuation (within an accuracy of 0.05dB) after the removal of the load.

Bend

The test shall be carried out according to IEC 60794-1-2, method E11, procedure 1. The test mandrel diameter shall be 40mm (2, 4, 6f) or 60mm (8, 12f). The number of cycles shall be 3 and the number of turns shall be 3. There shall be no change in attenuation (within an accuracy of 0.05dB) after the test.

Aged bend

The test shall be carried out according to BT CW 1500 pt 4. The test mandrel diameter shall be 40mm (2, 4, 6f) or 60mm (8, 12f). The test temperature shall be 60°C and test duration 1000 hours.

Temperature performance

The test shall be carried out according to IEC 60794-1-2, method F1. The low temperature TA shall be -30°C and the high temperature TB shall be +60°C. The sample shall be subjected to three cycles. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Cold test

The test shall be carried out according to BS EN 60068-2-1 and temperature shall be -20°C. The test shall continue for 96 hours. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Condensation test

The test shall be carried out according to IEC 60068-2-38. The test conditions shall be -10 °C to 65°C temperature for 93% relative humidity with 10 cycles. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Water immersion

The test shall be carried out according to BT CW1500 pt 4 and temperature shall be 20°C. The test shall continue for 2000 hours. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Fibre breakout from unit

The test shall be carried out according to BT CW1500 pt 4 at temperatures of 0°C, 20°C, 40°C. The break-out time shall be ≤2min (2f), ≤3min (4f), ≤4min (6f), ≤5min (8f) and ≤8min (12f).

3.2 - Blown Fibre Mini Cables (6.3mm)

General

Blown fibre units are units of 12, 24, 48, 72, 96, 144, 216, 240 or 288 optical single mode fibres optimized for blowing into primary 9.8/12 mm (inside/outside diameter) mini-ducts integrated in multi-tube assemblies. **Cable sizes of 12, 24, 48 and 72-strands MUST be supplied with G.655D fibre. Cable sizes of 96, 144, 216, 240 and 288 strand may be supplied with G.657A2 fibre.**

Blown fibre strands shall meet the requirements of ITU G.655D or G.657A2 and all tests shall be performed in accordance with IEC 60793-1, IEC 60794-1, IEC 60068, BS EN 60068 and British Telecom specification CW1500. Typical blowing distance of blown fibre units into standard 9.8/12 mm primary mini-duct shall be 500 m.

Cable fibre count

All cable sizes (12, 24, 48, 72, 96, 144, 216, 240 and 288) shall have 12 fibre strands/ tube. Smaller sizes (12, 24, 48, 72 and 96) shall have fibres with a **250 micron** buffer. Larger sizes (144, 216, 240 and 288) may have a **200 micron** buffer.

Colour code

The fibre colour code in blown fibre unit tubes shall be according to the table below:

Fibre	Colour
1	Red
2	Green
3	Blue
4	Yellow

5	White
6	Grey
7	Brown
8	Violet
9	Turquoise
10	Black
11	Orange
12	Pink

Cable length requirements

The cable lengths must be delivered in excess of or equal to 8 050 meters, unless otherwise specified. The excess of 50 meters shall be used for cutback and testing and shall not be considered as part of the drummed cable length. Shorter cable lengths will only be accepted with the concession of the City of Cape Town.

Mechanical requirements

Tensile performance

The test shall be carried out generally in accordance to IEC 60794-1-2.

Test Requirements

Short Term (installation) - Load of 300 N

Long Term (operating) - Load of 175 N

Acceptance criteria

Short Term - No changes in attenuation before versus after load. Max. fibre strain 0.33%

Long Term - No attenuation increase. No fibre strain.

Crush performance

Test Requirements

The test shall be carried out according to IEC 60794-1-2, method E3. Total force (short-term) applied shall be 1000 N. The duration of application of the force shall be 60 seconds. The test shall be performed three times at three different places 500mm apart, without rotating the unit. There shall be no change in attenuation (within an accuracy of 0.05dB) after the removal of the load.

Acceptance criteria

No changes in attenuation before versus after load. No Mechanical damage – when examined visually without magnification, there shall be no evidence of damage to the sheath. The imprint of plates will not be considered as damage.

Bend performance

The test shall be carried out according to IEC 60794-1-2, method E11, procedure 1.

Test Requirements

Short Term (installation) - Bend diameter of 250mm

Long Term (Handling fixed installed) - Bend diameter 180mm

Acceptance criteria

Short Term - No changes in attenuation before versus after Load

Long Term - No attenuation increase

Aged bend performance

The test shall be carried out according to BT CW 1500 pt 4. The test mandrel diameter shall be 300 mm. The test temperature shall be 60°C and test duration 1000 hours.

Environmental Requirements

Temperature performance

The test shall be carried out according to IEC 60794-1-2, method F1. The low temperature TA shall be –30°C and the high temperature TB shall be +60°C. The sample shall be subjected to three cycles. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Cold test

The test shall be carried out according to BS EN 60068-2-1 and temperature shall be -20°C. The test shall continue for 96 hours. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Condensation test

The test shall be carried out according to IEC 60068-2-38. The test conditions shall be -10 °C to 65°C temperature for 93% relative humidity with 10 cycles. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

Water immersion

The test shall be carried out according to BT CW1500 pt 4 and temperature shall be 20°C. The test shall continue for 2000 hours. During the test the fibre attenuation shall not vary by more than 0.07dB/km.

4 - 1.7MM DUPLEX FIBRE PATCH LEADS

This specification covers the minimum standards and requirements for patch leads supplied to the City of Cape Town, without connector identification.

The regular patch leads must be 1.7mm duplex cable, and must be available in both **G.655 and G.652** fibre.

The patch must leads have the following connectors according to the price schedule:

- LC/SC/ST and APC/UPC

Intended use

The patch leads will be used indoors to connect fibre and equipment ports.

Long term performance requirements

The patch leads shall be capable of withstanding the typical service conditions of South Africa for a period of many years without detriment to the operation and maintenance characteristics and must include 1 year of warranty.

The patch leads shall be designed, manufactured and packaged so that the physical, and operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outside and inside the country. The environmental conditions of South Africa may include ambient air temperature variations from – 40 to + 70.

Associated specification

The following unattached international and /or national standards shall be applied, and deemed to be an integral part of this specification:

Item Specification	Test
Temperature shock	FOTP-3
Humidity	FOTP-5
Temperature Life	FOTP-4
Mating durability	FOTP-21
Vibration	FOTP-11
Cable flex	FOTP-1A
Cable retention	FOTP-6
Cable twist	FOTP-36
Impact	FOTP-2

Connector properties

Single mode Connectors	LC-APC
Insertion Loss (1310 and 1550nm)	0.2 dB max
Return Loss (1310 and 1550nm)	65 dB min
Fibre Recess	50 nm
Apex Offset	65 micron max
Polished End Face Radius	5-12 mm
End Face Angle	8° ±0.5

Other optical requirements

Parameter	Units	Value
Cut-Off Wavelength (cables)	nm	≤1450
PMD (Link design value)	ps /√ km	≤ 0.2
Core Concentricity	μm	≤ 0.6
Mode Field Diameter @ 1550nm	μm	8-11
Clad Diameter	μm	125 +/- 0.7
Zero Dispersion Wavelength	nm	<1530
Chromatic Dispersion (1460-1550nm)	ps/(nm.km)	$(2.91/90)*(\lambda-1460)+3.29$
Chromatic Dispersion (1550-1625nm)	ps/(nm.km)	$(5.06/75)*(\lambda-1550)+6.2$
Dispersion at 1550nm	ps/(nm.km)	≤6.2
Cladding non-circularity	%	≤1
Coating Diameter	μm	245 +/-10
Coating concentricity	μm	≤12.0
Proof Test	%	≥1

Other requirements

Packing

The patch cords must be individually packed in a plastic bag with cardboard reinforcement, put into boxes and shipped on wood pallets.

Marking

The packing will be marked with the product catalogue number and the sales order number.

The patch cords must have a test report with Insertion Loss and Return Loss measured against a reference connector.

Pricing Model

In order to avoid different lengths or types of patch leads being supplied by different suppliers, the tender for this item

will be awarded to the supplier who satisfies all technical requirements, but has the lowest bundle price.

The bundle price must contain the following:

- 5x 5m patch cords, LC-APC connectors on both ends
- 5x 10m patch cords, LC-APC connectors on both ends
- 5x 15m patch cords, LC-APC connectors on both ends
- 5x 20m patch cords, LC-APC connectors on both ends
- 5x 5m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other
- 5x 10m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other
- 5x 15m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other
- 5x 20m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other

The supplier will be expected to supply a full list of patch cords with a tender price for each item. The list must have the following connector combinations:

- LC-UPC to LC-UPC
- LC-APC to LC-APC
- LC-APC to LC-UPC
- LC-UPC to SC-UPC
- LC-APC to SC-UPC
- LC-APC to SC-APC

For each of the six connector combinations, a pricelist must be supplied for the following list of patch lead lengths: 1m, 2m, 3m, 4m, 5m, 6m, 7m, 8m, 9m, 10m, 12m, 14m, 16m, 18m, 20m, 22m, 24m, 26m, 28m, 30m, 32m, 34m, 36m, 38m, 40m.

Therefore, the full price list submitted by the supplier for this tender item (1.7MM DUPLEX FIBRE PATCH LEADS) must be 25x6 = **300** line items. If the supplier cannot supply G.655 leads at the same price as a G.652 lead, the supplier must submit a separate price list for each kind, i.e. **600** line items

5 - RUGGEDISED DUPLEX FIBRE PATCH LEADS

This specification covers the minimum standards and requirements for ruggedized patch leads supplied to the City of Cape Town, without connector identification.

The 3.8mm duplex patch leads must be available in both **G.655** and **G.652** fibre types.

The patch must leads have the following connectors according to the price schedule:

- LC/SC and APC/UPC

SPECIFICATIONS

SINGLEMODE

Torsion	5 Turns/m
Impact Resistance:	5nm
Min Static Bend:	40mm
Min Dynamic Bend:	60mm
Tensile Load (long term):	200N
Tensile Load (short term):	400N
Crush (long term):	2000N/100mm
Crush (short term):	2000N/100mm
Operating Temperature:	-10°C to +70°C
Net weight	29kg/km
Fire	IEC 60332-1

Intended use

The patch leads will be used indoors to connect fibre and equipment ports, but in rough environments like in ceiling voids and under floors.

Long term performance requirements

The patch leads shall be capable of withstanding the typical service conditions of South Africa for a period of many years without detriment to the operation and maintenance characteristics and must include 1 year of warranty.

The patch leads shall be designed, manufactured and packaged so that the physical, and operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outside and inside the country. The environmental

conditions of South Africa may include ambient air temperature variations from – 40 to + 70.

Associated specification

The following unattached international and /or national standards shall be applied, and deemed to be an integral part of this specification:

Item Specification	Test
Temperature shock	FOTP-3
Humidity	FOTP-5
Temperature Life	FOTP-4
Mating durability	FOTP-21
Vibration	FOTP-11
Cable flex	FOTP-1A
Cable retention	FOTP-6
Cable twist	FOTP-36
Impact	FOTP-2

Connector properties

Single mode Connectors	LC-APC
Insertion Loss (1310 and 1550nm)	0.2 dB max
Return Loss (1310 and 1550nm)	65 dB min
Fibre Recess	50 nm
Apex Offset	65 micron max
Polished End Face Radius	5-12 mm
End Face Angle	8° ±0.5

Other optical requirements

Parameter	Units	Value
Cut-Off Wavelength (cables)	nm	≤1450
PMD (Link design value)	ps /√ km	≤ 0.2
Core Concentricity	µm	≤ 0.6
Mode Field Diameter @ 1550nm	µm	8-11
Clad Diameter	µm	125 +/- 0.7
Zero Dispersion Wavelength	nm	<1530
Chromatic Dispersion (1460-1550nm)	ps/(nm.km)	(2.91/90)*(λ-1460)+3.29
Chromatic Dispersion (1550-1625nm)	ps/(nm.km)	(5.06/75)*(λ-1550)+6.2
Dispersion at 1550nm	ps/(nm.km)	≤6.2
Cladding non-circularity	%	≤1
Coating Diameter	µm	245 +/-10
Coating concentricity	µm	≤12.0
Proof Test	%	≥1

Other requirements

Packing

The connector identification system patch cords must be individually packed in a plastic bag with cardboard reinforcement, put into boxes and shipped on wood pallets.

Marking

The packing will be marked with the product catalogue number and the sales order number.

The connector identification system patch cords must have a test report with Insertion Loss and Return Loss measured against a reference connector.

Pricing Model

In order to avoid different lengths or types of patch leads being supplied by different suppliers, the tender for this item will be awarded to the supplier who satisfies all technical requirements, but has the lowest bundle price.

The bundle price must contain the following:

- 5x 5m patch cords, LC-APC connectors on both ends
- 5x 10m patch cords, LC-APC connectors on both ends
- 5x 15m patch cords, LC-APC connectors on both ends
- 5x 20m patch cords, LC-APC connectors on both ends
- 5x 5m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other
- 5x 10m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other
- 5x 15m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other
- 5x 20m patch cords, one LC-APC connector on one end and one SC-UPC connector at the other

The supplier will be expected to supply a full list of patch cords with a tender price for each item. The list must have the following connector combinations:

- LC-UPC to LC-UPC
- LC-APC to LC-APC
- LC-APC to LC-UPC
- LC-UPC to SC-UPC
- LC-APC to SC-UPC
- LC-APC to SC-APC

For each of the six connector combinations, a pricelist must be supplied for the following list of patch lead lengths: 5m, 10m, 15m, 20m, 25m, 30m, 35m, 40m, 45m, 50m.

Therefore, the full price list submitted by the supplier for this tender item (RUGGEDISED DUPLEX FIBRE PATCH LEADS) must be 10x6 = **60** line items. If the supplier cannot supply G.655 leads at the same price as a G.652 lead, the supplier must submit a separate price list for each kind, i.e. **120** line items

6 - 1.7MM DUPLEX CONNECTOR IDENTIFICATION FIBRE PATCH LEADS

This specification covers the minimum standards and requirements for connector identification fibre patch leads supplied to the City of Cape Town.

The 1.7mm duplex patch leads must be available in both **G.655** and **G.652** fibre types.

Intended use

The connector identification system must offer a quick and accurate method of identifying the termination point of optical patch cords. Each end of a patch cord will feature a flashing light source allowing technicians to visually trace individual patch cords from one end to the other without disconnecting, pulling or affecting the patch cord.

Long term performance requirements

The connector identification system supplied in compliance with this specification shall be capable of withstanding the typical service conditions of South Africa for a period of many years without detriment to the operation and maintenance characteristics and must include 1 year of warranty.

The connector identification system shall be designed, manufactured and packaged so that the physical, and operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outside and inside the country. The environmental conditions of South Africa may include ambient air temperature variations from – 40 to + 70.

Associated specification

The following unattached international and /or national standards shall be applied, and deemed to be an integral part of this specification:

Item Specification	Test
Temperature shock	FOTP-3
Humidity	FOTP-5
Temperature Life	FOTP-4
Mating durability	FOTP-21
Vibration	FOTP-11
Cable flex	FOTP-1A
Cable retention	FOTP-6
Cable twist	FOTP-36
Impact	FOTP-2

Connector properties

Single mode Connectors	LC-APC
Insertion Loss (1310 and 1550nm)	0.2 dB max
Return Loss (1310 and 1550nm)	65 dB min
Fibre Recess	50 nm
Apex Offset	65 micron max
Polished End Face Radius	5-12 mm
End Face Angle	8° ±0.5

Other optical requirements

Parameter	Units	Value
Cut-Off Wavelength (cables)	nm	≤1450
PMD (Link design value)	ps /√ km	≤ 0.2
Core Concentricity	μm	≤ 0.6
Mode Field Diameter @ 1550nm	μm	8-11
Clad Diameter	μm	125 +/- 0.7
Zero Dispersion Wavelength	nm	<1530
Chromatic Dispersion (1460-1550nm)	ps/(nm.km)	(2.91/90)*(λ-1460)+3.29
Chromatic Dispersion (1550-1625nm)	ps/(nm.km)	(5.06/75)*(λ-1550)+6.2
Dispersion at 1550nm	ps/(nm.km)	≤6.2
Cladding non-circularity	%	≤1
Coating Diameter	μm	245 +/-10
Coating concentricity	μm	≤12.0
Proof Test	%	≥1

Other requirements*Packing*

The connector identification system patch cords must be individually packed in a plastic bag with cardboard reinforcement, put into boxes and shipped on wood pallets.

Marking

The packing will be marked with the product catalogue number and the sales order number.

The connector identification system patch cords must have a test report with Insertion Loss and Return Loss measured against a reference connector.

Technical requirements

The connector identification system optical patch cords must feature a flashing light source (LED) component near each connector end. The connector identification system power source is inserted with minimal force into the Connector Identification System component on one end of the patch cord. This causes the LED on each end to begin flashing rapidly. As a result, the distant end of the patch cord can be quickly and easily identified without interruption of service.

The patch cords must be available in any standard length or connector style. The connector identification system patch cords must have the same functions, features, and stringent environmental requirements as standard patch cords. Optical performance of the patch cords must not be affected by the connector identification system components. The connector identification system patch cords are installed in the same manner as standard patch cords. The connector identification system must dramatically minimize the risk of taking the wrong fibre out of service.

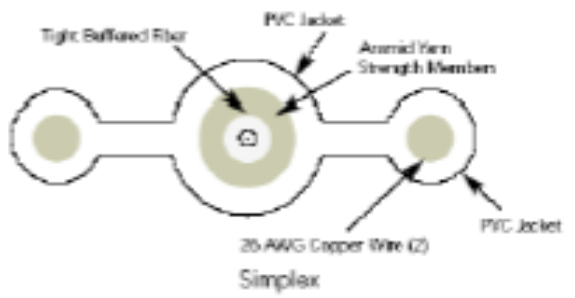
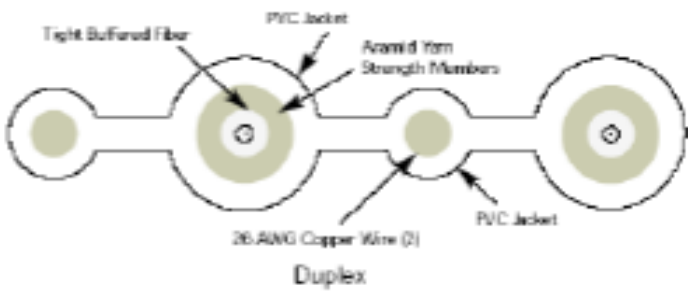
Design requirements

- The connector identification system must improve system turn-up speed and accuracy
- The connector identification system must meet all performance criteria of standard industry patch cords
- The added identification components must not affect optical performance of the patch cord
- The power source must produce a flashing LED on each end of the patch cord
- Metal components must be corrosion resistant
- The compact power source shall be comprised of a lightweight, plastic flashlight body featuring two AA batteries and a printed circuit board (PCB)
- The compact power source must provide at least 80 hours of continuous service and feature a 1-hour auto-off.

- The end of battery life must be indicated by a slowing of the blink rate

Optical fibre properties

All patch cords will have a thickness of 1.7 mm and contain 2 fibre strands (duplex). The fibre will be specified in accordance with ITU recommendation G.655D and with the following specification:

<p>CONNECTORS (Singlemode and Multimode)</p> <p>Intermateability:</p> <p>FC: SC: ST*: LX.5*:</p> <p>Connector Body</p> <p>FC and ST*: SC and LX.5*:</p> <p>Ferrule:</p> <p>LX.5*: FC, SC, and ST*:</p> <p>Connector Color:</p> <p>Singlemode PC: APC: Multimode FC/SC/ST*: LX.5*:</p>	<p>TIA/EIA-604-X FOCIS-4 FOCIS-3 FOCIS-2 FOCIS-13*</p> <p>Metal Plastic</p> <p>TIA/EIA-604 Zirconia, 1.25 Zirconia, 2.5 GR-326</p> <p>Blue Green</p> <p>Black Beige</p>	 <p>Simplex</p>
<p>OPTICAL (Singlemode)</p> <p>Operating Wavelengths:</p> <p>Insertion Loss:</p> <p>Return Loss:</p>	<p>GR-326; 1310 and 1550 nm; All tests below apply at both wavelengths FOTP-171, Method D; To a master cable PC: 0.2 dB maximum APC: 0.5 dB maximum</p> <p>FOTP-107; To a master cable PC: 57 dB minimum APC: 60.5 dB minimum</p>	 <p>Duplex</p>
<p>MECHANICAL (Singlemode and Multimode)</p> <p>Vibration: Flex Cycling: Twist: Mating Durability: Tensile Load (Proof): Impact:</p>	<p>GR-326 and FOTP 11; ΔIL < 0.3 dB; 3 planes, 6hrs, 10-55 Hz GR-326 and FOTP 1; ΔIL < 0.3 dB; 100 cycles with 2lbs. load GR-326; ΔIL < 0.3 dB; 3lbs; 5 turns, 0 cycles FOTP-21A; ΔIL < 0.3 dB; 500 cycles GR-326 and FOTP-6; ΔIL < 0.3 dB; 15 lbs. at 0° and 7.5 lbs. at 90° GR-326 and FOTP-2; ΔIL < 0.3 dB; 8 drops from 1 meter (or 1.5 meters)</p>	
<p>ENVIRONMENTAL (Singlemode and Multimode)</p> <p>Thermal Age: Thermal Cycle: Humidity Age:</p>	<p>GR-326 and FOTP-4; ΔIL < 0.3 dB; 7 days at 85°C GR-326 and FOTP-3A; ΔIL < 0.3 dB; 7 days, -40° to 75°C, 21 cycles GR-326 and FOTP-5; ΔIL < 0.3 dB; 7 days at 75°C and 95% RH</p>	

* Release Pending

Note: Now included with all flat polish (UPC) FC, SC, ST® connectors:
0.2 dB maximum insertion loss at both 1310 and 1550 nm
100% interferometer data
±50 nm recession
<50 micron apex offset
10-25 mm radius of curvature

Pricing Model

In order to avoid different lengths or types of patch leads being supplied by different suppliers, the tender for this item will be awarded to the supplier who satisfies all technical requirements, but has the lowest bundle price.

The bundle price must contain the following:

- 5x 5m patch cords, LC-APC connectors on both ends
- 5x 10m patch cords, LC-APC connectors on both ends
- 5x 15m patch cords, LC-APC connectors on both ends
- 5x 20m patch cords, LC-APC connectors on both ends

The supplier will be expected to supply a full list of patch cords with a tender price for each item. The list must have the following connector combinations:

- LC-APC to LC-APC

A pricelist must be supplied for the following list of patch lead lengths: 1m, 2m, 3m, 4m, 5m, 6m, 7m, 8m, 9m, 10m, 12m, 14m, 16m, 18m, 20m, 22m, 24m, 26m, 28m, 30m, 32m, 34m, 36m, 38m, 40m. Therefore, the full price list submitted by the supplier for this tender item (1.7MM DUPLEX CONNECTOR IDENTIFICATION FIBRE PATCH LEADS) must be **25** line items. If the supplier cannot supply G.655 leads at the same price as a G.652 lead, the supplier must submit a separate price list for each kind, i.e. **50** line items

7 - MTP/MPO Optical Patch Leads

This specification covers the minimum standards and requirements for MPO patch leads supplied to the City of Cape Town, without connector identification. The patch leads must contain either 12 or 24 fibre strands of **G.655D** fibre. Each patch lead will terminate in either a standard MTP connector (either 12- or 24 fibre), or a fan-out arrangement with each fibre terminating in a jacketed pigtail with a LC-APC connector. Both male and female MTP connectors will be available, as specified on order. All cables will have a straight connection arrangement (no cross-over), i.e. port1=port1.

Intended use

The patch leads will be used indoors to connect fibre and equipment ports to patch panel or ODF ports, either MTP or LC-APC.

Long term performance requirements

The patch leads shall be capable of withstanding the typical service conditions of South Africa for a period of many years without detriment to the operation and maintenance characteristics and must include 1 year of warranty. The patch leads shall be designed, manufactured and packaged so that the physical, and operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation outside and inside the country. The environmental conditions of South Africa may include ambient air temperature variations from – 40 to + 70.

Associated specification

The following unattached international and /or national standards shall be applied, and deemed to be an integral part of this specification:

Item Specification	Test
Temperature shock	FOTP-3
Humidity	FOTP-5
Temperature Life	FOTP-4
Mating durability	FOTP-21
Vibration	FOTP-11
Cable flex	FOTP-1A
Cable retention	FOTP-6
Cable twist	FOTP-36
Impact	FOTP-2

Other fibre requirements

Parameter	Units	Value
Cut-Off Wavelength (cables)	nm	≤1450
PMD (Link design value)	ps /√ km	≤ 0.2
Core Concentricity	μm	≤ 0.6
Mode Field Diameter @ 1550nm	μm	8-11
Clad Diameter	μm	125 +/- 0.7
Zero Dispersion Wavelength	nm	<1530
Chromatic Dispersion (1460-1550nm)	ps/(nm.km)	$(2.91/90)*(\lambda-1460)+3.29$
Chromatic Dispersion (1550-1625nm)	ps/(nm.km)	$(5.06/75)*(\lambda-1550)+6.2$
Dispersion at 1550nm	ps/(nm.km)	≤6.2
Cladding non-circularity	%	≤1
Coating Diameter	μm	245 +/- 10
Coating concentricity	μm	≤12.0
Proof Test	%	≥1

Other requirements

Packing

The connector identification system patch cords must be individually packed in a plastic bag with cardboard reinforcement, put into boxes and shipped on wood pallets.

Marking

The packing will be marked with the product catalogue number and the sales order number.

The connector identification system patch cords must have a test report with Insertion Loss and Return Loss measured against a reference connector.

MTP connector Specifications

Type	Single mode	
	(UPC APC polish)	
Insertion Loss	≤0.30dB	
Return Loss	≥55 dB	≥60 dB
Durability	≥1000 times	
Operating Temperature	-40°C ~ +80°C	
Test Wavelength	1310nm	

Pricing Model

In order to avoid different lengths or types of patch leads being supplied by different suppliers, the tender for this item will be awarded to the supplier who satisfies all technical requirements, but has the lowest bundle price.

The bundle price must contain the following:

- 5x 5m patch cords, MTP connectors on both ends, 12 fibre strands
- 5x 10m patch cords, MTP connectors on both ends, 12 fibre strands
- 5x 15m patch cords, MTP connectors on both ends, 12 fibre strands
- 5x 20m patch cords, MTP connectors on both ends, 12 fibre strands
- 5x 5m patch cords, MTP connectors on both ends, 24 fibre strands
- 5x 10m patch cords, MTP connectors on both ends, 24 fibre strands
- 5x 15m patch cords, MTP connectors on both ends, 24 fibre strands

- 5x 20m patch cords, MTP connectors on both ends, 24 fibre strands
- 5x 5m patch cords, MTP to LC-APC fanout, 12 fibre strands
- 5x 10m patch cords, MTP to LC-APC fanout, 12 fibre strands
- 5x 15m patch cords, MTP to LC-APC fanout, 12 fibre strands
- 5x 20m patch cords, MTP to LC-APC fanout, 12 fibre strands
- 5x 5m patch cords, MTP to LC-APC fanout, 24 fibre strands
- 5x 10m patch cords, MTP to LC-APC fanout, 24 fibre strands
- 5x 15m patch cords, MTP to LC-APC fanout, 24 fibre strands
- 5x 20m patch cords, MTP to LC-APC fanout, 24 fibre strands

The supplier will be expected to supply a full list of patch cords with a tender price for each item. The list must have the following connector combinations:

- MTP to LC-APC fanout (12 fibre strands/connectors)
- MTP to LC-APC fanout (24 fibre strands/connectors)
- MTP to MTP (12 fibre strands)
- MTP to MTP (24 fibre strands)

A pricelist must be supplied for the following list of patch lead lengths: 5m, 10m, 15m, 20m, 25m, 30m, 35m, 40m, 45m, 50m.

Therefore, the full price list submitted by the supplier for this tender item (MTP/MPO Optical Patch Leads) must be 4*10 = **40** line items.

8- OPTICAL FIBRE MONITORING EQUIPMENT

Monitoring principles

The monitoring shall be based on the OTDR (Optical Time Domain Reflectometer). The RTU (Remote Test Unit) shall constantly compare levels between a reference OTDR trace and the OTDR trace at the time of the test.

In order to have a fast scanning time without degrading the fault localization performance, for each monitored fibre the RTU shall handle two reference traces. The first one will be used for detection. It shall have a short acquisition time. The second one will be used for fault confirmation and localization. It shall have a high resolution. The second one will be used only if there is anomaly detected with the first one.

The fault distance shall be given in optical distance (as measured by the OTDR) but also in physical distance taking into account refractive index and helix factor.

Alarm management

- There shall be storage for the active alarms and storage for the historical alarms. An alarm shall be considered active until it is cleared and acknowledged
- The alarm ticket shall show:
 - The RTU which detected the alarm
 - The timestamp of the alarm
 - The optical distance of the fault from the origin
 - The physical distance of the fault from the nearest connectors/splices.
 - The names of the user who acknowledged the ticket with the time when it happened
- It shall be possible to generate an alarm report from the alarm ticket
- The alarm report shall be in HTML format
- The alarm report shall contain the same information as the alarm ticket and the OTDR trace.

Alarm dispatching

- It shall be possible to notify users by e-mail according to on duty schedule
- It will be possible to define backup for each user
- The alarm shall be considered correctly transmitted until it is acknowledged, but the system will notify the backup user if an alarm is not acknowledged

Performance report

The performance report shall show for a set of monitored fiber and a period of time:

- A bar chart giving the number of alarms according to the severity
- A logarithm bar chart giving the fibre availability when not in an alarm state
- A pie chart showing the breakdown of the alarm duration

Access from a web browser

From a web browser, it shall be possible:

- To list the active alarms
- To acknowledge the alarms
- To clear the alarms
- To make a measurement on demand
- To generate an alarm report
- To generate a performance report

Remote Test Unit technical requirements**Mechanical design**

- The RTU shall be equipped with brackets to be mounted in 19" racks
- The depth must be less than 300mm with all the fibre and the cables connected
- All the connectors electrical and optical shall be available on the front panel

Environment

- Operating temp: 0°C to 55°C
- Storage temp: -20°C to 60°C
- Humidity: 95% without condensing
- EMI/ESD: CE Compliant
- The RTU must be compliant with the Restriction of Hazardous Substances directive

Reliability

The RTU shall not be equipped with media storage using moving parts such as magnetic hard disk

Data communication

- The RTU shall be equipped with an Ethernet interface
- It shall be possible to setup the RTU from a standard web browser
- In case of alarm, if the server is not reachable the RTU shall be able to send an e-mail to a user

Power supply

- DC input: -38 to -72V
- Power consumption max: 50W
- Power consumption (average): <30W
- Dual power feeds

Relay contacts

- The RTU must be equipped with 3 relays that correspond respectively to Unit alarm, major optical alarm and minor optical alarm
- The relay must be closed in normal condition
- The nominal relay switching capacity must be 1A @30VDC, 0.5A@125VAC or better

OTDR test unit

- Laser safety class: 21 CFR Class I, IEC825 Class 3A
- Recalibration period ≥ 2 years
- MTBF ≥ 2 years
- Wavelength: **1625nm**
- Dynamic Range ≥ 40 dB at 20 μ s
- Attenuation Dead Zone (measured at ± -0.5 dB from the linear regression using a LC type reflectance) ≤ 4 m
- Event dead zone (measured at ± -1.5 dB down from the peak of an unsaturated reflective event) ≤ 3 m
- Attenuation dead zone ≤ 15 m

Distance Accuracy:

- Offset error ≤ 1 m
 - Scale error $\leq 1E-4$
 - Sampling error ≤ 0.5
 - Loss/reflectance accuracy:
 - Backscatter measurements (1 dB steps) ± 0.05 dB
 - Reflectance measurements ± 2 dB
 - Minimum sample spacing ± 8 cm
 - Modulation = 1 kHz
 - Pulse width = 10ns to 20 μ s
 - Stability = ± 0.1 dB at 1625nm
- Horizontal parameters:
- Range = 0 – 400km
 - Span = 0.1 – 400km
 - Readout resolution = 0.1 m
 - Length unit = km
 - Number of sample points: up to 64 000

Vertical parameters:

- Vertical scale: 0.1 μ V 10 dB/div
- Readout resolution = 0.001 dB
- Reflectance range = -14 to -60 dB

Optical switch

- The Optical switch must be a plug-in module that can be plugged directly on the front panel
- Repeatability - 0.01dB
- Several standard sizes must be available, to test typically 16, 32, 64 or more fibres
- The RTU must be modularly expandable, with a maximum capacity of at least 264 fibres
- Insertion loss: 1.1 dB including connector
- Crosstalk: 80dB
- Switching time: 25ms
- Lifetime: 100 million cycles
- The optical switch must be able to function as a stand-alone unit at a remote site. This unit will be under the control of a central RTU/OTDR and will function as a remote shelf of the RTU.

OFMS deployments

The bidder shall provide a list of references for complete OFMS deployments for these last 3 years. For each project the following information are required:

- Customer name
- Number of RTUs deployed
- Date of the deployment
- Number of fibres under test

DWDM filters

In order to perform live-fibre monitoring, the OFMS must support DWDM combiners/splitters to enable a client signal to be multiplexed with the signal from the OTDR unit. These filters must be supplied as standard list items on the tender (see pricing schedule). Three types of filters will be allowed: individual filters with three connectors (OTDR, Client, common), a filter/wavelength blocker integrated into a patch lead and an attenuator type filter/wavelength blocker with an LC male and female port. The CoCT has a preference for the integrated patch lead. The filters must be available in the following configurations:

- 1550/1625nm ingress filter (combiner)
- 1550/1625nm egress filter (splitter/wavelength blocker: the 1625nm wavelength being blocked)
- 1310/1625nm ingress filter (combiner)
- 1310/1625nm egress filter (splitter/wavelength blocker: the 1625nm wavelength being blocked)

All the filters must be available with the following connector types:

- LC-APC
- LC-UPC
- SC-APC
- SC-UPC

The insertion loss of the filter cannot exceed 0.5 dB. Band pass filters may be used instead of egress filters, on condition that the supplier can prove interworking with the standard optical transceivers in use by the City.

Filter Boxes

The City requires the filters to be installed in its existing TE/Commscope VTS ODF frames, as well as a patch-panel type for smaller stations.

Accessories

The supplier must provide all necessary accessories for implementing the OFMS solution, including mounting brackets, screws and power cords, etc.

Intended use

The optical fibre monitoring system tests selected fibre strands on the network on an on-going basis, in order to detect faults such as a cable break, as well as to compare the specifications of the fibre strand to an accepted benchmark, which enables the network management to detect slow failures such as fibre degradation over time.

Long-term performance requirements

The optical fibre monitoring system supplied in compliance with this specification shall be capable of withstanding the typical service conditions of South Africa for many years without detriment to the operation and maintenance

characteristics.

The optical fibre monitoring system shall be designed, manufactured and packaged so that the physical, operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of South Africa and the expected environmental conditions during storage and transportation.

General requirements

The OFMS must be rack mounted for installation on a false floor in a data center environment. It will be connected to the City intranet in order to communicate with a central server. The server will not only store reference traces of all the tested fibres in the network, but will also serve as a network management system, generating alarms and notifying the relevant personnel in the case of faults on the network.

System technical requirements

System Overview

- The system shall have a client - server architecture.
- The system shall be a multi user system
- The system shall provide access from a web browser
- The communications between the different elements of the system shall be TCP-IP based

Server

- The server shall be equipped with 2 hard disks and a mirroring mechanism.
- The server shall be equipped with a tape to backup the database
- The server shall use an Oracle or similar database for storing reference OTDR traces and alarm history
- It shall be possible to interface the server with a GIS based facilities management system in order to locate the exact geographic position of the fibre fault
- The supplier must additionally quote on a remote hot standby backup server ready to replace the primary server when it fails (high availability)
- All server hardware required must be specified by the vendor but will be supplied by the City

Client station

- The client stations will be provided by the supplier
- The supplier shall specify the minimum requirements

Security

- The access to the system shall be only possible after the user enters a log-in and a password
- The system shall have a general administrator who defines the users profiles
- The profile shall be composed with the following privileges:
 - RTU set up
 - Test set up
 - Alarm acknowledgement
 - Alarm clearing
 - Alarm filtering

9 – GNSS Survey System

The City requires a GNSS (Global Navigation Satellite System) field capturing survey system with decimetre-accuracy for capturing existing outside plant infrastructure, as well as planning for new infrastructure. The system must consist of a ruggedized tablet coupled to a pole-mounted GNSS receiver. The system must be supplied with a yearly calibration for three years. The system must have the following features:

- Tablet:
 - Dust and waterproof (IP65)
 - Built-in camera for geo-tagged photos
 - Adjustable brightness for use in full-sun conditions
 - Windows 7 or higher OS
 - At least 4 GB of RAM
 - At least 1.6 GHz processor
 - Connectivity with Wi-Fi, Bluetooth and 3G
 - 128 GB solid state hard drive
 - Capacitive touchscreen with stylus, at least 1024x 600 resolution
 - At least 5 hours of battery life, AC charging kit included
 - Pole mount and carry case included
 - Built-in GPS: 50 channel (L1 code/carrier), RTCM v2.3, SBAS, 1Hz update rate, NMEA-0183, UBX binary, 2-4 m accuracy
 - Operating temperature -20 to 60 degrees Celsius

- o Drop strength according to MIL-STD-810G (multiple 4-foot drops)
- o Swappable battery packs
- Receiver
 - o Decimetre accuracy (10cm)
 - o 220 channels
 - o Compatible with GPS (L1C/A, L2C, L2E), GLONASS (L1C/A, L1P, L2C/A, L2P), WAAS, EGNOS, MSAS, GAGAN
 - o Update rate = 1Hz
 - o Time to first fix = 45s or less
 - o Swappable battery packs
 - o Operating temperature -20 to 60 degrees Celsius
 - o Drop strength according to MIL-STD-810G (multiple 4-foot drops)
 - o At least 10 hours of battery life, AC charging kit included
 - o Connectivity min-USB and Bluetooth
 - o GNSS antenna
 - o Dust and waterproof (IP65)
 - o Unit must include a pole and mount

10 - TEST EQUIPMENT

Test equipment must be supplied with all relevant test leads etc. The vendor must include yearly calibration in the price of each device.

10.1 Ruggedized Optical Time Domain Reflectometer (OTDR)

The City requires a ruggedized hand-held platform for field-testing its optic fibre network. The main use of this platform is as OTDR, but other modules may be necessary, such as an Ethernet tester or Optical Spectrum Analyser, as discussed below.

The typical features of the OTDR platform the City requires is as follows:

Display	Touchscreen, color, 640 x 480 TFT 163 mm (6.5 in)
Interfaces	Two USB 2.0 ports RJ-45 LAN 10/100/1000 Mbit/s Fiber inspection probe connector port (video) Built-in Bluetooth and Wi-Fi (hardware option)
Storage	8 GB internal memory (flash)
Battery	Rechargeable lithium-ion batteries 8 hours of operation as per Telcordia (Bellcore) GR-196
Power supply	AC/DC adapter, input: ~ 100 – 240 V; 50/60 Hz; 1.6 VA max, output: --- 24 V; 3.75 A
Computer	Intel ATOM processor Windows Embedded Standard

Temperature Operating Storage ^b	-5 °C to 50 °C (23 °F to 122 °F) -40 °C to 70 °C (-40 °F to 158 °F)
Relative humidity	0 % to 95 % non-condensing
Size (H x W x D)	322 mm x 197 mm x 109 mm (12 ¹¹ / ₁₆ in x 7 ³ / ₄ in x 4 ⁵ / ₁₆ in)
Weight ^b	2.1 kg (4.6 lb)
Vibration	<1.5 g at 10 Hz to 500 Hz (on three main axes)
Mechanical shock	<760 mm on six sides and eight main edges (compliant to GR-196-CORE)

The typical features of the OTDR module are as follows:

Wavelengths (nm) ^b	1310 ± 20 1383 ± 1 1550 ± 20 1625 ± 10
Dynamic range at 20 μs (dB) ^c	42/40/41/41
Event dead zone (m) ^d	0.8
Attenuation dead zone (m) ^d	4/4/4.5/4.5
Distance range (km)	1.25, 2.5, 5, 10, 20, 40, 80, 160, 260, 400
Pulse width (ns)	5, 10, 30, 100, 275, 1000, 2500, 10 000, 20 000
Linearity (dB/dB) ^b	±0.03
Loss threshold (dB)	0.01
Loss resolution (dB)	0.001
Sampling resolution (m)	0.04 to 5
Sampling points	Up to 256 000
Distance uncertainty (m) ^e	±(0.75 + 0.001 % x distance + sampling resolution)
Measurement time	User-defined (5 sec. minimum to 60 min. maximum)
Typical real-time refresh (Hz)	4
Stable source output power (dBm) ^f	-4.5

The platform must be supplied with power cords, batteries, a carrying case and optical test leads. The optical test port MUST have a LC optical coupler (preferably APC).

10.2 Optical Spectrum Analyser (OSA)

The OSA can either be supplied in a stand-alone package or as a plug-in module to the OTDR platform mentioned above. If the vendor intends to supply a stand-alone solution, the platform specifications mentioned above will apply.

The OSA will comply with the following specifications:

Optical Spectrum Analyser (OSA)	for spectral measurements on the DWDM and ROADM-based network, providing OSNR measurements based on a specified in-band OSNR method
Specification	Range
Spectral Range	1250-1650 nm
Wavelength Accuracy ¹ (Signal from +5 to -30 dBm in C&L band from 15°C to 30°C)	±40 pm (±20 pm typical)
Power Range ^{2 3 4} (Maximum total safe power + 25 dBm; In C&L band; With averaging; linearity may be degraded above +15 dBm)	+15 to -65 dBm
Power Accuracy ⁵ (At -15 dBm in C band)	±0.5 dB
Polarization Dependence ⁶ (At 1550nm; at 23°C ±2°C)	±0.1 dB
Resolution Bandwidth ³ (In C&L band)	<70 pm
Optical Rejection Ratio ^{3 7} (In C&L band; With the 60 pm resolution)	40 dBc at ±50 GHz from peak 35 dBc at ±25 GHz from peak 25 dBc at ±12.5 GHz from peak
Measurement Time at Full Resolution	8s for full scan 40 nm/s for small scan
Channel Table	512
Optical Return Loss	> 40 dB
Channel drop	
Spectral Range	1250-1650 nm
Modulation Rate	Up to 40 Gb/s
Filter Bandwidth (In C&L band)	From 60 pm to 800pm
Crosstalk (In C&L band)	Up to 65 dB
General	
Operating Temperature	0°C to +40°C
Storage Temperature	-20°C to +70°C
Humidity	95% RH non-condensing
Battery Operation	Yes
Operating System	Windows XP, Professional or Windows 7
Display	25-30cm colour XGA (1024x768) LCD with touch screen interface
Internal storage	20 GB (min) hard drive
Removable Storage (modular)	Standard: CD-R/W Optional: 3.5 inch 1.44 MB floppy
Interfaces	USB (2), 10/100 Ethernet
Power Supply	220-230 VAC (50 Hz)
Optical Test port	LC-APC
Environmental conditions	Operation: 0° to 45°C (32° to 122°F) Storage: -25° to 60°C (-13° to 140°F) Humidity: 95% max, non-condensing
Weight	No more than 8kg

The platform must be supplied with power cords, batteries, a carrying case and optical test leads. The optical test port MUST have a LC optical coupler (preferably APC).

10.3 Ruggedized Power Meter

The City requires a ruggedized hand-held optical power meter for measuring power levels in primarily the 1310 and 1550nm spectrums. It will be used in conjunction with a 1310/1550nm light source described below to do end-to-end testing of long fibre links. It will comply with the following specifications:

Handheld Power Meter	for attenuation and power throughput measurements on point-to-point fibre optic links
Connector Adapter	LC-APC
Fibre Type	MM/SM
Calibrated Wavelengths	850, 1300, 1310, 1490, 1550, 1625 nm
Power Range	+10 to -60 dBm
Guaranteed Specifications power Range	+5 to -60dBm (+10 to -50 dBm at 850 nm)
Accuracy	±0.2 dBm
Linearity	±0.2 dB
Modulation Detect	2 kHz
Stability	±0.1 dB
Warranty	3 years
Auto-Zeroing	Yes
Warm Up Time	0s
Display	LCD
Power Supply	9V battery or optional AC adapter
Operational Temperature Range	-10° to +50°C
Storage Temperature Range	-25° to +60°C
Relative Humidity	5% to 95% non-condensing

The device must be supplied with power cords, batteries, a carrying case and optical test leads. The optical test port MUST have a LC optical coupler (preferably APC).

10.4 Connector Inspector (LC/SC)

10.5

The City requires optical connector inspection modules to field inspect the physical condition of optical connectors, specifically LC and SC connectors. The inspector can be supplied as a hand-held stand-alone unit with a USB connector for viewing on a smart-phone or PC, with its own screen or as an integrated component of the OTDR platform. It must also have a WiFi radio to connect to a smart phone, when the USB connector can't be used.

It will have the following specifications:

Connector Inspector	for inspecting fibre optic connector end-face contamination
Field of View	~400µm x 300µm
Resolution	0.5µm detectable
Focus	Manual adjustment, 2mm max travel
Handset Dimensions	Approx.. 32mm x 175mm (without a tip)
LCD version	
Monitor Set	Foldable
LCD Monitor	3.5" TFT-LCD; Brightness/ Contrast adjustable
Power Supply	9.6V battery pack (last 4 hours) with charger; or AC power supply
USB version	
USB video capture device	USB 2.0 port, single snap shot, with software for Windows® XP/7
Power Supply	USB port of PC

The device must be supplied with power/USB cords, batteries and a carrying case. It MUST be able to test both a LC optical coupler as well as a SC connector (UPC and APC).

10.5 Visual Fault Locator (pen-type LC)

The City requires a visible-light optical fault locator to find faults in optical patch leads as well as to confirm end-to-end connectivity of patch connections. The preference is for a battery-powered pen-type device with a LC-connector and bright output light, preferably red. It MUST be supplied with a LC optical coupler (preferably APC). The following specifications are typical:

Operation (Hz)	2 to 3	
Wavelength (nm) (typical)	650 to 660	
Emitter type	Laser	
Power output ^b (typical) (mW)	0.6	
Distance range ^c (typical) (km)	5	
Operation mode	Pulsed and CW	
Power supply	2 AAA alkaline batteries	
Laser class	2	
Battery life ^d (h)		
pulsed	40	
Length	157 mm	(6 ³ / ₁₆ in)
Maximum diameter	12 mm	(1/2 in)
Weight (with batteries)	70 g	(2.5 oz)
Temperature		
operating	-10 °C to 45 °C	(14 °F to 113 °F)
storage	-30 °C to 60 °C	(-22 °F to 140 °F)

10.6 Light Source 1310/1550nm

The City requires a light source that operates at 1310- and 1550nm for end-to-end testing of long optical links as well as for fault finding. The light source will be used in conjunction with the hand-held power meter described above. It should be supplied either as a stand-alone device or as a plug-in unit to the OTDR platform described above. Below are some typical specifications it must comply to:

Central wavelength (nm)	1310 ± 20 1550 ± 20
Spectral width ^b (nm)	≤5
Output power (dBm)	≥1/≥1
Power stability ^c (dB)	
15 min	±0.03
8 h	±0.1
Auto-switching	Yes
Tone generation	270 Hz, 1 kHz, 2 kHz
Battery life (hours) (typical in Auto mode)	50
Warranty (years)	3

If the device is stand-alone, it must be supplied with power/USB cords, batteries and a carrying case. It MUST be supplied with a LC optical coupler (preferably APC).

10.7 Ethernet Tester (10Gbps)

The City requires an Ethernet network tester that can test Ethernet ports and traffic flow across the network, up to 10Gbps. It MUST be able to do full Metro Ethernet testing and optionally MPLS as well. The following specifications must be met:

Compulsory:

- Full Ethernet testing features and pass through capability for in-service monitoring
- Dual port testing: run any application on port 1 and a smart loopback on port 2
- Throughput, latency, frame loss, and back-to-back measurements per industry-standard RFC2544 and V-SAM tests (per ITU-T Y.1564)
- Ethernet BER testing at Layer 1, Layer 2, Layer 3 and Layer 4, with or without VLAN and MPLS tags
- Link Partner auto-negotiation advertisement analysis
- Q-in-Q (VLAN stacking)
- MAC flooding and VLAN flooding
- IPv4 and IPv6 traffic generation
- Multiple stream traffic generation and analysis for end-to-end QoS verification of multiple services
- Smart Loop mode for Layer 1, Layer 2, Layer 3, and Layer 4
- 10GE LAN/WAN XFP or SFP+, 100Base-FX/1000Base-X SFP, 10/100/1000Base-T RJ45 ports
- IEEE 802.1ab, 802.1ag, 802.3ah

Optional:

- MPLS, MPLS-TP, PBB (802.1ah) support
- ITU-T Y.1731 and MPLS-TP OAM support
- multiple MPLS tag support

The tester must have a ruggedized housing with its own battery supply and must be supplied with power cords, battery, carry case, test leads and LC optical port.

10.8 Ethernet Loopback Responder

The City requires an Ethernet loopback responder for use in conjunction with the Ethernet Tester mentioned above. This will enable end-to-end SLA testing and verification. It must support the following features:

- 10/100/1000Base-T Electrical port (IEEE802.3), RJ45
- 1000Base-X Optical port
- BERT, RFC2544
- supervisory port to configure IP address

It must support the following loopback modes:

- Layer 1, Layer 2, Layer 3, and Layer 4 modes are available for looping back test traffic
- Layer 1: loops back all incoming traffic
- Layer 2: all incoming unicast traffic is looped back with MAC source and destination addresses swapped
- Layer 3: all incoming unicast traffic is looped back with MAC and IP source and destination addresses swapped
- Layer 4: all incoming unicast traffic is looped back with MAC, IP, and UDP/TCP ports swapped

10.9 LC Optical Connector Cleaner

The City requires a pen-type one-click device for cleaning the end-face of LC optical connectors (both UPC and APC). It will have the following typical features:

- Easy pushing motion engages connector and initiates cleaner
- Disposable with 750+ cleanings per unit
- Cleaning system rotates 180 for a full sweep
- Extendable tip reaches recessed connector
- Cartridge refills must be available

10.10 LC Mid-Coupler Ferrule Cleaner

The City requires a pen-type one-click device for cleaning the ferrules of LC mid-couplers. It will have the following typical features:

- Cleans LC, MU and other 1.25mm ferrule fibre optic connectors
- Cleaning tip adjustable to 45 degrees for angled adapters
- 350 swipes per cleaner (1 swipe per cleaning)
- Polyester static free cloth for optimal cleaning
- Spring-loaded tip for controlled cleaning pressure

10.11 MTP/MPO Optical Connector Cleaner

The City requires a pen-type one-click device for cleaning the end-face of MTP/MPO optical couplers. It will have the following typical features:

- Used to remove dirt, oil, and debris from MPO fibre optic connectors
- Easy pushing motion engages connector and initiates cleaner
- Disposable with 600+ cleanings per unit
- Extendable tip reaches recessed connectors
- Fully compatible with MTP products

10.12 OTDR Launch Leads

Optical Time Domain Reflectometers (OTDRs) suffer from the problem of giving errors if the cable under test is plugged directly into the machine. In order to overcome the problem a fibre optic launch lead is required of sufficient length to compensate for the errors. It should have the following typical features:

- Up to three fibres with a maximum cumulative fibre length of 2,000 metres in any combination of singlemode fibre
- Fibre lengths selectable in 100 metre increments
- Ruggedized tails for field use
- Choice of connector styles (ST, SC, LC)
- The bare fibre spool is secured inside the box from which two ruggedized flying leads provide approximately 1 metre of connectivity

11 – BLOWN FIBRE DUCTS

11.1 Direct Buried Micro Ducts 5/8mm HDPE

Scope

This specification details the requirements for 5.0mm internal diameter / 8.0 mm outer diameter Primary Blown Fibre Tube allowing blown fibre units to be installed up to typical distances of 1000m depending on route topology, installation pressure and nature of the fibre unit.

Additionally, this specification details the requirements for a range of sheathed Multi Blown Fibre Tube assemblies, accommodating direct buried (non-metallic) applications.

The supplier shall be registered to ISO9001 and ISO14001.

The supplier should provide pricing for both HDPE ducts for direct burial applications, as well as MDPE ducts for indoor use.

Detailed Specifications

Primary Tubes

The primary tubes shall be dual layer.

Material

The inner surface of the tubing shall be constructed from a suitable material in order that the completed tubing shall meet the blow performance requirements of this specification.

For co-extruded tubing, the inner liner shall bond intimately with the tube wall material and there shall be no delamination/separation of the layers over the life of the product.

The primary tube shall be circular and uniform in cross section throughout its length. The primary tube shall be free from pin holes, joints, water splash marks, die-marks, repairs and all other defects. The wall of the tubing shall be constructed from a suitable HDPE material.

Dimensions

Dimensions of the tube shall be:

- External diameter = 8.0 +/- 0.1 mm.
- Internal diameter = 5.0 +/- 0.1 mm.

Primary tube surface texture

The internal surface shall be coated with a low friction liner.

Blown Fibre Tube Accessories Compatibility

The primary tube shall be compatible with commercially available tube connectors and withstand a burst pressure of 25 850 mbar. The operating pressure should be 10 000 mbar.

1 Way cable assemblies must be supplied with 1 ripcord which must be laid under the sheath. All 2 – 12 Way cable assemblies must be supplied with 2 ripcords to enable mid span break out. The ripcords shall provide an effective

means of slitting the sheath longitudinally to facilitate its removal and to gain access to the primary tubes, down to -10°C.

Tube assemblies shall be sheathed in high density polyethylene coloured YELLOW (unless otherwise stated on the purchase order) with a non-metallic tape moisture barrier beneath the sheath and formed outside of the primary tubes. The supplier should state the specification of the tape, including the sheath/tape peel strength performance. The sheath shall be circular in cross section and the curvature of the external surface shall not be concave at any point. The sheath shall be uniform in cross section throughout its length. It shall be free from pin holes, joints, repairs and other defects. Any compressive force applied by the sheath to the primary tubes as a result of the manufacturing process shall not alter the primary tube maximum/minimum external diameter ratio by more than 1:1.1.

Primary Tube Identification

The primary tubes shall be identified by colour, as specified below for each assembly size

2 Way Cable Assembly

1 = red
2 = green

4 Way Cable Assembly

1 = red
2 = green
3 = blue
4 = yellow

7 Way Cable Assembly

1 = red
2 = green
3 = blue
4 = yellow
5 = grey
6 = white
7 = brown

12 Way Cable Assembly

1 = red
2 = green
3 = blue
4 = yellow
5 = grey
6 = white
7 = brown
8 = violet
9 = turquoise
10 = black
11 = orange
12 = pink

Installation Performance of Fibre Unit within Tube Cable Assemblies

All tube cable assemblies must be tested with the 4f blown fibre units at a 30m/s air flow rate and at least 10 bar pressure under the following test requirements:

Test Requirements

- Blown Fibre Tube type/assembly = primary or sheathed tubing
- Blown Fibre Tube assembly length = 500 metres
- Fibre unit type = 4 fibre
- Cable drum belly diameter (maximum) = 509mm
- Cable drum width (maximum) = 546mm
- Direction of Blow = Outside to drum centre
- Minimum blowing speed = 22 meters/minute
- Maximum blowing speed = 25 metres/minute
- Climatic window limit (Wet end) .t = +10°C
- Climatic window limit (Wet end) Dewpoint = -15°C
- Climatic window limit (Static end) .t = -25°C
- Climatic window limit (Static end) Dewpoint = -25°C

Pass criteria

Maximum fibre unit installation time is 21 minutes
 Ref: Cockrill et al "Blown fibre reference test blowing route."
 IWCS paper 1997 PP 348-353

Tube Performance Tests**Environmental Stress Crack Performance**

The primary tube wall material shall meet the Environmental Stress Crack resistance.
 The ESCR is carried out by the raw material supplier in accordance with ASTM D1693 B, with a result greater than 500 hours.

Tube assemblies for external ducts

- Conditioning temperature: 50°C
- Conditioning time: 7 days
- Sample size: U shape – Dia = 12D
- Reagent: ANTAROX CO-630 or Caflon CF30

Environmental Performance

A 500 metre length of primary or sheathed tubing shall be placed in an oven at +85°C for a period of 7 days. After removal from the oven the following test sequence shall be met on a Product Approval basis:

- The aged tubing shall conform to the installation performance requirements of this specification
- The aged tubing shall be filled with water for a period of 7 days at +20°C.
- Following removal of the water the tubing shall conform to the blow performance requirements of this specification

Other Requirements

The method of testing the primary tube integrity, continuity and length of tubes should be provided by suppliers.

Sheathed Assembly Ends

The sheathed assembly ends shall be sealed to prevent the ingress of moisture.

Sheathed Assembly Supply

The sheathed assembly shall be packaged and supplied on a wooden cable drum and suitably protected with wrapping and/or batons.

Tensile Performance

Test in accordance to IEC60794-1-2 Method E1.

The following requirement applies to primary tube and sheathed multi tube assemblies.

Test Requirements

- Tubing length (gauge length) \geq 1m
- Rate of extension of tubing \geq 20mm/minute
- Duration of maximum load = 10 minutes
- Tensile load parameter = 100N

Acceptance criteria

No permanent damage or deformation to the primary tubing or component parts of the sheath assembly after an applied load at 20mm/minute.

Crush Performance

Test in accordance with IEC 60794-1-2 Method E3.

The following requirement applies to primary tubing and sheathed multi tube assemblies

Test Requirements

- Tubing length \geq 1 metre
- Maximum load applied = 700 N
- Duration of maximum load = 1 minute
- Number of applied loads = 3 (minimum) at no less than 500mm apart without rotating the cable

Acceptance criteria

- No permanent damage shall be imparted to the sheath or tubes as a result of this test
- Permanent deformation of the individual primary tube diameter shall be less than 0.5mm as a result of this test.

Bend Performance

Test in accordance with IEC 60794-1-2 Method E11

The following requirement applies to primary tubing and sheathed multi tube assemblies

Test Requirements

- Mandrel diameter = 12 x cable diameter
- Tubing sample length \geq 1 metre (or to suit sample size)
- Number of turns per cycle = 5
- Number of cycles = 3

Acceptance criteria

- No permanent damage shall be imparted to the sheath or tubes as a result of this test
- Permanent deformation of the individual primary tube diameter shall be less than 0.5mm as a result of this test.

Stiffness

Test in accordance with IEC 60794-1-2 Method E17C

The following requirement applies to Primary tube only

Test Requirements

- Separation factor = 14
- Duration of test = 5 minutes
- Number of samples to be tested = 10
- Selection of samples to be tested = 1 sample/50 metres
- Length of test sample = 100mm

Acceptance criteria

- Direct Buried and Install Stiffness (EI) to be in the range 4×10^{-3} to 12×10^{-3} Nm²

Pneumatic Performance

The following requirement applies to Primary tube only

Test Requirements

- Test temperatures = 0°C to +40°C
- Pressure medium = Water (+anti freeze)
- Proof test pressure = 12,925 mbar
- Duration of proof test pressure = 24 hours
- Minimum burst test pressure = 25,850 mbar

Acceptance criteria

- Primary tubing shall be capable of sustaining the stated requirements without bursting or loss of pressure

Impact Performance

Test in accordance with IEC 60794-1-2 Method E4

The following requirement applies to primary tubing and sheathed multi tube assemblies

Test requirements

- Number of impacts = one in 3 different places spaced no less than 500mm apart
- Striking surface radius = 10mm
- Impact force = 1J
- Recovery time = 1 hour

Acceptance criteria

- Under visual examination there shall be no damage to the protected microduct(s). There shall be no residual deformation greater than 0.5mm of the protected microduct(s) diameter, no splitting or permanent damage. The imprint of the striking surface on the sheath is not considered mechanical damage.

Repeated Bending

Test in accordance with IEC 60794-1-2 Method E6

The following requirement applies to primary tubing and sheathed multi tube assemblies

Test Requirements

- Bending Radius = 20 d or 30mm whichever is greater
- Load = Adequate to assure uniform contact with the mandrel
- Number of cycles = 25
- Duration of cycle = 2 seconds (approx.)

Acceptance criteria

- No permanent damage shall be imparted to the sheath or tubes as a result of this test
- Permanent deformation of the individual primary tube diameter shall be less than 0.5mm as a result of this test.

Kink

Test in accordance with IEC 60794-1-2 Method E10

The following requirement applies to primary tubing and sheathed multi tube assemblies

- Loop to be made of the cable, applying force to either end of the cable reduce diameter till kink occurs
- Measure and record minimum diameter at which kink occurs
- D = Cable nominal diameter.
- Bend = 15D

Acceptance criteria

- Cable shall kink at the defined bend or lower.

Friction Performance

Test Requirements

- Sample length: 1.5 m
- Mandrel diameter: 300mm

Acceptance criteria

A 5kg weight shall be pulled at 1000mm/min and travel 100mm. An average force of 2 pulls shall be recorded to give a coefficient of friction less than 0.1

Accessories

The bidder must supply a full list of all accessories that may be required for the installation of the micro ducts. This may include, but not be limited to:

- Airtight tube connectors (regular and gas/water-blocking)
- Airtight tube end caps
- T-joints, junction boxes and other branching units
- Water-blocking gel
- Building entry lead-ins, bends, termination boxes and gas seal units

Other Requirements

Delivery

The microduct must be delivered to the City Of Cape Town on strong treated wooden drums or other approved alternatives. The manufacturer must guarantee a cable drum with a minimum lifetime of five (5) years when stored outside in typical South African weather conditions. The delivery address will be supplied by the City of Cape Town Telecommunications Branch.

The following are approved dimensions for wooden drums:

- Maximum outside dimensions : 2.2 m x 1.15 m
- Minimum spindle hole diameter : 90 mm
- The drum must have the following information clearly painted on it:
 - o CITY OF CAPE TOWN
 - o The Contract No.
 - o Order No.
 - o The unique drum number.
 - o The type of microduct and number of tubes.
 - o The length of the microduct in meters.
 - o The gross mass of the microduct and drum in kilograms.

Microduct length requirements

The microduct lengths must be delivered in excess of or equal to 1000 meters, unless otherwise specified. Shorter microduct lengths will only be accepted with the concession of the City of Cape Town.

Information to be furnished by Supplier

- Nominal microduct length per drum
- Microduct outer/inner diameter
- Maximum variation of microduct diameter
- Installation tension under normal and worst case conditions
- Minimum installation bending radius
- Microduct mass per unit length
- Maximum microduct strain for zero fibre strain
- Ultimate tensile strength of the microduct
- Drawing or sketch indicating microduct make up

11.2 Direct Install Blown Fibre Mini Ducts (10/12mm)**Scope**

This specification details the requirements for 12mm outer diameter / 9.8 mm internal diameter Primary Blown Fibre Tube allowing blown fibre units to be installed up to typical distances of 500m depending on route topology, installation pressure and nature of the fibre unit.

The supplier shall be registered to ISO9001 and ISO14001.

Detailed Specifications for Primary Tubes

The primary tubes shall be dual layer.

Material

- The inner surface of the tubing shall be constructed from a suitable material in order that the completed tubing shall meet the blow performance requirements of this specification.
- For co-extruded tubing, the inner liner shall bond intimately with the tube wall material and there shall be no delamination/separation of the layers over the life of the product.
- The primary tube shall be circular and uniform in cross section throughout its length. The primary tube shall be free from pin holes, joints, water splash marks, die-marks, repairs and all other defects. The wall of the tubing shall be constructed from a suitable HDPE material.

Dimensions

Dimensions of the tube shall be:

- External diameter = 12.0 ± 0.1 mm.
- Internal diameter = 9.8 ± 0.1 mm.

Primary tube surface texture

- The internal surface shall be coated with a low friction liner.

Blown Fibre Tube Accessories Compatibility

- The primary tube shall be compatible with commercially available tube connectors and withstand a burst pressure of 37500 mbar.

Operating Pressure

- The operating pressure will be 15000 mbar.

Metallic Direct Burial Tube Assemblies

- All products supplied must conform to the details contained in table below which must not be changed without prior consultation
- Tube assemblies must be supplied with 1 ripcord which must be laid under the sheath to enable mid span break out. The ripcords shall provide an effective means of slitting the sheath longitudinally to facilitate its removal and to gain access to the primary tubes, down to -10°C .
- Tube assemblies shall be sheathed in high density polyethylene coloured Yellow (unless otherwise stated on the purchase order) with a layer of medium density polyethylene on the inside, as well as an aluminium tape moisture barrier beneath the two sheaths and formed outside of the primary tubes. The supplier should state the specification of the aluminium tape, including the sheath/tape peel strength performance.
- The sheath shall be circular in cross section and the curvature of the external surface shall not be concave at any point. The sheath shall be uniform in cross section throughout its length. It shall be free from pin holes, joints, repairs and other defects. Any compressive force applied by the sheath to the primary tubes as a result of the manufacturing process shall not alter the primary tube maximum/minimum external diameter ratio by more than 1:1.1.

7 Way Tube Assembly Colour Codes

The 7-way must be supplied with the following colour-code:

- 1 = red
- 2 = green
- 3 = blue
- 4 = violet
- 5 = grey
- 6 = yellow
- 7 = orange

Installation Performance of Fibre Unit within Tube Cable Assemblies

All tube cable assemblies must be tested with the 24f blown fibre units at a 30m/s air flow rate and at least 15 bar pressure under the following test requirements:

Test Requirements

- Blown Fibre Tube type/assembly = primary or sheathed tubing
- Blown Fibre Tube assembly length = 500 metres
- Fibre unit type = 24 fibre
- Direction of Blow = Outside to drum centre
- Minimum blowing speed = 22 meters/minute
- Maximum blowing speed = 25 metres/minute
- Climatic window limit (Wet end) .t = +10°C
- Climatic window limit (Wet end) Dewpoint = -15°C
- Climatic window limit (Static end) .t = -25°C
- Climatic window limit (Static end) Dewpoint = -25°C

Pass criteria

- Maximum fibre unit installation time is 21 minutes
- Ref: Cockrill et al "Blown fibre reference test blowing route."
- IWCS paper 1997 PP 348-353

General Tube Performance Tests

Environmental Stress Crack Performance

- The primary tube wall material shall meet the Environmental Stress Crack resistance.
- The ESCR is carried out by the raw material supplier in accordance with ASTM D1693 B, with a result greater than 500 hours.
- Tube assemblies for external ducts
- Conditioning temperature: 50°C
- Conditioning time: 7 days
- Sample size: U shape – Dia = 12D
- Reagent: ANTAROX CO-630 or Caflon CF30

Environmental Performance

- A 500 metre length of primary or sheathed tubing shall be placed in an oven at +85°C for a period of 7 days.
- After removal from the oven the following test sequence shall be met on a Product Approval basis:
- The aged tubing shall conform to the installation performance requirements of this specification. The aged tubing shall be filled with water for a period of 7 days at +20°C.
- Following removal of the water the tubing shall conform to the blow performance requirements of this specification.

Other Requirements

The method of testing the primary tube integrity, continuity and length of tubes should be provided by suppliers.

Sheathed Assembly Ends

The sheathed assembly ends shall be sealed to prevent the ingress of moisture.

Sheathed Assembly Supply

The sheathed assembly shall be packaged and supplied on a wooden cable drum and suitably protected with wrapping and/or batons.

Primary Tube Type Tests

Tensile Performance

Test in accordance to IEC60794-1-2 Method E1.

Test Requirements

- Mini duct length under tension: 200m
- Tensile load: $0.5 W^*$
- Diameter of test pulleys: 30x OD
- Where Maximum tensile load = $0.5 \times 9.81 \times W$, N,
- W = mass of 1Km of component in Kg

Acceptance criteria

- There shall be no permanent deformation of the Primary tube. This shall be verified by passing the inner clearance test.

Crush Performance

Test in accordance with IEC 60794-1-2 Method E3

Test Requirements

- Sample length: 250mm
- Load: 50d or 450N whichever lower
- Duration of maximum load: 1 minute
- Recovery time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. This shall be verified by passing the inner clearance test. The imprint of the anvil on the sheath is not considered as mechanical damage.

Bend Performance

Test in accordance with IEC 60794-1-2 Method E11.

Test Requirements

- No Turns: 4
- Mandrel diameter: $.40 \times OD$ or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Stiffness Performance

Test in accordance with IEC 60794-1-2 Method E17C.

Test Requirements

- Separation factor = 14
- Duration of test = 5 minutes
- Number of samples to be tested = 10
- Selection of samples to be tested = 1 sample/50 metres
- Length of test sample = 100mm

Acceptance criteria

- Direct Buried and Install Stiffness (EI) to be in the range $4 \times 10E-3$ to $12 \times 10E-3$ Nm²

Pneumatic Performance

Test Requirements

- „h Proof test pressure 19500 mbar (20C for 0.5 hr)
- „h Minimum burst test pressure 37500 (20C for 0.5 hr)

Acceptance criteria

- Primary tubing shall be capable of sustaining the stated requirements without bursting or loss of pressure.

Impact Performance

Test in accordance with IEC 60794-1-2 Method E4.

Test requirements

- Striking surface radius: 10 mm
- Impact: 1 Joules
- Number of impacts 3
- Recovery Time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. The imprint of the anvil on the sheath is not considered as mechanical damage.

Repeated Bending

Test in accordance with IEC 60794-1-2 Method E11.

Test Requirements

- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Kink Performance

Test in accordance with IEC 60794-1-2 Method E10

Test Requirements

- Loop to be made of the cable, applying force to either end of the cable reduce diameter till kink occurs. Measure and record minimum diameter at which kink occurs
- D = Cable nominal diameter.
- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Friction Performance

Test Requirements

- Sample length: 1.5 m
- Mandrel diameter: 300mm

Acceptance criteria

- A 5kg weight shall be pulled at 1000mm/min and travel 100mm. An average force of 2 pulls shall be recorded to give a coefficient of friction less than 0.1

Flexibility Performance

Test in accordance with IEC 60794-1-2 Method E10

Test Requirements

- No Turns: 10
- Mandrel diameter: .15 xOD
- Duration: 30 min

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Tube Assembly Type Tests
Tensile Performance

Test in accordance to IEC60794-1-2 Method E1.

Test Requirements

- Miniduct length under tension: 50m
- Tensile load: 1 W*
- Diameter of test pulleys: 30x OD
- Where Maximum tensile load = 9.81 x W , N,
- W = mass of 1Km of component in Kg

Acceptance criteria

- There shall be no permanent deformation of the Primary tube. This shall be verified by passing the inner clearance test.

Crush Performance

Test in accordance with IEC 60794-1-2 Method E3

Test Requirements

- Maximum load applied via flat plate: 1 kN Direct Install; 2 kN Direct Burial
- Duration of maximum load: 1 minute
- Recovery time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. This shall be verified by passing the inner clearance test. The imprint of the anvil on the sheath is not considered as mechanical damage.

Bend Performance

Test in accordance with IEC 60794-1-2 Method E11.

Test Requirements

- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Flexibility Performance

Test in accordance with IEC 60794-1-2 Method E10

Test Requirements

- No Turns: 10
- Mandrel diameter: .20 x OD
- Duration: 30 min

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Impact Performance

Test in accordance with IEC 60794-1-2 Method E4.

Test requirements

- Striking surface radius: 10 mm

- Impact: 3 Joules for DI
- 5 Joules for DB
- Number of impacts 3
- Recovery Time: 1 hr

Acceptance criteria

Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. The imprint of the anvil on the sheath is not considered as mechanical damage

Accessories

The bidder must supply a full list of all accessories that may be required for the installation of the mini ducts. This may include, but not be limited to:

- Airtight tube connectors (regular and gas/water-blocking)
- Airtight tube end caps
- T-joints, junction boxes and other branching units
- Water-blocking gel

Other Requirements

Delivery

The miniduct must be delivered to the City Of Cape Town on strong treated wooden drums or other approved alternatives. The manufacturer must guarantee a cable drum with a minimum lifetime of five (5) years when stored outside in typical South African weather conditions. The delivery address will be supplied by the City of Cape Town Telecommunications Branch.

The following are approved dimensions for wooden drums:

- Maximum outside dimensions : 2.1 m x 1.15 m
- Minimum spindle hole diameter : 90 mm
- The drum must have the following information clearly painted on it:
 - o CITY OF CAPE TOWN
 - o The Contract No.
 - o Order No.
 - o The unique drum number.
 - o The type of miniduct and number of tubes.
 - o The length of the miniduct in meters.
 - o The gross mass of the miniduct and drum in kilograms

Miniduct length requirements

The miniduct lengths must be delivered in excess of or equal to 1000 meters, unless otherwise specified. Shorter miniduct lengths will only be accepted with the concession of the City of Cape Town.

Information to be furnished by Supplier

- Nominal miniduct length per drum
- Miniduct outer diameter
- Maximum variation of miniduct diameter
- Installation tension under normal and worst case conditions
- Minimum installation bending radius
- Miniduct mass per unit length
- Maximum miniduct strain for zero fibre strain
- Ultimate tensile strength of the miniduct
- Drawing or sketch indicating miniduct make up

11.3 Direct Buried Blown Fibre Mini Ducts (10/14mm)

Scope

This specification details the requirements for 14mm outer diameter / 10 mm internal diameter Primary Blown Fibre Tube allowing blown fibre units to be installed up to typical distances of 500m depending on route topology, installation pressure and nature of the fibre unit.

The supplier shall be registered to ISO9001 and ISO14001.

Detailed Specifications for Primary Tubes

The primary tubes shall be dual layer.

Material

- The inner surface of the tubing shall be constructed from a suitable material in order that the completed tubing shall meet the blow performance requirements of this specification.
- For co-extruded tubing, the inner liner shall bond intimately with the tube wall material and there shall be no delamination/separation of the layers over the life of the product.
- The primary tube shall be circular and uniform in cross section throughout its length. The primary tube shall be free from pin holes, joints, water splash marks, die-marks, repairs and all other defects. The wall of the tubing shall be constructed from a suitable HDPE material.

Dimensions

Dimensions of the tube shall be:

- External diameter = 14.0 ± 0.1 mm.
- Internal diameter = 10.0 ± 0.1 mm.

Primary tube surface texture

- The internal surface shall be coated with a low friction liner.

Blown Fibre Tube Accessories Compatibility

- The primary tube shall be compatible with commercially available tube connectors and withstand a burst pressure of 37500 mbar.

Operating Pressure

- The operating pressure will be 15000 mbar.

Metallic Direct Burial Tube Assemblies

- All products supplied must conform to the details contained in table below which must not be changed without prior consultation
- Tube assemblies must be supplied with 1 ripcord which must be laid under the sheath to enable mid span break
- out. The ripcords shall provide an effective means of slitting the sheath longitudinally to facilitate its removal and
- to gain access to the primary tubes, down to -10°C .
- Tube assemblies shall be sheathed in high density polyethylene coloured Yellow (unless otherwise stated on
- the purchase order) with a layer of medium density polyethylene on the inside, as well as an aluminium tape
- moisture barrier beneath the two sheaths and formed outside of the primary tubes. The supplier should state the
- specification of the aluminium tape, including the sheath/tape peel strength performance.
- The sheath shall be circular in cross section and the curvature of the external surface shall not be concave at
- any point. The sheath shall be uniform in cross section throughout its length. It shall be free from pin holes,
- joints, repairs and other defects. Any compressive force applied by the sheath to the primary tubes as a result of
- the manufacturing process shall not alter the primary tube maximum/minimum external diameter ratio by more than 1:1.1.

7 Way Tube Assembly

- 1 = red
- 2 = green
- 3 = blue
- 4 = violet
- 5 = grey
- 6 = yellow
- 7 = orange

Installation Performance of Fibre Unit within Tube Cable Assemblies

All tube cable assemblies must be tested with the 24f blown fibre units at a 30m/s air flow rate and at least 15 bar pressure under the following test requirements:

Test Requirements

- Blown Fibre Tube type/assembly = primary or sheathed tubing
- Blown Fibre Tube assembly length = 500 metres
- Fibre unit type = 24 fibre
- Direction of Blow = Outside to drum centre
- Minimum blowing speed = 22 meters/minute
- Maximum blowing speed = 25 metres/minute
- Climatic window limit (Wet end) .t = +10°C
- Climatic window limit (Wet end) Dewpoint = -15°C
- Climatic window limit (Static end) .t = -25°C
- Climatic window limit (Static end) Dewpoint = -25°C

Pass criteria

- Maximum fibre unit installation time is 21 minutes
- Ref: Cockrill et al "Blown fibre reference test blowing route."
- IWCS paper 1997 PP 348-353

General Tube Performance Tests

Environmental Stress Crack Performance

- The primary tube wall material shall meet the Environmental Stress Crack resistance.
- The ESCR is carried out by the raw material supplier in accordance with ASTM D1693 B, with a result greater than 500 hours.
- Tube assemblies for external ducts
- Conditioning temperature: 50°C
- Conditioning time: 7 days
- Sample size: U shape – Dia = 14D
- Reagent: ANTAROX CO-630 or Caflon CF30

Environmental Performance

- A 500 metre length of primary or sheathed tubing shall be placed in an oven at +85°C for a period of 7 days.
- After removal from the oven the following test sequence shall be met on a Product Approval basis:
- The aged tubing shall conform to the installation performance requirements of this specification. The aged tubing shall be filled with water for a period of 7 days at +20°C.
- Following removal of the water the tubing shall conform to the blow performance requirements of this specification.

Other Requirements

The method of testing the primary tube integrity, continuity and length of tubes should be provided by suppliers.

Sheathed Assembly Ends

The sheathed assembly ends shall be sealed to prevent the ingress of moisture.

Sheathed Assembly Supply

The sheathed assembly shall be packaged and supplied on a wooden cable drum and suitably protected with wrapping and/or batons.

Primary Tube Type Tests

Tensile Performance

Test in accordance to IEC60794-1-2 Method E1.

Test Requirements

- Mini duct length under tension: 200m
- Tensile load: 0.5 W*
- Diameter of test pulleys: 30x OD
- Where Maximum tensile load = 0.5x 9.81 x W, N,
- W = mass of 1Km of component in Kg

Acceptance criteria

- There shall be no permanent deformation of the Primary tube. This shall be verified by passing the inner clearance test.

Crush Performance

Test in accordance with IEC 60794-1-2 Method E3

Test Requirements

- Sample length: 250mm
- Load: 50d or 450N whichever lower
- Duration of maximum load: 1 minute
- Recovery time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. This shall be verified by passing the inner clearance test. The imprint of the anvil on the sheath is not considered as mechanical damage.

Bend Performance

Test in accordance with IEC 60794-1-2 Method E11.

Test Requirements

- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Stiffness Performance

Test in accordance with IEC 60794-1-2 Method E17C.

Test Requirements

- Separation factor = 14
- Duration of test = 5 minutes
- Number of samples to be tested = 10
- Selection of samples to be tested = 1 sample/50 metres
- Length of test sample = 100mm

Acceptance criteria

- Direct Buried and Install Stiffness (EI) to be in the range $4 \times 10E-3$ to $12 \times 10E-3$ Nm²

Pneumatic Performance

Test Requirements

- „h Proof test pressure 19500 mbar (20C for 0.5 hr)
- „h Minimum burst test pressure 37500 (20C for 0.5 hr)

Acceptance criteria

- Primary tubing shall be capable of sustaining the stated requirements without bursting or loss of pressure.

Impact Performance

Test in accordance with IEC 60794-1-2 Method E4.

Test requirements

- Striking surface radius: 10 mm
- Impact: 1 Joules

- Number of impacts 3
- Recovery Time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. The imprint of the anvil on the sheath is not considered as mechanical damage.

Repeated Bending

Test in accordance with IEC 60794-1-2 Method E11.

Test Requirements

- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Kink Performance

Test in accordance with IEC 60794-1-2 Method E10

Test Requirements

- Loop to be made of the cable, applying force to either end of the cable reduce diameter till kink occurs. Measure and record minimum diameter at which kink occurs
- D = Cable nominal diameter.
- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Friction Performance

Test Requirements

- Sample length: 1.5 m
- Mandrel diameter: 300mm

Acceptance criteria

- A 5kg weight shall be pulled at 1000mm/min and travel 100mm. An average force of 2 pulls shall be recorded to give a coefficient of friction less than 0.1

Flexibility Performance

Test in accordance with IEC 60794-1-2 Method E10

Test Requirements

- No Turns: 10
- Mandrel diameter: .15 xOD
- Duration: 30 min

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Tube Assembly Type Tests

Tensile Performance

Test in accordance to IEC60794-1-2 Method E1.

Test Requirements

- Miniduct length under tension: 50m
- Tensile load: 1 W*
- Diameter of test pulleys: 30x OD
- Where Maximum tensile load = $9.81 \times W$, N,
- W = mass of 1Km of component in Kg

Acceptance criteria

- There shall be no permanent deformation of the Primary tube. This shall be verified by passing the inner clearance test.

Crush Performance

Test in accordance with IEC 60794-1-2 Method E3

Test Requirements

- Maximum load applied via flat plate: 1 kN Direct Install; 2 kN Direct Burial
- Duration of maximum load: 1 minute
- Recovery time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. This shall be verified by passing the inner clearance test. The imprint of the anvil on the sheath is not considered as mechanical damage.

Bend Performance

Test in accordance with IEC 60794-1-2 Method E11.

Test Requirements

- No Turns: 4
- Mandrel diameter: .40 x OD or 30mm whichever greater
- Number of Cycles: 3

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Flexibility Performance

Test in accordance with IEC 60794-1-2 Method E10

Test Requirements

- No Turns: 10
- Mandrel diameter: .20 x OD
- Duration: 30 min

Acceptance criteria

- The outer and inner diameter of the miniducts shall show, under visual examination without magnification no damage and no reduction of diameter greater than 15%

Impact Performance

Test in accordance with IEC 60794-1-2 Method E4.

Test requirements

- Striking surface radius: 10 mm
- Impact: 3 Joules for DI
- 5 Joules for DB
- Number of impacts 3

- Recovery Time: 1 hr

Acceptance criteria

- Under visual examination, without magnification, there shall be no damage to the miniduct. There shall be no residual deformation greater than 15% of the miniduct diameter and no splitting or permanent damage. The imprint of the anvil on the sheath is not considered as mechanical damage

Accessories

The bidder must supply a full list of all accessories that may be required for the installation of the mini ducts. This may include, but not be limited to:

- Airtight tube connectors (regular and gas/water-blocking)
- Airtight tube end caps
- T-joints, junction boxes and other branching units
- Water-blocking gel

Other Requirements

Delivery

The miniduct must be delivered to the City Of Cape Town on strong treated wooden drums or other approved alternatives. The manufacturer must guarantee a cable drum with a minimum lifetime of five (5) years when stored outside in typical South African weather conditions. The delivery address will be supplied by the City of Cape Town Telecommunications Branch.

The following are approved dimensions for wooden drums:

- Maximum outside dimensions : 2.1 m x 1.15 m
- Minimum spindle hole diameter : 90 mm
- The drum must have the following information clearly painted on it:
 - o CITY OF CAPE TOWN
 - o The Contract No.
 - o Order No.
 - o The unique drum number.
 - o The type of miniduct and number of tubes.
 - o The length of the miniduct in meters.
 - o The gross mass of the miniduct and drum in kilograms

Miniduct length requirements

The miniduct lengths must be delivered in excess of or equal to 1000 meters, unless otherwise specified. Shorter miniduct lengths will only be accepted with the concession of the City of Cape Town.

Information to be furnished by Supplier

- Nominal miniduct length per drum
- Miniduct outer diameter
- Maximum variation of miniduct diameter
- Installation tension under normal and worst case conditions
- Minimum installation bending radius
- Miniduct mass per unit length
- Maximum miniduct strain for zero fibre strain
- Ultimate tensile strength of the miniduct
- Drawing or sketch indicating miniduct make up

12 - 110MM DUCTS

110mm HDPE ducts are required for direct burial in order to install 7-way and other fibre ducts into. They must have the following specifications:

- Double wall corrugated construction providing high ring stiffness
- Smooth bore ensuring easy draw-in of cables.
- Manufactured from HDPE with high impact strength
- Must carry the SABS certification mark in respect of specification SANS IEC 61386-24:2005
- Must be manufactured in accordance with BS EN50086-2-4
- Must be available with simple push fit couplings with rubber sealing ring
- Delivered in 6m lengths

The stainless steel slow bends must have the following specifications:

- 600mm radius bend
- Must be manufactured from 3CR12 stainless steel or better
- Must be size compatible with the HDPE ducts to ensure smooth coupling

13 - OPTICAL TRANSCEIVERS FOR CISCO/ ALCATEL-LUCENT OR EQUIVALENT

In the light of the fact that optical transceivers are a commodity item in the telecommunications industry, the City would like to purchase these transceivers from multiple vendors to avoid long delivery lead times and high costs. All transceivers are for use in the City's existing installed base of both Cisco and Alcatel-Lucent equipment. The following product families are deployed in the City:

- Cisco
 - o 7900
 - o 2900
 - o ASR9000
 - o ME34/3600
 - o 3560/3750
- Alcatel-Lucent
 - o 7950
 - o 7750
 - o 7210
 - o 6850

The transceivers supplied under this tender **MUST** be OEM and type approved for use in the equipment mentioned above, and written proof will be required before the tender is awarded.

The City requires the following transceiver types:

- 1Gbps SFP Grey
 - o LR – singlemode 1310nm (10km)
 - o ER – singlemode 1550nm (40km)
 - o ZR – singlemode 1550nm (70km)
- 10Gbps XFP Grey
 - o LR – singlemode 1310nm (10km)
 - o ER – singlemode 1550nm (40km)
 - o ZR – singlemode 1550nm (70km)
- 10Gbps SFP+ Grey
 - o LR – singlemode 1310nm (10km)
 - o ER – singlemode 1550nm (40km)
 - o ZR – singlemode 1550nm (70km)
- 10Gbps XFP Coloured, 50GHz spacing, fixed wavelength (non G.709)
 - o LR – C-Band(10km)
 - o ER – C-Band (40km)
 - o ZR – C-Band (70km)
- 10Gbps SFP+ Coloured, 50GHz spacing, fixed wavelength (non G.709)
 - o LR – C-Band (10km)
 - o ER – C-Band (40km)
 - o ZR – C-Band (70km)
- 10Gbps XFP Coloured, 50GHz spacing, tuneable wavelength (non G.709)
 - o LR – C-Band (10km)
 - o ER – C-Band (40km)
 - o ZR – C-Band (70km)
- 10Gbps SFP+ Coloured, 50GHz spacing, tuneable wavelength (non G.709)
 - o LR – C-Band (10km)
 - o ER – C-Band (40km)
 - o ZR – C-Band (70km)
- 1Gbps SFP Coloured, **CWDM**, fixed wavelength
 - o LR – (10km)
- 10Gbps SFP+ Coloured, **CWDM**, fixed wavelength
 - o LR – (10km)
- 10Gbps XFP Coloured, **CWDM**, fixed wavelength
 - o LR – (10km)

Below is a typical specification sheet:

Optical Characteristics

Parameter	Unit	Min.	Typ.	Max
Transmitter				
Output Optical Power	dBm	-1		+3
Optical Extinction Ratio	dB	8.2	9	
Optical Wavelength	nm	$\lambda-20$		$\lambda+20$
Spectral Width	nm			
Side Mode Suppression Ratio	dB			
Receiver				
Optical Center Wavelength	nm	1260		1620
Receiver Sensitivity @ 10.3	dBm	-15		0
LOS DE-Assert	dBm			-17
LOS Assert	dBm	-29		

	Tx Min dBm	Tx Max dBm	Rx Min dBm	Rx Max dBm	Link Attenuation dB	Power Budget dB
Product Specifications	-1	+3	-15	0		
Optical Calculation Results			-14.8	-10.8	13.8	14

General Specifications

Parameter	Unit	Min.	Typ.	Max
Absolute Maximum Ratings				
Maximum Supply Voltage	V	-0.5		6.0
Storage Temperature	°C	-40		+85
Case Operating Temperature	°C	-5		+70
Recommended Operating Condition				
Supply Voltage	V	4.75		5.25
Supply Current	mA			500
Data Rate	Gbps	8.5		11.35

Electrical Characteristics

Parameter	Unit	Min.	Typ.	Max
Transmitter				
Differential Input Voltage Swing	mVpp	120		820
Input Differential Impedance	ohm		100	
Transmit Disable Voltage - High	V	2.0		Vcc
Transmit Disable Voltage - Low	V	GND		GND+0.8
Transmit Fault Voltage - High	V			
Transmit Fault Voltage - Low	V			
Receiver				
Differential Output Voltage Swing	mVpp	340	650	850
Differential Output Impedance	ohms			
LOS Output Voltage - High	V	Vcc-0.5		VccHOST
LOS Output Voltage - Low	V	GND		GND+0.5

14 - CWDM PASSIVE OPTICAL FILTERS

The City requires the use of in-line CWDM filters for use in point-to-point applications to avoid fibre exhaustion. A multiplexer/demultiplexer unit that may be used at both ends of a dual-fibre point-to-point link with 4, 8, 12 or 16 ports will satisfy the need.

The following specifications are required:

- Insertion loss < 3dB per channel
- 1 Rack Unit in height
- LC-APC optical couplers
- Passive unit (no power consumption)

15 - OPTIC FIBRE DOME ENCLOSURES

The City of Cape Town employs the double-dome Fibre Distribution Point (FDP) technique, which means that the FDP consists of a Core- and an Access dome joint. In the Core dome either 12 or 24 fibres out of a main cable of (typically) 72 strands is diverted onto a link cable (24 or 48 strands). As illustration, imagine that tubes 1 & 2 of the main cable (consisting of 6 tubes of 12 fibres each) is cut inside the Core dome and spliced onto the 48-strand link cable, such that tubes 1&2 of the link cable is now connected onto tubes 1&2 (West) of the main cable, and tubes 3&4 are connected to tubes 1&2 East. Effectively both tubes of the 72 cable are now diverted into the link cable, which runs into the second (Access) dome. Inside the Access dome the cable is spliced tube-to-tube so that 1=25, 2=26 and 24=48. Now full fibre continuity is once again achieved.

When a new building connection is required, a new cable will be brought into the Access dome and the required fibres spliced onto the relevant fibres of the 48 cable. This scheme ensures an even distribution of the capacity of the main cable over many FDPs/manholes and also significantly reduces the risk of the splicing personnel accidentally damaging other fibres in the main cable, other than those diverted into the Access dome.

All dome types must adhere to the following specifications:

- Watertight (continuous overpressure 0,4 bar)
- Temperature range: -40°C to +70°C
- Applicable cable tensile force up to 1000N
- UV-stabilised
- Resistant to common contaminating fluids
- Impact resistant
- Metal parts stainless (stainless steel or aluminium)
- Domes must be supplied with a full set of heat-shrink, labelling, brackets and fasteners to enable complete installation in the field

15.1 Core Dome

The Core dome's primary use is as described above, to house the 12 or 24 splices connecting the link cable, but it is also used when the end of a cable drum is reached and two drums must be spliced together. Also, it frequently happens that several main cables follow the main run so it is conceivable that a break in one main cable may result in the necessity of doing a full through splice on two main cables in the same Core dome. With these considerations in mind, the Core dome must have the following features:

- Single-element fibre routing (12 splices per cassette)
- 26 cassettes (2x72 splices for main cable and 24 for link), or the ability to house 168 splices in 24 cassettes
- Flip-up cassette arrangement (not concertina-type) to allow safe working on live cables
- Consistent fibre bend radius management
- Slack storage for uncut fibre tubes (with bend radius management)
- Cable strength member termination points
- Transportation tube routing from sheath termination onto cassette
- At least 2x 75mm oval spigots to allow uncut main cable insertion
- At least 6x 10mm flexible spigots for other cables to enter
- Consistent waterproofing and heat shrinking of all orifices to ensure a water-tight enclosure
- Locking ring to attach a small padlock to discourage vandalism
- A bracket with wingnut fastener to allow attachment of dome to manhole wall
- Rust-proof handle on bottom to allow dome to be removed from manhole without pulling it by the fibre cable

15.2 Access Dome

The Access dome is similar to the Core dome except that it establishes single-circuit routing; it needs fibre slack management to ensure easy splitting of tubes into several trays; and rather than using oval spigots for main cables it needs several 32mm spigots to allow the entry of a flexible duct containing 12 blown fibre micro-tubes. It therefore has the following specifications:

- Single-circuit fibre routing (2 splices per cassette). Nested cassettes may be used
- 12 dual (nested) cassettes (2x2 splices per cassette) for a total of 48 splices
- Flip-up cassette arrangement (not concertina-type) to allow safe working on live cables
- Consistent fibre bend radius management
- Slack storage for naked fibre when splitting tubes into several cassettes
- Consistent fibre routing arrangement to enable smooth and protected guiding of naked fibres from sheath-end into each cassette
- Cable strength member termination points
- At least 2x 32mm round spigots to allow insertion of flexible blown fibre 12-way micro duct
- At least 6x 10mm flexible spigots for other cables to enter
- Consistent waterproofing and heat shrinking of all orifices to ensure a water-tight enclosure
- Locking ring to attach a small padlock to discourage vandalism
- A bracket with wingnut fastener to allow attachment of dome to manhole wall
- Rust-proof handle on bottom to allow dome to be removed from manhole without pulling it by the fibre cable

15.3 Mini-Dome

A much smaller version of the Access dome is required in the case where smaller main cables are used and therefore the double-dome scheme is not employed. The Mini-dome will have the following specifications:

- Single-circuit fibre routing (2 splices per cassette). Nested cassettes may be used
- 6 dual (nested) cassettes (2x2 splices per cassette) for a total of 24 splices
- Flip-up cassette arrangement (not concertina-type) to allow safe working on live cables
- Consistent fibre bend radius management

- Slack storage for naked fibre when splitting tubes into several cassettes
- Consistent fibre routing arrangement to enable smooth and protected guiding of naked fibres from sheath-end into each cassette
- Cable strength member termination points
- At least 4x 10mm flexible spigots for other cables to enter
- Consistent waterproofing and heat shrinking of all orifices to ensure a water-tight enclosure
- Locking ring to attach a small padlock to discourage vandalism
- Rust-proof handle on bottom to allow dome to be removed from manhole without pulling it by the fibre cable

15.4 Inline Dome Enclosure – 10/12mm and 10/14mm Tube Duct

The City makes extensive use of both 10/12mm and 10/14mm Tube Ducts. In the event that one of these ducts must be extended or repaired, an inline dome enclosure is required to house the tube couplers connecting the old and the new/extended piece of ducting. This enclosure has the following specifications:

- One 43mm spigot in the base to insert one piece of the 7-way
- Locking ring to attach a small padlock to discourage vandalism
- Circular locking ring around second 43mm 7-way duct entry to allow in-service opening of the dome (dome enclosure slides along flexible duct)

15.5 Flexible Transition Tube – Inline Enclosure (5/8mm)

The City generally uses direct buried HDPE 12-way micro-ducts containing 12 5/8mm HDPE tubes with a thin HDPE sheath. This duct is too stiff to bring directly into the Access dome so a transition mechanism is required. The Inline Enclosure is an empty but waterproof dome that houses the tube couplers which couple the 5/8mm tubes from the outside plant onto 3.5/5mm tubes. These tubes must be bundled into a flexible but waterproof sheath with a spigot at the other end which allows water-tight insertion into the Access dome so that micro-cable may be blown directly from the Access dome into the building at the other end of the tube. The In-line enclosure must have the following specifications:

- One 32mm spigot at the base end with rubber grommets to allow water-tight sealing of the oddly shaped 12-way:
- Locking ring to attach a small padlock to discourage vandalism
- Factory-installed flexible sheath containing 12 tubes 3.5/5mm with waterproof entry into dome
- Circular locking ring around flexible duct entry to allow in-service opening of the dome (dome enclosure slides along flexible duct)
- Water-tight spigot which may be inserted into 32mm spigot of Access dome before sealing and heat-shrinking

15.6 Flexible Transition Tube – 7-Entry Enclosure (5/8mm)

In some applications the in-line dome joint is too bulky and thus the same end must be achieved through the use of a smaller, multi-entry enclosure. It has the following specifications:

- Seven 32mm spigots/holes with rubber grommets to allow water-tight sealing of the oddly shaped 12-way: , as well as the flexible duct
- Screws and rubber seals to ensure waterproofing
- Factory-installed flexible sheath containing 12 tubes 3.5/5mm with waterproof entry into dome
- Water-tight spigot which may be inserted into 32mm spigot of Access dome before sealing and heat-shrinking
- Bracket to enable the mounting of the enclosure onto the side of a manhole

15.7 T-Shape Enclosure (5/8mm)

When a single tube from the 5/8mm 12-way micro-duct is diverted into a building (redundantly), a 5/8mm 2-way micro duct must be coupled onto the main 12-way. A T-shaped dome enclosure is required to house the two couplers connecting the diverted tube onto the 2-way. It must have the following specifications:

- Two 32mm entries with rubber grommets to allow the oddly shaped 12-way to be inserted in a water-tight manner
- One 20mm entry with rubber grommets to allow the oddly shaped 2-way to be inserted in a water-tight manner

15.8 Boundary Box Tube Enclosure for micro-ducts

When it is required that the enclosure holding the micro-duct couplers be surface mounted, a boundary box enclosure shall be used.

Specifications

- Depth = 300mm
- Coping size = 285x285mm
- Daylight opening = 200mm

- Weight = 5kg
- Duct configuration: 1x30mm knock-out on all four sides
- Compression glands on all duct entries to provide mechanical strength
- Load rating: SANS 558 light duty (7kg)
- The cover must be lockable with a unique key, and the lock must be corrosion resistant
- The cover must contain the City logo

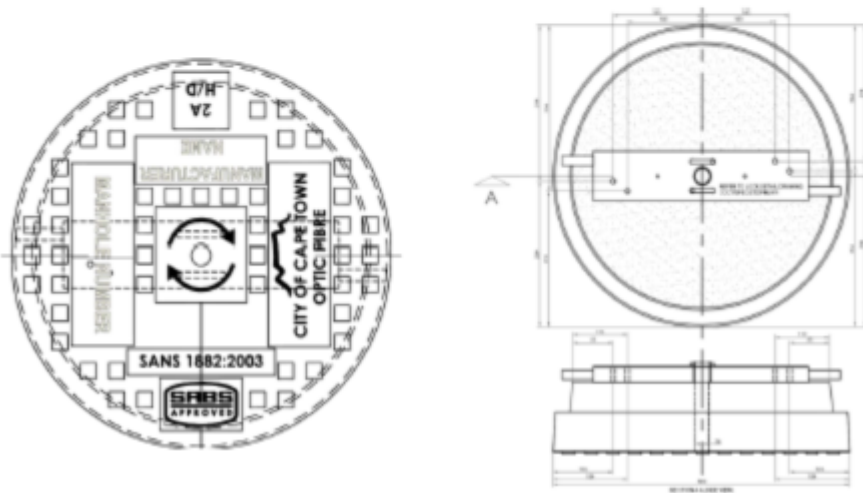
16 - MANHOLE FRAMES AND COVERS

City Telecoms only uses two types of manhole cover and frame: the polymer concrete type for medium duty and the ductile iron type for heavy duty. The covers and frames **MUST** be SABS approved, documentary proof will be required before the tender is awarded.

16.1 Polymer Concrete

The resin component must be UV resistant. The cover has an outside diameter of 600mm with a daylight opening of 550mm and a thickness of 140mm. It is fitted with a HDPE lock as described below. All other dimensions must be in accordance with the drawings below to ensure compatibility with existing installed frames. The cover and frame have the following specifications:

Specification Sheet	
<i>2A Lockable cover Roadway</i>	
Product Code	2A Roadway
Description	610mm diameter x 140mm thick 2A Lockable roadway Cover to Fit 1295x 140mm Polymer concrete coping opening
Force	135Kn
Material	Polymer concrete
Duty Class	Heavy duty
Colour	Grey
Weight	66Kg
Standard	Complies with SANS 1882: 2003
Sizes	Refer to diagram



16.2 Ductile Iron

The ductile iron frame and cover will comply to the specifications below:

Material		Ductile Iron	
Appearance		Ductile iron solid top	
DIMENSIONS	Item	Measured (mm unless otherwise stated)	Specified (mm unless otherwise stated)
Frame	Frame outside dimensions:	815 X 813	800 X 800

TENDER NO: 21S/2021/22

	Frame height:	153	Min 150
	Base thickness:	17	Max 50
	Web:	10	Min 10
	Frame opening (top):	700	700 [+2 / -0]
	Frame clear opening (Bottom):	605	600 min
	Rim:	20	Min 8
	Seat:	41.5	40 [-2 / +0]
	Depth of Insertion:	81	80
	First drop:	40.5	40 [+0 / -2]
	Second drop:	42	40 [+0 / -2]
	Mass:	73.5	N/A
	Frame bearing area:	0.3 sqm	0.2 sqm
	Cut-away in base of frame	2X 65mmdia. holes in each corner	Not specified
Cover	Stud measurement:	Top: 22 X 22 Bottom: 24 X 24	25 X 20
	Stud height:	3	3
	Lifting slots L:	94	90
	W:	18	18
	D:	31	30
	Lifting slot position:	81	70 to 100
	Outside diameter:	692	694 [-2 / +0]
	Underside diameter:	594	594 [+0 / -8]
	Insertion first drop:	40.5	40 [+0 / -2]
	Insertion second drop:	42	40 [+0 / -2]
	Seat:	40.5	40 [+2 / -0]
	Mass:	43.5	Cover is for Telecoms, without inserts
	Domed to achieve mass:	No	Optional

16.3 Manhole Cover Lock

City Telecoms uses an HDPE manhole lock with a unique key design to secure its manholes. The Lock has the following specifications:

- Solid HDPE body with stainless steel cover plate
- Two stainless steel spring loaded bolts
- Centre key entry
- Three versions are in use as per the different daylight cover openings (Polymer Concrete and Ductile Iron)

17 - PRE-FABRICATED GLASS FIBRE REINFORCED CONCRETE MANHOLES

The City uses prefabricated GRC manholes extensively. Glass fibre reinforced concrete consists of high strength glass fibre embedded in a cementations matrix. In this form, both fibres and matrix retain their physical and chemical identities, while offering a synergism: a combination of properties that cannot be achieved with either of the components acting alone. In general, fibres are the principal load-carrying members, while the surrounding matrix keeps them in the desired locations and orientation, acting as a load transfer medium between the fibres and protecting them from environmental damage. In fact, the fibres provide reinforcement for the matrix and other useful functions in fibre-reinforced composite materials. Glass fibres can be incorporated into a matrix either in continuous or discontinuous (chopped) lengths.

The supplier should price each manhole complete with base, coping and brackets.

MANUFACTURING AND WATER TEST PROCEDURES FOR FIBRE CEMENT MANHOLES

1. All fibre cement pipes to be cut according to specification/drawing
Wall thickness of fibre cement pipes: 1200 Ø = 30 mm
2. Marker to measure correct width of holes according to specification/drawings. Entry holes to be cut according to specification/drawing.
3. PVC cable trays, shark tooth or any accessories requested to be placed as per specification/drawing.
4. All surfaces on the baseplates, as well as barrels, to be bonded, are to be cleaned and primed using a 72A solvent to create a surface free of any loose particles or ravelling. Steel screws (5.8 mm diameter and 70 mm length) to be drilled and sealed according to specification onto baseplates into wall of barrel.
5. The cleaned surface to be bonded shall be treated with Epoxy, uniformly spread over the entire area and pressed firmly together followed by the screws to hold the units in place for the epoxy to set for 12 hours and take effect.
6. On the inside of each fibre cement barrel, as well as the entry holes to be sealed with bitumen, if required by client.
7. Clean water shall be poured into the manhole, up to the level of the duct entry holes and allowed to remain as such

for 48 hours (2 days) to note any leakage between barrel and baseplate.

8. Manholes to be loaded on pallets as follows: 600 mm = 710 mm x 710 mm, 1000 mm = 1140 mm x 1140 mm and 1200 mm = 1450 mm x 1450 mm, to be strapped for despatch purposes.

9. Any leaks observed shall render manholes as not fit for purpose and rejected.

10. GRC baseplates must utilize only alkali resistance glass and have at least a thickness of 20 millimeters.

The following specifications shall be met:

- Crush loading (horizontal) = 2.75 kN
- Vertical loading = 350kN
- Approved by SABS:819

The following sizes are required by the City

- 600mm diameter, 800mm deep
- 800mm diameter, 800mm deep
- 1000mm diameter, 1000mm deep
- 1200mm diameter, 1200mm deep

If there is a price difference between the square and round copings, the supplier should provide a price list with the four sizes with both types of coping (8 price items)

18 - ISOBODY CABINET ENCLOSURE

The City requires an isobody cabinet enclosure for mounting equipment in hostile environments, typically on the top landing of a brick tower at a fire station. The enclosure must be fully waterproof, IP65 rated and be equipped with an integral air-conditioner for cooling the equipment contained inside.

Each enclosure will contain a standard 19" equipment rack without doors, and an integrated 8000BTU air-conditioner unit with a leak tray to ensure no moisture ever drips onto the equipment below. The supplier should provide prices for units with an air-conditioner, as well as without.

The enclosure will be available in two sizes to house a 43U rack as well as a 25U rack.

The panels which make up the enclosure will be manufactured from two layers of pre-painted galvanised steel sheeting with a 75mm sheet of polystyrene sandwiched between the steel layers. An industrial adhesive is used to bond the polystyrene sheet between two layers of steel sheeting. It will have a fully sealing door with mechanical locking mechanism, into which a padlock may be inserted.

19 - MOBILE POWER GENERATORS

The City requires mobile power generators for use onsite in emergency situations.

19.1 5kW Single Phase Portable (50Hz)

The following typical specifications will be required:

- brushless alternator
- 1 cylinder, 9 HP, diesel fuelled, air cooled engine with recoil/electric start.
- Output power =5.4 kW 50 Hz at 220V
- factory warranty of 60 months
- Must have an automatic voltage regulator

19.2 10kW Three Phase Portable (50Hz)

The following typical specifications will be required:

- brushless alternator
- 1 cylinder, 23 HP, diesel fuelled, air cooled engine with recoil/electric start.
- Output power =10 kW 50 Hz at 220V (three phase)
- factory warranty of 60 months
- Must have an automatic voltage regulator

19.3 100kW Three Phase 50Hz (Trailer Mounted)

The following typical specifications will be required:

- brushless alternator
- Must have an automatic voltage regulator
- 4 cylinder, diesel fuelled, liquid cooled engine with electric start.
- Output power =100 kW 50 Hz at 220V (three phase)
- double walled tanks
- Tank is built into the trailer, which lowers the center of gravity and makes the generator more difficult to overturn

when off paved roads.

- factory warranty of 60 months
- Trailer frame hot dipped galvanized and rubberized
- Generator housing 3CR12
- All mounting hardware and bolt sets A2-70 Stainless steel

20 - CHERRY PICKERS

The City requires articulated access platforms (cherry pickers) for installing and maintaining radios and antennas on masts. Two kinds are required: electric boom and diesel boom.

Typical Specifications:

Working height:	20.00 m	Platform height:	18.00 m
Horizontal outreach:	12.00 m	Up and over height:	8.0 m
Jib movement:	+70°/-70°	Basket rotation:	+90°/-90°
Turret rotation:	355°	Basket size:	2.10 x 0.80 m
Platform capacity:	230 kg/2 persons	Unladen weight:	10 000 kg
Maximum slope accepted:	9% or 5°		
Power:	45 HP		

20.1 Diesel Boom

Working height	20.00 m
Platform height	18.00 m
Articulation height	8.00 m
Outreach	12.00 m
Jib tilting	+70°/-70°
Basket rotation	+90°/-90°
Turret rotation	355°
Capacity	230 kg
Number of persons (indoor/outdoor)	2/2
Basket (width and length)	2.10 x 0.80 m
1. Overall width	2.40 m
2. Overall length	8.50 m
3. Overall height	2.70 m
4. Overall length when folded	6.30 m
5. Overall height when folded	3.15 m
6. Inside turning circle	1.30 m
7. Outside turning circle	3.95 m
8. Turning Radius (basket)	7.45 m
9. Ground clearance	43 cm
10. Wheelbase	2.40 m
Speed of forward movement	4.70 kph
Working speed	0.80 kph
Maximum slope accessible	40 %
Maximum tilt	5° - 9%
Tyres	20"
Driving wheels	4
Steering/directional wheels	4
Weight (varies according to options & standards of the country)	10000 kg
Engine	KUBOTA V2403-M
Power	45 HP
Environmental noise (LwA)	101 dB

Other features required:

Proportional levers
4 simultaneous movements
4 wheel drive
4 wheel steer
Wheels crab position
Foam filled tyres
Differential Lock
Front Axle limited slip differential
On Board Diagnostics
Hour meter
Fuel gauge with low level warning
Tool box
Protective cover with optional locking
Horn
Beacon
Audible and visual display alarm for excessive slope
Code Protected Machine Set Up
Hooks for sling loading/lifting
Electric Pump
Predisposition 230V
Dead man pedal

20.2 Electric Boom

Typical Specifications Working height:	16.90 m	Platform height:	14.90 m
Horizontal outreach:	9.40 m	Up and over height:	7.15 m
Jib movement:	+70°/-70°	Basket rotation:	140°
Turret rotation:	355°	Basket size:	1.20 x 0.96 m
Platform capacity:	200 kg/2 persons	Unladen weight:	6 910 kg
Maximum slope accepted:	5% or 3°	Batteries:	240 Ah/2x24 V
Emergency manual descent		Hooks for sling loading/lifting	

Working height	17.00 m
Platform height	15.00 m
Outreach	9.43 m
Up and over	7.27 m
Basket rotation	140°
Turret rotation	355°
Platform capacity	230 kg (2 people)
Basket size	1.20*0.92 m
① Width	1.90 m
② Length	6.97 m
③ Stowed length	5.25 m
④ Height	2.10 m
Turning radius:	
① Inside	1.97 m
② Outside.....	4.7 m
③ Ground clearance	17.5 cm
Drive speed	6 km/h
Working speed	0.6 km/h
Gradeability	21%
Max. slope accepted	5° or 9 %
Weight	7435 kg
Tyres	Foam filled 12'
Traction battery	2*24 V/300 Ah
Integrated charger	48 V/45 Ah
Engine	Lombardini FOCS 702 water cooled
Power	9.2 kW
Generator	48 V/5.7 kW -100 Amp/2500 rpm
Standard equipment:	
- Protected control basket pane	
- Lifting brackets	
- Hour meter	
- Horn	
- 220 V predisposal	
- Battery charge indicator	
- Safety manual pump	
- Basket with mesh floor	
- Integrated charger	
- BusCAN technology	
- Diagnostic help integrated	

21 - ROLLER DOOR MOTORS

The City requires motors for raising and lowering industrial size roller doors.

Typical Specifications:

Power	Input Voltage	230-240V a.c. 1-phase
	Transformer Rating	150VA
	Standby Power	2.8W
	Motor Type	24V d.c. Permanent Magnet
	Motor Power	150W
	Peak Driving Force	1000N
	Rated Duty Cycle	100%
Door Sizes	Rated Door Area	28m ²
	Typical Travel Speed (door and setting dependent)	Variable via control panel
Transmitter System	Receiver/Transmitter Frequency	Multi-frequency UHF FM (433.47, 433.92 & 434.37MHz)
	Coding System	Code hopping (Non-linear encryption algorithm)
	Code Combinations	3.4x10 ²⁸ code combinations <small>(943,282,265,622,938,403,463,374,607,431,708,211,456 codes)</small>
	Transmitter Type	TrioCode™128
	Transmitter Capacity (x 4-button registers)	511
Additional Features	Courtesy Light	Output available
	Safety Beam Compatibility	3 x Wireless/2-wire Safety Beams
	LCD Screen	Y
Warranty		2 years

- Operates standard sectional, tip-up & roll up doors
- 24 Vdc Motor with integrated gearbox
- Main/Battery: 230Vac with 24V battery backup
- 700N Operating force (lifting capacity)
- Microprocessor-based controller
- Adjustable obstacle sensing
- Status indicator
- Audible Alert
- Adjustable Open-Position Stop
- Wall consol with Open/Close. Light control and Lock switch
- Supports Most Types of Safety Beams
- 'Endless Loop' Chain-drive system
- 60-watt Security Light
- Auto-Close Mode
- Self-setting Limits
- Straightforward assembly and conventional installation
- Simple coding of digiEkey remote controls via the wall console
- Ease of maintenance
- Sturdy drive strut
- Quiet and fast operation
- Supports safety beam

22 – SLIDING GATE MOTORS

The City requires sliding gate motors to open palisade fence gates.

Typical specifications:

Input voltage	90-240V AC, 50Hz
Motor voltage	24V DC
Motor power supply	Battery Driven – (standard capacity 2 x 7Ah)
Push force – rated	15kgf
Gate speed (varies with load)	40 - 50m/min
Duty cycle - mains present	25%
Daily operations – max	750
Gate mass - max	1000 - 240kg (depending on speed settings)
Onboard receiver specification	code-hopping ,multichannel, 433MHz, capacity - 500 transmitter buttons

- Fully sealed plastic housing (tamper proof)
- Code-hopping receiver
- Override function: lockable lever with key release

23 - FRESH AIR FANS / EXTRACTORS

The City requires fresh air fans and extractor units to ensure fresh air supply while a personnel is working inside the City's switching centres. The following specifications are appropriate:

- Tube Axial Fans with spark resistant, cast aluminium propellers.
- Heavy duty, industrial components and continuous duty motors to ensure long lasting operation minimizing equipment down time. Dependable service with few field problems.
- All fabricated steel, centrifugal models must have continuously welded housings for additional strength.
- All propellers must be statically balanced to assure smooth operation.
- Drum seam must be continuously welded.
- Typical values for a large switching centre fresh air supply is 355l/s @ 180 Pa static
- All fresh air fans must be supplied with fire louvres

The City will requires both units that are stand-alone with fan units installed through a wall, as well as a ducted version with louvers to supply air to several rooms

24 - SUMP WATER PUMPS

The City requires sump pumps for emptying water from manholes. Both submersible pumps with float switch permanent installation, automatic operation) and portable units will be needed.

24.1 Submersible pump with float switch

Specifications:

- Dirty water pump
- 250l/min capacity
- Liquid temperature: up to 40 Celsius
- Maximum operating depth 3m below water level
- The maximum density of the trans medium is 1200 kg/m³
- Aluminium pump body
- All parts must be made from corrosion resistant materials
- Fitted with float switch

24.2 Portable sump pump

Specifications:

- Dirty water pump
- 30m³/h capacity
- Petrol driven
- 50mm flexible pipe (5m long)
- Weight < 30kg

25 – PROGRAMMABLE MECHATRONIC LOCKS

The City requires an intelligent lock system with a programmable key that may be used all across the city in both harsh environments, such as the gate for a generator housing, as well as indoor applications and doors. Typically a key will be assigned to a particular individual. When he needs access to a particular lock, the Telecoms Operations Centre will send a SMS code to the user's phone, which he will then enter into his key's keypad. The key will then have the ability to access the relevant lock for a certain time only.

Central control will be exercised by the TOC and lost keys will be excluded from the system. On initiation a key will

be programmed in the TOC using a USB-connected key programmer.

The system will feature a central operating environment which will run on server hardware provided by the City. The vendor must supply all software and installation, as well as software and licence management and maintenance. The City will purchase the hardware (locks and keys) on an on-going basis.

The following types of locks are required:

- Barrel locks
 - o Blind (for cabinets)
 - o Button (single entry)
 - o Double entry
- Padlocks

Key specifications:

- battery-operated
- Power / Wire) – free
- Equipped with a 5 button keypad for security against fraudulent usage
- Key in reinforced ABS, UV proof, IP55, RoHS
- Stainless steel blade
- Key must be impossible to copy
- Splash Water resistant
- Operating Temperature:-10°C to +65°C
- 4 statuses LED (Access / No Access / Restricted Access / Low Battery)
- Powered by 2 x LR1 batteries
- Battery Autonomy: 2years / 25 000 openings
- Logs the last 1000 logs

25.1 Double Entry Lock General Specifications

- Locks are impossible to pick/bump
- Brass with stainless steel plating
- Power comes from key (no battery)
- No Wiring
- EURO-DIN standard
- Operating temperature -20°C to +85°C
- Logs last 1000 operations
- Sizes from 3cm to 14cm

25.2 Button Lock General Specifications

- Suitable for offices as it can be locked from the inside
- Locks are impossible to pick/bump
- Brass with stainless steel plating
- Power comes from key (no battery)
- No Wiring
- EURO-DIN standard
- Operating temperature -20°C to +85°C
- Logs last 1000 operations
- Sizes from 3cm to 14cm

25.3 Single Entry Lock General Specifications

- Suitable for cabinets and drawers
- Available in various predefined locking positions
- Locks are impossible to pick/bump
- Brass with stainless steel plating
- Power comes from key (no battery)
- No Wiring
- EURO-DIN standard
- Operating temperature -20°C to +85°C
- Logs last 1000 operations
- Sizes from 3cm to 14cm

25.4 Padlocks General Specifications

- Suitable for gates and heavy duty assets
- Padlocks are impossible to pick/bump
- Brass with chrome plating
- Power comes from Key (no battery)
- Operating temperature from -20°C to +85°C
- Logs last 1000 operations
- Compatible with security hasp

25.5 Security Hasp General Specifications

- Can be bolted and/or welded on gates
- Casing serves as a robust barrier to entry on any doors, gates, by re-enforcing their fastening.
- Protects against cutting / grinding / drilling

25.6 Key Programmer Specifications

- Powered by micro USB
- Optional Belt Clip
- Update access rights remotely by connecting to android device
- Reinforced ABS, UV proof
- IP55, RoHS

25.7 Central Software platform Specifications

- ADD, MODIFY / DELETE keys, locks and users
- MODIFY / UPDATE access rights.
- READ / DOWNLOAD access logs from the keys or locks
- BLACKLIST stolen or lost keys and RE-INSTATE them if needed.
- PRINT/ EXPORT listings of the keys, locks and users.
- Windows XP / Vista / Windows 7 on 32 and 64 bits.
- Compatible with Windows 7 and Windows 2012 server

26 – HARDENED DOOR

The City requires that some of its switching facilities be fitted with very high-security, tamper-proof doors to prevent unauthorised access.

Specifications

- Frame: 100 x 50 x 3 Four Sided with 32 x 32 Rebate (three), 20mm Architrave Three Edges
- Door: M/Steel Structure 45mm incorporating Fire Core + Filler Board Panel with Steel cover Plate Inner
- Locking: 5 Pin Four Throw Deadlock with 3 Point Locking and S/Steel Pull Handle
- Hinge: Roton Continuous Type with 2 x 20mm Fixed Hinge Bolts
- Door Contact: DC107 Leading Edge
- Slam Bar: 38mm Leading Edge
- Weather Brush to Door Bottom
- Door - Frame Finish: Epoxy Powder Coated
- Weight: 190kg
- Mag Lock: 2 x 280kg Slim Line to Leading Edge
- Door Closer
- Lock: With High Security Double bit Lever Keys or Cylinder Type.
- Locks Keyed Alike
- 60 min fire rated according to SABS 10177P - 2005

27 – ETHERNET RADIO SURGE PROTECTORS

The City requires a range of Ethernet lightning protectors and surge arresters to be used inline (typically using Cat5E copper cables) between indoor switching equipment and radio equipment/antennas mounted outdoor on masts and brackets.

General Specifications

- Receptacle = RJ-45 Cat 5e
- MCOV = 6 Vpeak
- Data Rate = 10/100/1000 Mb/s
- Connector = RJ-45
- Standards = UL 497 A

27.1 48V DC/56V DC POWER PROTECTION MODULE

This device is used to provide DC power to an outdoor radio with surge protection. It should be available in both a 48VDC and a 56VDC version

Specifications

- Nominal Operating Voltage = 48VDC (version 1)
- Nominal Operating Voltage = 56VDC (version 2)
- Maximum Continuous Operating Voltage = 62Vpeak
- Connector Style = RJ-45 Cat5 unshielded 100ohm, 50ohm single ended
- Protected Pins = (1,2), (3,4) (5,6) and (7,8)
- Unprotected Pins = None
- Surge Protection <85Vmax @ 100A 10/1000ms

27.2 Gigabit Ethernet Signal Protection Unit

This device is used to provide surge suppression to a single Ethernet outdoor radio. It should be available in both Power-over-Ethernet and non-POE versions.

Specifications

- Data Rate = 1000 Mb/s
- Nominal Operating Voltage = 3.3 Vdc
- Maximum Continuous Operating Voltage = 11 Vdc
- Connector Style = RJ-45, Unshielded, Cat5
- Maximum Capacitance per Pin = 3 pF
- Maximum DC Series Resistance = 9Ω
- Protected Pins = (1,2), (4,5), (3,6) & (7,8)
- Nominal Gas Tube Spark Over Voltage = 75 Vpeak
- Nominal Transient Blocking Current Threshold = 280 mA
- Frame Transmission = 100% Transmission @ 1000Mb/s
- Impedance = 85 to 115ohms

Surge Suppression Levels, according to Telcordia GR-1089-CORE

- 10/360μs 1st Level Lightning (25 Repetitions) = 100 A
- 10/1000μs 1st Level Lightning (25 Repetitions) = 100 A
- 2/10μs 2nd Level Lightning (1 Repetition) = 500 A
- 8/20μs Severe Climatic Conditions (1 Repetition) = 20 kA

27.3 Rack-Mounted (19") Gigabit Ethernet Protection Shelf

In order to connect several outdoor radios to the same shelf a rack mounted protection shelf is required. It contains several plug-in modules that can protect one copper connection each. They should be available in both Power-over-Ethernet and non-POE versions.

Specifications

- Mount Type = 19" Rack
- Line Voltage = 5 Vdc
- MCOV <11 Vpk
- Data Rate = 1000 Mb/s
- Connector = RJ-45
- Standards = GR 1089-CORE Issue 4, port type 3 & 5 surge
- Number of plug-in units ≥ 12

Specifications of the plug-in modules

- Data Rate = 1000 Mb/s
- Nominal Operating Voltage = 3.3 Vdc
- Maximum Continuous Operating Voltage = 11 Vdc
- Connector Style = RJ-45, Unshielded, Cat5
- Maximum Capacitance per Pin = 3 pF
- Maximum DC Series Resistance = 9Ω
- Protected Pins = (1,2), (4,5), (3,6) & (7,8)
- Nominal Gas Tube Spark Over Voltage = 75 Vpeak
- Nominal Transient Blocking Current Threshold = 280 mA
- Frame Transmission = 100% Transmission @ 1000Mb/s
- Impedance = 85 to 115ohms

Surge Suppression Levels, according to Telcordia GR-1089-CORE

- 10/360µs 1st Level Lightning (25 Repetitions) = 100 A
- 10/1000µs 1st Level Lightning (25 Repetitions) = 100 A
- 2/10µs 2nd Level Lightning (1 Repetition) = 500 A
- 8/20µs Severe Climatic Conditions (1 Repetition) = 20 kA

28 - POLE-MOUNTED ENCLOSURES

The City requires pole-mountable enclosures for housing power distribution units as well as copper- and optic fibre patch panels on lattice radio masts. They should be available in several sizes and be manufactured from either ABS plastic or stainless steel. The supplier should provide a full list of available sizes with a price for each.

28.1 Acrylonitrile butadiene styrene (ABS)**Specifications**

- Weatherproof Molded ABS Enclosure
- Fully gasketed padlocked raised lid
- Stainless steel quick release latches with padlock hasps
- IP66 rated
- Removable 220 VAC power module
- Heavy duty hook-and-loop tape for mounting equipment in enclosure
- Installed Mounting Rails for use with DIN3 Rails

28.2 Stainless Steel**Specifications**

- 1,5mm thick stainless steel walls (3CR12 version and 310 version)
- Fully gasketed padlocked raised lid
- Stainless steel quick release latches with padlock hasps
- IP66 rated
- Removable 220 VAC power module
- Heavy duty hook-and-loop tape for mounting equipment in enclosure
- Installed Mounting Rails for use with DIN3 Rails

29 - AVIATION OBSTRUCTION LIGHTS

The City requires navigation lights for masts (aviation obstruction lights). CAA light markings are the addition of lights at the highest practical point of a structure to make such a structure more visible in darkness and poor light conditions. This will be found mostly on communications structures below 45m in height above ground where the need is identified to improve its visibility. The lights on top of these structures are ALWAYS used in pairs, for redundancy purposes, and shall be approved steady burning, red aeronautical obstruction lights of at least 10 candela, unless specified differently.

Night markings may also be applied to buildings or other substantial structures, which by its size and appearance cannot be overlooked in normal visibility conditions, such as a skyscraper, the cooling towers of a power station, mine headgear etc. but the need is identified to improve its visibility at night and poor visibility conditions. Such structures shall be illuminated by aeronautical obstruction lights, as above, clearly defining the outline of the structure in accordance with ICAO Annex 14 chapter 6, unless specified differently. Where this is not achievable due to practical considerations, different means of compliance may be specified or allowed, after investigation. This may be in the form of flood lighting, effect lighting (such as illuminated advertisements) etc.

Specifications

- Direct installation into existing voltage power circuit.
- Direct mounting to conduit, bottom or side mounting.
- Photocell for automatic activation at night.
- Flashers used in fixtures are set at 45 FPM, 50% duty cycle.

30 - ENERGY SAVING FLOODLIGHTS

The City requires energy saving floodlights for security and general lighting purposes. The tenderer should offer a variety sizes and form factors.

Specifications

- Waterproof for outdoor use (IP55)
- Non-metal casings such as ABS preferred
- 1000 – 2000 lumens

31 – BLOWN FIBRE TUBE CONNECTORS

Tube connectors of are required for the connection of blown fibre tubes.

Specifications

- Push-fit with a locking device, preventing unintended disengaging
- Pull-ring for easy disengaging
- Smooth, lipless transition from tube to connector, ensuring a seamless join to allow easy fibre cable blowing
- Manufactured from HDPE or similar material to ensure long-term performance

The following types must be supplied:

31.1 Mini-Ducts (10/12mm)

Tube coupler
Tube end cap
Tube gas-blocker for 6.3mm cable

31.2 Mini-ducts (10/14mm)

Tube coupler
Tube end cap
Tube gas-blocker for 6mm cable
Tube reducer coupler: 10/14mm to 10/12mm

31.3 Micro-ducts (5/8mm)

Tube coupler
Tube end cap
Tube gas-blocker for 2.4mm cable
Tube reducer coupler: 5/8mm to 3.5/5mm

32 – OPTICAL PATCH LEAD SLACK PANELS

The City requires rack-mounted slack panels to store slack on patch lead cables.

Specifications

- Made from corrosion-free metal of high density plastic like HDPE or ABS
- Must have patch lead strain relief and bend radius protection
- Must have a several bobbins to allow slack storage in a figure-8 pattern
- Must have patch entries on both sides to enable easy patch routing
- All panels must be rack-mountable in a standard 19" equipment rack

The following types are required:

- 1RU shelf-type patch lead slack panel, preferably with swivel mounting
- 2RU shelf-type patch lead slack panel, preferably with swivel mounting
- Front-mount slack panel

33 – LABELING

The City requires a portable label printer for printing robust labels used to mark cables and ducts (both inside plant and outside plant), as well as rack-mounted devices.

Specifications

- All labels must be UV- and waterproof
- Labels must be available in a variety of shapes and sizes for different applications
- Labels must either be self-adhesive or come with holders that may be cable-tied to cables

The vendor must quote for the following:

- Label Printer
- Printer cartridges
- Label holders

34 – BUILDING ENTRY UNITS

The City requires building entry kits to enable easy micro-duct access into a building, when a below-ground core-drill entry is infeasible.

Specifications

- Micro-duct bend-radius of 30mm must be maintained at all times
- High density plastic on external components to ensure longevity
- Low-smoke, fire resistant materials on indoor components
- Removable cover for easy access
- Integrated coupler box on indoor side to allow the coupling between outdoor and indoor micro-ducts
- Available in two sizes:
 - o 5/8mm two-way micro-duct
 - o 10/14mm two-way mini-duct

All non-critical materials are to be delivered within **12 weeks** from the date of formal request. Critical materials must be available within **24 hours** from the time that CCT places an order.

TRADE NAMES OR PROPRIETARY PRODUCTS

Bid specifications may not make any reference to any particular trade mark, name, patent, design, type, specific origin or producer, unless there is no other sufficiently precise or intelligible way of describing the characteristics of the work, in which case such reference must be accompanied by the words “or equivalent”.

TENDERERS MUST NOTE THAT WHEREVER THIS DOCUMENT REFERS TO ANY PARTICULAR TRADE MARK, NAME, PATENT, DESIGN, TYPE, SPECIFIC ORIGIN OR PRODUCER, SUCH REFERENCE SHALL BE DEEMED TO BE ACCOMPANIED BY THE WORDS ‘OR EQUIVALENT’

EMPLOYMENT OF SECURITY PERSONNEL

All security staff employed by the supplier on behalf of the CCT or at any CCT property must be registered with Private Security Industry Regulatory Authority (PSiRA). Proof of such registration must be made available to the CCT’s agent upon request.

FORMS FOR CONTRACT ADMINISTRATION

The supplier shall complete, sign and submit with each invoice, the following:

- a) Monthly Project Labour Report (**Annex 3**).
- b) B-BBEE Sub-Contract Expenditure Report (**Annex 4**).
- c) Joint Venture Expenditure Report (**Annex 5**).

The Monthly Project Labour Report must include details of all labour (including that of sub-contractors) that are South African citizens earning less than R350.00 per day, as adjusted from time to time (excluding any benefits), who are employed on a temporary or contract basis on this contract in the month in question.

In addition to the Monthly Project Labour Report the Supplier shall simultaneously furnish the CCT’s Agent with copies of the employment contracts entered into with such labour, together with certified copies of identification documents, proof of attendance in the form of attendance register or timesheets as well as evidence of payments to such labour in the form of copies of payslips or payroll runs. If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it and proof of such acknowledgement shall be furnished to the CCT’s Agent.

The Monthly Project Labour Reports shall be completed and submitted in accordance with the instructions therein.

The **B-BBEE Sub-Contract Expenditure Report** is required for monitoring the supplier's compliance with the sub-contracting conditions of the **Preference Schedule**.

The Joint Venture Expenditure Report is required for monitoring the joint venture's/consortium/partnership compliance with the percentage contributions of the partners as tendered, where the joint venture/consortium/partnership has been awarded preference points in respect of its consolidated B-BBEE scorecard.

(14.1) MONTHLY PROJECT LABOUR REPORT (EXAMPLE)

ANNEX 1

CITY OF CAPE TOWN MONTHLY PROJECT LABOUR REPORT



Instructions for completing and submitting forms

General

- 1 The Monthly Project Labour Reports must be completed in full, using typed, proper case characters; alternatively, should a computer not be available, handwritten in black ink.
- 2 Incomplete / incorrect / illegible forms will not be accepted.
- 3 Any conditions relating to targeted labour stipulated in the Contract (in the case of contracted out services or works) shall apply to the completion and submission of these forms.
- 4 This document is available in Microsoft Excel format upon request from the City's EPWP office, tel 021 400 9406, email EPWPLR@capetown.gov.za.

Project Details

- 5 If a field is not applicable insert the letters: NA
- 6 Only the Project Number supplied by the Corporate EPWP Office must be inserted. The Project Number can be obtained from the Coordinator or Project Manager or from the e-mail address in point 4 above.
- 7 On completion of the contract or works project the anticipated end date must be updated to reflect the actual end date.

Beneficiary Details and Work Information

- 8 Care must be taken to ensure that beneficiary details correspond accurately with the beneficiary's ID document.

- 9 A new beneficiary is one in respect of which a new employment contract is signed in the current month. A certified ID copy must accompany this labour report on submission.
- 10 Was the beneficiary sourced from the City's job seeker database?
- 11 The contract end date as stated in the beneficiary's employment contract.
- 12 Where a beneficiary has not worked in a particular month, the beneficiary's name shall not be reflected on this form at all for the month in question.
- 13 Training will be recorded separately from normal working days and together shall not exceed the maximum of 23 days per month
- 14 Workers earning more than the maximum daily rate (currently R450 excluding any benefits) shall not be reflected on this form at all.

Submission of Forms

- 15 Signed hardcopy forms must be scanned and submitted to the City's project manager in electronic (.pdf) format, together with the completed form in Microsoft Excel format.
- 16 Scanned copies of all applicable supporting documentation must be submitted along with each monthly project labour report. Copies of employment contracts and ID documents are only required in respect of new beneficiaries.
- 17 If a computer is not available hardcopy forms and supporting documentation will be accepted.

PROJECT DETAILS

Numbers in cells below e.g (6) refer to the relevant instruction above for completing and submitting forms

CONTRACT OR WORKS PROJECT NAME: (6)	EPWP SUPPLIED PROJECT NUMBER: (6)																	
DIRECTORATE:	DEPARTMENT:																	
CONTRACTOR OR VENDOR NAME:	CONTRACTOR OR VENDOR E-MAIL ADDRESS:																	
CONTRACTOR OR VENDOR CONTACT PERSON:	CONTRACTOR OR VENDOR TEL. NUMBER:	CELL WORK																
PROJECT LABOUR REPORT CURRENT MONTH (mark with "X")																		
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR						

ACTUAL START DATE (yyyy/mm/dd)	ANTICIPATED / ACTUAL END DATE (yyyy/mm/dd) (7)
TOTAL PROJECT EXPENDITURE / VALUE OF WORK DONE TO-DATE (INCLUDING ALL COSTS, BUT EXCLUDING VAT)	
R	

TENDER NO: 21S/2021/22

ANNEX 1 (continued)

MONTHLY PROJECT LABOUR REPORT



BENEFICIARY DETAILS AND WORK INFORMATION

CONTRACT OR WORKS PROJECT NUMBER:

Year	Month

Sheet		
1	of	

No.	(8) First name	(8) Surname	(8) ID number	(9) New Beneficiary (Y/N)	Gender (M/F)	Disabled (Y/N)	(10) Job seeker database (Y/N)	Contract start date (DDMMYY)	(11) Contract end date (DDMMYY)	(12) No. days worked this month (excl. training)	(13) Training days	(14) Rate of pay per day (R - c)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

0 0 R -

Declared by Contractor or Vendor to be true and correct:	Name		Signature	
	Date			

Received by Employer's Agent / Representative:	Name		Signature	
	Date			

(14.2) BBEE SUB-CONTRACT EXPENDITURE REPORT (PRO FORMA)

TENDER NO. AND DESCRIPTION: 21S/2021/22 SUPPLY AND DELIVERY OF ELECOMMUNICATIONS MATERIALS AND EQUIPMENT

SUPPLIER:

B-BBEE SUB-CONTRACT EXPENDITURE REPORT

Rand Value of the contract (as defined in Schedule 4: Preference Schedule) (P*)	R	B-BBEE Status Level of Prime Supplier	
---	---	---------------------------------------	--

Name of Sub-contractor (list all)	B-BBEE Status Level of supplier ¹	Total value of Sub-contract (excl. VAT) ¹	Value of Sub-contract work to date (excl. VAT) ¹	Value of Sub-contract work to Sub-contractors with a lower B-BBEE Status Level than supplier
Sub-contractor A		R	R	R
Sub-contractor B		R	R	R
Sub-contractor C		R	R	R

¹Documentary evidence to be provided

Total:	R
Expressed as a percentage of P*	%

Signatures

Declared by supplier to be true and correct:

Date:

Verified by CCT Project Manager:

Date:

(14.3) PARTNERSHIP/ JOINT VENTURE (JV) / CONSORTIUM/ EXPENDITURE REPORT (PRO FORMA)

TENDER NO. AND DESCRIPTION: 21S/2021/22 SUPPLY AND DELIVERY OF ELECOMMUNICATIONS MATERIALS AND EQUIPMENT

SUPPLIER: _____

PARTNERSHIP/ JOINT VENTURE (JV)/ CONSORTIUM EXPENDITURE REPORT

Rand value of the contract (as defined in Schedule 4: Preference Schedule) (P*)	R	B-BBEE Status Level of Partnership/ Joint Venture (JV)/ Consortium	
---	---	--	--

Name of partners to the Partnership/ JV / Consortium (list all)	B-BBEE Status Level of each partner at contract award	Percentage contribution of each partner as per the Partnership/ JV/ Consortium Agreement ¹	Total value of partner's contribution (excl. VAT) ¹ B = A% x P*	Value of partner's contribution to date (excl. VAT) ¹ C	Value of partner's contribution as a percentage of the work executed to date D = C/P*x100
		A			
Partner A		%	R	R	%
Partner B		%	R	R	%
Partner C		%	R	R	%

¹Documentary evidence to be provided

Signatures

Declared by supplier to be true and correct:

Date: _____

Verified by CCT Project Manager:

Date: _____