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TITLE	SPECIFICATION FOR PERIMETER FENCE, GATES AND LIGHTS	REFERENCE CP_TSSPEC_213	REV 1
		DATE: DECEMBER 2021	
		PAGE: 1	OF 16

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SPECIFICATION FOR PERIMETER FENCE AND GATES

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REV

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FOREWORD

This specification was prepared by the following Work Group members:

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2016

INTRODUCTION

A perimeter fence is a structure that circles the perimeter of an area to prevent access. These fences are frequently made out of single vertical metal bars connected at the top and bottom with a horizontal bar. They often have spikes or barbed wire on the top to prevent climbing. Some fences may be string-like pieces of metal stretching across horizontally and vertically, creating a mesh of metal.

City Power's facilities are vulnerable to intrusion, theft and vandalism and thus security is vital to the company's operation. Some of these facilities, such as substations, are surrounded by a perimeter fence, but are still susceptible as the fences are not of a sufficient standard to prevent unauthorised access to the facility. Some of these facilities are designated as National Key Points.

1. SCOPE

This specification covers material requirements and installation of security fencing and gates, for the substation environment.

2. NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

SANS 0222-3, Electrical Security Installations, part3: Electrical Security Fences

SANS 1222, Protection of Enclosures

SANS CKS 451, Specification for anti-intruder fences

SANS 121 / SANS ISO 1461:2000, Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods

SANS 675 / SANS 675:1997, Zinc-coated fencing wire (plain and barbed)

SANS 10044-3 / SANS 044-3: 1983, Welding Part 3: The fusion welding of steel (including stainless steel): Tests for the approval of welding procedures and production welds

SANS 10044-4 / SANS 044-4:1963, Welding Part 4: The fusion welding of steel (including stainless steel): Tests for the approval of welders working to approved welding procedures

SANS 10044-5 / SANS 044-5:1963, Welding Part 5: The fusion welding of steel (including austenitic stainless steel): Tests for the approval of welders where weld procedure approval is not required

SANS 10162-1 / SANS 0162-1, the structural use of steel

SANS 1431 / SANS 1431:2003, Weldable structural steels

SANS 10142-1 (Latest edition)

- SANS 16368

- SANS 60598-2-3

- SANS 475

CP_TSSDRAW_073, Detail drawing of pad lock

CP_TSSDRAW_074 and 075, Detail drawing of mesh panels

CP_TSSDRAW_079, Detail drawing of double leaf gate

CP_TSSDRAW_080, Outer perimeter fence

CP_CV_PG_NJ_001, Detail drawing of pedestrian gate

CP_CV_SG_NJ_001, Detail drawing of sliding gate

CP_ES_NJ_001, Detail drawing of earth spike

LPM_DD_NJ_001, Detail drawing of padlock with lock box

3. REQUIREMENTS

3.1. General Requirements

- 3.1.1. Nothing in this specification shall lessen the obligation of the service provider. The contractor shall be fully responsible for the perimeter fence and gates installation.
- 3.1.2. Perimeter fences and gates shall be categorised (depending on the facility's security risk assessment undertaken by City Power) as high, medium or low security. The risk assessment report shall be submitted to the Engineer for review prior to commencement of any work.
- 3.1.3. All steel materials shall be galvanized or zinc coated steel and smooth with no joints. All manufacturing processes shall be completed prior to galvanizing or coating.
- 3.1.4. Fence classification range from Substation outer perimeter to High Voltage (HV) yard area, including general building requirements shall be based according to the generic drawing provided by City Power.
- 3.1.5. The outer perimeter fence shall be designed with an under-dig/ anti-burrow requirement of $\pm 600\text{mm}$.

Note: Generic drawings for different requirements have been develop and are available on request.

3.2. Intermediate posts

The materials used for posts, extension arms and fixing rails shall be as follows:

- 3.2.1. All structural steel shall conform to SANS 0162. The grade of steel shall be 300WA as defined according to SANS 1431.
- 3.2.2. The height of posts shall range from 2.4m, to 3m depending on site requirements.
- 3.2.3. The length of extension arms shall be 700mm.
- 3.2.4. The extension arm shall be bolted to the top of a post.
- 3.2.5. Posts shall include footplates application.
- 3.2.6. Earthing connection points to be available on all posts.

3.3. Panel

The materials used for straining posts, extension arms; and fixing rails shall be one of the following;

- 3.3.1. All structural steel shall conform to SANS 0162. The grade of steel shall be 300WA as defined according to SANS 1431.

- 3.3.2. The panel dimensions shall be of $\pm 3\text{m}$ wide and $\pm 2\text{m}$ in high, depending on the site requirements.
- 3.3.3. Panel aperture size (centres) shall be in a range of $\pm 76\text{mm} \times 12\text{mm}$ and wire diameter will be $\varnothing 3\text{mm}$.
- 3.3.4. The panel shall be reinforced horizontal recessed bands (rigidity).
- 3.3.5. Panel shall have flanges along sides internal fixtures, all fixtures shall be on the inside.
- 3.3.6. Panel post shall have a flush panel post finish with no climbing aid.
- 3.3.7. The fence configuration should not have any sharp corners.
- 3.3.8. The outer perimeter fence shall have an under-dig section.

Note: No tubing shall be used for substation fencing. Tubing may be used for the gate sections.

3.4. Removable sections

No removable panel on the perimeter fence shall be allowed.

3.5. Fixings

- 3.5.1. Strain eye bolts, hinge bolts, bolts and nuts shall comply with the requirements of SANS 135.
- 3.5.2. M12 bolt with nut and washer shall be used for gate hinges, as per the generic drawings.
- 3.5.3. Bolts used shall be stainless steel security bolts with anti-vandal shear off nuts and washers.
- 3.5.4. The length of bolt as well as the size of nuts and washers used shall be appropriate for its application.

3.6. Gates

- 3.6.1. Gate frames and their extension arms shall be made of tube shaped steel.
- 3.6.2. The height of the gate shall be the same as that of the fence.
- 3.6.3. The mesh razor wire sections (single strand) shall coincide with the corresponding section on the fence.

Note: Generic drawings for gates and locking requirements have been develop and are available on request.

3.7. Swing gates

- 3.7.1. All connections and joints shall be welded to form rigid corner frames.
- 3.7.2. Hinges shall not twist or turn under the action of the gate, shall be so arranged that a closed gate cannot be lifted off the hinges to obtain entry.
- 3.7.3. Roller wheel shall be installed at the ends, as to carry the weight of the gate.

Note: The High Voltage (HV) yard gate shall be the swinging type as per generic drawing.

3.8. Sliding gates

- 3.8.1. All fittings, brackets and rear wheel tracks shall be standard manufactured products for the intended application.
- 3.8.2. Latches, stops, and keepers shall be installed as required.
- 3.8.3. Sweepers to be included on sliding gates.
- 3.8.4. Lubrication on hardware and other moving parts shall be possible.
- 3.8.5. Cover plates shall be provided to form part of gates on the hinges as to prevent tampering.

3.9. Dimensions

- 3.9.1. The vehicle access gate shall consist of two 2.5m leaf gates opening to allow a 5m entry point.
- 3.9.2. A single 6m sliding gate shall also be an option for vehicle access points.
- 3.9.3. Runner wheels shall be used on double leaf gates.

3.10. Gate motor

- 3.10.1 The main entrances of certain sites shall be equipped with motorized gates. Where motorized gates are required, such gates such be sliding gates equipped with an electric motor. The installation of sliding gates shall include pad-lockable facilities (anti -bolt cutter). The installations shall be complete with all required IR detectors, motor padlockable anti-theft bracket and civil works such as kerbing, paving, trenching, backfill, compaction and sleeve installations (Class 6 HDPE) for full system operation. The motorized sliding gates shall also be linked for operational control by the access control systems.
- 3.10.2
- 3.10.3 The electrical gate motor shall be in accordance with the following minimum requirements:

Input Voltage:	220V – 240V ± 10%, 50Hz
Motor Voltage:	24V DC
Motor Power Supply:	Battery Driven (standard capacity = 2 x 7Ah)
Battery Charger:	2A @ 27.5V
Current (mains):	170mA
Current (motor at rated load):	8A
Operator push force Starting:	20kg
Operator push forced Rated:	15kg
Maximum gate length:	50m
Maximum gate speed:	40-50m/min
Manual override:	Lockable lever with key release
Maximum number of operations per day:	750
Duty cycle:	25%
Half day:	Operations in standby with 2 x 7Ah batteries
Full day:	58
Collision sensing:	37
Operating temperature range:	Electronic
Integration:	-15°C to + 50°C
	Controlled with access control system

3.11. Earthing

- 3.11.1. Fence posts shall be installed so that they align with the earth mat such that the earth grid and crusher stone extend 1m outside of the security fence.
- 3.11.2. All gate leaves shall be bonded to the hinged gate posts using 70mm² long flexible covered conductor which shall be attached to the earth lug on the gates and earth points.
- 3.11.3. In areas of high copper theft, the fence and gates shall be securely bonded to the earth mat.
- 3.11.4. All bolted earth connections must be cleaned and filled with a joint compound to prevent oxidation at the joint.
- 3.11.5. The fence shall be earthed on both sides of any gate and at intervals not exceeding 20m.

3.12. Civil work and Foundations

3.12.1. Site condition

Designs shall be applicable to meet specific site conditions; these include site layout, soil condition, drainage, piping, etc. The requirements shall be stipulated during the clarification meeting for the specific site.

3.12.2. Concrete

Concrete work shall be in accordance to SANS 1200 and the concrete strength to be 25MPa except for anti-tunnelling.

3.12.3. Stepping

Stepping per panel shall be 150mm from the tops of panels to be horizontal.

3.12.4. Concrete anti-burrow shall be 100mm (wide) x 600mm (deep) concrete between posts.

3.12.5. The mesh shall be anchored into/onto the centre of the anti-burrow (see generic drawings)

4. Perimeter security Lights

4.1 General requirements

4.1.1 The following shall serve as minimum requirements

4.1.2 All equipment shall be assembled in SA and meet local content requirements as dictated by the Department of Trade and Industry. (DTI).

4.1.3 The lights shall corrosive and weatherproof

4.1.4 The lights shall withstand and be able to operate under the following outdoor condition;

4.1.4.1 Pollution level: very heavy

4.1.4.2 Maximum temperature: 50 °C

4.1.4.3 Minimum temperature: -10 °C

4.1.4.4 Relative humidity: ±90%

4.1.4.5 Altitude: 1800 m (Above sea level)

4.1.4.6 Area: High lightning area

4.2 Luminaires

4.2.1 Luminaire manufactured from aluminium

4.2.2 The luminaires shall have a minimum protection rating of IP 66 on Optical and control gear compartment as per SANS 60529/ IEC 60529

4.2.3 The LED's and driver shall allow future upgrade (lighting control adaptable)

4.2.4 The Luminaires shall comply with the requirements of SANS 60598 part 1, part 2 and part 3.

-
- 4.2.5 Luminaires shall be a colour that is an acceptable match to neutral white (4000K) as per SANS 1091.
- 4.2.6 50 000 hours, at a lumen depreciation of not more than 30% or better
- 4.2.7 The luminaire shall operate at a Power factor rated at 0,95 or better
- 4.2.8 All control gear shall be suitable for operation with the specified rating of the lamp on a 230V $\pm 10\%$

4.3 Wiring

- 4.3.1 All Internal wiring of the luminaires shall comply with clause 3.10 of SANS 60598-2-3.
- 4.3.2 Wiring shall be flexible and suitably rated and insulated to withstand the voltages and temperatures encountered in service. All wiring shall comply with the requirements of SANS 1507 and, where applicable, SANS 529.
- 4.3.3 All parts of an earth terminal shall be made of brass or similar corrosion-resistant material and the contact surfaces shall be bare metal and not painted or varnished surfaces.
- 4.3.4 The contractor shall ensure that all connections in the poles are in accordance with SANS 10142-1
- 4.3.5 All terminations inside the poles shall be in End Connectors – size 2, internal size of 10 mm radius and be of a standard range
- 4.3.6 All end connectors shall be able to accommodate 2 x 16 mm²
- 4.3.7 All End Connectors shall use size 4 key size for tightening conductors.
- 4.3.8 All End conductor Insulating sleeves shall be Suitable for Non-Sparking Range 2-D type
- 4.3.9 The connection of lighting in the poles shall follow the sequence of RED- WHITE – BLUE from the control box to the end of the circuit, ensuring that all phases are equally balanced.
- 4.3.10 The lighting controls shall be controlled by day/Night switch.
- 4.3.11 The circuit breakers shall be replaced with similar and rated at 5 amps, single pole with a 3ka rating.
- 4.3.12 A Certificate of Compliance shall be issued on completion for each lighting circuit (K1, K2 and K3).
- 4.3.13 The weight of the wires shall not be more than the current pole structure design can handle
- 4.3.14 All covers shall be refitted with tapped screw thread and steel using 4mm allen head stainless steel machine screws.
- 4.3.15 Luminaires shall be earthed in accordance with clause 3.8 of SANS 60598-2-3 or with clause with clause 13 of the Electrical Machinery Regulations of the OSH Act (Act 85 of 1993).

- 4.3.16 The contractor shall ensure that supply power cable between all lighting poles circuits and control kiosks are electrically continuous.

4.4 The Spigot

- 4.4.1 The new Spigots shall be centrally mounted and fastened onto the top of each pole
- 4.4.2 The spigot shall be type – 42mm and have an angle of 15 degrees and the Spigot shall be made from marine grade aluminium allowing for corrosion resistance.

5. TEST

- 5.1 comprehensive test reports certifying that the luminaires have successfully passed accelerated ageing tests as to 4.8 and 5.6 of SANS 475
- 5.2 The Service provider will be required to provide a simulation of the lights to ascertain that there will be sufficient lighting to suit the existing pole arrangement and not result in dark spots.
- 5.3 Successful test results shall be presented to the Employer on delivery of the light fittings

6. Warranties and Guaranties.

- 6.1 5 years' warranty on light fitting
- 6.2 The power supply must automatically disengage when opening the luminaire.
- 6.3 Fitting must come with Surge protection 20kV/20kA device mounted inside the gear compartment and it should be easily replaceable

7. DOCUMENTATION

- 7.1. Technical product catalogue and installation approval shall be provided.
- 7.2. Certificate of compliance for materials and coatings.
- 7.3. Design drawings of perimeter fence and gates

8. QUALITY MANAGEMENT

A quality management plan shall be set up in order to assure the proper quality management of the modular parkhomes during design, development, production, installation and servicing phases. Guidance on the requirements for a quality management plan may be found in the ISO 9001:2015. The details shall be subject to agreement between City Power and the Supplier.

9. HEALTH AND SAFETY

A health and safety plan shall be set up in order to ensure proper management and compliance of the modular parkhomes during installation, operation, maintenance, and decommissioning phases. Guidance on the requirements of a health and safety plan may be found in ISO 45001:2018 standards. This is to ensure that the asset conforms to standard operating procedures and City Power SHERQ Policy. The details shall be subject to agreement between City Power and the Supplier.

10. ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to assure the proper environmental management of the modular parkhomes throughout its entire life cycle (i.e. during design, development, production, installation, operation and maintenance, decommissioning and disposal phases). Guidance on the requirements for an environmental management system may be found in ISO 14001:2015 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHERQ Policy.

ANNEXURE A - BIBLIOGRAPHY

DSP0024 – Eskom specification for security fences

ANNEXURE B - REVISION INFORMATION

DATE	REV. NO.	NOTES
June 2014	0	First issue
March 2015	1	Second issue
December 2021	2	Third issue
		Added gate moter
		Added perimeter light

ANNEXURE C - Item No. 1 – Perimeter fence and gates

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub clause of CP_TSSPEC_213	Description	Schedule A	Schedule B
1		Manufacturer	XXXX	
2		Location	XXXX	
3	3.1	General Obligation to the supplier 1. Risk assessment report of the site 2. Type of fence solution (As per site) 3. Steel material coating 4. Classification range 5. Under-dig/Anti-burrow	Note Required XXXX Galvanized or Zinc Substation /General ±600	
4	3.2	Intermediate posts 1. Steel grade as per SANS 1431 2. Height of posts 3. Lengths of extensions 4. Fixing of extension 5. Post footing 6. Earthing connection	WA m mm 300 2.4 - 3 700 Bolted Required Required	
5	3.3	Panels 1. Structural steel grade as per sub-clause 3.3.1	WA 300	
	3.3.2	2. Panel dimensions	m ±3 x 2	
	3.3.3	3. Panel aperture size	mm ±76 x 12	
		4. Diameter of wire	mm Ø3	
		5. Panel reinforcement	Horizontal	
		6. Panel flanges	Sides	

Note: Ticks, Cross [√, X], Astrick [∗], Word [Noted] or TBA [“To Be Advice”] will not be accepted.

Tender Number: _____

Tenderer's Authorised Signatory: _____

Name in block letters

Signature

Full name of company: _____

Item	Sub clause of CP_TSSPEC_207	Description	Schedule A	Schedule B
6	3.4	7. Panel post with no climbing aid	Required	
		8. Outer perimeter fence	Anti-barrow section	
		No removable sections	As per clause 3.4	
7	3.5	Fixings	XXXX	
8	3.6/3.7/3.8	Strain eye bolts, hinge bolts and nuts as per sub-clause 3.5.1	Required	
		Bolts	M12	
		Gates		
9	3.9	1. Swing gate (HV yard)	Required	
		2. Sliding gate (Perimeter)	Required	
		Dimensions		
10	3.10	1. Vehicle access gate m	2.5x 2	
		2. Single sliding gate m	6	
		3. Runner wheels requirements	Required	
11	3.11	Earthing		
		Gate bonding mm ²	70	
		Earthing intervals m	20	
11	3.11	Oxidation prevention	State	
		Civil work and Foundations	XXXX	
		Concrete	SANS 1200	
8	4	Concrete strength MPa	25	
		Stepping mm	150	
		Post concrete dimensions	As per 3.11.4	
8	4	Documentation		
9	5	1. As sub-clause requirements	Required	
		Quality management		
		ISO 9001 accreditation Yes/No	Required	
10	6	Environmental management		
		ISO 14001 accreditation Yes/No	Required	
		OHS management		
11	7	ISO 18001 accreditation Yes/No	Required	

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted.

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Tender Number: _____

Tenderer's Authorised Signatory: _____

Name in block letters

Signature

Full name of company: _____

Item No. 1 – PERIMETER FENCE AND GATES

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub clause of CP_TSSPEC_213	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

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ANNEXURE D – Stock Items

It is not intended that City Power should keep stock of these items.