

SPECIFICATIONS FOR STREET LIGHT LUMINAIRES

1. INTRODUCTION

Street lighting luminaires are used for the lighting of public thoroughfares and roadways, contributing to road safety as well as public safety. The reliability and safety of these luminaires have a direct impact on levels of customer satisfaction as well as quality of supply.

This tender shall evaluate streetlight luminaires considering such elements as luminaire construction, photometrics, maintenance costs and life span.

The performance of all luminaires will be evaluated by unit of their cost as well as the scheme price for a streetlight design as outlined in ARP 035, as issued by Standards South Africa.

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 475:2006	Luminaires for interior lighting, street lighting and floodlighting - Performance requirements
ARP 035: 2005	Guidelines for the installation and maintenance of street lighting.
SANS 1088: 2004	Luminaire entries and spigots
SANS 1250: 1991	Capacitors for use with fluorescent and other discharge lamp ballasts
SANS 1266: 2002	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SANS 1574: 2004	Electrical cables – flexible cords and flexible cables
SABS IEC 922:1989	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SABS IEC 60923:2001	Ballasts for discharge lamps (excluding tubular fluorescent lamps) – Performance requirements
SABS IEC 926:1995	Auxiliaries for lamps – Starting devices: General and safety requirements
SABS IEC 60927:2005	Starting devices (other than glow starters) - Performance requirements
SABS IEC 61048:2006	Capacitors for use in tubular fluorescent and other discharge lamp circuits: General and safety requirements
SABS IEC 61049:1991	Capacitors for use in tubular fluorescent and other discharge lamp circuits - Performance requirements
SANS 529: 2001	Heat-resisting wiring cables
SANS 1507: 2002	Electric cables with extruded solid dielectric insulation for fixed installations
VC 8011:1999	Lamp holders
SANS 1777:2004	Photoelectric control units for lighting (PECUs)
SABS ISO 1461:2000	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 556-1:2004	Low-voltage switchgear Part 1: Circuit-breakers
BS 1490: 1988	Specification for aluminium and aluminium ingots and castings for general engineering purposes.

3. DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations shall apply to this specification:

3.1. HPS: High Pressure Sodium.

3.2. PECU (Photoelectric control unit): A device, which comprises a photoelectric sensor responding to variations in illuminance combined with means for switching an electric load.

3.3. Socket (NEMA base): A receptacle into which a one-part control unit may be inserted.

3.4. /E (suffix): Elliptical e.g. 100 W HPS/E

3.5. /T (suffix): Tubular e.g. 100 W HPS/T

4. GENERAL TECHNICAL SPECIFICATIONS

4.1. Tenderers shall complete the technical schedules as detailed in Section 3: pages 15 to 19 of this specification giving details of fittings they propose to offer and if the item complies with the relevant SANS specification or any other standard.

4.2. Luminaires shall be Class 1 as per SANS 60598-1 and shall be of the totally enclosed type.

4.3. Luminaires shall be designed for use under conditions of heavy atmospheric pollution and exposure to high levels of solar (including ultraviolet) radiation and be suitable for operation at an ambient temperature T_a of +35°C. The luminaires may also be exposed to wind, rain, hail and sleet in service.

4.4. Luminaires shall have a lamp, control gear and spigot compartment and shall have a degree of protection rating of a minimum of IP65 rating on the lamp compartment and a minimum of IP54 on the control gear compartment. These are minimum ratings and preference may be given to luminaires offered with IP ratings exceeding the minimum requirements, particularly on the control gear compartment.

4.5. All ratings must be certified by a test report confirming compliance with SANS 60598-1, together with the standards listed under clause 4.2 of this specification, as well as clause 12 (Tests) of this specification. The test reports shall be issued by an SANS or IEC accredited test authority.

4.6. Luminaires offered under this contract shall bear the "SABS certification mark for approved performance shown by an " 'A' enclosed by a diamond" and shall be tested to the SANS 475 standard. Tenderers who do not comply with this clause will not be considered.

4.7. Luminaires shall be delivered completely assembled with control gear, lamp holder, reflectors, diffuser (bowl) and housing. Photoelectric cells, where used, are not required on this tender. Lamps are not required on this tender.

5. GENERAL CONSTRUCTION OF STREETLIGHT LUMINAIRES

5.1. General

5.1.1. Luminaires shall be robustly constructed, weatherproof, hail proof, insect proof, corrosion proof, solar (including ultra-violet) resistant and vandal resistant.

5.1.2. In order to prevent risks associated with road safety, luminaires shall be designed to avoid disintegration in the event of vehicular impact. Luminaire housings shall be secured to the pole spigot in such a manner that the

control gear compartment remains attached to the pole spigot even after a severe impact.

- 5.1.3. All external parts and components of the luminaire shall be designed to shed water and no accumulation of condensation or precipitation shall occur. An exterior lip shall be provided on the housing to ensure that there is no direct rainwater contact with the gasket between the housing and the diffuser, thus ensuring that no moisture is sucked into the diffuser when the luminaire is switched off and cools down.
- 5.1.4. Luminaires shall be constructed from durable lightweight materials and shall be accompanied by comprehensive test reports certifying that the luminaires have successfully passed accelerated ageing tests (also refer to 4.8 and 5.6 of SANS 475) and shall provide proof that the luminaires have a satisfactory performance history. Deterioration shall not occur due to electrolytic action or by differential thermal expansion. Note: Further details on tests can be found under clause 12 of this specification.
- 5.1.5. Luminaire housings shall be manufactured from ultraviolet stabilized engineering polymer. Luminaires made of DMC (Dough Moulding Compound) shall not be accepted. The luminaire housing shall be warranted to operate without distortion and deterioration for a minimum period of 5 years.
- 5.1.6. Luminaires shall be a colour that is an acceptable match to colour number F48 (cloud grey) of SANS 1091. Painted luminaires shall not be accepted.
- 5.1.7. Ferrous components shall be hot-dip galvanized in accordance with SABS ISO 1461:2000 for heavy-duty applications. External small components (clips, screws, bolts, nuts, washers, etc.) shall be manufactured from stainless steel (grade 304 or better).

5.2. Mounting

- 5.2.1. Spigot entries shall be designed to fit easily over the bracket pipe and shall be truly parallel to the fitting axis and shall comply with Table 1 of SANS 101088:1990 as follows:
 - For Type 2 luminaires (side entry): Nominal size 42 mm
 - For Type 3 luminaires (bottom entry): Nominal size 76 mm
- 5.2.2. Spigot entries shall be designed to fit easily over the spigot and shall be truly parallel to the fitting/lamp axis. Spigot entries shall be constructed of corrosion-resistant materials and compatible with the galvanized mild steel spigot such that deterioration by electrolytic action shall not occur.
- 5.2.3. Luminaires shall be secured to the spigot by means of at least two stainless steel M10 hexagonal head screws. The construction of the housing shall be such that cracking cannot occur during the process of fixing the luminaire to the pole or bracket.
- 5.2.4. Luminaires should incorporate a positive and substantial means of fixing to the pole or bracket, designed to allow adjustment and to ensure that once set to the required position, the luminaires remain locked in that position.

5.3. Diffusers

- 5.3.1. Diffusers shall have no external prisms that could accumulate dirt and thus reduce the light output of the luminaire. Diffusers shall be constructed in such a manner that the wall thickness of the material is maintained at a constant thickness, hence preventing the projection of lines of patterns onto the road surface.

- 5.3.2. Diffusers shall be heat-resistant and shall not discolour, even after prolonged exposure to light, both atmospheric and artificial. The mechanical strength shall be sufficient to prevent warping or distortion to occur. Diffusers shall be manufactured from injection moulded high impact acrylic. Tenderers shall submit documentation with respect to the properties of the material under service conditions (i.e. Depreciation in light transmission over time and material degradation). Diffusers made of polycarbonate shall not be acceptable.
- 5.3.3. Devices for locking the bowl to the luminaire shall be at least three stainless steel clips thus ensuring that it remains closed in the event of the failure of one clip. Hinges and clips shall be robust and simple to operate. Devices such as wing nuts and those requiring the use of a tool (e.g. screws) shall be rejected. Bowls that are completely flat, i.e. do not project below the luminaire body, will not be acceptable.
- 5.3.4. Diffusers shall have a means to prevent direct contact by rainwater with the one-piece gasket, which shall be permanently fitted into the housing (e.g. in a tongue and groove arrangement). The gasket shall form a seal when the diffuser is in the closed position, preventing the entry of dust, moisture and insects into the lamp compartment. The gasket shall be made from silicon sponge, which shall not be subject to permanent compression or deterioration in service. The gasket should be fitted into a groove in the housing and should be kept in place by a tongue provided on the diffuser, thus ensuring the integrity of the IP rating and shall not work loose during maintenance of the luminaire.
- 5.3.5. Luminaire bowls shall be capable of being removed from the luminaire body simply by unclipping for cleaning purposes. The bowl shall not detach from the luminaire body in the unlikely event of the bowls being left in the open or hanging position when mounted on the pole. The diffuser should also remain attached to the housing when hinged open for maintenance or lamp replacement. This hinge mechanism should be incorporated into housing to ensure that it is protected against damage during transport, installation and maintenance.

5.4. Lamp-holders and brackets

- 5.4.1. Lamp-holders shall comply fully with VC 8011 and be of the type (E27 or E40), as specified in SECTION 3 - Schedule A, and shall be capable of maintaining efficient electrical contact with the lamp terminals without deterioration due to temperature, climatic conditions and vibration which will be encountered in service.
- 5.4.2. For additional insulation against ignitor spark-over a suitable fibre washer for E40 GES lamp holders shall be used.
- 5.4.3. Lamp-holders shall be rated to withstand 240°C and be rated at the appropriate lamp ignition voltage.
- 5.4.4. A lamp fully inserted into the lamp-holder shall be rigidly held with its axis substantially coincident with that of the lamp-holder under conditions of wind, vibration and mechanical shock to be expected in service.
- 5.4.5. The lamp-holder shall have zero degree rake i.e. its axis shall be parallel to that of the spigot entry.
- 5.4.6. Lamp holder brackets and lamp supports shall accept and retain lamps which are within the dimensional tolerances stated in the appropriate lamp standard and shall locate the light source in the correct relationship to the optical control devices of the luminaire. With luminaires for lamps of greater rating than 150W, the lamp holder shall be mounted firmly to an aluminium bracket.

Alternatively the lamp holder is to be mounted directly onto aluminium bosses, which protrude into the lamp housing from the gear compartment.

5.5. Reflectors

- 5.5.1. Reflector surfaces shall be of high-grade 99,98% super pure deep anodised aluminium.
- 5.5.2. Reflectors or any other light-controlling component shall be such that they can only be fitted or replaced in the correct relationship to their light source.
- 5.5.3. Reflectors in luminaire bowls shall not deform due to heat from the lamp. Reflectors shall be well secured into position to prevent it from deforming thus causing false photometric performance of the luminaire.
- 5.5.4. Where provision is made for alternative reflector positions, the adjustment means shall be positive and be firmly retained in clearly identified positions.

5.6. Control Gear

- 5.6.1. Control gear shall be fully housed within the body of the luminaire and be suitable for operation with the specified rating of lamp. Under no circumstances shall control gear be mounted above the lamp or in a position where it may be adversely affected by the heat generated by the lamp.
- 5.6.2. For 250W and 400W luminaires - For safety and thermal reasons, the control gear compartment shall be manufactured from a sturdy and reliable housing of high-pressure die cast, corrosion resistant, aluminium of grade LM6 (EC1706 AC 44100), or higher. For 150W luminaires – Luminaires offered manufactured of one piece material shall submit detailed reports of material compliance to thermal tests etc as described in items 4.2, 4.6, 6.1.4 and 12.
- 5.6.3. The control gear compartment shall be so designed that there is sufficient space to permit repairs, replacement of components and reassembly without difficulty, without the removal of the luminaire from its mounting. To this end, and for maintenance reasons, preference will be given to luminaires where all control gear is mounted onto a removable tray. Where this is provided, removable connectors are required for disconnecting the supply to the tray for easy removal and subsequent replacement. Control gear wiring is to be terminated in a five-way termination block to facilitate the removal of the gear tray in the control gear compartment.
- 5.6.4. Control gear compartment (containing the ballast, capacitor, ignition devices if applicable, and terminal connectors) shall be sealed by a hinged, lightweight, non-corroding cover and shall be accessible from underneath. No components shall be mounted onto this cover. Access to the gear compartment, via the gear tray cover, shall not be possible without the use of a screwdriver or key, thus protecting unqualified staff, doing lamp replacement, against electric shock.
- 5.6.5. Where specified, luminaires shall be supplied with a thermal circuit breaker, which conforms to SANS 556-1, rated 5A/2.5kA, incorporated inside the luminaire and mounted on the removable gear tray. The exposed lever shall be accessible from the outside of the luminaire and shall be protected in a manner ensuring the integrity of the IP54 rating requirement for the control gear compartment.

5.6.6. All control gear shall be suitable for operation with the specified rating of the lamp on a 230V $\pm 10\%$ 50Hz single-phase system.

5.7. Ballasts

5.7.1. Ballasts shall comply with SANS 1266, SABS IEC 922 and SABS IEC 60923 and shall bear the SABS mark or IEC mark.

5.7.2. Ballasts shall be of the encapsulated or vacuum impregnated type. The process of vacuum impregnation shall be such that the interstices of the windings are completely filled with the impregnating material. Connections shall be brought out to a suitable brass screw terminal block mounted on the ballast housing. Terminal blocks with steel screws will not be acceptable.

5.7.3. Vacuum impregnated ballasts shall be constructed in such a manner that the lamination is engaged within a galvanised steel cover which cover shall with stand the test specified in SABS ISO 1461:2000.

5.8. Capacitors

5.8.1. Capacitors shall comply with SANS 1250, SABS IEC 61048 and SABS IEC 61049 and shall bear the SABS mark or IEC mark.

5.8.2. Capacitors shall only be connected to the primary (line) side of transformer ballasts. After connection of the power factor correction capacitor, the power factor shall not be less than 0,85 (lagging).

5.8.3. All capacitors shall be fully encapsulated and filled with self-extinguishing resin.

5.9. Ignition Devices

5.9.1. Ignitors shall comply with SANS 101630 and shall bear the SABS mark or IEC mark. Ignitors shall be of the superimposed-pulse solid-state electronic trigger type.

5.9.2. Ignitors shall be of the standard type to allow striking of the lamp without switching the power off after replacement of a faulty ignitor.

5.9.3. Ignitors shall be suitable for operating any make of lamp in conjunction with any make of ballast at temperatures up to 90 o C. The ignitor shall be connected in series with the ballast and installed between the ballast and lamp holder. Systems that operate with the ignitor in parallel with the lamp, or with special tapped ballasts, will not be acceptable.

5.9.4. All ignitors shall be suitable for connection in the circuit so that the ignition pulse is confined between the ignitor and lampholder.

5.10. Electrical Requirements

5.10.1. All Internal wiring of the luminaires shall comply with clause 3.10 of SANS 60598-2-3. It 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. The wiring colours to be used shall be as follows: live - red (or brown), neutral – black (or blue) and earth – green/yellow.

5.10.2. The neutral conductor of the incoming supply shall be connected to the screw thread portion of Edison screw type lampholders and the live conductor shall be connected to the central contact and the internal wiring shall be arranged accordingly.

5.10.3. Terminals and electric connections shall comply with clause 3.9 of SANS 60598-2-3. In addition, the luminaire shall incorporate a terminal block

mounted in a reasonably accessible position as close to the point of entry as possible. The material of the terminal block shall be non-tracking and the terminals shall be made of non-corroding material such as brass. Terminals made of aluminium shall not be acceptable.

- 5.10.4. Any wiring passing through metal shall have suitable grommets or otherwise protected to avoid abrasion of the insulation.
- 5.10.5. Luminaires shall be earthed in accordance with clause 3.8 of SANS 60598-2-3.
- 5.10.6. Metal parts of luminaires which may become alive in the event of an insulation fault and which are not accessible, when the luminaire is mounted, but which are liable to come into contact with the supporting surface, shall be permanently and reliably connected to an earth terminal and shall withstand the test specified in SANS 60598-2-3. An earth terminal shall be provided in all instances, even if the luminaire is fully insulated and even if all conductive parts, which could become alive in the event of an insulation fault, are not accessible. This is to facilitate future wiring should a unit, which requires an earth connection, replace the luminaire.
- 5.10.7. Protection against electric shock (of at least IP 2X) shall be maintained for all methods and positions of installation in normal use. Protection shall also be maintained after removal of all parts that can be removed by hand.
- 5.10.8. 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.
- 5.10.9. All earth connections shall be effected by means of suitable lugs. All possibility of electrolytic corrosion shall be avoided.

5.11. The luminaire shall be able to be supplied with the following optional extras:

- 5.11.1. A flat glass or shallow diffuser option for very specific light sensitive areas.
- 5.11.2. A bottom entry casting, incorporated into the spigot compartment and not attached as a side entry.

6. PHOTOMETRIC PERFORMANCE OF STREETLIGHT LUMINAIRES

- 6.1. Photometric data shall be supplied with the tender. This data shall be issued by the SABS or SANAS accredited lighting laboratory. The photometric requirements as listed in SANS 475, Clause 4.7.1.1, shall be provided.
- 6.2. Tenders shall be accompanied by a CD, containing the following data: luminous intensity tables in accordance with CIE Publication 27, in a form compatible with CIE 140 compatible computer software.
- 6.3. Tenderers are required to complete the tender form for: Design Criteria, Design Results and Pricing Schedule (Section 1), for Group A and Group B street lighting designs.
- 6.4. Adjudication of tenders shall be based upon the performance of luminaires from various manufacturers, utilizing the same lamp source.
- 6.5. Adjudication will be done on the project cost basis. The design results will indicate pole spacing, which should then be converted into a scheme price per kilometre, where a given price per installed pole forms part of the scheme price.

- 6.6. The cost of the scheme price shall be calculated in accordance with the formula, as detailed in Schedule 2, below each design criteria of luminaire items. Pole spacings shall be as calculated in accordance with SANS 10098-1: 1990.

7. GUARANTEE

- 7.1. Tenderers shall guarantee each street lighting luminaire for a minimum period of five years from the date of manufacture. Street lighting luminaires bearing a date of manufacture exceeding four (4) months prior to the date of delivery shall not be accepted.
- 7.2. This guarantee is primarily intended to be a material guarantee. This means that if any luminaire is unsuitable for use, or its IP rating(s) is compromised within a period of five years from date of delivery, it shall be replaced free of charge by the manufacturer.
- 7.3. Failure of the luminaire in terms of clause 10.2 would entail degradation of the polymer, by ultraviolet radiation for example, to a point where cracks or holes appear in the luminaire housing (or diffuser), thus compromising the structural integrity and IP rating of the luminaire.
- 7.4. The scope of this guarantee excludes control gear but includes the luminaire housing, diffuser, lamp-holder, brackets, etc. Tenderers shall provide separate guarantee for the control gear, as detailed in Section 3.
- 7.5. Where any dispute arises, between the tenderer and the Municipality/Metro, as to interpretation of any of the above clauses relating to the guarantee required, the matter shall be referred to an independent panel from IESSA (Illumination Engineering Society of South Africa).

8. SAMPLES

- 8.1. Tenderers shall provide fully labelled samples prior to opening of tender documents. The Council reserves the right to submit such samples to such tests as deemed reasonable and necessary.
- 8.2. The supplier shall supply all samples at their own cost.
- 8.3. Failure to provide samples will render the tender liable to rejection on the grounds of being incomplete.
- 8.4. The council reserves the right to purchase any sample submitted at the tender price.
- 8.5. Tenderers shall collect their samples within a week of request by the Council. Tenderers who do not collect samples after a week of request will be deemed to have waived all rights to the samples and the samples will become the property of the Municipality/Metro and disposed of at the Councils sole discretion.
- 8.6. Where a tender is accepted for the supply of goods, based on a sample submitted by the tenderer, the sample will become the contract sample and will be retained by the Municipality/Metro for the duration of the contract. After expiry of the contract, the conditions detailed in Clause 11.6 shall apply.

9. TESTS

- 9.1. The tests for ingress of dust, solid objects and moisture shall be carried out in accordance with section 9 of SANS 60598-1 and clause 3.13 of SANS 60598-2-3. Test reports confirming that the tests have been carried out as prescribed shall be the only acceptable verification of IP ratings.

Note: In accordance with the test requirements of the above documents, the luminaire shall be energised and brought to a stable operating temperature (thermal equilibrium) at its rated voltage before commencement of the tests. Test reports describing tests where the luminaire was not energised during testing will result in the tender being rejected.

- 9.2. Test reports shall have been issued by SABS or a test authority accredited by SANAS.
- 9.3. Tests as described in clauses 3.6.3 through 3.6.5 and clauses 3.7 through 3.15 of SANS 60598-2-3 shall be carried out and the test reports shall be supplied with the tender.
- 9.4. Luminaire housings shall also be subjected to resistance to corrosion and accelerated ageing testing and hence give a reasonable indication of premature failure and life expectancy of luminaires.
- 9.5. The acceptance criteria for the accelerated ageing test are as follows:
 - 9.5.1. No signs of material degradation
 - 9.5.2. No cracks on any part of the luminaire; and
 - 9.5.3. No compromise of any of the IP ratings of the luminaire.
- 9.6. The list of test certificates required are:
 - 9.6.1. Static wind-force test
 - 9.6.2. External and internal wiring
 - 9.6.3. Protection against electric shock
 - 9.6.4. Thermal tests
 - 9.6.5. Resistance to dust, solid objects and moisture
 - 9.6.6. Power factor and lamp voltage
 - 9.6.7. Photometric requirements
 - 9.6.8. Resistance to corrosion
 - 9.6.9. Insulation resistance and electric strength
 - 9.6.10. Resistance to heat, fire and tracking; and
 - 9.6.11. Accelerated ageing tests

SECTION 1
Schedule of Prices

IMPORTANT NOTE: ALL 3 SECTIONS ARE TO BE COMPLETED IN ORDER FOR THE BID DOCUMENT TO COMPLY WITH THE BID CONDITIONS.

Item No.	Description and Stores Code Numbers (Sample Reference Only)	Manufacturer and Model	Scheme Price (Excl. VAT)	Delivery Period in Weeks
A	50W high pressure sodium side entry Street Light luminaires, for use with 50W lamp with internal igniter, with incorporated 5A MCB			
B	70W high pressure sodium side entry Street Light luminaires, for use with 70W lamp with internal igniter, with incorporated 5A MCB			
C	100W high pressure sodium bottom entry Street Light luminaires, for use with 100W lamp with internal igniter, with incorporated 5A MCB			
D	150W high pressure sodium bottom entry Street Light luminaires, for use with 150W tubular lamp, with incorporated 5A MCB			
E	250W high pressure sodium bottom entry Street Light luminaires, for use with 250W tubular lamp, with incorporated 5A MCB			

SECTION 2i

Design criteria, design results and price schedule: Group B2 and B1 Street Lighting

These Schedules shall be completed, signed and returned with the bid document of which it forms part.

		Item A	Item B	Item C
Type of Luminaire and Lamp Type:		50W HPS	70W HPS	100W HPS
Design Criteria	Unit			
Arrangement	-	Single Sided Left	Single Sided Left	Single sided Left
Width of road	m	7	7	7
Mounting height	m	7.5	7.5	8.5
Overhang, of left hand side	m	-0.5	-0.5	-1
Angle of tilt	Degrees	15	15	15
Lamp lumen	Lm	5600	6600	9500
Ballast factor	%	98	98	98
Maintenance factor: 0.83* 0.90 = 0.75 for IP 6* and 0.76* 0.90= 0.68 for IP 5*				
Minimum average horizontal Illuminance, Eh ave	Lux	3	3	5
Minimum horizontal Illuminance, Eh min	Lux	0.6	0.6	1
Note: Horizontal illuminance values apply across the carriageway and side walks up to 2m from edge of carriageway				
Design Results				
Pole Spacing	m			
Minimum average horizontal Illuminance, Eh ave	Lux			
Minimum horizontal Illuminance, Eh min	Lux			
Price Schedule				
Unit Price	R			
Scheme Price in accordance with formula	R			

Scheme price applicable to Item "A"	Scheme price applicable to Item "B"
$Scheme\ Price = \frac{1000}{Pole\ Spacing} \times (\text{€}500 + Unit\ Price)$	$Scheme\ Price = \frac{1000}{Pole\ Spacing} \times (\text{€}000 + Unit\ Price)$

SECTION 2ii

Design criteria, design results and price schedule: Group A4, A3 and A2 Street Lighting

These Schedules shall be completed, signed and returned with the bid document of which it forms part.

		Item D	Item E
Type of Luminaire and lamp type:		150W HPS/E	250W HPS/E
Design Criteria	Unit		
Arrangement	-	Single Sided Left	Single Sided Left
Lanes per carriageway		2	2
Width of each lane	m	3.5	3.5
Mounting height	m	9	10
Overhang of left hand side	m	1	-0.5
Angle of tilt	Degrees	15	15
Lamp lumen	Lm	15000	27000
Ballast factor	%	98	98
Maintenance factor: 0.83*0.90=0.75 for IP 6* and 0.76*0.90=0.68 for IP 5*			
Lighting Category		A4	A2
Traffic volume for road without median		300	100
Luminance	cd/m ²	0.5	0.8
Overall Uniformity	U _O	0.4	0.4
Longitudinal Uniformity	U _L	0.5	0.5
Threshold Increment	%	20	20
Design results			
Pole Spacing	m		
Luminance	cd/m ²		
Overall Uniformity			
Longitudinal Uniformity			
Threshold Increment	%		
Price Schedule			
Unit Price	R		
Scheme Price in accordance with formula	R		

Scheme price applicable to Item "D"	Scheme price applicable to Item "E"
$Scheme\ Price = \frac{1000}{PoleSpacing} \times \text{€}300 + Unit\ Price$	$Scheme\ Price = \frac{1000}{PoleSpacing} \times \text{€}500 + Unit\ Price$

SECTION 3i

ITEM "A", "B" and "C": 50W, 70W and 100W HPS Street Light Luminaire

These Schedules shall be completed, signed and returned with the bid document of which it forms part.

Schedule A: Purchaser's specific requirements**Schedule B: Guarantees and technical particulars of equipment offered**

Item	Technical Details	Schedule A	Schedule B
1	Name of manufacturer		
2	Place of manufacture		
3	Manufacturer's reference		
4	Specification to which luminaire complies		
5	Does the luminaire bear either the SABS mark or IEC mark?		
6	Lamp compartment IP rating (minimum)	IP 65	
7	Gear compartment IP rating (minimum)	IP 54	
8	Material of housing		
9	Material of diffuser	High-Impact Acrylic	
10	Material of sealing gasket	Silicon	
11	Size of lamp-holder	E27: 70W E40: 100W	
12	Material of lamp-holder		
13	Does lamp-holder comply with VC 8011		
14	Does ballast comply with SABS 1266?		
15	Does capacitor comply with SABS 1250?		
16	Does ignitor comply with SABS 1630?		
17	Mass of luminaire as delivered (kg)		
18	Material of terminals	Brass	
19	Do the electrical requirements comply with clause 6.4 of this specification?		
20	Does the luminaire comply fully with the photometric requirements?		
21	Life expectancy of luminaire?		
22	Have test reports been included in the tender?		
23	Has all documentation required been submitted with the tender?		
24	Guarantee Period - Luminaire	Five Years	
25	Guarantee Period - Control Gear	18 Months	

SIGNATURE OF TENDERER:.....

SECTION 3ii**ITEM "D" 150W HPS Street Light Luminaire**

These Schedules shall be completed, signed and returned with the bid document of which it forms part.

Schedule A: Purchaser's specific requirements**Schedule B: Guarantees and technical particulars of equipment offered**

Item	Technical Details	Schedule A	Schedule B
1	Name of manufacturer		
2	Place of manufacture		
3	Manufacturer's reference		
4	Specification to which luminaire complies		
5	Does the luminaire bear either the SABS mark or IEC mark?		
6	Lamp compartment IP rating (minimum)	IP 65	
7	Gear compartment IP rating (minimum)	IP 54	
8	Material of housing		
9	Material of control gear compartment	High pressure die-cast aluminium (LM6) (**). See Note below	
10	Material of diffuser	High-Impact Acrylic	
11	Material of sealing gasket	Silicon	
12	Size of lamp-holder	E40	
13	Material of lamp-holder		
14	Does lamp-holder comply with VC 8011		
15	Does ballast comply with SABS 1266?		
16	Does capacitor comply with SABS 1250?		
17	Does ignitor comply with SABS 1630?		
18	Mass of luminaire as delivered (kg)		
19	Material of terminals	Brass	
20	Do the electrical requirements comply with clause 6.4 of this specification?		
21	Does the luminaire comply fully with the photometric requirements?		
22	Life expectancy of luminaire?		
23	Have test reports been included in the tender?		
24	Has all documentation required been submitted with the tender?		
25	Guarantee Period - Luminaire	Five Years	
26	Guarantee Period - Control Gear	18 Months	

Note: Item 9: (**). If proof can be submitted of compliance using a one-piece material, then this material may be offered. Refer to 6.6.2 of Page 5.

SIGNATURE OF TENDERER:.....

SECTION 3iii**ITEM "E" 250W HPS Street Light Luminaire**

These Schedules shall be completed, signed and returned with the bid document of which it forms part.

Schedule A: Purchaser's specific requirements**Schedule B: Guarantees and technical particulars of equipment offered**

Item	Technical Details	Schedule A	Schedule B
1	Name of manufacturer		
2	Place of manufacture		
3	Manufacturer's reference		
4	Specification to which luminaire complies		
5	Does the luminaire bear either the SABS mark or IEC mark?		
6	Lamp compartment IP rating (minimum)	IP 65	
7	Gear compartment IP rating (minimum)	IP 54	
8	Material of housing		
9	Material of control gear compartment	High pressure die-cast aluminium (LM6)	
10	Material of diffuser	High-Impact Acrylic	
11	Material of sealing gasket	Silicon	
12	Size of lamp-holder	E40	
13	Material of lamp-holder		
14	Does lamp-holder comply with VC 8011		
15	Does ballast comply with SABS 1266?		
16	Does capacitor comply with SABS 1250?		
17	Does ignitor comply with SABS 1630?		
18	Mass of luminaire as delivered (kg)		
19	Material of terminals	Brass	
20	Do the electrical requirements comply with clause 6.4 of this specification?		
21	Does the luminaire comply fully with the photometric requirements?		
22	Life expectancy of luminaire?		
23	Have test reports been included in the tender?		
24	Has all documentation required been submitted with the tender?		
25	Guarantee Period - Luminaire	Five Years	
26	Guarantee Period - Control Gear	18 Months	

SIGNATURE OF TENDERER:.....