Eskom	Standard	Technology

Title: **PLASTIC BIRD PERCH DIVERTER AND STAINLESS STEEL STRAP SPECIFICATION**

Unique Identifier:	**240-147885960**
Alternative Reference Number:	**<n/a>**
Area of Applicability:	**Engineering**
Documentation Type:	**Standard**
Revision:	**2**
Total Pages:	**15**
Next Review Date:	**October 2024**
Disclosure Classification:	**Controlled Disclosure**

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Date: 20/01/2021	Date: 20/01/2021	Date: 29 Jan 2021

Supported by SCOT/SC

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Date: 29 Jan 2021

PCM Reference: **N/A**

SCOT Study Committee Number/Name: **Overhead Lines**

Content

1. Introduction

Various types of birds use power line structures for perching and nesting purposes.

The principle to be followed in perch management is not to prevent birds from roosting on towers, but rather to prevent them from roosting on critical parts of the tower.

The main purpose of the plastic bird perch diverters is to reduce bird related faults (streamer and bird pollution).

The specified main device needed will be made from plastic and straps from stainless steel. This specification details requirements for both items.

2. Supporting Clauses

2.1 Scope

The new plastic bird perch diverter specification was developed to also prevent smaller bird species from roosting in-between bird perch diverters. This standard contains the plastic bird perch diverter's (and its fitment components) dimensions, material specification and technical tender returnable.

This document provides the standard to ensure plastic bird perch diverters are purchased with an acceptable quality so that the product will be able to withstand long periods of harsh weather conditions. The dimensions are also given to ensure effective bird diversion above the conductors to prevent/reduce bird related faults effectively.

This document is applicable to all plastic bird perch diverter and fastener suppliers.

2.1.1 Purpose

This document provides the technical requirements for purchasing plastic bird perch diverters and stainless steel straps for Transmission and Sub-Transmission line structures throughout Eskom.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions. This document is applicable to the Technical teams involved in the evaluation of plastic bird perch diverters and stainless steel straps for Eskom Transmission and Sub-Transmission line structures throughout Eskom as well as the relevant tender cross-functional team.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] SANS 9001:2015 Quality Management Systems

[2] EN10088-2 Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes

[3] ASTM D6953 Standard Test Method for Determination of Antioxidants and Erucamide Slip Additives in Polyethylene Using Liquid Chromatography (LC)

[4] ASTM D5815 Standard Test Method for Determination of Phenolic Antioxidants and Erucamide Slip Additives in Linear Low-Density Polyethylene Using Liquid Chromatograph (LC)

[5] ASTM D1996 Standard Test Method for Determination of Phenolic Antioxidants and Erucamide Slip Additives in Low Density Polyethylene Using Liquid Chromatography (LC)

[6] ASTM D6042 Standard Test Method for Determination of Phenolic Antioxidants and Erucamide Slip Additives in Polypropylene Homopolymer Formulations Using Liquid Chromatography (LC)

[7] ASTM D5576-00 Standard Practice for Determination of Structural Features in Polyolefins and Polyolefin Copolymers by Infrared Spectroscopy (FT-IR)

[8] ASTM D3418 Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry

[9] ASTM A370-06 Standard Test Methods and Definitions for Mechanical Testing of Steel Products

[10] ASTM D2565 Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications

[11] ASTM E794 Standard Test Method for Melting And Crystallization Temperatures By Thermal Analysis

[12] ASTM E1252 Standard Practice for General Techniques for Obtaining Infrared Spectra for Qualitative Analysis

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

None

2.3.2 Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
ASTM	American Society for Testing and Materials
DSC	Differential scanning calorimetry
Dx	Distribution
FTIR	Fourier Transform Infrared Spectroscopy
HDPE	High Density Polyethylene
HPLC	High-performance liquid chromatography
OEM	Original Equipment Manufacturer
Sub-Tx	Sub Transmission (Distribution HV lines)
TGA	Thermogravimetric analysis
Tx	Transmission
UV	Ultra Violet

2.5 Roles and Responsibilities

This document will also be used as the technical tender requirements for the appointment of plastic bird perch diverter suppliers. The suppliers are responsible to ensure that their product complies with the criteria set out in the Scope of Work document (240-156074231) for supply and delivery of plastic bird diverters. **Annexure A** - Schedules A / B for the plastic bird perch diverters from this document must be completed in full by the all suppliers during tender stage.

2.6 Process for monitoring

The product supplier is responsible for monitoring their manufacturing process and quality of the products produced.

2.7 Related/Supporting Documents

Not applicable.

3. Document Content

3.1 General requirements

The bird perch diverter material and dimensions must comply with the following (Read in conjunction with Annex B, drawing 236-04-01):

1) The bird perch diverter unit shall consist of a base and two types of verticals.

2) The main vertical shall be 500 mm high spaced at 160 mm apart.

3) The other vertical shall be a minimum of 280 mm high, to be installed between each two main verticals, but should not exceed the height of the main vertical.

4) The gaps between verticals must be between 40 mm and 60 mm.

5) The wall thickness of each component shall be not less than 2.5 mm.

6) The verticals must be securely attached/moulded to the base and not be removable. Gluing of the HDPE components is prohibited (Eskom reserve the right to approve manufacturing process).

7) The cross-section of the base shall measure 40x75 mm (W x H).

8) The installed device should have a life span of minimum 15 years

9) The bird perch diverter must be made of a non-conductive material

10) The raw materials used by the manufacturer of bird perch diverters should be sourced from a reputable supplier who shall issue a guarantee with regards to:

- the chemical composition of the materials (DOW HDPE M5010 or equivalent)
- the additives for ensuring suitable life of the product and estimated life.
- (The Ciba stabilizing system consisting of 2% minimum level of pigment type carbon black, Irganox B225 @ 0,1% and Tinuvin T783 @ 0,4% or equivalent should be used. Eskom will have to approve the stabilizing system before production starts.)
- the proper blending of the raw material with UV inhibitors and other additives, that they supply. The manufacturing process that is followed must be sanctioned by the manufacturer to ensure quality of the product. This includes the adding of any non-virgin material. Not more than 10% of own reground material will be permitted.

11) All devices shall carry a batch number and date. Eskom must be able to determine the materials used for the manufacture of the particular batch. With every batch delivered the manufacturer shall supply a certificate of compliance with material quality and mechanical properties.

12) The units shall be able to withstand exposure to wide range of temperatures (-5 to 50 °C) and a continuous exposure to UV radiation.

13) Rapid aging and other tests will be required that will indicate the specific properties of the device. Refer to 3.2.1 below. The device should be mechanically sound.

14) Deterioration of bird perch diverters should be tracked and observed by doing visual inspections and bent the bird perch diverter (The verticals should not break when bent by hand through an angle of 90 degrees) during routine line maintenance/audits. See Figures 3.1 and 3.2.

15) The 1m bird perch diverter unit must withstand a drop from a height of 30 m on concrete without cracking or coming apart. Refer to 3.2.2 below.

16) The bird perch diverters should be self-draining and not able to trap water inside the device.

17) The bird perch diverter design illustrated in drawings: 236-04-01 (Annex B) must be considered as the most preferred offer.

18) A stainless steel (304 grades) strap is the preferred fastening method for the bird perch diverter. It is also preferred if the fasteners have a quick release mechanism that can be reused during maintenance. Three (3) 600 mm long fasteners must be supplied with each bird perch diverter.

19) The strap must have a minimum width and thickness of 12 x 0.75mm respectively (3 x 600mm long straps supplied with each 1m bird perch diverter).

20) The bird perch diverters must be designed to ensure that it will not purposefully harm any birds/wildlife.

21) Unannounced, random samples of the materials may be taken during manufacturing for testing. Contracts will be terminated with any supplier that does not comply with the quality standards.

3.2 Test requirements

Any bird perch diverter product submission by a supplier must be accompanied with valid test results and test certificates as required in this section.

Table 1: of testing requirements

	Test	Requirement	Deviation
1	Rapid aging test	Provide test certificate during tender stage. If tests are not submitted as requested, automatic disqualification at that stage.	None
2	Material composition	Provide test certificate during tender stage. If tests are not submitted as requested, automatic disqualification at that stage.	None
3	Strength test for straps and buckles	Provide supplier details and technical data sheets for straps and buckles. Test certificates to be provided at tender stage.	None
4	Strength test for Plastic bird perch diverter	Provide test certificate during tender stage. If tests are not submitted as requested, automatic disqualification at that stage.	None

	Test	Requirement	Deviation
5	Pull test	Provide test certificate during tender stage. If tests are not submitted as requested, automatic disqualification at that stage.	None
6	Drop test	Provide test certificate during tender stage. If tests are not submitted as requested, automatic disqualification at that stage.	None
7	Visual and dimensional	Dimensions of device as well as fasteners as per Section 3.1 and drawings in Annex B. Compliance to be indicated in Schedule A/B on Annex A. To be provided at tender stage.	None

3.2.1 Rapid aging and material composition tests

The supplier must provide valid test certificates from an independent accredited test facility. The following test certificates must be provided with the tender submission for both the bird perch diverter as well as the fasteners:

- **Rapid aging of bird perch diverter material indicating estimated lifespan of materia**l. Typical tests/standards are listed below:
  - DSC (Differential scanning calorimetry) testing to establish melting points of materials according to ASTM practice E794
  - Laboratory accelerated ageing using Xeon Arc and wetting cycles according to ASTM D2565 cycle 2
  - Outcomes of tests must be interpreted and must include an estimated lifespan of material exceeding 15 years. This assumption must be supported by quantifying the amount of TIN 783 UV stabiliser found in the material during material composition testing.
- **Material composition**. Typical tests/standards are listed below:
  - Chemical analysis to indicate composition of material as well as stainless steel grade. This must then correspond with the composition of 304 Grade stainless steel composition as specified in EN10088-2. Strapping manufacturer details and datasheet is also acceptable.
  - HPLC (High-performance liquid chromatography) tests to identify stabilisers in material according to ASTM D6953 , D5815, D1996 and D6042 standards
  - FTIR (Fourier Transform Infrared Spectroscopy) test according to ASTM D5576-00 standard and ASTM Practice E1252 to verify polymer type used for the device. HDPE is required for this device.
  - TGA (Thermogravimetric analysis) test according to ASTM D3418 standard to give an indication of the amount of filler present in the material. Must comply with section 3, point 11 above.

- **Strength tests.** Typical tests/standards are listed below:
  - Fasteners/strapping tensile strength/pull test recommended. Recommended standard is ASTM A370-06. The material strength must comply with 304 grade stainless steel strength specified in EN10088-2. Manufacturer details and datasheet is also acceptable.
  - Bird perch diverter pull test

The device must be fastened to an angle iron with the relevant fasteners provided by the supplier (close as possible to field conditions). The device must be pulled in the transverse direction (Horizontal as per Figure 3-1) and the longitudinal (Figure 3-2) at the tip of the taller verticals until it is bent past a 90° angle. Thereafter the device has to be assessed for deflection and/or breakage. After an hour of the load being released, the amount of permanent deflection must also be noted. The permanent deflection must be rectifiable by hand. A test report must be provided by the supplier/manufacturer as per requirements in table 1, point 3.2.

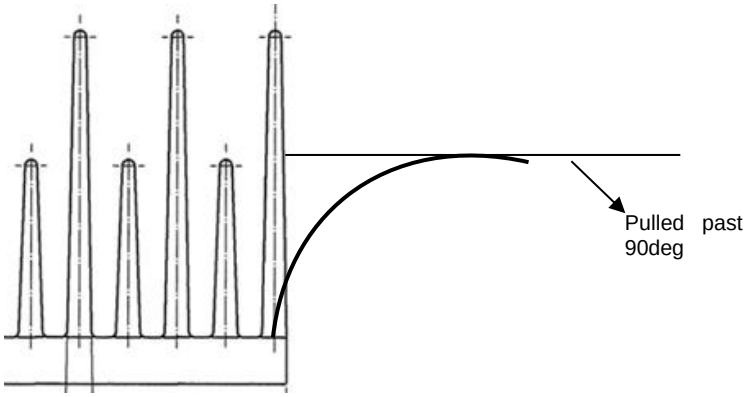

Figure 1: Bird perch diverter transverse pull test

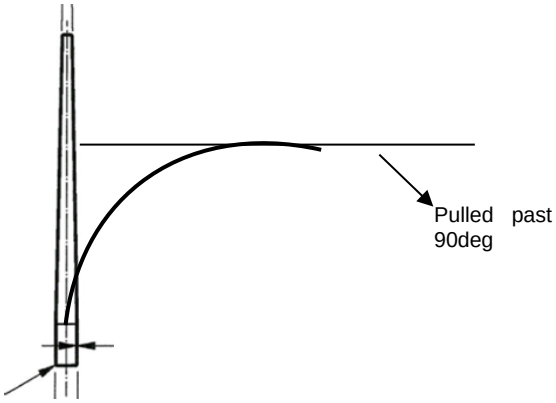

Figure 2: Bird perch diverter longitudinal pull test

3.2.2 Drop test

The device must withstand a drop from a height of 30m onto concrete. The sample must thereafter be assessed for any signs of cracking, breakage and/or deformation. A test report must be provided by the supplier/manufacturer as per requirements in table 1, point 3.2.

Visual inspection and measurements

Eskom reserves the right to verify the material and dimensions of the product at supply stage via a visual inspection. The dimensions and tolerances must be verified against the drawings provided in Appendix B of this document. The visual inspection must also assess the following:

- Rigidity of the sample: Does the vertical spikes bend by hand through 90 degrees, and if they do, can the permanent deflection be rectified by hand.

- Are there any defects in the material (bubbling, cracking, discoloration etc.)
- Verify whether device and fastener conform to the general requirements set out in Section 3 above.

4. Authorisation

This document has been seen and accepted by:

Name and surname	Designation
Riaz Vajeth	Senior Manager Engineering
Bharat Haridass	Senior Consultant Engineering
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Simpiwe Minnie	Middle Manager Lines & Servitudes
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Swazi Simelane	Middle Manager Lines & Servitudes
Tlholo Mafutsana	Middle Manager Lines & Servitudes
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5. Revisions

Date	Rev	Compiler	Remarks
Oct 2019	1	DW Visser	First issue First Revision. Alternative vertical/spike dimension changed to minimum. Changed Table 1- test requirements, changed Test requirements to include submission of tests before contract award.
Dec 2020	2	T Sibi	Updated section 2.2.1, 3.1 and 3.2; changes have been made regarding sentence construction and required test certificates. Removed technical evaluation criteria for plastic bird perch diverters and related fasteners, the information to be captured under a separate document.

6. Development team

The following people were involved in the development of this document:

- Riaz Vajeth
- Dan Dukhan
- Mdu Mthethwa
- Bertie Jacobs
- Bharat Haridass
- Johan Cloete
- Jacques Calitz
- Timothy Sibi
- Jorge Correia

7. Acknowledgements

The author acknowledges the input from all the members of the national bird perch diverter project team.

Annex A – Schedules A / B for the bird perch diverters and related fasteners

INSTRUCTION: All tenderers must complete Schedule B below and include it in their submission. No fields may be left blank.

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and particulars of equipment to be supplied (to be completed by tenderer)

Item	Description	Unit	Schedule A	Schedule B
1.	Bird perch diverter dimensions			
1.1	Length	mm	1000	_____
1.2	Height of tall vertical	mm	500	_____
1.3	Height of short vertical	mm	280	_____
1.4	Spacing between tall verticals	mm	160	_____
1.5	Spacing between tall and short vertical	mm	80	_____
1.6	Height and depth of base	mm	75 x 40	_____
1.7	Width of verticals at base	mm	40	_____
1.8	Radius at tip of vertical	mm	10	_____
1.9	Minimum material wall thickness	mm	2.5	_____
1.10	Device dimensions are as per Section 3.1 and drawings in Annex D (within 5mm tolerance on all dimensions except wall thickness which must be between 2.5 and 3.5mm)	YES/NO	Yes	_____
1.11	Drawing of product to be supplied with tender submission with Supplier/Manufacture details.	YES/NO	Yes	_____
1.12	Sample of product to be supplied before contract award	YES/NO	Yes	_____
2.	Bird perch diverter material			
2.1	Reground material used	%	<10	_____
2.2	Material type	Material and grade	DOW HDPE M5010 or equivalent	_____
2.3	% additives to increase lifespan and UV stability	% and additive type	Ciba stabilizing system consisting of 2% minimum level of pigment type carbon black, Irganox B225 @ 0,1% and Tinuvin T783 @ 0,4% preferred	_____
3.	Bird perch diverter mechanical requirements (If test in progress, indicate TBA)			

Item	Description	Unit	Schedule A	Schedule B
3.1	Longitudinal load	YES/NO /TBA	Deflection after bending past 90° in longitudinal direction rectifiable by hand, see section 3.2.1	_____
3.2	Transverse load	YES/NO /TBA	Deflection after bending past 90° in transverse direction rectifiable by hand, see section 3.2.1	_____
4.	Fastener dimensions and material			
4.1	Strapping width, thickness	mm	12 x 0.75	_____
4.2	Strapping length provided per bird perch diverter	mm	3 x 600 sections	_____
4.3	Strapping material		304 grade stainless steel	_____
5.	Fastener mechanical loads and connecting method			
5.1	Fastener datasheet or tensile strength test certificate supplied	YES/NO	Yes	_____
5.2	Fastening method (hand, quick release mechanism and/or tool). If tool required, please specify.		Application without tool preferred or standard tools	_____
6.	General requirements			
6.1	Drainage of device (what mitigation will be provided to prevent the accumulation of water in the device?)		i.e. drainage hole	_____
6.2	Bird perch diverter base build (modular or single unit)		Single unit	_____
6.4	Markings and labelling as per standard	YES/NO	Indelible batch number / manufacturer details and date on devices and fasteners	_____
6.5	Operating temperature range of device and fasteners	°C	–5 °C to 50 °C with continuous UV exposure	_____
6.6	Samples provided	YES/NO	Optional	_____
6.7	Detailed drawings provided for device and fasteners	YES/NO	Optional	

Item	Description	Unit	Schedule A	Schedule B
7.	Material test requirements (Section 3)			
7.1	Is there a laboratory rapid ageing test certificate result (Mandatory during tender submission).	YES/NO	Yes	_____
7.2	Is there a material composition test certificate results (Mandatory during tender submission).	YES/NO	Yes	_____
7.3	Is there a pull test report results (Mandatory during tender submission).	YES/NO	Yes	_____
7.4	Are there drop test report results (Mandatory during tender submission).	YES/NO	Yes	_____
7.5	Is there an indication of the estimated lifespan from test results (copy included in submission)	Years	≥15 years	_____

Annex B – Drawing of proposed plastic bird perch diverter and stainless steel fastening method