

	<h1>Specification</h1>	Transmission Telecommunications
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Content

Page

1. Introduction.....	3
2. Supporting Clauses	3
2.1 Scope.....	3
2.1.1 Purpose.....	3
2.1.2 Applicability	3
2.1.3 Effective date.....	3
2.2 Normative/Informative References	3
2.2.1 Normative.....	3
2.2.2 Informative.....	3
2.3 Definitions	3
2.3.1 Document:.....	3
2.4 Abbreviations	4
2.5 Roles and Responsibilities	4
2.6 Process for Monitoring.....	4
2.7 Related/Supporting Documents.....	4
3. Document Content.....	4
3.1 Background	4
3.2 Benefits to Eskom	4
3.3 Scope of Training	5
3.4 Specifications	5
3.5 Technical evaluation criteria	6
4. Acceptance.....	17
5. Revisions.....	17
6. Development Team	17
7. Acknowledgements	17

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1. Introduction

The tender technical evaluation criteria is for enquiry, Optical Fibre Training

2. Supporting Clauses

2.1 Scope

This document provides the Technical Evaluation Criteria.

2.1.1 Purpose

This document shall provide the Technical Evaluation Criteria for Optic Fibre Training.

2.1.2 Applicability

This document shall apply to Eskom Telecommunications, and Group Technology and Commercial.

2.1.3 Effective date

This document is effective from the 10th December 2021.

2.2 Normative/Informative References

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

Not applicable.

2.2.1 Normative

[1] ISO 9001 Quality Management Systems

2.2.2 Informative

[2] 240-118710943 Optical Fibre Training Specification

2.3 Definitions

2.3.1 Document:

Not Applicable.

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2.4 Abbreviations

Abbreviation	Explanation
PMD	Polarisation Mode dispersion
DWDM	Dense Wave Division Multiplexing
OADM	Optical Add-Drop Multiplexor
OTDR	Optical Time Domain Reflectometer
ADSS	All Dielectric Self Supporting
OPGW	Optical Ground Wire
MASS	Metallic Aerial Self Supporting

2.5 Roles and Responsibilities

This document shall be handed to Group Technology and Commercial as the Technical Evaluation Criteria.

2.6 Process for Monitoring

Not applicable.

2.7 Related/Supporting Documents

Not applicable.

3. Document Content

3.1 Background

The need for the Optical Fibre training originates from Eskom Telecommunications (ET), and is as a result of fibre optic systems that are used extensively throughout the Eskom power and telecommunications networks. These fibre systems are used to provide teleprotection, telecontrol, substation automation and remote engineering which collectively ensure and enhance the performance of the power network. Furthermore, the fibre optic cable network constitutes an integral component of the Eskom telecommunications network and thereby supports the provision of bandwidth and reliable telecommunications services as required by Eskom's business systems.

A critical requirement is to provide constant maintenance, repairs and inspections. To standardise and improve the level of maintenance and repairs and ensure integrity of the optical fibre network, this training is focused specifically to the Eskom optical fibre network..

3.2 Benefits to Eskom

The benefits to Eskom are as follows:

- Enhances performance of Eskom's fibre optic network by improving maintenance techniques and thereby increase the network uptime.

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- Extends the useful life of the fibre optic network, decreasing the need for capital replacement.

3.3 Scope of Training

The scope of the training required was compiled by Reginald Morgan, and was stated in the enquiry as follows:

Optical Fibre Training Specification, document identifier: 240-118710943.

3.4 Specifications

The following specifications were issued with the tender:

Doc No	Expiry Date	Description	Comments
240-118710943	November 2026	Optic Fibre Training Specification	Latest revision

Table 1: List of Specifications

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3.5 Technical evaluation criteria

TECHNICAL EVALUATION CRITERIA				
Company Name				
REFERENCED TO OPTICAL FIBRE SPECIFICATION 240-118710943				
CATEGORY 1 – Fibre Optic Basic Training				FOR OFFICE USE ONLY
The following requirements are set as the minimum content requirements for fibre optic courses. The courses shall be structured by the supplier into modules/levels so as to advance the learners knowledge from basic to advanced.				
Training Materials and Venue	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
The supplier shall provide for all lecture materials, test equipment, machinery and hardware required to provide a comprehensive course for both theory and practical.	100%	Lecture Materials 50% Hardware and, Test Equipment and machinery 50%		
Optical Fibre courses presented to Eskom Telecommunications shall cater for both theory lectures as well as practical interventions.	100%	Theory 60% Practical 40%		

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The supplier shall make provision for a suitable venue as well as facilities for both theory and practical interventions.	100%	Venue information and suitability to be provided 100%		
The supplier shall provide Eskom with a detailed course outline so that Eskom may scrutinise the content. The course content shall concentrate on fibre optic networks within the power utility environment, with emphasis on the impact of the electrical network on the fibre optic network (Induction, dry band arcing) as well as personal safety while working in proximity to live conductors and routine maintenance.	100%	Detailed course content supplied 60% Fibre Optics within the power utility 25% Personal Safety 15%		
The courses shall include an introduction to fibre optics which will include, fibre optic theory, cable preparation, practical splicing, practical OTDR measurements, fault finding, dome joint and patch panel packing.	100%	Proof to be demonstrated in the course content 100%		
Pass Mark and Certificate	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
Learners attending the course shall be required to have a 100% attendance record during the course. The supplier shall provide Eskom at the end of each course, a daily attendance record of the learners.	100%	Supplier shall elaborate how this will be achieved 100%		
Learners attending the course shall be required to undergo a comprehensive evaluation which is set out to thoroughly test	100%	Supplier shall elaborate how this will be achieved 100%		

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the knowledge and practical skills gained during the course.				
Learners shall be required to achieve an 80% pass mark. The completed exam results shall be made available to the Eskom training department providing the name, unique number and score achieved by each learner.	100%	Supplier shall elaborate how this will be achieved 100%		
The supplier shall provide on successful completion of the course a certificate of competence for each learner indicating the results for both theory and practical evaluation.	100%	Supplier shall elaborate how this will be achieved 100%		
Accreditation of Supplier, Trainer as well as Course Content	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
The supplier shall demonstrate to Eskom that the supplier and its trainers and training content is suitably accredited according to national and/or international standards.	100%	Proof of Certified Trainers 50% Proof of accredited Training Content 50%		

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Course Content	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
The following requirements are set as the minimum content requirements for fibre optic courses. The courses shall be structured by the supplier into modules/levels so as to advance the learners knowledge from basic to advanced.				
Fibre Optic Introduction Course	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
Learners with or without prior knowledge of fibre optics, will need to be fully competent with fibre optic theory, testing and splicing. The learner shall be fully competent to enter into the fibre optic maintenance environment to maintain, test and splice fibre optic cables.	100%	Course content aligned to accommodate learners with no prior experience 50% Competence guaranteed post training 50%		
The learner shall be able to “pack” a dome joint and patch panel correctly. The learner shall be able to perform power and light source testing as well as OTDR testing and understand and interpret the results.	100%	Proof to be demonstrated in the course content 100%		
Optical Fibre Theory	100%	Scoring Criteria	Supporting Comments	

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<p>Fibre Optic's vs. Copper</p> <p>How a fibre optic cable is manufactured with respect to Materials, Doping, Cladding, Buffer – Loose tube buffer and tight buffer, Colour coding Fibres and Transport Tubes, strengthening of the different fibre cables for their applications (Kevlar, Glass Reinforced Plastic rods etc.).</p> <p>. Core and Cladding diameters, Single mode vs. Multimode and wavelengths, Water peak, non-zero dispersion shifted fibres, Dispersion shifted fibres, Dispersion compensation fibres.</p> <ul style="list-style-type: none"> • Properties of light and dispersion, Reflection, Refraction, Rayleigh Backscatter, Chromatic dispersion, Transmission differences via Laser and Led, Types of lasers, Identifying the laser types, Laser safety. • Differences between the types of cable and where best applied, Duct, OPGW, Wrap, ADSS, MASS, Handling and installing cables, bend radius, hauling methods, Machinery and equipment required, safety. • Connector types as well as difference between APC and UPC and the effects of incorrect use. • Theory of how an OTDR works, What is a dead zone, OTDR setup such as: Cable type, 		<p>Proof to be demonstrated in the course content 100%</p>		
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<p>Site names, Dates, Setting the wavelength, Setting Pulse width, Setting the Distance range. Trace analysis such as: Identifying and understanding the different types of events, What is ghosting, Distance to events, Bi-directional testing, Saving the OTDR data. Practical fault finding using an OTDR (EXFO FTB 400) (each learner to participate individually).</p> <ul style="list-style-type: none"> • Power and light source measurement theory (Recording your reference), Power and light source practical (each learner to participate individually). • Theory of operation of a Fusion Splicing machine, Safety issues w.r.t eyes, ingestion etc. Fibre preparation, Cleaving, Splice protectors, Cleaning and care of the splicing machine. Fibre waste management, Practical splicing exercises (each learner to participate individually).Dome Joints theory of packing, Dome Joint packing practical (each learner to participate individually). • Patch panel theory of packing, Patch panel packing practical (each learner to participate individually). • Cleaning of connectors on ODF's, Patch leads and test equipment. 				
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<ul style="list-style-type: none">• Identification of installation defects on all fibre technologies• International methods of temporary repairs.• Enforcing installation and repair standards• Contractor management.				
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TECHNICAL EVALUATION CRITERIA

Company Name

REFERENCED TO OPTICAL FIBRE SPECIFICATION 240-118710943

CATEGORY 2 - Fibre Installation Training

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The following requirements are set as the minimum content requirements for fibre optic courses. The courses shall be structured by the supplier into modules/levels so as to advance the learners knowledge from basic to advanced.

Fibre Optic Advanced Courses	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
The Learner shall be able to demonstrate and perform the installation of OPGW, ADSS, and Wrapped fibre. The learner must demonstrate the use of the installation machinery required (winch and Tensioner, use of pulleys etc.), tensioning, associated safety and earthing. The learners need to be able to identify incorrect/poor installation practises, incorrect/poor installation of attachment hardware and highlight any safety issues.	100%	Proof to be demonstrated in the course content 100%		
<ul style="list-style-type: none"> Theory of Installing of ADSS, planning, attachment hardware required, methods of 	100%	Proof to be demonstrated in the course content 100%		

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installing, tensioning, safety, ADSS practical installation.				
<ul style="list-style-type: none"> Theory of installing OPGW, planning, attachment hardware required, method of installing, tensioning, safety, OPGW practical installation. 	100%	Proof to be demonstrated in the course content 100%		
<ul style="list-style-type: none"> Theory of installing wrapped fibre, planning, attachment hardware required, method of installing, tensioning, safety, Wrapped Fibre practical installation. 	100%	Proof to be demonstrated in the course content 100%		
<ul style="list-style-type: none"> Theory of installing duct cable, planning of manholes and ducted routes, hauling, safety during installation, safety accessing manholes post installation (gas detection, vermin etc.), Duct cable practical installation. 	100%	Proof to be demonstrated in the course content 100%		

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TECHNICAL EVALUATION CRITERIA

Company Name

REFERENCED TO OPTICAL FIBRE SPECIFICATION 240-118710943

CATEGORY 3 - Advanced Testing and Network Planning

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The following requirements are set as the minimum content requirements for fibre optic courses. The courses shall be structured by the supplier into modules/levels so as to advance the learners knowledge from basic to advanced.

Advanced Testing and Network Planning	Mandatory Compliance	Scoring Criteria	Supporting Comments	Score
The learner shall be able to design a fibre optic network route and work out the loss budget as well as determine the correct power levels required to operate across the network. The learner shall also demonstrate and understand the working of DWDM and SDH principles. The learner shall be well versed with PMD testing as well as analysing and understanding the results.	100%	Proof to be demonstrated in the course content 100%		

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<ul style="list-style-type: none"> DWDM basics, multiplexing and de-multiplexing, DWDM components and ITU standards – OADMS. 	100%	Proof to be demonstrated in the course content 100%		
<ul style="list-style-type: none"> Network planning and budget calculations. 	100%	Proof to be demonstrated in the course content 100%		
<ul style="list-style-type: none"> PMD testing and analysis. 	100%	Proof to be demonstrated in the course content 100%		

Table 2: Technical evaluation criteria

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4. Acceptance

This document has been seen and accepted by:

Name	Designation
MJ Manyisa	Middle Manager – Network Management Centre
AN Maseko	Senior Manager – Eskom Telecommunications

5. Revisions

Date	Rev.	Compiler	Remarks
December 2021	1	RR Morgan	New document

6. Development Team

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

- Joe Mmako (Manager FON)
- Reg Morgan (FON Senior Advisor)
- Jaco Badenhorst (FON Senior Advisor)

7. Acknowledgements

- N/A

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