SPOORNET

A division of Transnet limited

ENGINEERING & TECHNOLOGY
TECHNOLOGY MANAGEMENT

SPECIFICATION

OUTDOOR, HIGH VOLTAGE, ALTERNATING CURRENT DISCONNECTORS COMBINED WITH EARTHING SWITCHES

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1.0 SCOPE

1.1 This specification covers Spoornet's requirements for the supply of outdoor, 3 phase, 50 hertz disconnectors combined with earthing switches for voltages above 1 000 V.

1.2 Equipment is required for installation at the end of overhead transmission lines to control the power supply to traction substations and step- down points and shall consist of a 3 pole disconnector to be connected to the line and provided with facilities to earth the "load" side of the circuit.

2.0 STANDARDS AND PUBLICATIONS

The following publications and documents (latest edition) are referred to herein.

2.1 SOUTH AFRICAN NATIONAL STANDARDS

SANS 121	:	Hot dip galvanized coatings for fabricated iron or steel article.
SANS 60273	:	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V.
SANS 60815	:	Guide for selection of insulators in respect of polluted conditions
SANS 62271-102	:	High voltage switchgear and controlgear part 102: Alternating Current disconnectors and earthing switches

2.3 SPOORNET SPECIFICATIONS

CEE.0224	:	Drawings, catalogues, instruction manuals, spares list for electrical equipment supplied under contract.

3.0 TENDERING PROCEDURE

3.1 Tenderers shall indicate clause by clause compliance with the specification. This shall take the form of a separate document listing all the specifications clause numbers indicating the individual statement of compliance or non-compliance.

3.2 A statement of non-compliance shall be motivated by the tenderer.

3.3 Tenderers shall complete annexure 2. "Technical data sheet."

3.4 Tenderers shall submit descriptive literature consisting of detailed technical specifications, general constructional details and principal dimensions, together with clear illustrations of the equipment offered.

3.5 Failure to comply with clauses 3.1, 3.2, 3.3 and 3.4 could preclude a tender from consideration.

4.0 ANNEXURES

The following annexures form an integral part of this specification and shall be read in conjunction with it.

4.1 Annexure 1 - "Schedule of Requirements"

This annexure details the specific requirements for this application.

4.2 Annexure 2 - "Technical Data Sheet"

This annexure calls for specific technical information to be furnished with tenders.

4.2.1 This annexure is used during adjudication of tenders to assess the equipment offered.

4.2.2 Equipment described in annexure 2 shall comply with, and be supplied in terms of this specification. No changes or substitutions will be allowed without the written consent of Spoornet.

4.2.3 Acceptance of the equipment detailed in this annexure in no way relieves the tenderer of his obligation to fulfil his statement of compliance with the specification.

4.2.4 Tenderers are responsible for the accuracy of information submitted in this annexure.

5.0 SERVICE CONDITIONS

5.1 The equipment shall be designed and rated for continuous operation under the following conditions:

Altitude	:	0 to 1800m above sea level.
Ambient temperature	:	-5 °C to +45 °C
Relative humidity	:	10% to 90%
Lightning Conditions	:	12 ground flashes per square kilometre per annum.
Pollution	:	Heavily salt laden or polluted with smoke from industrial sources.

6.0 CLEARANCES

6.1 The following minimum safety clearances shall be maintained between any live conductor and earthed metal: -

Nominal phase to phase r.m.s system voltage	22kV	33kV	44kV	66kV	88Kv	132kV
Highest phase to phase r.m.s voltage for equipment.	24kV	36kV	48kV	72kV	100kV	145kV
Safety clearance	320mm	430mm	540mm	770mm	1000mm	1450mm

7.0 DISCONNECTORS COMBINED WITH EARTHING SWITCHES

This section shall be read in conjunction with SANS 62271-102

7.1 The combined AC disconnector and earthing switches shall be designed, manufactured and tested in accordance with SANS 62271-102.

7.2 Disconnectors and earthing switches shall have been type tested to verify performance and safety. Proof of these tests in the form of type test certificates shall be included in the tender documents.

7.3 The disconnectors shall be provided with a means for earthing the "load" side of the circuit, either by means of a separate earthing switch interlocked with its operating mechanism or contacts so placed that when the disconnector is in the "open" position, the "load" side is earthed.

7.4 The disconnectors shall be of the air-break type with the blades operating in a horizontal plane.

7.5 The disconnectors shall be so mounted that the phase-to-phase clearance for both the "open and earthed" and "closed" positions, shall not be less than:

22kV - 355mm
33kV - 510mm
40kV - 610mm
66kV - 890mm
88kV - 1,14metres
132 kV - 1,7metres

7.6 The operation of the disconnector shall be manual. (Dependent or independent).

7.7 The operating mechanism shall be constructed of anti-corrosive material to prevent sticking due to rust. All ferrous material shall be galvanised.

7.8 The operating handle shall be provided with suitable attachments to enable it to be locked in the up (closed) position and in the down (open and earthed) position by standard locks, supplied by Spoornet.

7.9 The operating assembly shall be fixed at a satisfactory operating height of approximately 1m from the bottom of the structure.

7.10 A mechanism shall be provided to mechanically interlock the operating handle with the associated primary circuit breaker to ensure that operation is only possible when the circuit breaker is in the "open" position.
It must, however, be possible to close the primary circuit breaker when the earthing switch is in the "earthed" position.

7.11 Electrical contacts shall be fitted to interlock the operating handle with the associated primary circuit breaker. In the event of accidental operation or movement of the operating handle the primary circuit breaker will be tripped before the main contacts of the AC disconnector starts opening.

7.12 A notice with the following inscription shall be mounted next to the operating mechanism:

"DO NOT OPERATE UNDER LOAD"

Refer to clause 11.4.2 of specification.

8.0 SUPPORT STRUCTURES

8.1 The combined AC disconnector and earthing switches shall be rigidly mounted on robust, hot-dipped galvanised supporting steel structures or pedestals in accordance with SANS 121.

8.2 The supporting steel structures or pedestals shall provide a minimum clearance of 3,6 metres (up to 88 kV) or 4,1 metres (above 88 kV) from the lowest "live" high voltage connection to finished yard level. Outline drawings submitted with tenders must indicate the actual clearances proposed.

9.0 CONNECTIONS

9.1 All high voltage connections must be of the solderless, concentric grip, or other approved solderless type, and must be of adequate cross-sectional area to suit both electrical and mechanical requirements. All connections to the disconnectors must be flexible so as not to affect smooth operation of the blade mechanism.

10.0 POST INSULATORS

This section shall be read in conjunction with SANS 60273.

10.1 All post insulators shall be designed, manufactured and tested in accordance with SANS 60273.

10.2 Unless otherwise stated in Annexure 1, creepage distances for heavy polluted atmospheres shall be in accordance SANS 60815 Clause 4.

11.0 NAMEPLATES AND LABELS

11.1 All nameplates and labels shall be in English.

11.2 In addition to the data called for in SANS 62271-102 the nameplate of each device shall indicate the Spoornet contract number.

11.3 Labels other than interchangeable labels shall be fixed by screws or rivets.

11.4 All labels shall be made of composite sandwich type plastic material of the following colour combinations:

11.4.1 Identification labels: White lettering on Black background. Letters must be of sufficient size to be clearly legible from a distance of 3 m.

11.4.2 Danger labels: White lettering on Red background. Letters must be of sufficient size to be clearly legible from a distance of 3 m.

11.5 The following is a list of approved labels referred to in the body of this specification.

On (1)
Off (0)
Open (Verb.)
Close (Verb.)
Closed
Open
Do not operate link under load.
Open and earthed.

12.0 DRAWINGS AND INSTRUCTIONS

12.1 All drawings shall be in accordance with specification CEE-0224.

12.2 The successful tenderer shall supply the following drawings and/or instructions, all of which shall be included in the tender price and be to the satisfaction of Spoornet.

12.2.1 Before delivery to site three (3) sets of detailed operating and maintenance instructions, with illustrations where necessary. These instructions shall be supplied with the "as built" drawings.

12.3 Late submission of drawings and instructions shall incur delivery penalties on the full contract price.

13.0 INSPECTION

13.1 Spoornet reserves the right by prior arrangement to inspect the equipment at any stage during manufacture.

14.0 TOOLS AND APPLIANCES

14.1 One set of any special tools and appliances required for normal operation and maintenance shall be supplied. All fittings, including holding down bolts, etc. for the complete installation of the equipment offered shall be supplied.

15.0 SPARES

15.1 Tenderers shall submit a separate quote for recommended spares for maintenance purposes.

15.2 A detailed description of each item including manufacturer's catalogue number and item number where applicable shall be furnished. Separate prices for each item shall be indicated.

15.3 The spare list shall be divided into two parts, one covering items used in a 12 month period and those likely to be used in a 10 year period.

15.4 Tenderers shall also state whether a complete range of spares is held in stock by their local representatives for subsequent purchase by Spoornet as and when required.

16.0 PACKING

16.1 The equipment shall be packed in such a manner that it will be adequately protected during handling and transport.

END

ANNEXURE 1

SCHEDULE OF REQUIREMENTS

1.0 Required for .....

2.0 Number of sets required .....

3.0 System of supply ..... kV, 50 Hz, 3 phase,.....neutral

		DISCONNECTOR	EARTHING SWITCH
4.0	Rated voltage:	.....kV	..... kV
5.0	Rated frequency:	50 Hz	50 Hz
6.0	Rated normal current:	.....A	..... . A
7.0	Rated short time withstand current:	.....kA	..... kA

8.0 Special requirements: .....

.....

.....

.....

.....

.....

END

ANNEXURE 2

TECHNICAL DATA SHEET

(To be completed by tenderers and submitted as part of their tender)

1.0 Spoornet Tender number: .....

		DISCONNECTOR	EARTHING SWITCH
2.0	Name of manufacturer.	.....	.....
3.0	Type number	.....	.....
4.0	Number of poles.	.....	.....
5.0	Indoor/Outdoor.	.....	.....
6.0	Rated voltage.	.....	.....
7.0	Rated insulation level.	.....	.....
7.1	Rated 1 minute power frequency withstand voltage.	.....	.....
7.2	Rated lightning impulse withstand voltage.	.....	.....
8.0	Rated frequency.	.....	.....
9.0	Rated normal current.	.....	.....
10.0	Rated short circuit making current.	.....	.....
11.0	Rated short time withstand current.	.....	.....
12.0	Mass of complete unit.	.....	.....
13.0	Minimum clearance in air:		
13.1	Between poles.	.....	.....
13.2	To earth.	.....	.....
13.3	For isolating distance.	.....	.....
14.0	Type of closing mechanism.	.....	.....
15.0	Height above ground of lowest HV connection.	.....	.....

ANNEXURE 2

		DISCONNECTOR	EARTHING SWITCH
16.0	Length of insulator (taut string measurement)	.....	.....
17.0	Type test certificate	.....	.....
17.1	Testing authority	.....	.....
17.2	Test number	.....	.....
18.0	Insulators		
18.1	Type test certificate number	.....	.....
18.2	Testing authority	.....	.....

END