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EAST AFRICAN STANDARD

Development, maintenance and management of groundwater resources — Part 1: The location and siting of water boreholes

EAST AFRICAN COMMUNITY

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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East African Community

P O Box 1096

Arusha

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: eac@eachq.org

Web: www.each.int

Introduction

In the preparation of this East African Standard, the following source was consulted extensively:

SANS 10299-1:2003, *Development, maintenance and management of groundwater resources — Part 1: The location and siting of water boreholes*

Assistance derived from this source and others inadvertently not mentioned is hereby acknowledged.

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Any reference to SABS 0299-1 is deemed
to be a reference to this standard
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SOUTH AFRICAN NATIONAL STANDARD

Development, maintenance and management of groundwater resources

Part 1: The location and siting of water boreholes

Published by Standards South Africa
1 dr Iategan road Groenkloof ☒ private bag x191 Pretoria 0001
tel: 012 428 7911 fax: 012 344 1568 international code + 27 12
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Table of changes

Change No.	Date	Scope
Amdt 1	2003	Amended to update referenced standards and to delete the definitions, since reference has now been made to SANS 10299-0.

Foreword

This South African standard was approved by National Committee STANSA SC 5120.12B, *Water supply, equipment and systems – Groundwater extraction*, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement.

This edition cancels and replaces edition 1 (SABS 0299-1:2002).

A vertical line in the margin shows where the text has been modified by amendment No. 1.

Annex A forms an integral part of this part of SANS 10299.

SANS 10299 consists of the following parts, under the general title *Development, maintenance and management of groundwater resources*:

Part 0: Glossary of terms.

Part 1: The location and siting of water boreholes.

Part 2: The design, construction and drilling of boreholes.

Part 4: Test-pumping of water boreholes.

Part 5: The design, selection and performance of pumping equipment for production boreholes.

Part 6: The installation and commissioning of pumping equipment for production boreholes.

Part 7: The rehabilitation of water boreholes.

Part 8: The management of water boreholes.

Part 9: The decommissioning of water boreholes.

Introduction

The need for standardization of the siting of boreholes in South Africa has been expressed for some time.

The realization of this need in the groundwater industry would not have been possible without consulting as many stakeholders as was possible. Drillers' associations, particularly those involved in the drilling and construction of water boreholes, and agricultural bodies, which make up a large part of the users of groundwater, are some of the above-mentioned stakeholders.

Particular care had to be taken to write this standard to be as user-friendly as possible, but to also be as scientifically correct as possible. With this in mind, it is acknowledged that there are traditional methods that are widely used, but because these methods are not measurable, they are not included in this standard.

The procedures given in this part of SANS 10299 are intended to promote and facilitate the best scientific methods for the siting of boreholes, which are becoming all the more important for the protection of our underground water resources.

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Development, maintenance and management of groundwater resources

Part 1:

The location and siting of water boreholes

1 Scope

This part of SANS 10299 covers the requirements for the location and siting of water boreholes. Whenever a borehole is considered for conversion to a water production borehole, the relevant clauses of this part of SANS 10299 shall apply.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of SANS 10299. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this part of SANS 10299 are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from Standards South Africa.

SANS 10299-0, *Development, maintenance and management of groundwater resources – Part 0: Glossary of terms.* **Amdt 1**

SANS 10299-2, *Development, maintenance and management of groundwater resources – Part 2: The design, construction and drilling of boreholes.*

SANS 10299-9, *Development, maintenance and management of groundwater resources – Part 9: The decommissioning of water boreholes.*

3 Definitions

For the purposes of this part of SANS 10299, the definitions given in SANS 10299-0 apply. **Amdt 1**

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4 Principles regarding the siting and location of boreholes

4.1 General

The following considerations constitute part of site suitability assessment. The owner shall ensure that the appropriate requirements and threats are fully addressed during the siting process.

4.2 Legal considerations

Before incurring the expense of a borehole siting process, the owner shall ensure that all legal requirements regarding the drilling of a borehole on the property are reviewed and complied with. This shall include both surface rights, e.g. as defined by local by-laws and the property title deed, and subsurface rights, e.g. such as relate to the intended exploitation of the groundwater resource in terms of the requirements of the National Water Act, 1998 (Act 36 of 1998).

4.3 Environmental considerations

The owner shall ensure that the appropriate level of consideration is given to the effect that a water production borehole drilled at the selected site will have on the environment, and vice versa. Factors to be considered in this regard relate to the potential occurrence of exclusion zones (see 5.2). The services of a specialist may be required to address these considerations, in which case such service will form part of the site suitability assessment to be agreed upon between the owner and the specialist (see 6.1).

5 Specific requirements relating to borehole siting

5.1 Physical considerations

The property plans shall be studied in order to identify exclusion areas in which the drilling and operation of a borehole may not be possible. In the absence of property plans, exclusion areas will need to be identified on the basis of visual observations and such knowledge as can be sourced locally. Such areas may include, but are not limited to, the following:

- a) areas offering restricted access for the drilling machine and equipment;
- b) areas providing restricted clearance for raising the mast of the drilling machine;
- c) areas defining existing and proposed routes for surface and subsurface services, e.g. power cables and pipe lines;
- d) areas supporting foundations and other underground structures; and
- e) areas providing restrictions on the installation, operation and maintenance of pumping equipment.

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5.2 Environmental exclusion zones

The borehole site shall not occur within an exclusion zone defined on the basis of potential environmental pollution threats, especially where these threats are located up-gradient of the site. It is, however, permissible for a borehole site to be located in the vicinity of a potential pollution threat if the subsurface zone influenced by the operation of such a borehole and that influenced by the threat will not intersect each other. The evaluation of these circumstances will generally require the services of a specialist, and be undertaken as part of the site suitability assessment if required.

The aforementioned threats include, but are not limited to, processes, activities and areas such as the following:

- a) the flow of contaminated storm water or surface runoff (or both) past the borehole from potentially polluted areas;
- b) the disposal of waste fluids and materials in facilities such as pit latrines, septic tanks, landfills and mine tailings dams. Cemeteries also represent a potential pollution threat to groundwater resources;
- c) areas supporting agricultural activity such as stock kraals, dip tanks, cattle drinking troughs and fertilizer storage; and
- d) areas supporting the development of formal and informal settlement or industrial activity and underground fuel storage tanks.

6 Siting procedure

6.1 Site suitability assessment

A site suitability assessment must at least address the legal considerations described in 4.2.

At this stage, it establishes for the owner the legality of drilling a borehole and using groundwater on the property for the intended purpose. The scope of a site suitability assessment that extends beyond these considerations generally requires the services of a professional person. It is recommended that where the services of a specialist are employed, the scope of the site suitability assessment be agreed upon between the owner and the professional person. The outcome of a site suitability assessment is generally the identification and marking of a borehole site (see 6.2). The scope of a site suitability assessment leading to this outcome might include, without being limited to, any one or more of the following activities:

- a) a study of existing and available geological, geophysical or groundwater literature (or all of these), data and information relevant to the area or region in which the property is located. This activity can provide information regarding the general occurrence and quality of groundwater;
- b) a study of relevant existing and available maps, aerial photographs and other remotely sensed information for the area or region in which the property is located. This activity can assist in identifying appropriate drilling targets;
- c) a survey of existing boreholes in the area or region in which the property is located. This activity can provide information with regard to typical borehole depths and drilling success rates, the depth of water levels and the general quality of groundwater in the area (see annex A);

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- d) a survey employing one or more models of suitable and appropriate geological exploration. This activity finds specific application in an environment where geological exposures are plentiful. Under these circumstances, field observations of rock types and the recognition of geological structures can facilitate the siting of a borehole;
- e) a survey employing one or more methods of appropriate geophysical exploration. This activity generally provides one or more specific drilling targets within a given geological and groundwater environment;
- f) the execution of an exploration drilling programme. This activity provides first-hand information regarding the occurrence and quality of groundwater in the vicinity of the proposed borehole site. Exploratory boreholes shall be drilled and constructed to the requirements of SANS 10299-2 and, when no longer used, shall be decommissioned in accordance with SANS 10299-9; and
- g) the compilation of a written report. This report shall present the salient results and findings of the assessment. This activity will also provide a written record of the service(s) rendered by the specialist for purposes of future reference.

6.2 Identification and marking (borehole pegging)

The site suitability assessment shall identify a borehole site that is acceptable within the framework of at least the legal, physical and environmental considerations described in sections 4.2, 5.1, and 5.2 respectively. The specialist shall employ the information collected within the agreed scope of the site suitability assessment to identify and mark a borehole site. This position shall be identified to the owner.

The owner or specialist must also recognize circumstances that preclude the siting of a borehole. In that case, the circumstances must be documented clearly and concisely, and the project discontinued.

Annex A
(informative)

Intended use of the new borehole

A.1 General

The quality of groundwater occurring in a region may not be suitable for a particular use. Information in this regard is typically revealed as part of a site suitability assessment. If this possibility is known to the prospective borehole owner, and if the particular use is also that which is intended or envisaged for the proposed new borehole, then the owner is forewarned of the possibility that the water, once and if found, might not be usable. Under these circumstances, the owner should decide whether to proceed with the drilling of a borehole or not.

Water quality is evaluated according to accepted sets of guidelines. The guidelines differ from one another, depending on the purpose for which the water is or will be used.

A.2 Domestic use

The guidelines in the following publications are recommended for evaluating human drinking water quality:

- a) SANS 241, *Drinking water*.
- b) Department of Water Affairs and Forestry, *South African water quality guidelines. Volume 1: Domestic use*. Pretoria: Government Printer, 1996.
- c) Department of Water Affairs and Forestry, Department of Health and Water Research Commission: *Quality of domestic water supplies* (second edition) *Volume 1: Assessment guide*. 1998.

A.3 Other uses

The guidelines in the following publications are recommended for evaluating water quality for purposes other than domestic use:

- a) Recreational purposes:
Department of Water Affairs and Forestry, 1996. *South African water quality guidelines* (second edition). *Volume 2: Recreational use*.
- b) Industrial purposes:
Department of Water Affairs and Forestry, 1996. *South African water quality guidelines* (second edition). *Volume 3: Industrial use*.
- c) Irrigation purposes:
Department of Water Affairs and Forestry, 1996. *South African water quality guidelines* (second edition). *Volume 4: Agricultural use: irrigation*.

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d) Livestock watering purposes:

Department of Water Affairs and Forestry, 1996. *South African water quality guidelines* (second edition). *Volume 5: Agricultural use: livestock watering.*

e) Aquacultural purposes:

Department of Water Affairs and Forestry, 1996. *South African water quality guidelines* (second edition). *Volume 6: Agricultural water use: aquaculture.*

f) Environmental purposes:

Department of Water Affairs and Forestry, 1996. *South African water quality guidelines* (second edition). *Volume 7: Aquatic ecosystems.*

Bibliography

SANS 241 (SABS 241), *Drinking water.*

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