



SANS 241:2015

DRINKING WATER STANDARDS

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Introduction

The purpose of this document is to help improve understanding of drinking water quality standards. SANS 241:2015 is a critical document in South Africa, providing comprehensive guidelines for drinking water quality. Its purpose is to ensure that the water supplied to consumers meets stringent standards, safeguarding public health and well-being. This document serves as a valuable reference for various stakeholders, including government agencies, water utilities, and consumers.

By understanding the key components of SANS 241:2015, individuals can gain insights into the factors that influence drinking water quality and the measures taken to protect public health. This article aims to provide a clear and concise overview of the standard, highlighting its significance and the essential aspects it addresses.

A determinand in water testing refers to a specific substance or property that is being measured or analyzed in a water sample. It's a key term used in water quality standards and regulations.

Water quality standards typically set limits for various determinands to ensure that water is safe for drinking, recreational use, and other purposes. By testing water for these determinands, authorities and individuals can monitor water quality and take appropriate measures to protect public health and the environment.

Read more to know more about specific determinands or water quality standards.

Risk

SANS 241:2015 classifies risks associated with drinking water contamination into high, medium, and low categories based on their severity and likelihood. High-risk contaminants pose significant threats to public health, while low-risk contaminants are generally not considered a significant health hazard.

RISK*	DEFINITION
Acute Health	Determinand that poses an immediate unacceptable health risk, if present, at concentration values exceeding the numerical limits specified in this part of SANS 241.
Aesthetic	Determinand that taints water with respect to taste, odour and colour and that does not pose an unacceptable health risk if present at concentration values exceeding the numerical limits specified in SANS 241.
Chronic Health	Determinand that poses an unacceptable health risk if ingested over an extended period if present at concentration values exceeding the numerical limits specified in SANS 241.
Operational	Determinand that is essential for assessing the efficient operation of treatment systems and risks to infrastructure.
*World Health Organization (WHO) – Guidelines for Drinking Water Quality	

Microbial Determinands

SANS 241:2015 sets stringent standards for the microbial quality of drinking water in South Africa. It specifies limits for various microbial pathogens and indicator organisms, ensuring the safety and potability of the water supplied to consumers.

Key Microbial Determinands:

1. **Total Coliforms:** These are a group of bacteria that are commonly found in the environment, including soil, vegetation, and the intestines of warm-blooded animals. Their presence in drinking water indicates potential fecal contamination.
2. **E. coli:** A specific type of coliform bacterium that is exclusively found in the intestines of warm-blooded animals. Its presence in drinking water is a strong indicator of recent fecal contamination.
3. **Fecal Coliforms:** A subset of total coliforms that are specifically associated with fecal matter. Their presence in drinking water is also a strong indicator of fecal contamination.
4. **Salmonella:** A genus of bacteria that can cause foodborne illnesses, such as typhoid fever and salmonellosis.
5. **Cryptosporidium and Giardia: Protozoan parasites** that can cause waterborne diseases, particularly in immunocompromised individuals.

Significance of Microbial Determinands

- **Public Health:** The presence of microbial pathogens in drinking water can lead to serious health issues, including gastrointestinal illnesses, diarrhea, and infections.
- **Water Quality:** Microbial contamination can indicate the presence of other pollutants, such as viruses and bacteria that may not be easily detected.
- **Water Treatment:** The microbial quality of water is a key factor in determining the effectiveness of water treatment processes.

SANS 241:2015 establishes specific limits for these microbial determinands, ensuring that drinking water is safe for consumption. Regular monitoring and testing of water supplies are essential to prevent microbial contamination and protect public health.

Microbial Determinands Standard

Determinand	Risk	STANDARD LIMITS
E.coli (a) or Faecal Coliforms (b) (Count per 100 ml)	Acute Health	Not Detected
Protozoan Parasites: (d) Cryptosporidium Species (Count per 1 litres)	Acute Health (g)	Not Detected
Protozoan Parasites: (d) Giardia Species (Count per 10 litres)	Acute Health (g)	Not Detected
Total Coliforms (e) (Count per 100 ml)	Operational	≤10
Heterotrophic PlateCount (e) (Count per ml)	Operational	≤1000
Somatic Coliphages (f) (Count per 10 ml)	Operational	Not Detected
Risk* : World Health Organization (WHO) – Guidelines for Drinking Water Quality		

Microbial Determinands - Notes

NOTES

a	Definitive, preferred indicator of faecal pollution.
b	Indicator of unacceptable microbial water quality, could be tested instead of E.coli, but is not the preferred indicator of faecal pollution. Also provides information on treatment efficiency and after-growth in distribution networks.
c	Confirms a risk of infection and faecal pollution, and also provides information on treatment efficiency. The detection of selected protozoan parasites confirms a human health risk.
d	Indicates potential faecal pollution and provides information on treatment efficiency and after-growth.
e	Process indicator that provides information on treatment efficiency, after-growth in distribution networks and adequacy of disinfectant residuals.
f	Process indicator that provides information on treatment efficiency.
g	Determinand that is presently not easily quantifiable and lacks information pertaining to viability and human infectivity, which, however, does pose immediate unacceptable health risks if present in drinking water.

Physical Determinands

Physical determinands refer to the measurable characteristics of water that are not related to its chemical composition. These properties can significantly impact the quality and usability of water. By measuring these physical determinands, water quality professionals can assess the overall condition of water, identify potential problems, and determine appropriate treatment methods.

Color: The perceived color of water, often caused by dissolved substances or suspended particles. Color can affect the aesthetic appeal of water and may indicate the presence of certain pollutants.

Conductivity: A measure of the water's ability to conduct an electrical current, primarily due to the presence of dissolved ions. Conductivity can provide information about the total dissolved solids (TDS) in water, which can affect its taste, suitability for certain uses (e.g., irrigation), and treatment requirements.

pH: A measure of the acidity or alkalinity of water. pH influences chemical reactions in water, affecting the solubility of minerals, the formation of precipitates, and the availability of nutrients.

Specific gravity: The ratio of the density of a substance to the density of a reference substance. A higher specific gravity generally indicates a higher concentration of dissolved substances.

Physical Determinands

Taste and Odor: The sensory properties of water perceived by the taste buds and nose. Taste and odor can be influenced by a variety of factors, including dissolved substances, microorganisms, and environmental conditions.

Temperature: Temperature affects the solubility of gases and other substances in water, as well as biological activity. Temperature can influence the taste and odor of water, and it's important for aquatic life.

Turbidity: A measure of the clarity of water, caused by suspended particles like dirt, silt, or algae. High turbidity can affect the aesthetic quality of water, reduce light penetration for aquatic plants, and interfere with water treatment processes.

Solids: The total amount of particulate matter suspended or dissolved in water. High levels of solids can impact the aesthetic quality of water, interfere with water treatment processes, and affect the suitability of water for certain uses.

Total dissolved solids (TDS): The total amount of dissolved substances in water. High TDS levels can make water unsuitable for drinking and irrigation purposes.

Total Suspended Solids (TSS): Total Suspended Solids (TSS) are particles suspended in water that can be retained by a filter with a pore size of 0.45 micrometers. TSS can increase the cost of water treatment processes, as they can clog filters and membranes.

Physical Determinands

Determinand	Risk	STANDARD LIMITS
Colour (mg/l as Pt-Co)	Aesthetic	≤15
Conductivity (at 25 °C)	Aesthetic	≤170
Total Dissolved Solids (mg/l)	Aesthetic	≤1200
Turbidity (NTU)	Operational <i>(a)</i>	≤1
	Aesthetic	≤5
pH (at 25 °C) <i>(b)</i>	Operational	≥5 to ≤9.7

Chemical Determinands

Chemical determinands are specific substances or compounds present in water that are measured to assess its quality and safety. These can include:

Inorganic Compounds

- Metals: Lead, arsenic, copper, iron, mercury, zinc, etc.
- Ions: Chloride, sulfate, sodium, potassium, calcium, magnesium, etc.
- Acids and Bases: pH, alkalinity, acidity
- Nutrients: Nitrogen (nitrate, nitrite), phosphorus

Organic Compounds

- Volatile Organic Compounds (VOCs): Benzene, toluene, xylene, etc.
- Pesticides: Herbicides, insecticides, fungicides
- Pharmaceuticals: Antibiotics, hormones, etc.
- Industrial Chemicals: Surfactants, solvents, etc.

Significance of Chemical Determinands

- Health Risks: Many chemical contaminants can pose serious health risks, ranging from acute poisoning to chronic diseases.
- Environmental Impact: Chemical pollution can harm aquatic ecosystems and contaminate groundwater resources.
- Aesthetic Concerns: Some chemicals can affect the taste, odor, or appearance of water.

Chemical Determinands – Macro Determinands

Determinand	Risk	STANDARD LIMITS
Free Chlorine (mg/l as Cl ₂) (d)	Chronic Health	≤5
Monochloromine (mg/l) (c)(d)	Chronic Health	≤3
Nitrate (mg/l as N) (e)(f)	Acute Health	≤11
Nitrite (mg/l as N) (e)(f)(g)	Acute Health	≤0.9
Combined Nitrate plus Nitrite (mg/l) (e)(f)(g)	Acute Health	≤1
Sulphate (mg/l as SO ₄ (2-))	Acute Health	≤500
	Aesthetic	≤250
Fluoride (mg/l as F-)	Chronic Health	≤1.5
Ammonia (mg/l as N)	Aesthetic	≤1.5
Chloride (mg/l as Cl-)	Aesthetic	≤300
Sodium (mg/l as Na)	Aesthetic	≤200
Zinc (mg/l as Zn)	Aesthetic	≤5

Chemical Determinands – Micro Determinands

Determinand	Risk	STANDARD LIMITS
Aluminium (µg/l as Al)	Operational	≤300
Antimony (µg/l as Sb)	Chronic Health	≤20
Arsenic (µg/l as As)	Chronic Health	≤10
Barium (µg/l as Ba)	Chronic Health	≤700
Boron (µg/l as B)	Chronic Health	≤2400
Cadmium (µg/l as Cd)	Chronic Health	≤3
Total Chromium (µg/l as Cr)	Chronic Health	≤50
Copper (µg/l as Cu)	Chronic Health	≤2000
Cyanide (recoverable) (µg/l as CN ⁻)	Acute Health	≤200
Iron (µg/l as Fe)	Chronic Health	≤2000
	Aesthetic	≤300
Lead (µg/l as Pb)	Chronic Health	≤10
Manganese (µg/l as Mn)	Chronic Health	≤400
	Aesthetic	≤100
Mercury (µg/l as Hg)	Chronic Health	≤6
Nickel (µg/l as Ni)	Chronic Health	≤70
Selenium (µg/l as Se)	Chronic Health	≤40
Uranium (µg/l as U)	Chronic Health	≤30

Chemical Determinands – Organic Determinands

Determinand		Risk	STANDARD LIMITS
Total Organic Carbon (mg/l as C)		Chronic Health	≤10
Trihalo- methanes ^(h)	Chloroform (µg/l)	Chronic Health	≤300
	Bromoform (µg/l)	Chronic Health	≤100
	Dibromochloromethane (µg/l)	Chronic Health	≤100
	Bromodichloromethane (µg/l)	Chronic Health	≤60
Combined Trihalomethane ^(h)		Chronic Health	≤1
Total Microcystin (µg/l) ^(j)		Chronic Health	≤1
Phenols (µg/l)		Aesthetic	≤10

Chemical Determinands - Notes

NOTES	
a	Values in excess of those given in column 4 may negatively impact disinfection.
b	Low pH values can result in structural problems in the distribution system.
c	This is equivalent to 4.1 mg Cl as Cl ₂ /l as measured by standard DPD colorimetric and ferrous titrimetric methods.
d	The health concerns associated with most chemical determinands in drinking water differ from those associated with microbial contamination and arise primarily from the ability of chemical determinands to cause adverse health effects after prolonged periods of exposure.
e	This is equivalent to Nitrate at 50 mg NO ₃ /l and Nitrite at 3 mg NO ₂ /l.
f	See Annex C of SANS 241-2:2014 for an example of the sum of Nitrate plus Nitrite ratio. The sum of the ratios of the concentrations of each (as detected in the sample) to its guideline value should not exceed 1.
g	Due to the dynamic nature of Nitrite-Nitrate conversion in distribution networks and the potential health impact on bottle-fed infants, the standard is applicable at the point of consumption.
h	See Annex C of SANS 241-2:2014 for an example of the sum of THM ratio. The sum of the ratios of the concentrations of each to its respective guideline value should not exceed 1.
j	Microcystin only needs to be measured where algal bloom (>20000 cyanobacteria cells per millilitre) is present in a raw water source. In the absence of algal monitoring, an algal bloom is deemed to occur where the surface water is visibly green in the vicinity of the abstraction, or samples taken have a strong musty odour.

SANS 241:2015: Your Guide to Safe Drinking Water

Thank you for exploring the world of SANS 241:2015. As you've seen, this comprehensive standard plays a crucial role in ensuring the quality and safety of South Africa's drinking water. By understanding the guidelines and requirements outlined in SANS 241:2015, you can contribute to protecting public health and the environment.

Need more information or support?

If you have any questions or require further assistance with SANS 241:2015, please don't hesitate to reach out. Our team of experts is dedicated to providing guidance and support on all aspects of water quality management.

Contact us today to learn more.



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