The Water-Fire Paradox

Fire Safety Standards in South Africa

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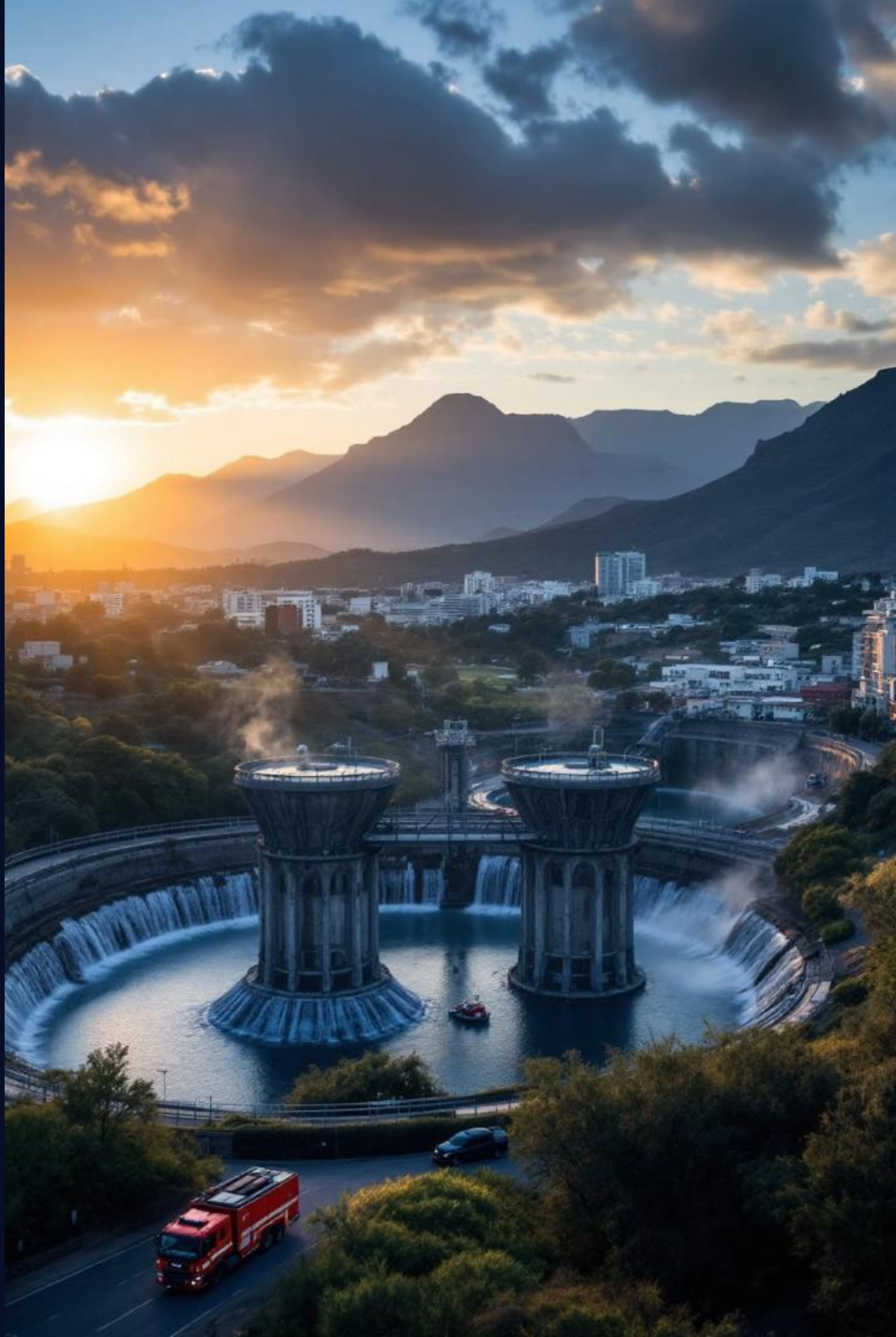

The Water-Fire Paradox: Fire Safety Standards in South Africa

South Africa is a water-scarce nation, yet the protection of lives and assets from fire hazards depends heavily on water availability. This dual challenge requires that fire protection systems be designed with precision, not excess. This report explores the core fire safety water provision standards – SANS 10090, The Red Book, and SANS 10400-T – and identifies the installation, maintenance, and enforcement challenges that hinder their effectiveness. Practical insights and compliance pathways are offered to align systems with real-world needs and conditions.

Purpose of Fire Safety Standards

1. **Protecting life and health**

   They ensure safe evacuation routes and sufficient water supply for firefighting.

2. **Preventing structural collapse**

   Structural integrity under fire conditions is addressed in SANS 10400-T section 4.1(a-c).

3. **Minimising property loss**

   Limiting the extent of fire damage reduces rebuilding costs and economic disruption.

4. **Supporting emergency response**

   Hydrant locations and pressure requirements must assist emergency services, not hinder them.

5. **Ensuring accountability**

   The standards define legal obligations for municipalities, insurers, and property owners.

South Africa's Primary Fire Water Standards

SANS 10090:2003 (Enforceable standard)

Sets minimum fire flows based on building risk categories.

SANS 10252-1:2016

Details pipe sizing and pressure regulations for hydrants and hose reels.

SANS 10400-T:2024

Part T of the Building Regulations–provides application rules for hydrants, hose reels, access, and suppression systems.

The Red Book (CSIR, 2019)

A planning guideline for human settlements – not legally enforceable, but often used incorrectly as a de facto standard.

Fire Risk Classifications and Flow Requirements

SANS 10090 Fire Flow Rates (Selected Examples):

Risk Category	Description	Minimum Flow (L/min)	Min Hydrant Flow	Spacing (m)
A	CBD / heavy commercial	13,000	2,000	85
B	Smaller commercial / towns	9,000	2,000	120
C	Formal residential	6,000	2,000	200
D1–D4	Various residential densities	1,900–5,700	1,200–2,000	200–300
E	Special risks (custom assessed)	Variable	Variable	Variable

Hydrant Requirements Under SANS 10400-T

According to clause 4.35:

Hydrants are required:

- In buildings >12 m high, or
- With a floor area >1,000 m²

Specifications:

- Spacing: Max 90 m apart, one per 1,000 m² and per storey
- Hose: 24–30 m length with 16 mm nozzle
- Must comply with SANS 1128-1, SANS 10105-2 (installation), and SANS 1475-2 (maintenance).

Hose Reels and Suppression Systems

1

Hose Reels

Mandated for buildings exceeding 250 m^2 or 2+ storeys (except dwellings with external access). Must be spaced every 500 m^2 and ensure coverage of all zones. Where water is unavailable, extinguishers must substitute.

2

Suppression Systems

Suppression systems (e.g., sprinklers) are mandated for:

- Buildings >30 m in height
- Basements exceeding 500 m^2

The Red Book's Lower Flow Limits and Its Risk

Red Book values are significantly lower than SANS 10090 for comparable risk categories. For example:

Risk Type	Flow (L/min)	Hydrant Flow (L/min)
High Risk	6,000	1,500
Moderate Risk 1	3,000	1,500
Low Risk	900	900

This undercuts the enforceable standards of SANS 10090 and may mislead planners into under-providing water.

Incorrect Pipe Sizing and Installation Challenges

Common issues found in the field include:

Undersized Piping

Use of 63 mm or 75 mm piping in areas requiring 100 mm minimum

Pressure Issues

Failure to maintain a working pressure of 300 kPa

Calculation Errors

Uncalculated pipe losses due to elbows, reducers, or elevation

Improper Connections

Tapping fire lines off household plumbing, compromising capacity

These violate SANS 10252-1, which mandates 1,200 L/min for hydrants with no drop in pressure.

Poor Hydrant Maintenance – The Hidden Threat

Hydrants are often neglected, with serious consequences:

1. **Pressure Testing**
   No pressure testing, resulting in "dry" or low-pressure units
2. **Physical Damage**
   Vandalised or inaccessible hydrant cupboards
3. **Component Failure**
   Nozzle threads damaged or non-standard
4. **Missing Equipment**
   Missing hose or expired seals
5. **Accessibility Issues**
   Hidden cabinets obscured by vegetation or debris

Clause 4.35.5 of SANS 10400-T demands compliance with SANS 1475-2, which requires scheduled servicing intervals. These are often ignored.

Fire Incident Data – Johannesburg Study

99.9%

Low Flow Fires

of fires required less than 1,200 L/min

75%

Small Volume

were extinguished using under 6.6 kL – less than a single tanker capacity

Fires often occurred outside peak domestic demand, reducing system strain.

Legal Enforcement and Non-Compliance Offences

Under SANS 10400-T, Regulation T2, non-compliance with hydrant requirements is a legal offence:

1. ### Building Owner Prosecution
   Can be prosecuted for non-operational systems
2. ### Equipment Violations
   Hydrants or hose reels not provided or non-operational
3. ### Safety Route Violations
   Escape routes obstructed or non-functional
4. ### Maintenance Violations
   Equipment not maintained as per SANS 10105 and SANS 1475

Offenders may face fines, building approval revocations, or imprisonment for severe negligence.

The Role of Insurance Companies

Insurance companies act as risk assessors and enforcers:

Coverage Assessment

Can withhold cover for non-compliant sites or buildings

Claims Denial

May deny fire damage claims where hydrants were inoperable or missing

Municipal Collaboration

Should collaborate with local municipalities to report substandard systems

Testing Requirements

Some insurers require annual hydrant test certificates from SAQCC Fire-registered firms

Fire Department Enforcement and Reporting

Local fire departments are first responders and ideal watchdogs. Their roles should include:

Hydrant Monitoring

Reporting "dead" hydrants to water departments

System Mapping

Mapping accessible vs inoperative hydrants per zone

Incident Documentation

Logging incidents where fire suppression failed due to lack of water

Infrastructure Planning

Proposing re-zoning or infrastructure upgrades

Municipal and Water Authority Responsibilities

Municipalities and water departments are ultimately responsible for:

Infrastructure Support

Ensuring water pressure and pipe sizing support hydrants in all developments

Maintenance

Repairing or replacing failed units

Funding

Funding hydrant upgrades in older zones

Testing Schedule

Scheduling routine flow and pressure testing

Accountability in Construction and Engineering

Contractors and plumbing engineers must install systems:

SANS Compliance

In full compliance with SANS 10252-1

Testing Documentation

With pressure and flow tests signed off before completion

Detailed Drawings

Including detailed "as-built" drawings with hydrant layout

Standard Fittings

Using fittings and threads matching SANS 1128

The Consequences of Outdated Infrastructure

Many hydrants installed pre-2000 are:

Incomplete

Missing outlets or valves

Inaccessible

Located in overgrown areas or under pavement

Unlisted

Unlisted on municipal GIS databases

Poor Connections

Connected to undersized or corroded piping

Modern GIS-based hydrant asset management tools can solve this – but only if local authorities invest in mapping and updating infrastructure.

Misinterpretation and Misuse of The Red Book

The Red Book, although well-intended, is a guideline, not a standard. Misuse happens when:

1

Engineering Misuse

Engineers use its lower flow rates in place of SANS 10090

2

Municipal Shortcuts

Municipalities approve plans based on Red Book values to save water

3

Developer Exploitation

Developers use it as a reason to exclude hydrants in "low risk" zones

This puts developments and their future residents at unnecessary risk and should be discouraged unless rational design proves adequacy.

Training and Certification Gaps

Effective systems depend on qualified people. Current gaps include:

Personnel Issues

- Unregistered contractors working on fire systems
- Building managers unaware of servicing schedules
- Inspectors not trained to identify violations

Certification Requirements

SAQCC Fire registration is required for all installers and servicing companies under SANS 1475. Enforcement of this credentialing is essential for accountability.

Recommendations for Industry and Government

Systemic Improvements:

1. **Annual hydrant audits**
   Mandated for all buildings >1,000 m²

2. **Fire department empowerment**
   Empowered to report and fine non-compliance

3. **Red Book amendments**
   To be amended with clear disclaimers where it conflicts with SANS codes

4. **Mandatory layout approval**
   Hydrant layout approval prior to building handover

5. **Smart technology integration**
   Integration of smart hydrants and GIS tracking

6. **Registration enforcement**
   Enforcement of SAQCC Fire registration across all servicing contracts

Conclusion: Reclaiming Confidence in Fire Protection Systems

The South African fire safety system is robust – on paper. But real-world implementation has suffered due to unclear enforcement, poor maintenance, and inconsistent application of standards. Hydrants remain an indispensable asset, especially for prolonged or inaccessible fires. Through consistent testing, informed regulation, and empowered authorities, hydrant infrastructure can serve as the backbone of effective, sustainable firefighting response.

Fire safety is not only about design. It's about vigilance, compliance, and a shared commitment to protect life.