

# VHATHENZHENI

## GENERAL SOLUTIONS

*Turnkey Engineering Excellence  
for a Sustainable South Africa*



Founded 2019 · Polokwane, Limpopo · Net-Zero Committed

COMPANY PROFILE · 2026



# Working Towards Great Solutions

A dynamic, multi-disciplinary engineering and project management company delivering holistic, end-to-end turnkey solutions across mechanical, electrical, renewable energy, mining, and IT disciplines — for public and private sectors across South Africa.

ATTENTIVE

PIONEERING

COMMITTED

Multi-disciplinary · Turnkey · Net-Zero Committed · CIDB Compliant

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# COMPANY OVERVIEW

DEDICATION TO SERVICE IN THE ENGINEERING & CONSTRUCTION INDUSTRY



Vhathenzheni General Solutions is a dynamic, multi-disciplinary turnkey engineering and project management company founded in 2019 by Andani Libago, Pr. Techni Eng. Born from a disadvantaged background within South Africa's Rainbow Nation ethos of diversity, restitution, equality, and growth, the company has grown steadfastly — overcoming procurement challenges and economic headwinds to deliver world-class, end-to-end engineering solutions across public and private sectors.

**2019**

Year Founded

**5+**

Engineering Disciplines

**Net-Zero**

Committed

**100%**

Turnkey Delivery

## CORE SPECIALISMS

**01** Mechanical Engineering

**02** Electrical, Electronic & Renewable Energy

**03** Project & Programme Management

**04** Mining Engineering

**05** Information Technology

**1**

Reduce Energy Demand

**2**

Harvest Site Energy

**3**

Maximize Efficiency

**4**

Efficient Operations and Maintenance

**5**

Renewable Energy

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# VALUES, VISION & MISSION



## CORE VALUES

We uphold professionalism, integrity, and ethical behaviour at all times. Openness, honesty, discretion, and excellence form our cultural foundation. We respect every client, subconsultant, contractor, and community we serve — guided by Batho Pele: putting people first.



## OUR VISION

To be South Africa's most trusted turnkey engineering partner — helping clients transform opportunities into sustainable realities. We believe the quality of our relationships is what makes the lasting difference in people's lives and businesses.



## OUR MISSION

To bring good things to life by building lasting relationships, delivering competence, sound business principles, and excellent professional knowledge. We pursue Net-Zero aligned engineering that reduces carbon footprints and advances South Africa's clean energy transition.



# ESG & NET-ZERO

*Our Sustainable Future*

Vhathenzheni embeds ESG at every project stage — conducting energy audits, designing with renewables, specifying green suppression gases, and partnering on community development. We align with South Africa's mandatory ESG reporting, the Mining Charter, and Science-Based Targets to deliver measurable, auditable progress toward Net-Zero.



## E ENVIRONMENTAL

- ▶ Energy-optimised HVAC & precision cooling
- ▶ Solar PV & wind — reducing grid dependence
- ▶ Green gases (FK-5-1-12, CO<sub>2</sub>, Novec 1230) — ODP=0
- ▶ Water recycling: RO, softeners & closed loops
- ▶ Scope 1, 2 & 3 emissions reduction
- ▶ Carbon footprint benchmarking & net-zero roadmaps

## S SOCIAL

- ▶ Community upliftment & local employment
- ▶ Skills development & youth learnerships
- ▶ Safe workplaces via fire & medical gas systems
- ▶ Batho Pele principles in all service delivery
- ▶ Diversity & inclusion — disadvantaged-background founded
- ▶ Stakeholder engagement & social licence

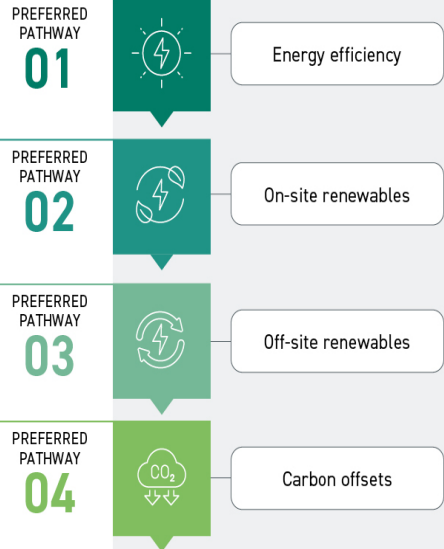
## G GOVERNANCE

- ▶ CIDB, SARS & Dept. of Labour compliance
- ▶ Transparent, ethical project accountability
- ▶ Risk management on all contracts
- ▶ Mining Charter & ESG mandatory reporting
- ▶ Science-Based Targets (SBTi) integration
- ▶ Independent auditing support for clients



# NET-ZERO IN PRACTICE

How we get there



### GREEN FIRE SUPPRESSION GASES

We specify and install Novec 1230, FK-5-1-12, CO<sub>2</sub>, and IG-541 (Inergen) clean-agent systems replacing legacy halon and HFC suppressants. These agents carry zero ozone depletion potential (ODP=0) and ultra-low global warming potential (GWP<1), ensuring fire safety never comes at a climate cost — critical for mines, data centres, server rooms, and protected heritage buildings.

### LOW-GWP & NATURAL REFRIGERANTS

Our refrigeration designs specify NH<sub>3</sub> (ammonia), R-290 (propane), and R-744 (CO<sub>2</sub>) natural refrigerants alongside low-GWP synthetics (R-32, R-454B). This dramatically cuts F-gas emissions across cold rooms, agricultural degreening facilities, blast freezers, and HVAC chillers — directly reducing Scope 1 emissions and aligning with South Africa's F-gas phase-down roadmap.

### SOLAR PV & ENERGY MANAGEMENT

Every mechanical system we design is paired with an energy optimisation strategy. Solar PV offsets compressor and pump loads; BMS platforms monitor and cut consumption in real time; variable-speed drives (VSDs) reduce fan and pump energy by up to 50%. We deliver Net-Zero ready infrastructure for hotels, factories, mines, and agricultural facilities across South Africa.

### NET-ZERO FOR AGRICULTURAL FARMS

Farms are heavy refrigeration and water-pump consumers. We replace legacy HFC systems with NH<sub>3</sub>/CO<sub>2</sub> cascade configurations, integrate solar-powered cold storage, implement waste-heat recovery from compressors for on-farm hot water, and design VSD-driven precision irrigation pumping — delivering truly carbon-neutral cold chains from farm gate to distribution centre.



# INDOOR AIR & WATER QUALITY

Healthy buildings are smart buildings. Vhathenzheni integrates continuous indoor environmental monitoring — air quality, CO<sub>2</sub>, pollutants, humidity, turbidity and Legionella risk in water systems — feeding real-time data into Building Management Systems for proactive control. This approach underpins Green Building certification, occupant wellness and verifiable Net-Zero performance.



## INDOOR AIR QUALITY MONITORING

- ▶ TVOC (Total Volatile Organic Compounds) continuous sensing
- ▶ CO<sub>2</sub> monitoring — triggers fresh-air dampers via BMS
- ▶ PM2.5 & PM10 particulate matter detection
- ▶ Formaldehyde & NO<sub>2</sub> gas sensors for occupied spaces
- ▶ Temperature & relative humidity monitoring 24/7
- ▶ Radon detection in basement & sub-slab spaces
- ▶ Kaiterra Sensedge & Sensedge Mini sensor deployment
- ▶ WELL Building Standard alignment (WELL v2 Air Concept)
- ▶ ASHRAE 62.1 ventilation compliance verification

## WATER QUALITY & LEGIONELLA

- ▶ Water turbidity measurement — NTU-rated inline sensors
- ▶ Legionella risk monitoring — temperature & stagnation flags
- ▶ Chlorine residual & pH continuous monitoring
- ▶ Flow-rate sensing for dead-leg detection in pipework
- ▶ Cold water storage temp logging — below 20°C compliance
- ▶ Hot water system temp logging — above 60°C at calorifier
- ▶ Water treatment compliance per SANS 241 drinking water
- ▶ Alerts integrated to BMS for automatic valve cycling
- ▶ Monthly Legionella risk assessment reports generated

## BMS INTEGRATION & WELLNESS

- ▶ All sensor data fed to centralised BMS dashboard in real time
- ▶ Automatic damper, AHU & FCU control based on CO<sub>2</sub> thresholds
- ▶ Demand-controlled ventilation — reduces HVAC energy up to 30%
- ▶ Occupant wellness dashboards — display air quality index live
- ▶ SCADA & BMS integration: Modbus, BACnet, MQTT protocols
- ▶ Alert escalation workflow: BMS → facilities manager → engineer
- ▶ Historical trend logging for ESG reporting & Green certification
- ▶ Energy & IAQ correlation analysis — optimise without compromise
- ▶ Building resilience — pandemic-ready ventilation management

## PLATFORMS & CERTIFICATION

- ▶ Kaiterra Sensedge sensors — commercial-grade, RESET certified
- ▶ Airwits IoT platform — cloud-based IAQ reporting & analytics
- ▶ RESET Air certification programme support (RESET Standard v2)
- ▶ SANS 10400-XA energy & ventilation performance compliance
- ▶ Green Star SA Indoor Environment Quality (IEQ) credit support
- ▶ WELL v2 Air, Water & Mind concept documentation support
- ▶ EDGE green building certification IAQ evidence preparation
- ▶ Net-Zero buildings: verified indoor quality = sustainable asset
- ▶ Monthly & annual IAQ/water quality reports for clients



# QMS & SHE PLAN

Vhathenzheni operates under a rigorous Quality Management System and Safety, Health & Environment (SHE) framework aligned to international best practice. Every project — from refrigeration installation to mining plant maintenance — is executed under documented procedures, risk assessments, and statutory compliance protocols governing construction and mining activities in South Africa.



## QUALITY MANAGEMENT SYSTEM (QMS)

- ▶ QMS framework aligned to ISO 9001:2015 principles
- ▶ Documented quality plans for every project scope
- ▶ Inspection & Test Plans (ITP) on all mechanical & electrical works
- ▶ Non-Conformance Report (NCR) tracking & closeout procedures
- ▶ Material traceability & certification record management
- ▶ Supplier & subcontractor quality vetting and approval
- ▶ Project quality audits — internal & client-led
- ▶ As-built documentation, O&M manuals & commissioning records
- ▶ Continuous improvement: lessons-learned registers per project

## SAFETY & HEALTH (SHE)

- ▶ SHE policy aligned to ISO 45001:2018 OHS principles
- ▶ Site-specific Safety File per Construction Regulations
- ▶ Baseline Risk Assessment & task-based risk registers
- ▶ HIRA (Hazard Identification & Risk Assessment) for all tasks
- ▶ Personal Protective Equipment (PPE) management programme
- ▶ Toolbox talks, safety inductions & competency records
- ▶ Incident, near-miss & accident investigation & reporting
- ▶ Emergency response plans & first-aid resources on site
- ▶ Monthly SHE statistics compiled & reported to clients

## CONSTRUCTION REGULATIONS

- ▶ Construction Regulations 2014 (OHS Act Section 43) compliance
- ▶ Principal Contractor obligations — Construction Regulations CR4
- ▶ Designer competency obligations — Construction Regulations CR5
- ▶ Contractor SHE file management — Construction Regulations CR7
- ▶ Fall protection plans for all work-at-height activities
- ▶ Excavation permit system per Construction Regulation CR13
- ▶ Lifting machine & rigging inspection compliance (GMR 18)
- ▶ Section 37(2) Agreements with clients (OHS Act obligations)
- ▶ Temporary electrical installation compliance (SANS 10142-2)

## MINING SHE & LEGISLATION

- ▶ Mine Health & Safety Act (Act 29 of 1996) compliance
- ▶ Mine Health & Safety Council (MHSC) CoP adherence
- ▶ Codes of Practice for mining equipment maintenance
- ▶ Mandatory reporting of dangerous occurrences (DMRE)
- ▶ Safety data sheets (SDS) for all hazardous substances on site
- ▶ Lock-out / Tag-out (LOTO) procedures on all plant and equipment
- ▶ Working in confined spaces — permit & standby procedures
- ▶ Hot work permits for welding, cutting & grinding activities
- ▶ Environmental management plan (EMP) compliance on mine sites



# MECHANICAL ENGINEERING



## HVAC

Chillers · VRVs · Split units · Heat pumps  
Coil design · Kitchen, toilet & warehouse extraction

## Fire Engineering

Rational fire design · Suppression systems  
Green agent gases · Sprinklers · Detection

## Refrigeration

Simplex/multiplex systems · Cold rooms · Blast freezers  
Mortuaries · Pharmaceutical · Plant monitoring

## Medical & LP Gas

Oxygen, low-pressure & vacuum design  
Pump selection · Medical gas maintenance

## Wet Services

Water supply & drainage — residential, corporate  
School & hospital kitchens · Sanitation

## Bulk Water Treatment

Water softeners · Reverse osmosis  
Design, installation & ongoing maintenance

## Steam & Condensate

Boilers · Calorifiers · Reticulation systems  
Pressure testing & compliance

## Kitchen & Laundry

Commercial & industrial kitchen services  
Laundry plant design & maintenance



# REFRIGERATION SYSTEMS

Vhathenzheni delivers comprehensive refrigeration engineering across the full spectrum of industrial and commercial applications — from agricultural pack-houses and pharmaceutical cold stores to beverage processing plants and mortuaries. All new designs prioritise natural and low-GWP refrigerants aligned with South Africa's F-gas phase-down roadmap and client Net-Zero commitments.



## Simplex & Multiplex Systems

Design & maintenance for shopping centres, agricultural pack-houses, pharmaceutical facilities, and food processing plants. Parallel racks, floating head pressure control, and remote SCADA monitoring.

## Cold Rooms & Freezer Rooms

Degreening rooms · Holding rooms · Blast freezers · IQF tunnels. Compressor selection, insulation panel spec, door sealing, and floor heating to prevent frost heave.

## Mortuaries

Specialised low-temperature mortuary systems including body storage rooms, refrigerated drawer banks, and embalming room climate control — with full redundancy and precision temperature management.

## Agricultural Net-Zero Refrigeration

NH<sub>3</sub>/CO<sub>2</sub> cascade systems replacing legacy HFCs. Solar-powered cold storage, waste-heat recovery for farm hot water, and VSD-driven compressors — delivering carbon-neutral cold chains from farm gate to distribution.

## Ammonia & Natural Refrigerant Systems

Large-scale NH<sub>3</sub> chillers and R-290 systems for breweries, dairies, and FMCG. Zero ODP, near-zero GWP — the sustainable industrial refrigerant choice endorsed by international climate agreements.

## Plant Monitoring & Predictive Maintenance

Real-time plant monitoring, automated alarm management, energy dashboards, and predictive maintenance scheduling to minimise downtime and extend equipment operating life.



# MINING MECHANICAL EQUIPMENT

South African mines depend on mechanically reliable infrastructure to sustain production, protect lives, and meet the Mining Charter's ESG obligations. Vhathenzheni provides turnkey maintenance and engineering for the full range of critical underground and surface mechanical plant — aligned to net-zero targets.



## VENTILATION & COOLING

- ▶ Surface & underground refrigeration plants
- ▶ Bulk air coolers (BACs) for deep-level mines
- ▶ Chilled water reticulation networks
- ▶ Cooling tower maintenance & water treatment
- ▶ Ventilation fan overhauls — axial & centrifugal
- ▶ SCADA & auto-control integration

## PUMPING & FLUID SYSTEMS

- ▶ Multistage centrifugal dewatering pumps
- ▶ High-pressure water supply columns
- ▶ Pump column pipe maintenance & inspection
- ▶ Settlers, dams & water recycling systems
- ▶ Compressed air reticulation networks
- ▶ Hydraulic system servicing & compliance

## SURFACE & PROCESSING PLANT

- ▶ Conveyor belt systems & drive stations
- ▶ Crusher & milling plant mechanical maintenance
- ▶ Screens, feeders & vibrating equipment
- ▶ Thickeners, filters & tailings plant maintenance
- ▶ Hoist & winder mechanical inspections
- ▶ Weighbridge calibration & SABS certification

## FIRE & SAFETY SYSTEMS

- ▶ Conveyor belt fire detection & suppression
- ▶ Underground fire deluge & sprinkler systems
- ▶ Gas & flame detection networks
- ▶ Refuge chamber servicing & compliance
- ▶ Emergency backup generator maintenance
- ▶ Explosion-proof electrical equipment compliance



# FIRE PROTECTION & GREEN GASES

Vhathenzheni leads with green suppression agents — Novec 1230, FK-5-1-12, CO<sub>2</sub>, and IG-541 — that achieve zero ozone depletion and near-zero global warming potential while providing superior fire knockdown performance. Fire safety must not compromise climate commitments.



## FIRE DETECTION

- ▶ Detcon gas & flame detection
- ▶ Distributed Temperature Sensing (DTS) via optical fibre
- ▶ Ember & spark detection
- ▶ IR temperature scanning & IR3 flame detection
- ▶ Linear heat detection cable
- ▶ Plummer block caps, smoke & thermal sensors



## GREEN SUPPRESSION AGENTS

- ▶ Novec 1230 — GWP=1, ODP=0 clean agent
- ▶ FK-5-1-12 — halon replacement, zero residue
- ▶ CO<sub>2</sub> fixed flooding — no chemical footprint
- ▶ IG-541 (Inergen) — inert gas blend, zero GWP
- ▶ CAF (Compressed Air Foam) systems
- ▶ Water mist — 90% less water than sprinklers



## FIRE CONTROL & SUPPRESSION

- ▶ Modular control panel — auto/manual operation
- ▶ Real-time fault, alarm & failure notifications
- ▶ Automatic belt stop & solenoid activation
- ▶ Containerised / skid-mounted pump stations
- ▶ Water deluge & foam induction systems
- ▶ Water sprinkler systems for mines & factories



**NET-ZERO IMPACT:** Green suppression gases reduce fire-safety Scope 1 emissions by up to 99% vs legacy HFCs — enabling mines, farms, and factories to meet decarbonisation targets without compromising safety.



# ELECTRICAL & RENEWABLE ENERGY



## Building Management Systems

BMS networking · HVAC integration  
Energy management dashboards  
Systems integration · People counting

## Solar PV & Renewable Energy

Rooftop & ground-mount solar PV design & install  
Wind turbine maintenance  
Battery storage & grid-tie solutions

## Electrical Power Systems

MV/LV distribution design  
Redundancy planning (N, N+1, 2N)  
Mission-critical & data centre infrastructure

## UPS & Emergency Generators

UPS supply, installation & commissioning  
Backup generator maintenance & repair  
Automatic transfer switching

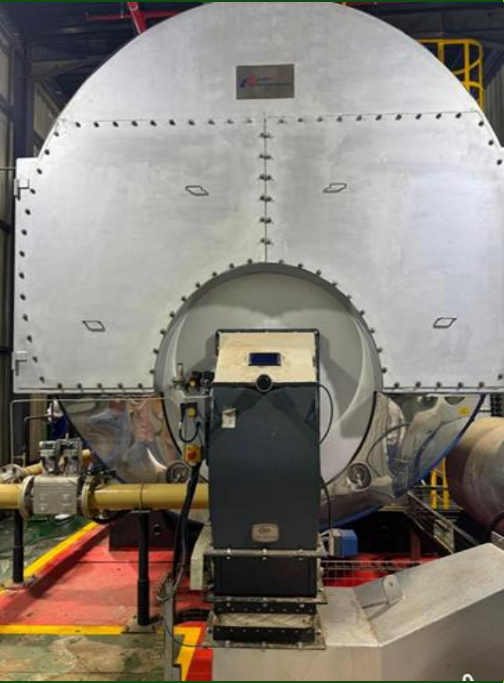
## Weighbridges

Calibration & SABS certification  
Software maintenance & diagnostics  
Environmental protection & sealing

## Oil & Gas Systems

Oil & gas supply infrastructure  
Pipeline installation & pressure testing  
Safety compliance & documentation

# MAINTENANCE SERVICES



MULTI-DISCIPLINARY ENGINEERING & MAINTENANCE ACROSS ALL SECTORS



Engineering services & technical designs

Welding & corrosion treatment of steel pipes

Piped systems maintenance & repair

Waste water treatment plant refurbishment

UPS, generator, A/C & electrical supply & installation

Mechanical & electrical general maintenance

Rehabilitation of ponds & environmental remediation

Emergency backup generator maintenance & repair

Packaged air conditioning maintenance & repair

Water treatment plant refurbishment

Plumbing & general building works

Borehole testing & equipping

Asset management for major plant & machinery

Various turnkey project delivery



# SANS STANDARDS & REGULATORY COMPLIANCE



Every Vhathenzheni design, installation and maintenance activity is executed in compliance with applicable South African National Standards (SANS), Acts, and international codes. Our multi-disciplinary scope spans refrigeration, HVAC, fire protection, wet services, electrical, and building services — each governed by specific mandatory standards.

## REFRIGERATION & HVAC

- ▶ SANS 10147 — Refrigeration systems (ammonia plant)
- ▶ SANS 10229 — Mechanical ventilation & HVAC systems
- ▶ SANS 10400-O — Environmental sustainability
- ▶ SANS 10400-XA — Energy usage in buildings
- ▶ ASHRAE 15 — Safety standard for refrigeration systems
- ▶ ASHRAE 34 — Refrigerant designation & classification
- ▶ ASHRAE 62.1 — Ventilation & indoor air quality
- ▶ ASHRAE 90.1 — Energy standard for buildings
- ▶ Kigali Amendment — HFC phase-down obligations
- ▶ F-gas Regulation — refrigerant handling & record-keeping

## FIRE PROTECTION

- ▶ SANS 10400-T — Fire protection in buildings
- ▶ SANS 10139 — Flammable liquids storage
- ▶ SANS 10090 — Community protection against fire
- ▶ NFPA 13 — Sprinkler system design standard
- ▶ NFPA 72 — National fire alarm code
- ▶ NFPA 2001 — Clean agent fire suppression systems
- ▶ FM Global — Data centre & insurance-grade suppression
- ▶ SANS 10400-W — Fire detection & alarm systems
- ▶ OHS Act Section 9 — Fire precaution obligations
- ▶ National Building Regulations — fire compartmentation

## WET SERVICES & WATER

- ▶ SANS 10252-1 — Water supply installations in buildings
- ▶ SANS 10252-2 — Drainage installations in buildings
- ▶ SANS 241 — Drinking water quality standard
- ▶ SANS 342 — Water treatment chemicals
- ▶ SANS 10221 — Swimming pool water quality
- ▶ CIBSE TM13 — Minimising the risk of Legionella
- ▶ SANS 10252-3 — Heating installations in buildings
- ▶ ARP 069 — Backflow prevention & cross-connection
- ▶ Local authority bylaws — water & sewage connections
- ▶ SANS 1083 — Polyethylene & uPVC pipe standards

## ELECTRICAL & BUILDINGS

- ▶ SANS 10142-1 — Wiring of premises (LV installations)
- ▶ SANS 10142-2 — Wiring of premises (LV temporary)
- ▶ SANS 10400-XA — Energy efficiency in buildings
- ▶ SANS 204 — Energy efficiency in buildings (design)
- ▶ IEC 60364 — Electrical installations in buildings
- ▶ SANS 10108 — Hazardous area classification
- ▶ NERSA SSEG — Small-scale embedded generation rules
- ▶ NRS 048 — Electricity supply quality of service
- ▶ OHS Act GMR 2 — General machinery regulations
- ▶ National Building Regulations (NBR) — SANS 10400



# LET'S BUILD SOMETHING GREAT

*Working Towards Great Solutions*

## COMPLIANT WITH:

- ✓ CIDB — Construction Industry Development Board
- ✓ SARS — South African Revenue Service
- ✓ Department of Employment & Labour

**NET-ZERO COMMITTED**



## CONTACT US

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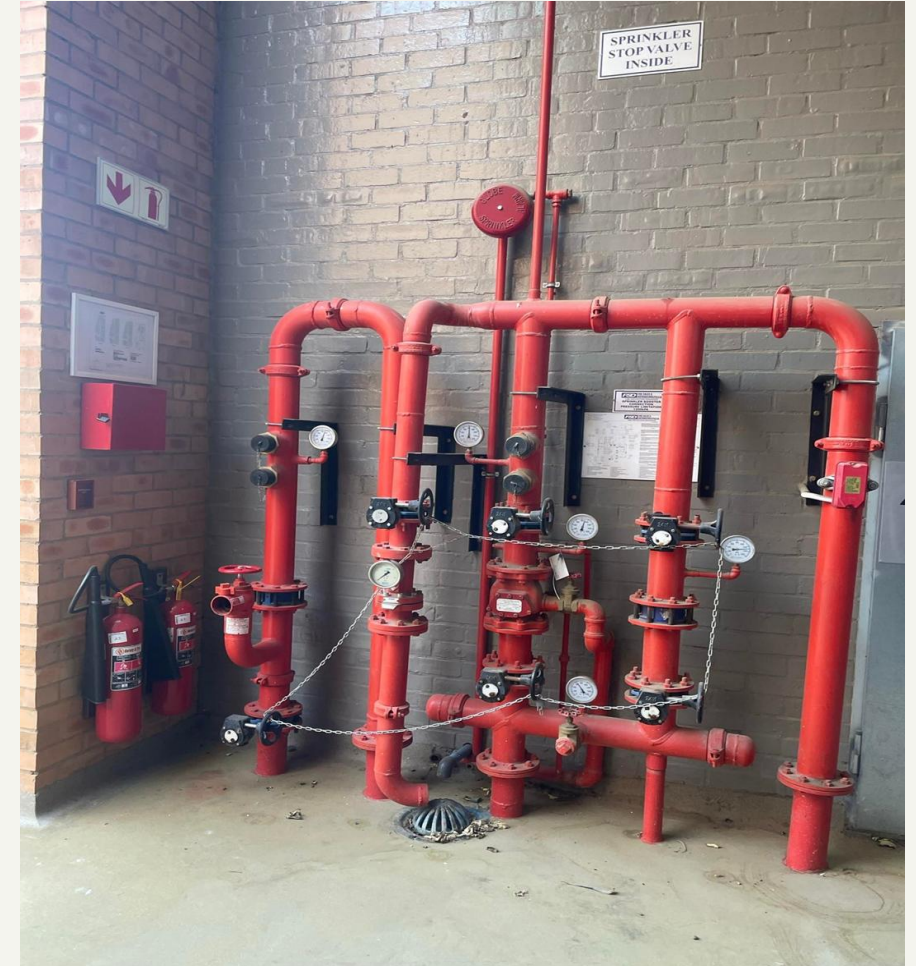
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*Andani Libago · Pr. Techni Eng. · Founder & Director*

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