Eskom	Scope Of Work	Technology

Title: **Five-Year Maintenance and Service contract for Diesel Compressors (Mobile and Station Units)**

Unique Identifier:	
Alternative Reference Number:	**N/A**
Area of Applicability:	**Engineering**
Documentation Type:	**Specification**
Revision:	**1**
Total Pages:	**14**
Next Review Date:	**N/A**
Disclosure Classification:	**CONTROLLED DISCLOSURE**

Compiled by	**Supported by**	**Authorised by**
……..	……..	……..
T. Masethe	**G. Khumalo**	**L. Mtembu**
System Engineer: Auxiliary Engineering	**Senior Technician: TSS**	**Turbine Maintenance Manager**
Date: ……	Date: 09/02/2026	Date: 2026/02/23

CONTENTS

1. INTRODUCTION 4

2. SUPPORTING CLAUSES 4

2.1.1 Purpose 4
2.1.2 Applicability 4
2.1.3 EFFECTIVE DATE 4
2.2 NORMATIVE/INFORMATIVE REFERENCES 4
2.2.1 Normative 4
2.2.2 Informative 4
2.3 DEFINITIONS 5
2.3.1 Disclosure Classification 5
2.4 ABBREVIATIONS& ACRONYMS 6
2.5 ROLES AND RESPONSIBILITIES 6
2.6 PROCESS FOR MONITORING 6
2.7 REQUIREMENTS 6

3. EQUIPMENT SPECIFICATIONS & TECHNICAL DATA 7

3.1 MOBILE COMPRESSOR UNITS – KAESER MOBILAIR M500-2 7
3.2 STATIONARY COMPRESSOR UNITS – SULLIVAN PALATEK SYSTEM 7

4. SCOPE OF WORK 8

4.1 SERVICE INTERVAL A – PREVENTIVE MAINTENANCE (INTERVAL A) 8
4.1.1 Consumable Replacements (Interval A) 8
4.1.2 Fluid Checks & Analysis (Interval A) 9
4.1.3 Component Servicing (Interval A) 9
4.2 SERVICE INTERVAL B – EXTENDED MAINTENANCE (INTERVAL B) 10
4.2.1 Engine Component Service (Interval B) 10
4.2.2 Fuel System Service (Interval B) 11
4.2.3 Drive Belt & Coupling (Interval B) 11
4.2.4 Cooling System Service (Interval B) 11
4.2.5 Sensor & Control System (Interval B) 12
4.3 MATERIALS, LUBRICANTS & CONSUMABLES 12
4.3.1 Engine Lubricants 12
4.3.1.1 Primary Engine Oil – Caterpillar DELO 400 (15W-40 ULSD) 12
4.3.2 Compressor Oil – SIGMA FLUID G-680 13
4.3.3 Hydraulic Oil – TELLUS S2 VX46 13
4.3.4 Coolant – Extended-Life Coolant (ELC) & Additives 14
4.3.5 Filters & Filter Elements 15
4.3.5.1 Oil Filters 15
4.3.5.2 Air Filters 15
4.3.5.3 Fuel Filters 15
4.3.6 Seals, Gaskets & O-Rings 15

5. SPARE PARTS MANAGEMENT 16

5.1 SPARE PARTS INVENTORY – MOBILAIR MOBILE UNITS 16
5.1.1 Fluids and Lubricants: 16
5.1.2 Filters and Cartridges: 16
5.1.3 Electrical Components: 16
5.1.4 Seals, Gaskets, and Hardware: 16
5.1.5 Hoses and Couplings: 17
5.1.6 Consumables and Diagnostics: 17
5.1.7 Documentation: 17
5.2 SPARE PARTS INVENTORY – SULLIVAN PALATEK STATION UNITS 17
5.2.1 Fluids and Lubricants (for 2 units): 17
5.2.2 Filters and Cartridges: 17
5.2.3 Electrical Components: 17

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

5.2.4 Seals, Gaskets, and Hardware: 18
5.2.5 Hoses, Tubing, and Piping: 18
5.2.6 Consumables: 18
5.2.7 Documentation: 18
5.2.8 KAESER MOBILAIR Distributor: 18
5.2.9 Sullivan Palatek Service Partner: 18
5.2.10 Engine OEM Support (Caterpillar or Deutz): 18

6. QUALITY ASSURANCE & DOCUMENTATION MANAGEMENT 19

6.1 QUALITY CONTROL PLAN (QCP) 19
6.2 SERVICE DOCUMENTATION REQUIREMENTS 19
6.2.1 Per-Service Documentation Package 19
6.2.2 Monthly Consolidated Report 20
6.3 OIL ANALYSIS PROGRAM 20
6.3.1 Laboratory Testing Protocol 20
6.4 NON-CONFORMANCE MANAGEMENT 21
6.4.1 NCR Initiation 21
6.4.2 NCR Process 22
6.4.3 NCR Register 22

7. ENVIRONMENTAL & SAFETY MANAGEMENT 22

7.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP) 22
7.1.1 Spill Prevention & Recovery 22
7.1.2 Spill Containment Procedure: 22
7.1.3 Waste Disposal: 22
7.1.4 Water & Soil Protection 22
7.1.5 Air Quality & Noise 23
7.2 OCCUPATIONAL HEALTH & SAFETY (OHS) 23
7.2.1 Legal Framework 23
7.2.2 Safety Requirements 23
7.2.3 Machine Guarding & Lockout: 23
7.2.4 Induction & Competency: 23
7.2.5 Incident Reporting: 23
7.2.6 Tooling & Equipment Safety 24
7.2.7 Emergency Preparedness 24
7.3 CONTRACTOR OHS RESPONSIBILITIES 24

8. AUTHORISATION 24

9. REVISIONS 24

10. DEVELOPMENT TEAM 25

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

1. INTRODUCTION

This document establishes technical scope and performance obligations for the maintenance and service contractor to ensure safe, reliable, efficient, and cost-effective operation of five diesel compressor units (3 mobile + 2 station-mounted) at Duvha Power Station throughout the five-year contract period.

This scope of work defines comprehensive maintenance and support requirements for five diesel-driven screw air compressors installed at Duvha Power Station:

- Three (3) MOBILAIR M500-2 Mobile Units: Oil-free screw compressors, each rated 45 m³/min at 700 kPa(g), mounted on trailers for flexible deployment across multiple stations within Eskom's generation fleet
- Two (2) Sullivan Palatek Station Units: Oil-free screw compressors, each rated 45 Nm³/min at 700 kPa(g), permanently installed in LPS facility

The Contractor shall provide preventive maintenance, corrective maintenance, technical support, spare parts management, operator training, and performance monitoring over a five-year period .

2. SUPPORTING CLAUSES

2.1.1 Purpose

This document establishes technical scope and performance obligations for the maintenance and service contractor to ensure safe, reliable, efficient, and cost-effective operation of five diesel compressor units (3 mobile + 2 station-mounted) at Duvha Power Station

2.1.2 Applicability

This document is applicable to Duvha Power Station only.

2.1.3 EFFECTIVE DATE

This document is effective from the date of authorisation.

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 Normative

[1] Act No 107 of 1998: National Environmental Management Act, 1998.

[2] Act No 85 of 1993: Occupational Health and Safety Act & Regulations, 1993.

[3] ISO 9001: Quality Management Systems.

[4] 36 - 681:Plant Safety Regulations.

[5] 32-846: Operating Regulations for High Voltage Systems.

2.2.2 Informative

[6] Act No 107 of 1998: National Environmental Management Act, 1998.

[7] Act No 85 of 1993: Occupational Health and Safety Act & Regulations, 1993. ISO 9001: Quality Management Systems.

[8] 36 - 681:Plant Safety Regulations.

[9] 32-846: Operating Regulations for High Voltage Systems.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

[10] Act No 102 of 1980: National Key Points Act, 1980

[11] 32-846: Operating Regulations for High Voltage Systems

[12] 240-97661287: Duvha Power Station Construction Regulation - SHE File

2.3 DEFINITIONS

Term	Definition
Employer	Eskom Holdings (Pty) Ltd, trading as Eskom Duvha Power Station
Contractor	Service provider contracted to deliver maintenance services (OEM-approved compressor specialist)
Service Manager	Employer's appointed representative for contract administration and service authorization
Contract Manager	Contractor's appointed representative responsible for service delivery coordination
Interval A Service	Preventive maintenance: filter replacement, fluid checks, consumable servicing (per KAESER spec)
Interval B Service	Extended maintenance: engine overhaul, fuel/oil change, belt service, cooling system flush
Mobile Unit	KAESER MOBILAIR M500-2 with integrated diesel engine and compressor mounted on trailer
Stationary Unit	Sullivan Palatek fixed-installation compressor with separate engine/drive system
Preventive Maintenance	Scheduled service performed according to fixed intervals (time or operating hours)
Corrective Maintenance	Unplanned repair performed in response to equipment failure or degradation
Condition Monitoring	Real-time assessment of equipment health via oil analysis, vibration, temperature, and pressure data
OEM	Original Equipment Manufacturer (KAESER, Sullivan, Caterpillar)
SANS	South African National Standards (used for quality and safety compliance)

2.3.1 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

2.4 ABBREVIATIONS& ACRONYMS

Abbreviation	Explanation
BMCR	Boiler Maximum Continuous Rating
ISO	International Standards Organisation.
AKZ	Kraftwerk Kenn zeichen System.
KPI	Key Performance Indicator.
NEC	New Engineering Contract.
ORHVS	Operating Regulations for High Voltage Systems.
PCLF	Planned Capability Loss Factor.
PJFFP	Pulse Jet Fabric Filter Plant
PPE	Personal Protective Equipment.
PSR	Plant Safety Regulations.
QCP	Quality Control Plan
QMP	Quality Management Program.
SOW	Scope of Work.
UCF	Unit Capability Factor.
UCLF	Unplanned Capability Loss Factor.

2.5 ROLES AND RESPONSIBILITIES

The Employer, the Contractor and the Service Manager shall act as stated in this contract and in a spirit of mutual trust and co-operation.

2.6 PROCESS FOR MONITORING

N/A

2.7 REQUIREMENTS

- The contractor will ensure all Safety Documentation is submitted before the contract is placed.
- The contractor shall ensure that all Quality Control Documents are to be submitted before contract placement.
- The employer will be responsible for ablution facilities.
- The contractor shall ensure that all the required equipment (including compressors and generators if required) for executing the job is included in his/her tender.
- The contractor must mobilize within 2 weeks of contract placement.
- The contractor must submit a program and quality control plan to the contracts manager before commencement of the job.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

3. EQUIPMENT SPECIFICATIONS & TECHNICAL DATA

3.1 MOBILE COMPRESSOR UNITS – KAESER MOBILAIR M500-2

Parameter	Specification	Notes
Equipment	KAESER MOBILAIR M500-2	Trailer-mounted rotary screw compressor
Engine	Caterpillar C18 Diesel	18 L displacement; Tier 2 emissions; mechanical fuel injection
Power Output	500 CFM @ 8 bar (283 m³/h)	Nominal delivery at 8 barg; adjustable to 10 bar
Compressor Type	Rotary screw (air-cooled)	Oil-flooded design; integral air/oil separator
Serial Numbers	[To be confirmed by Stores]	Mobile Unit 1, 2, 3 identifiers
Duty Class	24/7 Continuous (5-year amortization)	Designed for standby and primary use
Engine Oil	SIGMA FLUID G-680	KAESER proprietary compressor oil; 10 L per service
Hydraulic Oil	TELLUS S2 VX46	Auxiliary system lubrication; 20 L per service
Air Filter	KAESER KE series (E9 element)	Washable or disposable (2 sets per service cycle)
Oil Filter	25 bar cartridge	Spin-on design; replacement per Interval A
Fuel Specification	EN 590 ULSD Diesel (2-D)	Ultra-low sulfur diesel; max 50 ppm sulfur
Coolant	SIGMA FLUID coolant (ELC)	Extended-life type; 5 L per annual changeover
Warranty	OEM 12-month parts warranty	Excludes wear items and consumables

3.2 STATIONARY COMPRESSOR UNITS – SULLIVAN PALATEK SYSTEM

Parameter	Specification	Notes
Equipment	Sullivan Palatek P500-4	Fixed-installation rotary screw
Engine	Caterpillar C18 or equivalent	Direct-drive or belt-driven configuration
Power Output	500 CFM @ 125 psi (283 m³/h)	Higher discharge pressure for industrial applications

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Compressor Type	Rotary screw (water-cooled)	Oil-injected; integrated oil/water cooler
Location	Duvha Power Station Compressor Plant	Stationary installation; 24/7 duty
Engine Oil	Caterpillar DELO 400 (15W-40)	OEM-approved heavy-duty diesel engine oil
Hydraulic Oil	TELLUS S2 VX46 (20 L)	System lubrication and cooling
Air Filter	Sullivan primary + secondary	Staged filtration: 5 µm + 1 µm elements
Oil Filter	Sullivan spin-on (25 bar)	High-capacity design for continuous operation
Fuel	EN 590 ULSD Diesel	Same specification as mobile units
Coolant	Extended-life coolant (ELC)	Water-cooled radiator system; seasonal changeover

4. SCOPE OF WORK

This Five-Year Maintenance and Service Contract establishes a comprehensive framework for the preventive, scheduled, and corrective maintenance of the Duvha Power Station diesel compressor fleet. The contract covers 5 compressor units (3 mobile KAESER MOBILAIR M500-2 and 2 stationary Sullivan Palatek systems), each powered by diesel engines. The service program integrates ISO 13372 condition monitoring standards, OEM-approved maintenance intervals (Interval A and B service schedules), and SANS/Eskom operational requirements to maximize equipment availability, extend asset life, and ensure regulatory compliance.

The maintenance program follows a Preventive-Corrective Model, combining:

- Preventive (Scheduled): Fixed-interval service based on OEM recommendations and operating experience
- Condition-Based: Oil analysis and vibration monitoring to extend intervals where appropriate
- Corrective (Reactive): Emergency repairs in response to failure or operational demand

Objective: Maintain ≥95% equipment availability while minimizing total cost of ownership.

4.1 SERVICE INTERVAL A – PREVENTIVE MAINTENANCE (INTERVAL A)

Frequency: Every 500 operating hours or 3 months (whichever occurs first)

Duration: 6–8 hours on-site

4.1.1 Consumable Replacements (Interval A)

Item	Quantity	Replacement Criteria
Oil Filter 25 bar	1 per service	Spin-on cartridge; visual inspection for bypass valve function

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Air Filter Cartridges (SET)	2 sets	Washable or disposable; inspect for saturation and damage
Filter Element E9 KE (inlet)	1	Primary stage; replace if collapsed or bypass activated
Filter Element 5 µm (secondary)	1	Secondary stage; replace per differential pressure gauge
Return Filter (high-capacity)	1	Tank-top design; protect oil cleanliness
O-ring Ø30×2 & seals	As needed	Replace if damaged during service; use OEM specification

4.1.2 Fluid Checks & Analysis (Interval A)

Task	Method	Acceptance Criteria	Action
Oil Level Check	Dipstick/sight glass	Within 2 cm of full mark	Top up SIGMA FLUID G-680 (max 10 L per service)
Fluid Condition Analysis	ISO 4406 particle count	≤17/15/12 cleanliness code	If exceeded: increase filter frequency or flush system
TAN (Acid Number)	ASTM D2896	≤3.0 mg KOH/g	Replace fluid if >4.0 (oxidation degradation)
Viscosity @ 40°C	ASTM D445	100–110 cSt (±5%)	If outside range: oil replacement required
Water Content (Karl Fischer)	Karl Fischer titration	<500 ppm	If >1,000 ppm: drain and refill system
Metal Content	ICP atomic spectroscopy	Fe <50 ppm, Cu <5 ppm	Exceeding limits indicates wear; investigate source

Lab Report Submission: Within 5 working days of service completion

4.1.3 Component Servicing (Interval A)

Valve Group Service:

- Inlet valve DN250: Service with maintenance kit (replacement o-rings, spring, seat)
- Combination/Thermostat valve 60°C: Revision kit; test for proper closure/opening
- Check valve G1/2: Inspect for leakage; replace seal set if required
- Non-return valve: Replace seals if bypass detected
- Solenoid valves (2× G1/4 2/2-W, 1× G1/2 3/2-W): Test 24V DC operation; replace coil if open circuit

Control System:

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

- Proportional valve: Service with maintenance kit; adjust differential pressure per specification
- Temperature regulator: Verify setpoint (60°C ±3°C); replace bulb if erratic response
- Overflow valve Rp1: Service with maintenance kit; pressure-test at 1.1× setpoint

Cooling & Auxiliaries:

- Ventilator axial (24V DC): Lubricate bearings; test rotation speed; replace if stalled
- Sinter filter G1 1/2: Flush with compressed air; replace element if bypass detected

Pressure Test Points:

- Oil pressure @ 1,500 RPM: 5–8 bar (normal)
- Air discharge pressure: 8 bar ±0.5 bar
- Temperature @ outlet: 60–65°C (thermostat control)

4.2 SERVICE INTERVAL B – EXTENDED MAINTENANCE (INTERVAL B)

Frequency: Every 2000 operating hours or 6 months (whichever occurs first)
Includes: All Interval A tasks PLUS major component servicing

Duration: 10–12 hours on-site (2 technicians; may require 2 days for stationary units)

4.2.1 Engine Component Service (Interval B)

Component	Service Task	Materials	Notes
Engine Oil	Drain and refill	5× 20 L containers Caterpillar DELO 400 (15W-40)	Total ~60 L for full sump capacity
Oil Filter	Replace (2 per service)	2× oil filter cartridges (25 bar)	Standard replacement schedule
Air Filter Cartridges	Complete set replacement	4 cartridges (2 sets)	Washable type: clean before replacement
Damp-Filter	Replace	1× damp-filter element	Pre-filter stage; prevents moisture ingress
SOS Oil Analysis	Comprehensive condition analysis	Lab testing kit	Extended element analysis (particle count, elemental analysis)
Cylinder Head Cover	Inspect & replace gasket	Gasket + seals	Visual inspection for oil seepage
Turbocharger Oil	Change if separate system	5 L high-temperature oil	Inspect for excessive carbon buildup

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

4.2.2 Fuel System Service (Interval B)

Component	Action	Materials	Criteria
Fuel Filter Insert	Replace	2× fuel filter cartridges	Replace if water detected or differential pressure high
Fuel Filter (complete)	Replace complete unit	2× spin-on fuel filters	Preventive replacement every 6 months
Fuel Water Trap	Replace water trap insert	1× water trap cartridge	Prevents fuel contamination from condensation
Fuel System Inspection	Visual inspection for leaks	N/A	Check fuel lines, hose clamps, pump condition

4.2.3 Drive Belt & Coupling (Interval B)

Component	Inspection	Action	Replacement Criteria
V-ribbed Belt BX 1397	Visual & tension check	Adjust tension or replace	If cracked, frayed, or slipping
V-belt 4P 1375.16	Measure deflection (10–15 mm)	Retension or replace	If deflection exceeds 20 mm or visible wear
Coupling Alignment	Check with dial indicator	Adjust or replace	Radial run-out <0.05 mm acceptable
Belt Guard Condition	Inspect for damage	Repair or replace	Critical safety component

Belt Tension Measurement: Check with tension gauge; typical range 10–15 mm deflection under hand pressure.

4.2.4 Cooling System Service (Interval B)

System	Service	Materials	Specification
Coolant Drain & Refill	Flush cooling circuit	5× 20 L containers Extended-Life Coolant (ELC)	Complete system flush; refill with fresh ELC
ELC Extender Addition	Add corrosion inhibitor	2× 1 L ELC extender	Maintains protection for additional 12 months
Distilled Water Top-up	Demineralized water	1× 5 L distilled water	Use only distilled water (no tap water)

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Radiator Cleaning	Pressure wash & inspect	N/A	Remove debris, leaves, insects from fins
Thermostat Test	Function test @ 60°C	Replacement thermostat (if failed)	Must maintain ±3°C tolerance
Water Hose Inspection	Visual check for cracks	Replacement hose kit (if needed)	Replace if brittle or leaking
Heater Hose (Water Jacket)	Inspect & test operation	Replacement hose assembly	Essential for winter start-up capability

Coolant Temperature Set point: 60°C ±3°C normal; alarm at ≥70°C.

4.2.5 Sensor & Control System (Interval B)

Component	Test	Method	Pass Criteria
Proximity Switch 1S	Continuity & function	Digital multi-meter	0 Ω when activated; ∞ when deactivated
Temperature Transducer	Accuracy check	Thermocouple comparison	±2°C of reference
Pressure Transducer	Calibration verification	Pressure gauge comparison	±0.5 bar of reference
Fuel Level Sensor	Functional test	Visual fuel tank level	Linear response across range

4.3 MATERIALS, LUBRICANTS & CONSUMABLES

4.3.1 Engine Lubricants

4.3.1.1 Primary Engine Oil – Caterpillar DELO 400 (15W-40 ULSD)

Specification	Value	Verification Method
Grade	SAE 15W-40	SAE J183 classification
OEM Spec	Caterpillar ECF-3, API CI-4	Manufacturer certification
Container	20 L sealed metal canister	Standard Eskom supply
Viscosity @ 40°C	100–110 cSt	ASTM D445 test
Viscosity @ 100°C	12.5–14.5 cSt	Fluidity at engine operating temperature
Pour Point	≤ -20°C	Cold-start capability (winter)

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Flash Point	220–240°C	Fire safety specification (ASTM D92)
Density @ 15°C	0.87–0.89 g/cm³	ASTM D1298
TBN (Total Base Number)	≥ 10 mg KOH/g	Acid neutralization capacity (ASTM D2896)
Viscosity Index	≥ 95	Temperature stability (ASTM D2270)
Sulfated Ash	≤ 1.5% w/w	Additive package level (ASTM D874)
Copper Corrosion	≤ 3a	Bearing material protection (ASTM D130)
Water Separation	≥ 30 min	Demulsibility (ASTM D1401)
Oxidation Stability	≥ 500 min @ 100°C	Oil life expectancy (ASTM D2272 TOST)

4.3.2 Compressor Oil – SIGMA FLUID G-680

Parameter	Specification	Purpose
Oil Type	Mineral petroleum base	Compressor-specific formulation
Viscosity Grade	ISO VG 46 (46 cSt @ 40°C)	Optimized for screw compressor
Container	10 L sealed canister	Standard service unit
Flash Point	>200°C	Fire safety (ASTM D92)
Pour Point	<-20°C	Cold-start performance
Oxidation Stability	≥1,000 hours (ASTM D2272)	Extended oil change intervals
Water Separation	≥100 minutes	Demulsibility for water removal
Supplier	KAESER OEM or equivalent	Proprietary formulation recommended
Shelf Life	3 years unopened	Store in cool, dry location
Annual Consumption	~30 L per unit (3–4 10 L canisters)	Based on 2× Interval A services + 1× Interval B

4.3.3 Hydraulic Oil – TELLUS S2 VX46

Parameter	Specification	Application
Type	Premium anti-wear hydraulic oil	Auxiliary control systems
Viscosity	ISO VG 46 (46 cSt @ 40°C)	Optimized for 24V solenoid systems

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Container	20 L sealed drum	Bulk service unit
Antiwear Additive	Zinc-based (ZDDP)	Wear protection for proportional valve spools
Flash Point	>180°C	Fire safety specification
Oxidation Stability	≥1,000 hours	Extended fluid life
Water Separation	≥30 minutes	Protects servo components
Annual Consumption	~50 L per unit	Top-up per service check
Supplier	Shell or equivalent OEM-approved	Use only premium grade

4.3.4 Coolant – Extended-Life Coolant (ELC) & Additives

Parameter	Specification	Notes
Type	Glycol-based extended-life coolant	Orange or green type (check OEM spec)
Container	20 L sealed canister	Bulk supply for system flush
Freeze Protection	-38°C (typical)	South African winter requirement
Boil Protection	+104°C	Maintains seal integrity at operating temp
TDS (Total Dissolved Solids)	<500 ppm	Indicates coolant degradation
pH Range	8.5–9.5	Neutral to slightly alkaline
Corrosion Protection	≥2,000 hours (ASTM D1384)	Multi-metal protection
Extended Life Additive	2× 1 L bottles per annual service	Maintains inhibitor levels
Annual Requirement	5× 20 L (100 L full system flush)	Plus 2× 1 L ELC extender per unit
System Capacity	~60–80 L (Caterpillar C18 radiator + hoses)	Complete system refill requirement

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

4.3.5 Filters & Filter Elements

4.3.5.1 Oil Filters

Filter Type	Specification	Replacement Interval	Supplier
Oil Filter 25 bar (Engine)	Spin-on cartridge; bypass valve 3.5 bar	Every Interval A service	Caterpillar/KAESER OEM
Oil Filter 25 bar (Compressor)	High-capacity spin-on; 5 µm absolute	Every Interval A service	KAESER OEM
Return Filter (Tank-Top)	Tank-mounted; 10 µm absolute	Every Interval A service	KAESER OEM

4.3.5.2 Air Filters

Filter Type	Application	Replacement Criteria	Notes
Primary Air Filter (E9 KE)	Engine inlet stage	Every Interval A or 250 hours	KAESER standard; washable design
Secondary Air Filter (5 µm)	Compressor inlet (2-stage)	Every Interval A or 250 hours	Disposable cartridge; replace if bypass activated
Engine Air Filter Set	CAT C18 inlet (2-stage set)	Every Interval B or 500 hours	4 cartridges per set; Tier 2 compatible
Damp-Filter	Turbocharged engine pre-filter	Every Interval B or 500 hours	Prevents moisture carryover

4.3.5.3 Fuel Filters

Filter Type	Service	Replacement Interval
Fuel Filter Cartridge	EN 590 ULSD fuel	Every Interval B (6 months)
Fuel Filter (Complete Unit)	Water/sediment trap	Every Interval B (6 months)
Fuel Water Trap Insert	Separates water from diesel	Every Interval B (6 months)

4.3.6 Seals, Gaskets & O-Rings

Component	Quantity	Specification	Purpose
O-ring Ø30×2	12 per unit	Viton (high-temp resistant)	Valve stem seals

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Gasket Sets	1 per unit (complete kit)	Mixed materials (cork, PTFE, rubber)	Engine, cooler, intake manifold
Engine Head Gasket	1 (emergency stock)	OEM specification	Catastrophic failure replacement only
Seal Set (Non-return Valve)	4 per unit	Viton/FKM blend	Solenoid valve servicing
Solenoid Valve Replacement Coil	2 per unit	24V DC rated	Emergency backup stock

5. SPARE PARTS MANAGEMENT

5.1 SPARE PARTS INVENTORY – MOBILAIR MOBILE UNITS

Containerized Field Service Kit (portable, deployable to remote sites):

5.1.1 Fluids and Lubricants:

- Diesel engine oil (15W-40, ULSD): 2 cases (40 L)
- Compressor gear oil (ISO VG 68): 1 case (20 L)
- Bearing grease (NLGI 2, EP): 3 × 400 g tubes
- Engine coolant: 1 case (20 L)

5.1.2 Filters and Cartridges:

- Diesel fuel filter elements: 2 units
- Compressor inlet filter cartridges: 2 units
- Desiccant dryer desiccant cartridge: 1 unit per mobile compressor

5.1.3 Electrical Components:

- Starter solenoid (spare): 1 unit
- Pressure transducers (0–10 bar): 1 unit
- Temperature sensors: 1 unit
- Battery (backup): 1 unit

5.1.4 Seals, Gaskets, and Hardware:

- Compressor seal kit: 1 set per unit
- O-ring assortment: 1 kit (standard sizes)
- Fastener assortment: stainless steel bolts, nuts, washers

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

5.1.5 Hoses and Couplings:

- High-pressure hose assemblies: 3 units (various)
- Quick-disconnect coupling repair kit: 1 kit (critical for deployment)
- Clamps and fittings assortment

5.1.6 Consumables and Diagnostics:

- Diesel fuel (emergency supply): 50 L (portable cans)
- Portable fuel quality test kit (Karl Fischer)
- Shop towels and cleaning supplies
- Antiseize compound, sealant

5.1.7 Documentation:

- Pre-deployment checklist (laminated cards)
- Maintenance logbook (per unit)
- Spare parts reference list with OEM part numbers

5.2 SPARE PARTS INVENTORY – SULLIVAN PALATEK STATION UNITS

Facility-Based Inventory (on-site warehouse storage):

5.2.1 Fluids and Lubricants (for 2 units):

- Diesel engine oil: 10 cases (200 L total)
- Compressor gear oil: 5 cases
- Bearing grease: 10 tubes
- Engine coolant: 5 cases

5.2.2 Filters and Cartridges:

- Diesel fuel filter elements: 5 units
- Compressor inlet filter cartridges: 5 units
- Desiccant dryer desiccant cartridges: 4 units (2 per unit minimum stock)
- Aftercooler element/core: 2 units

5.2.3 Electrical Components:

- Starter motor (backup): 1 unit
- Alternator (backup): 1 unit
- Pressure transducers (0–10 bar): 2 units
- Temperature sensors (PT100): 2 units
- Dew point sensor: 1 unit
- Pressure switches (adjustable): 2 units
- Battery (12V or 24V): 1 unit

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

5.2.4 Seals, Gaskets, and Hardware:

- Compressor seal kits: 1 set per unit
- Engine gasket sets: 1 set per unit OEM spec
- O-ring assortment: 2 kits
- Fastener kits: stainless steel bolts, nuts, washers

5.2.5 Hoses, Tubing, and Piping:

- High-pressure hose assemblies: various
- Compressed air hose (ISO 1402): 50 m bulk
- Stainless steel instrumentation tubing: assortment
- Hose clamps (stainless, assorted): 20 units

5.2.6 Consumables:

- Compressed air quality test kit (ISO 8573-1 compliant)
- Oil sampling bottles (sterile, lab-sealed): 50 bottles
- Cleaning supplies, shop towels, antiseize, sealant

5.2.7 Documentation:

- Spare parts reference list with OEM part numbers
- Supplier contact information
- Parts consumption tracking spreadsheet
- Inventory audit checklist (monthly)

5.2.8 KAESER MOBILAIR Distributor:

- Location: eMalahleni/Witbank area (within 50 km of Duvha)
- Parts availability: 5 business days standard; air freight for critical items (24–48 hours)

5.2.9 Sullivan Palatek Service Partner:

- Location: Regional representative within 200 km
- Parts availability: 5 business days standard; expedited arrangements for critical components

5.2.10 Engine OEM Support (Caterpillar or Deutz):

- Johannesburg-based distributor network
- Parts availability: 5–10 business days for common components; 15+ days for major assemblies

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

6. QUALITY ASSURANCE & DOCUMENTATION MANAGEMENT

6.1 QUALITY CONTROL PLAN (QCP)

Before service commencement, Contractor shall submit QCP covering:

Section A: Service Execution

- Step-by-step service procedures (aligned with OEM manual)
- Safety work permits and lockout/tagout protocols
- Tool calibration and maintenance (pressure gauges, thermometers, multi-meters)
- Environmental containment procedures (spill trays, fluid handling)
- Photographic documentation points (pre-service and post-service condition)

Section B: Inspection & Testing

- Witness points (areas Contractor invites Service Manager observation)
- Hold points (Contractor halts work pending Service Manager approval)
- Test protocols (pressure testing, fluid sampling, electrical continuity)
- Acceptance criteria (pass/fail parameters)

Section C: Documentation

- Work completion checklist
- Parts installed and serial numbers recorded
- Oil analysis request form preparation
- Spare parts inventory tracking

Section D: Records Management

- Document filing system (physical and digital)
- Retention period (minimum 5 years)
- Distribution list (Service Manager, Eskom, Contractor archives)

QCP Approval Timeline: Submitted one weeks before service mobilization; approved within a weeks

6.2 SERVICE DOCUMENTATION REQUIREMENTS

6.2.1 Per-Service Documentation Package

Document	Format	Submission Deadline	Recipient
Service Work Order	Eskom template (provided)	Same day as service completion	Service Manager
Service Checklist (Interval A/B)	Contractor template (approved QCP)	Same day	Service Manager

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Parts Installation Log	Serial numbers, quantities, condition	Next business day	Service Manager
Oil Analysis Request	Lab form + sealed sample (500 mL)	Same day (kit submit to lab)	Testing Laboratory
Photographic Evidence	Pre/post condition, component details	Next business day	Service Manager
Non-Conformance Report (if applicable)	NCR form detailing deviations	Within 24 hours of discovery	Service Manager + Contractor
Safety Incident Report (if any)	OSHA-style incident form	Within 24 hours of incident	Service Manager + Eskom OHS
Technician Sign-off	Printed/signed service completion certificate	Same day	Service Manager

6.2.2 Monthly Consolidated Report

Due: Last business day of each month

Contents:

- Summary of services completed (Interval A, B, corrective)
- Equipment uptime/downtime analysis
- Spare parts consumed and restocking recommendation
- Oil analysis results (tabular summary)
- Safety incidents and near-misses (zero count or detailed report)
- Outstanding items requiring follow-up

6.3 OIL ANALYSIS PROGRAM

6.3.1 Laboratory Testing Protocol

Test Frequency: Every Interval A service (minimum 4× per year per unit)

Test Package (Standard):

Test	Method	Units	Acceptance Limit	Remarks
ISO 4406 Particle Count	ISO 11171	Particles/mL	≤17/15/12	Oil cleanliness indicator
Viscosity @ 40°C	ASTM D445	cSt	100–110 (±5%)	Flow property
Viscosity @ 100°C	ASTM D445	cSt	12.5–14.5 (±5%)	High-temp fluidity

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

TAN (Total Acid Number)	ASTM D2896	mg KOH/g	<3.0	Oxidation state
Water Content	ASTM D6304 (Karl Fischer)	ppm	<500	Moisture ingress
Iron (Fe)	ICP-OES	ppm	<50	Engine wear indicator
Copper (Cu)	ICP-OES	ppm	<5	Bearing wear
Lead (Pb)	ICP-OES	ppm	<5	Upper bearing wear
Tin (Sn)	ICP-OES	ppm	<3	Bearing alloy wear
Silica (Si)	ICP-OES	ppm	<30	Dust/air ingress

Trending & Action Limits:

If any parameter exceeds acceptance limit:

1. **Yellow Flag (warning):** Parameter approaching limit → increase monitoring frequency; plan maintenance within 2 weeks
2. **Red Flag (action required):** Parameter exceeds limit → immediate fluid replacement; investigate root cause; document in NCR
3. **Catastrophic (critical):** Multiple parameters failed (water >1,000 ppm + metal content >100 ppm) → emergency service; unit taken offline pending root cause analysis

Laboratory Standards:

- Testing laboratory must hold ISO/IEC 17025 accreditation (SANS equivalent)
- Turnaround time: Results within 5 business days of sample submission
- Report format: Detailed lab report with historical trending graph (last 4 quarters)

Sample Retention: Contractor retains 500 mL sealed sample for 3 years; available for retest if dispute arises

6.4 NON-CONFORMANCE MANAGEMENT

6.4.1 NCR Initiation

Trigger: Any deviation from specification, procedure, or accepted practice

Examples:

- Oil viscosity outside spec (requires viscosity override)
- Missing or damaged gasket installation
- Service not completed by due date
- Technician safety violation
- Unauthorized parts substitution

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

6.4.2 NCR Process

1. **Issue NCR:** Service Manager or Contractor identifies non-conformance
2. **Document:** Complete NCR form within 24 hours (description, root cause, photos)
3. **Contractor Response:** Proposed corrective action within 5 business days
4. **Approval:** Service Manager approves or requests rework
5. **Corrective Action:** Implemented within agreed timeframe
6. **Closure:** NCR signed off when corrective action verified

6.4.3 NCR Register

Maintained by Service Manager; tracked monthly with trend analysis. Pattern identification (>3 NCRs of same type in 3 months) triggers contract review discussion.

7. ENVIRONMENTAL & SAFETY MANAGEMENT

7.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The Contractor shall prepare and submit an EMP covering:

7.1.1 Spill Prevention & Recovery

Secondary Containment:

- All service work conducted over 110% fluid capacity spill trays
- Double-bunded containers for all bulk fluid storage
- Absorbent pads on-hand during all work (minimum 5 kg capacity per service)

7.1.2 Spill Containment Procedure:

1. Isolate spill with absorbent pads and cordoning tape
2. Contain overflow in secondary basin or spill kit
3. Do NOT allow fluid to enter storm drains or soil
4. Notify Service Manager if spill >5 L
5. Document with photos and incident report
6. Arrange licensed waste contractor for disposal

7.1.3 Waste Disposal:

- Used oil: Collected in sealed 20 L containers; labeled with date and fluid type
- Filters: Placed in hazardous waste drum; drained of residual oil
- Rags/absorbent materials: Collected in sealed container; arranged for incineration
- Licensed waste contractor: Selected via Eskom tender; compliance certificate required

7.1.4 Water & Soil Protection

- No washing of equipment on-site (use wash bays with treatment)
- No discharge of coolant to stormwater (collect and dispose as hazardous waste)
- Fuel spills (diesel) trigger emergency response: deploy absorbent boom; notify Eskom EHS

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

- Coolant or hydraulic oil spills: Same containment protocol

7.1.5 Air Quality & Noise

- Engine exhaust: Ensure muffler in good condition; no visible black smoke
- Noise: Service work restricted to 08:00–16:00 weekdays (Duvha operational noise restrictions)
- VOC emissions: Minimize solvent usage; use enclosed containers during cleaning

7.2 OCCUPATIONAL HEALTH & SAFETY (OHS)

7.2.1 Legal Framework

- **OHS Act 85 of 1993** – Contractor full responsibility for worker safety
- **NEMA 107 of 1998** – Environmental protection obligations
- **SANS 347:2001** – Diesel engine safe operating procedures

7.2.2 Safety Requirements

Personal Protective Equipment (PPE):

- Hard hats (industrial grade) at all times on-site
- Safety glasses (anti-scratch/impact rated)
- Hearing protection (if noise >85 dB during engine testing)
- Chemical gloves (nitrile) during fluid handling
- Safety footwear (steel-capped boots, puncture-resistant sole)
- High-visibility vests for outdoor work

7.2.3 Machine Guarding & Lockout:

- All rotating components (belts, coupling) guarded
- Engine shutdown before service commencing (except test runs)
- LOTO (Lockout/Tagout) applied on fuel injection system (prevent inadvertent start)
- Hot surface warning signs posted (engine >60°C prohibited contact)
- Pressurized systems: Depressurize and bleed all air before component removal

7.2.4 Induction & Competency:

- All Contractor technicians undergo site induction (OHS orientation, emergency procedures, local hazards)
- Competency certification: Evidence of diesel engine service training (SETA-registered apprenticeship or equivalent)
- Medical fitness: Technicians medically fit for work; evidence of health screening on file

7.2.5 Incident Reporting:

- All incidents (injuries, near-misses, unsafe conditions) reported to Service Manager within 24 hours

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

- Serious incidents (>3 days lost time): Reported to Eskom Group OHS within 24 hours
- Investigation: Root cause analysis completed within 5 business days

7.2.6 Tooling & Equipment Safety

- All hand tools inspected pre-work (no cracked hammers, worn screwdrivers)
- Power tools (impact guns, grinders) PAT tested (electrical safety; sticker dated)
- Pressure test equipment: Calibrated per SANS 347 (gauges accurate ±2%)
- Lifting equipment (jacks, chains): Load-tested annually; SWL marked clearly

7.2.7 Emergency Preparedness

- First aid kit on-site (minimum, contents per SANS)
- Spill kit accessible (absorbent, pads, disposal bags)
- Fire extinguisher (ABC type) within 10 m of work area
- Emergency contact list (Service Manager, plant medical, emergency services)

7.3 CONTRACTOR OHS RESPONSIBILITIES

The Contractor shall:

1. Ensure all technicians are competent and medically fit
2. Provide all PPE and tooling (Contractor cost, not Eskom cost)
3. Conduct daily tool box talks (5-minute safety briefing before work)
4. Maintain a safety log (incidents, near-misses, toolbox talks)
5. Respond immediately to unsafe conditions (stop work if necessary)
6. Cooperate with Eskom OHS audits and inspections
7. Indemnify Eskom against claims arising from Contractor negligence or non-compliance

8. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
Lucky Mtembu	Manager Maintenance
Andries Nxumalo	HMD maintenance supervisor
Sibonokuhle Tapala	Auxiliary Snr Engineer Prof Engineer

9. REVISIONS

Date	Rev.	Compiler	Remarks
Jan 2026	1	T Masethe	Draft Document

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

10. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Thabiso Masethe
- Gugulethu Khumalo

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.