"The Engineer" Chief Directorate: Engineering Services
Department of Water and Sanitation
Room 331
Sedibeng Building
185 Francis Baard Street
PRETORIA

Private Bag X313
PRETORIA
0001

COMPILER: A. van Schalkwyk.
Directorate: Mechanical and Electrical Engineering
Sub-Directorate: Special Projects
Tel: (012) 336-3623
Email: vanschalkwyka2@dws.gov.za

January 2025

APPROVED BY: Chief Engineer: Special Projects (Pr Eng)

PARTICULAR SPECIFICATION KPS-1-1

KLIPHOEK PUMP STATION

MODIFICATION OF DN 900, PN 40 SPHERICAL VALVES

INDEX TO PARTICULAR SPECIFICATION KPS-1-1

PARTICULAR SPECIFICATION KPS-1-1
KLIPHOEK PUMP STATION
MODIFICATION OF DN 900, PN 40 SPHERICAL VALVES

KPS 1 SCOPE

KPS 1.1 Background

The Kliphoek Pump Station, located at coordinates -26.675595, 30.273332, near Ermelo in the Mpumalanga Province, serves an essential function in the Usutu River Government Water Scheme.

KPS 1.2 Services Required

The scope of work shall include the as-built drawings, supply of all materials, manufacture, shop assembly and testing, delivery to the manufacturers workshop, delivery to site, loading and off-loading of equipment, remedial corrosion protection at the Manufacturer's workshop, testing (at the manufacturer's workshop), handover, and provision of the operation and maintenance manuals as required for the following equipment:

KPS 1.2.1 ITEM A: Valves

Repurposed Spherical Valves and Modifications

The unutilised DN 900, PN 40 spherical valves at Kliphoek Pump Station require modification to their operating actuators and lever arms.

The existing mounting bracket, counterweight lever arm and baseplates of the spherical valves shall be modified in accordance with Sketch A and Sketch B in Appendix B of this Particular Specification to accommodate the requirements specified in this Particular Specification.

The Contractor shall be responsible for providing fully operational, tight shut-off valves. It is not envisioned to redo the corrosion protection of the existing spherical valves, only remedial corrosion protection.

The scope of work shall also include the installation of position indication sensors on the spherical valves.

KPS 1.2.2 General

It is imperative that the Contractor familiarise himself with the Site layout, confirm as-built dimensions and the available resources on the site to accomplish feasible methodology to perform the scope of work.

If any mechanical or electrical resources (equipment) on Site, that are deemed necessary for performing the scope of work or any existing Site conditions, are found by the Contractor to be lacking in performance or serviceability, the Contractor shall bring it to the attention of the Engineer, in writing, during the quotation process.

All stainless-steel threads shall be coated with molybdenum disulfide in accordance with DWS 9900.

This request shall include transport of all activities regarding materials and labour to perform scope of work.

Inspections: The DWS Representative(s) may enter into the Workshop and demarcated areas on site to carry out inspections as they find necessary from time to time. Mr. A. van Schalkwyk (012 336 3623) and Mr. M. Marakalla (012 336 6571) shall be notified two weeks in advance of attending scheduled inspections.

Where valves are refurbished, one complete set of new fasteners shall be supplied for each flange of such valve.

The Contractor's offer shall be in accordance with the following Drawings:

MODIFICATIONS OF VALVE LEVER ARM:	APPENDIX B - SKETCH A
MODIFICATIONS OF VALVE BASEPLATE:	APPENDIX B - SKETCH B
DN 900, PN 40 SPHERICAL VALVE:	GA 9029 – SHEET 1 OF 2
DN 900, PN 40 SPHERICAL VALVE - INSTALLATION:	GA 9029 – SHEET 2 OF 2

All accessories to be supplied under this Contract shall be prepared by the Contractor for approval by the Engineer.

In summary this specification shall cover:

(a) Modification of the existing DN 900, PN 40 hydraulically operated Spherical Valves (4-off).

(b) Supply and Modification of existing hydraulic equipment to allow for the adjustment of the valve opening and closing speed.

(c) Full workshop testing of each spherical valve with its associated hydraulic cylinder and power pack to ascertain the desired functionality.

(d) Removal, packing, handling (loading and unloading) and transport of the spherical valves, lever arms, hydraulic actuators and hydraulic power packs.

(e) As-built drawings of the modifications to the counterweight lever arm, baseplates and shaft keyways.

(f) Quality control and inspection by the Department shall be in accordance with Section KPS 7. The inspections shall include, but not be limited to the following:

i. Checking of dimensions and tolerances.

ii. Verification of material (Including material test certificates, hydraulic test certificates, etc. as applicable).

iii. Inspection of welding and weld certificates.

iv. Review of as-built dimensions/-measurements (where applicable).

v. Inspection of corrosion protection.

(g) Workshop corrosion protection of all items modified/manufactured, complete with, where applicable, welded in-situ ancillaries.

(h) Remedial corrosion protection where necessary to remedy damage to all items, including the items supplied by others prior to handing over to the Department.

(i) Supply of all Operating and Maintenance Manuals and data pack in accordance with KPS 3.2.

KPS 1.3 Conditions of Contract

The conditions governing this Contract are as set out in the document “General Conditions of Contract for Construction Works – Third Edition (2015)".

Contracts for this Particular Specification will only be awarded to South African based Contractors who, after assessment of the Department, are found to be capable of manufacturing to the required standard. Only Specialist Contractors who can demonstrate that they or their sub-contractors are bona fide manufacturers of the equipment as specified in this Particular Specification, with their own manufacturing and service workshop within the borders of the Republic of South Africa, may quote. An established local service and spare parts network for the equipment offered shall be available at the time of closing. Workmanship shall conform to accepted industrial standards and welders shall be coded. The size of tools and equipment used shall be proportional to the task being carried out.

The Department reserves the right to unconditionally, prior to placing the order, amend the quantity, size or rating of any mechanical equipment without suffering any penalties imposed by any Contractor. Costing for any such changes after placing of the order shall be negotiated at that time.

Quotations shall only be awarded on a fixed price basis. No escalation shall be considered.

KPS 1.3.1 Subcontractors (If Applicable):

Subcontracting shall be in accordance with Section 4.4: Subcontracting of the General Conditions of Contract for Construction Works – Third Edition (2015).

KPS 1.4 Guarantee

The guarantee and defects liability period shall be twelve (12) months from the issue of the commissioning certificate. It is envisaged that the commissioning shall take place within 30 days of the completion of all outstanding points. The Contractor’s guarantee shall include all aspects of the work done by any Sub-Contractors or Specialist Sub-Contractors.

KPS 1.5 Target Date for Delivery

The target date for modification and delivery of the equipment at the Kliphoek Pump Station Site shall be **6 weeks** from the placement of the order.

It is essential that the delivery agreed with the Contractor is realised otherwise penalties for delay may be enforced.

KPS 1.6 Specifications and Supporting Standards

This Particular Specification shall where applicable, have preference over all other documents supplied or any Standard Specifications referred to.

This Particular Specification shall be read in conjunction with the following:

Departmental Standard Specifications (which are available on request):

STANDARD SPECIFICATION DWS 1601: GENERAL MECHANICAL SPECIFICATION

STANDARD SPECIFICATION DWS 2020:	QUALITY CONTROL SPECIFICATION (October 2001 edition) and QUALITY CONTROL PROCEDURES (September 2022 edition)
STANDARD SPECIFICATION DWS 2510/01:	SUPPLY OF VALVES – GENERAL VALVE SPECIFICATION (January 2007 edition)
STANDARD SPECIFICATION DWS 2510/02:	AUXILIARY DRIVES (January 2007 edition)
STANDARD SPECIFICATION DWS 2510/14:	SUPPLY OF VALVES – SPHERICAL VALVES (January 2007 edition)
STANDARD SPECIFICATION DWS 9900:	CORROSION PROTECTION SPECIFICATION (July 2023 edition)

This Particular Specification is supported by the following standards of which the latest publication shall apply:

(a) **South African Bureau of Standards:**

SANS 62:	Steel Pipes
SANS 121:	Hot dip galvanised coatings on fabricated iron and steel articles – Specifications and test methods
SANS 719:	Electric welded low carbon steel pipes
SANS 1123:	Pipe Flanges
SANS 1213:	Mechanical cable glands
SANS 1431:	Weldable Structural Steels
SANS 1700:	Fasteners
SANS 18752:	Rubber hoses and hose assemblies
SANS 50025:	Structural steel standard
SANS 60529:	Degrees of protection provided by enclosures

(b) **Other:**

ASME B16.11:	Forged Fittings, Socket Welding and Threaded.
ASTM A240:	Standard Specification for Stainless Steel products
AWS D1.1:	Structural Welding Code
EN 1092-1:	Flanges
EN 10058-2:	Dimensional Tolerances for Hot Rolled Stainless Steels

KPS 1.7 Definitions and Abbreviations

Contractor: The successful bidder to whom the Contract comprising this Particular Specification is awarded to.

Subcontractor: The party appointed by the Contractor to perform part of the work of this Particular Specification. The Subcontractor is also referred to as the Specialist Valve Supplier.

Employer: Central Operations (Usutu River Area Office) of the Department of Water & Sanitation.

Engineer: Chief Directorate Engineering Services of the Department of Water & Sanitation.
(For the purposes of this Particular Specification, the Engineer will be represented by the mechanical engineer of the Mechanical & Electrical Engineering Directorate named as "COMPILER" in the front part of this Particular Specification).

Specification: This Particular Specification together with any references therein to other documents.

Supply: This shall include, as applicable, the purchase of materials or goods, manufacture, fabrication, any specified corrosion protection measures, installation and commissioning and any off-site inspection or testing.

Tests on Completion: The tests which are specified in this Particular Specification, which are carried out before the works are taken over by the employer.

ABS	:	Acrylonitrile-Butadiene-Styrene
AL	:	Aluminium
BS	:	British Standards
CI	:	Cast Iron (Grade 220)
CS	:	Cast Steel
DCA	:	Die Cast Aluminium
DFT	:	Dry Film Thickness
DN	:	Nominal Diameter
DWS	:	Department of Water and Sanitation

EOT	:	Electric Overhead Traveling
FBE	:	Fusion-bonded Epoxy
FBP	:	Fusion-bonded Polyester
GRP	:	Glass Fibre Reinforced Polyester
HDG	:	Hot Dip Galvanized
ID	:	Inside Diameter
LHS	:	Left Hand Side
Masl	:	Metres above sea level
MS	:	Mild Steel (Grade S355JR) or any Carbon Steel
OD	:	Outside Diameter
PC	:	Polycarbonate
PCD	:	Pitch Circle Diameter
RHS	:	Right Hand Side
RL	:	Reduced Level
SANS	:	South African National Standards
SCADA	:	Supervisory Control and Data Acquisition
SG	:	Spheroidal Graphite Cast Iron – Grade 420
SS	:	Stainless steel – grades 304, 304L, 316 and 316L
UV	:	Ultraviolet
3CR12	:	Corrosion Resistant Steel
µm	:	Micrometre

KPS 2 MATERIALS

KPS 2.1 General

Materials and equipment, where not specified, shall be in accordance with relevant SANS, ISO, ASTM or BS specifications and DWS 1601: GENERAL MECHANICAL SPECIFICATION. All material certificates shall be provided as stipulated in DWS 2510/01.

Welding electrodes for welding mild steel to stainless steel shall contain E309L filler metal in accordance with AWS A 5.4. Hydraulic cylinders shall be manufactured from stainless steel 316L.

KPS 2.2 Bolts and Nuts

All fasteners, including washers shall be Grade S355JR Mild Steel and hot dip galvanised to SANS 121.

KPS 2.3 Hydraulic Piping

All fixed hydraulic tubing (seamless), fittings, double ferrel type couplings, supports and anchorage shall be of stainless steel 316L. All flexible hydraulic hoses shall be of rubber in accordance with SANS 18752.

KPS 3 MECHANICAL AND ELECTRICAL REQUIREMENTS

KPS 3.1 General

Valves shall be supplied and installed as indicated in TABLE 1 and all of the relevant drawings.

TABLE 1
SCHEDULE OF VALVES

Location	Use	Type	Size DN [mm]	Nominal Pressure Rating PN [bar]	Flow velocity (m/s)		Number Off
					Normal	Maximum	
Kliphoek Pump Station	Flow Control	Spherical	900	40	2,3	3,5	4

Note that the spherical valves described in TABLE 1 shall be operated by means of an electro-hydraulic power pack with a manual hydraulic override (hand pump). The valves shall also be required to close against the maximum velocity at the full head (±250 m) in accordance with DWS 2510/01 (SUPPLY OF VALVES).

KPS 3.2 Bolts and nuts

All bolts and nuts shall be in accordance with DWS 1601 – GENERAL MECHANICAL SPECIFICATION and SANS 1700. Bolts, nuts, studs, etc. which are out of the waterway, shall be hot dip galvanised to SANS 121. Bolted joints shall have a washer underneath both the bolt head and nut corrosion protected in accordance with DWS 9900, Section 9.9.1 - FASTENERS.

KPS 3.3 Operating hydraulic cylinders and control gear

Actuators and control gear shall be removed from the spherical valves prior to transportation to avoid damage during transport and the handling on the Site.

The Contractor shall be responsible to wrap and pack each actuator in accordance with the requirements of the Original Equipment Manufacturer. Covers and cable entrances shall be protected in accordance with the requirements for the specified environmental protection IP 65 rating. Only the Specialist Valve Contractor shall be allowed to unpack the hydraulic cylinders on Site.

KPS 3.4 Operating and Maintenance Manuals

In addition to the requirements stipulated in Section 3.24 of DWS2510/01: SUPPLY OF VALVES – GENERAL VALVE SPECIFICATION (January 2007 edition), the Specialist Valve Contractor shall provide a complete hardcopy in triplicate and an electronic copy of the final Operation and Maintenance Manual(s) of the modified spherical valves, in a format mutually agreed upon with the Engineer.

Complete material certificates for all materials used shall also be provided as stipulated in Section 3.14 of DWS2510/01: SUPPLY OF VALVES – GENERAL VALVE SPECIFICATION (January 2007 edition).

KPS 4 DESIGN, MANUFACTURE AND MODIFICATIONS OF VALVES

KPS 4.1 Spherical Valves

KPS 4.1.1 Valve Requirements

The spherical valves shall be operated as pump discharge control valves. The spherical valves shall be required to control the pump discharge from fully closed to 100% open. They shall be required to open under unbalanced conditions.

The spherical valves shall have an opening time of between 25 and 30 seconds.

The spherical valves are required to work under a maximum no-flow pumping head of 195 metres and be specified for a pressure of 2500 kPa.

Under normal operating conditions, the maximum flow rate will result in a mean velocity that will not exceed 3,5 m/s. The complete valve with newly supplied hydraulic cylinders shall be designed to operate under these conditions for a prolonged period.

The hydraulic operating actuator of the hydraulic cylinder and mounting bracket shall not reach below the baseplates of the valve.

KPS 4.1.2 Valve Modifications

Modifications to the hydraulic operating actuators shall be made in order to comply with the valve requirements.

The existing counterweight for the valve shall be removed and the counterweight lever arm shall be shortened as seen in Sketch A found in Appendix B of this Particular Specification to enable the lever arm to stay above the baseplates of the spherical valve.

The existing mounting bracket that connects to the spherical valve shaft with the counterweight lever arm and new hydraulic cylinder shall be rotated 180° about the valve spindle. The seal direction plate and the valve position indication plate shall also be removed and replaced on the mounting bracket to show the true seal direction of the valve as well as the true valve opening indication.

The existing baseplate of the spherical valve shall also be modified in accordance with Sketch B found in Appendix B of this Particular Specification.

KPS 4.1.3 Operating Actuator

Each DN 900 spherical valve shall be operated by its own separate, attached hydraulic actuator. The orientation of the actuators shall be in accordance with TABLE 1.

The operating actuator shall also make provision for integration with a SCADA control system (24 VDC signal basis). The operating actuators shall be capable of regulating the pump discharge by opening and closing of the valves from 0% open to 100% open.

Each spherical valve shall also be equipped with its own position indication sensors that shall connect to a SCADA control system and indicate the opening position of the valve.

KPS 5 CORROSION PROTECTION

Corrosion protection of the equipment supplied under this Particular Specification shall conform to DWS 9900 – CORROSION PROTECTION. Colour coding shall be in accordance with Annexure J of DWS 9900 (2023 edition). Technical details of all corrosion protection products shall be submitted to the Engineer for approval before application.

KPS 5.1 Toxicity of Lining Material

Materials used for the lining of valves and pipes shall be non-toxic and shall not impart any odour, taste, or colour to the water. Certification shall be submitted to the Corrosion Engineer for his approval.

KPS 5.2 Proprietary Items

Components that are supplied painted or protected e.g. gearboxes, actuators etc. **shall only be accepted** provided that they meet the corrosion protection requirements of this Particular Specification. If this specification cannot be adhered to the Contractor **shall submit full details of the equivalent paint systems** at quotation stage for approval by the Corrosion Engineer.

KPS 5.3 Coating Systems

(a) Valves (including hand pump lever and hydraulic cylinder mounting)

ENVIRONMENT	MATERIAL	SURFACE	SYSTEM	MINIMUM DFT (µm)
N/A	MS SG	Lining	1. Two pack Epoxy	600
			2. FBE	250
	SS 316	Lining	1. Two pack Epoxy	150
			2. FBE	125
			3. Pickle & passivate - See note 4 of Clause KPS 5.3(g)	
Wet	MS SG	Coating	1. Two pack Epoxy plus top coat of recoatable Polyurethane	600 50
	SS 304 SS 316	Coating	1. Two pack Epoxy plus top coat of recoatable Polyurethane	600 50

(b) Hydraulic Cylinders

ENVIRONMENT	MATERIAL	SURFACE	SYSTEM	MINIMUM DFT (µm)
Dry/Wet	SS 316L	Coating	Pickle and passivate – See note 4 of Clause KPS 5.3(g)	N/A

(c) Hydraulic Pipes

ENVIRONMENT	MATERIAL	SURFACE	SYSTEM	MINIMUM DFT (µm)
Dry/Wet	SS 316L	Coating	Pickle and passivate – See note 4 of Clause KPS 5.3(g)	N/A

(d) Power Packs

ENVIRONMENT	MATERIAL	SURFACE	SYSTEM	MINIMUM DFT (µm)
Dry	MS	Lining	1. Two pack Epoxy	300
			2. FBE	125

		Coating	Two pack Epoxy plus top coat of recoatable Polyurethane	300 50
			FBE plus top coat of recoatable Polyurethane	200 50
Wet	MS	Coating	1. Two pack Epoxy plus top coat of recoatable Polyurethane	600 50
			2. FBE plus top coat of recoatable Polyurethane	600 50
	3CR12	Lining	1. Two pack Epoxy	600
			2. FBE	125
		Coating	1. Two pack Epoxy plus top coat of recoatable Polyurethane	300 50
			2. FBE plus top coat of recoatable Polyurethane	125 50
	SS 304	Coating	Pickle and passivate - See note 4 of Clause KPS 5.3(g)	

(e) Fasteners

ENVIRONMENT	**MATERIAL**	**SYSTEM**	**MINIMUM DFT (µm)**
Fasteners and washers - **Dry**	MS	HDG plus threads coated with Molybdenum Disulfide lubricant or wax	45
	SS 304	Threads coated with Molybdenum Disulfide lubricant or Nickel Anti-seize compound	Uniform cover
Fasteners and washers - **Wet/Submerged**	SS 316	1. Pickle and passivate - See note 4 of Clause KPS 5.3(g) plus threads coated with Molybdenum Disulfide lubricant or Nickel Anti-seize compound	Uniform cover
		2. FBE coated (thread surfaces excluded) plus threads coated with Molybdenum Disulfide lubricant or Nickel Anti-seize compound.	50
Fasteners for flanges	MS	HDG plus complete fastener system coated with an approved spray type lubricant. Bolt heads and nuts to be covered with plastic bolt caps.	45

(f) Stainless Steel Items

ENVIRONMENT	**MATERIAL**	**SYSTEM**	**MINIMUM DFT (µm)**
Dissimilar materials in submerged conditions	Stainless steel components	Two pack Epoxy or FBE to a smooth, glossy and uniform finish	600
Dissimilar materials in submerged conditions	3CR12 steel components	Two pack Epoxy or FBE	600 250
Dry or compatible metal conditions	Stainless steel components	Pickle and passivate – See note 4 of Clause KPS 5.3(g)	
Dry conditions only	3CR12 steel components	Pickle and passivate – See note 4 of Clause KPS 5.3(g)	

(g) Notes

The following items shall be approved by the Corrosion Engineer

1. Hot-dip galvanising	- Only for pipes up to 200 mm diameter maximum and flow velocity less than 2 m/s. - Pipes shall not be embedded in concrete. - Water analysis shall be provided. - Pipes over 200 mm diameter to be coated with a duplex system
2. Sealant	- Interfaces of different environments shall be sealed with a Polyurethane or Polysulphide flexible sealant to be applied in accordance with the manufacturer's data sheets.
3. Un-coated stainless steel	- Only to be used if no galvanic reaction and anaerobic conditions are found.
4. Pickle and passivate	- If not in contact with less noble material. - If exposed to anaerobic conditions seal-coat all crevices with solvent-free Epoxy. - Shall be done by the dipping process.
5. Galvanic cells	- Where a galvanic cell is situated within a water path <150 mm and concrete cover <75 mm, both the MS, 3Cr12 or SS shall be coated.
6. Anaerobic conditions	- SS grade 316L shall be used under anaerobic and aggressive water conditions.
7. Polyurethane for colour coding	- Recoatable Polyurethane where required colour for colour coding. Only UV resistant Polyurethane shall be used.
8. Primers	- Primers shall only be used in special cases i.e. over-coating of galvanized surfaces.
9. 3CR12	- In view of superior corrosion resistance, coated 3CR12 material is preferred.
10. Epoxy primer	- Epoxy primer may not be required if appropriate two pack Epoxy/ Recoatable Polyurethane is being used.

KPS 5.4 Colour Coding

See the table below for specific colour coding, for further information refer to Annexure J of DWS 9900 (July 2023 edition).

ITEMS	COLOUR	SANS 1091 CODE
Spherical Valves Remedial Work	Brilliant Green	H10

KPS 6 QUALITY ASSURANCE AND INSPECTIONS

Quality assurance and inspections shall be in accordance with this Particular Specification, DWS 1601: GENERAL MECHANICAL SPECIFICATION (Revision 0), STANDARD SPECIFICATION DWS 2020: QUALITY CONTROL SPECIFICATION (October 2001 edition) and as further described hereunder. The Contractor shall compile the Date Book of QCP's (for manufacturing and corrosion protection), material certificates, test certificates, welder qualifications and welding procedures.

KPS 6.1 Visual Inspection

All finished equipment shall be visually examined and shall be free of injurious defects as defined in the relevant specification.

The Contractor shall refer to the tolerances specified and the relevant Drawings. The Contractor shall confirm all relevant dimensions on the Site prior to manufacturing of any equipment.

KPS 7 HANDLING AND TRANSPORT

All handling and transport of equipment shall be in accordance with DWS 2510/01: Section 3.25 (January 2007 edition).

The Contractor shall provide all the necessary balks of timber and sawdust bags used to support the components on soil, concrete or other hard surface and to separate them from each other during storage.

The Contractor shall be deemed to have included in the pricing schedule or the Bill of Quantities for all materials and packing cases necessary for the safe packing and storage of the equipment.

All crates, packages, steel fabrications and machinery shall be clearly marked with a waterproof material to show the weight, the position to which slings may be attached and shall have an indelible identification mark relating them to the packing lists. In addition, all packages shall be clearly painted with a distinctive site identification colour and sign, so that the final location of each item can be easily identified at the Site in order to avoid delay, double handling or loss. These special identification marks shall be in addition to the normal shipping and transport marks.

Machined flanges of valves and fittings shall be protected by wooden discs attached by means of service bolts (which shall not be used for the installation) or by other approved means.

Wherever possible, lifting of painted items shall be from approved lifting attachments. All coated items shall only be lifted by means of broad band slings that shall not damage the coating. Slings shall not be less than 50 mm wide or as approved by the Engineer.

Stainless steel items shall be handled and packed in a way that prevents contamination.

The use of ropes, wire ropes or chains without suitable padding is expressly forbidden.

When loading onto vehicles, precautions shall be taken to support and chock the components to prevent movement. Components shall be firmly lashed or chained with padded lashing, supported on sawdust bags. The area of padded surfaces shall be adequate to prevent damage to the coating.

Any repairs necessary shall be to the cost of the Contractor. Any damage that occurs during the handling and storage of equipment and components at the storage shall be repaired by the Contractor at his own cost, in accordance with the Specification and to the approval of the Engineer.

Damage repair to corrosion protection shall only be carried out by a specialist corrosion protection applicator.

KPS 8 TESTS

All equipment supplied under this Particular Specification shall be tested for compliance with this Particular Specification as well as any other Specification referred to herein.

KPS 8.1 Valves

Full mechanical (including welding preparation and welding) and corrosion protection inspection of the items shall be carried out at the Manufacturer's Works in the presence of the relevant DWS representative. Workmanship and dimensional correctness shall be checked prior to corrosion protection procedures. All equipment shall be completely assembled for functional tests and inspection at the Manufacturer’s Works. Each valve shall be seal tested at the Manufacturer’s workshop in accordance with Standard Specification DWS 2510/01, Section 3.20. Each valve supplied shall be operated in both opening and closing directions and through its full travel by means of new hydraulic cylinders and existing hydraulic power packs for that valve.

All of the above requirements form part of this Contract and shall be provided as part of the rates by the Contractor.

KPS 9 MEASUREMENT AND PAYMENT

KPS 9.1 Basic Principles

Notwithstanding the breakdown as indicated in the Bill of Quantities, all the work and requirements of any nature as specified in this Particular Specification shall be covered by the Contractor in the pricing as reflected in the Bill of Quantities. No additional cost for any work or requirement in this Particular Specification shall be allowed.

KPS 9.2 General

Items are provided for the Contractor to price for:

- Procurement and manufacture of all mechanical equipment
- Corrosion protection
- Testing of all mechanical equipment
- Delivery from/to Site
- Provision of Operating and Maintenance Manuals
- Handover

The Contractor shall price each of these items separately.

KPS 9.3 Scheduled Items

The Contractor shall price each of the under-mentioned items separately for each specific piece of equipment supplied.

KPS 9.3.1 Procurement and Manufacture of all Mechanical Equipment

Unit: No & Sum

The rates quoted against the items in the Bill of Quantities shall include for full compensation of all costs incurred in the design, procurement, manufacture, inspection and testing of the specified valves and fasteners, associated operating or control equipment.

KPS 9.3.2 Corrosion Protection

Unit-: Sum

The rates quoted against the items in the Bill of Quantities shall include full compensation of all costs incurred in the preparation for corrosion protection, procurement, application, inspection, and testing of corrosion protection of the specified valves, fasteners, and associated hydraulic power pack and hydraulic cylinders. Payment will be made per unit. Payment will only be effected after full compliance of the items with the Particular Specification has been certified by the Engineer.

KPS 9.3.3 Testing

Unit: No & Sum

The rates quoted against the items in the Bill of Quantities shall include the provision of all labour, equipment, transport, materials and temporary works necessary to, at the Manufacturer's workshop install and adjust the associated power pack, auxiliary equipment for valves, quality control, inspection and testing in accordance with this Particular Specification. Payment will be made per unit. Payment will only be effected after full compliance of the items with the Particular Specification has been certified by the Engineer.

KPS 9.3.4 Delivery from/to Site

Unit-: Sum

The rates quoted against the items in the Bill of Quantities shall include for full compensation of all costs incurred in the packaging, loading and off-loading and delivery into storage on the Site of the specified items and fasteners and associated operating or control equipment. The rates quoted against shall also include the packaging and transport of the spherical valves from their current location (Kliphoek PS) to the Manufacturer's workshop and from the Manufacturer's workshop to the storage location determined by the engineer. Payment shall be made once all items have been delivered. Payment will be made per unit. Payment will only be effected after full compliance of the items with the Particular Specification has been certified by the Engineer.

KPS 9.3.5 Provision of Operating and Maintenance Manuals

Unit: No

The rates quoted shall include for full compensation of all costs incurred in preparing and submitting to the Engineer the updated Operating and Maintenance Manuals in accordance with KPS 3.4 requirements and approved drawings for the spherical valves. Payment will only be effected after full compliance of the items with this Particular Specification has been certified by the Engineer.

KPS 9.3.6 Handover

Unit: Sum

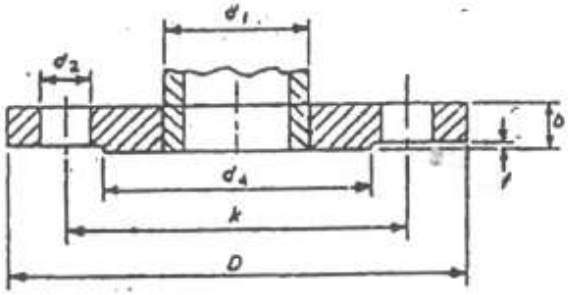
The rate quoted shall include for full compensation for all Tests on Completion including labour, supervision, materials, tools, instruments, etc., necessary for remedial work due to damage during delivery and any other work as specified.

APPENDIX A

NWS 1676 FLANGE DIMENSIONS TABLES 4 & 5:

TABLE 4

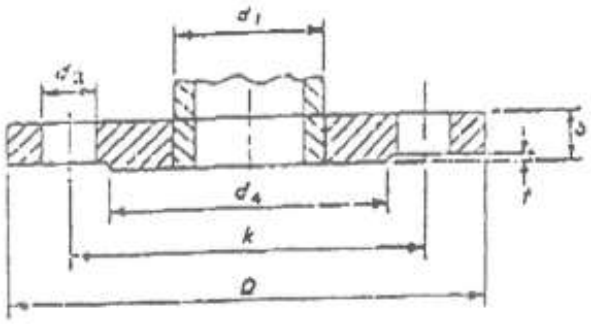
STEEL PLATE FLANGES FOR WELDING
CONSISTENT WITH, BUT NOT COVERED BY,
TABLE WITH, 25/3 OF BS4504:PART 1:1969
NOMINAL PRESSURE 2,5 MPa.



NOM. SIZE	PIPE OD	FLANGE		RAISED FACE		BOLTING	DRILLING		
	d_1	D	b	d_4	f		No.	d_2	k
150	168,3	300	24	218	3	M24	8	26	250
225	246,1	395	30	305	3	M27	12	30	340
550	558,8	785	60	680	4	M36	20	39	710
650	660,4	895	70	770	5	M36	24	39	820
700	711,2	960	74	820	5	M39	24	42	875
750	762,0	1020	78	880	5	M39	24	42	935
800	812,8	1085	82	930	5	M45	24	48	990
900	914,4	1185	90	1030	5	M45	28	48	1090
1000	1016,0	1320	98	1140	5	M52	28	56	1210
1100	1118,0	1420	106	1240	5	M52	32	56	1310
1200	1220,0	1530	116	1350	5	M52	32	56	1420
1300	1320,0	1645	124	1450	5	M56	32	62	1530
1400	1420,0	1755	134	1560	5	M56	36	62	1640
1500	1520,0	1865	144	1670	5	M56	36	62	1750
1600	1620,0	1975	154	1780	5	M56	40	62	1860
1800	1820,0	2195	170	1985	5	M64	44	70	2070

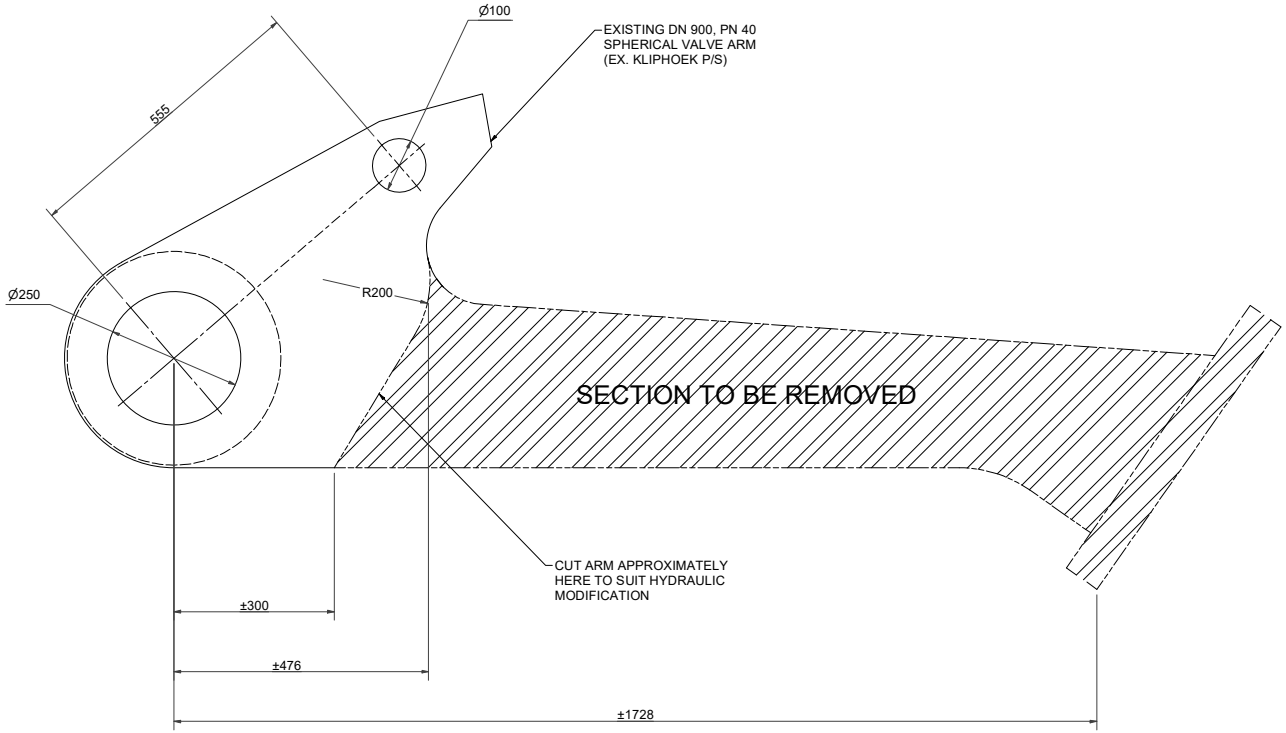
TABLE 5

STEEL PLATE FLANGES FOR WELDING
CONSISTENT WITH, BUT NOT COVERED BY,
TABLE 40/3 OF BS4504:PART 1:1969
NOMINAL PRESSURE 4,0 MPa



NOM. SIZE	PIPE OD	FLANGE		RAISED FACE		BOLTING	DRILLING		
	d_1	D	b	d_4	f		No.	d_2	k
225	246,1	420	38	315	3	M30	12	33	355
550	558,8	835	78	680	4	M45	20	48	740
600	609,6	890	84	735	5	M45	20	48	795
650	660,4	945	90	790	5	M45	24	48	850
700	711,2	995	96	840	5	M45	24	48	900
750	762,0	1080	102	900	5	M52	24	56	970
800	812,8	1140	108	960	5	M52	24	56	1030
900	914,4	1250	120	1070	5	M52	28	56	1140
1000	1016,0	1360	132	1180	5	M52	28	56	1250
1100	1118,0	1460	142	1280	5	M52	32	56	1350
1200	1220,0	1575	154	1380	5	M56	32	62	1460
1300	1320,0	1685	166	1490	5	M56	32	62	1570
1400	1420,0	1795	178	1600	5	M56	36	62	1680

APPENDIX B



SIDE VIEW
HYDRAULIC LEVER ARM MODIFICATION (4-OFF)
SCALE 1 : 5

GENERAL NOTES:

0 5 10 SCALE (mm) 100

ROUND ALL SHARP EDGES / REMOVE BURRS

ALL DIMENSIONS IN MILLIMETERS

DO NOT SCALE DRAWING

PROJECTION SANS 10111

REV No.	DATE	REVISION DESCRIPTION	SIGNED
0	07/2024	ISSUED FOR CONSTRUCTION	

DEPARTMENT OF WATER AND SANITATION
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
M / E ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 FRANCIS BAARD STREET
PRETORIA
(012) 336-7500

DIRECTOR GENERAL

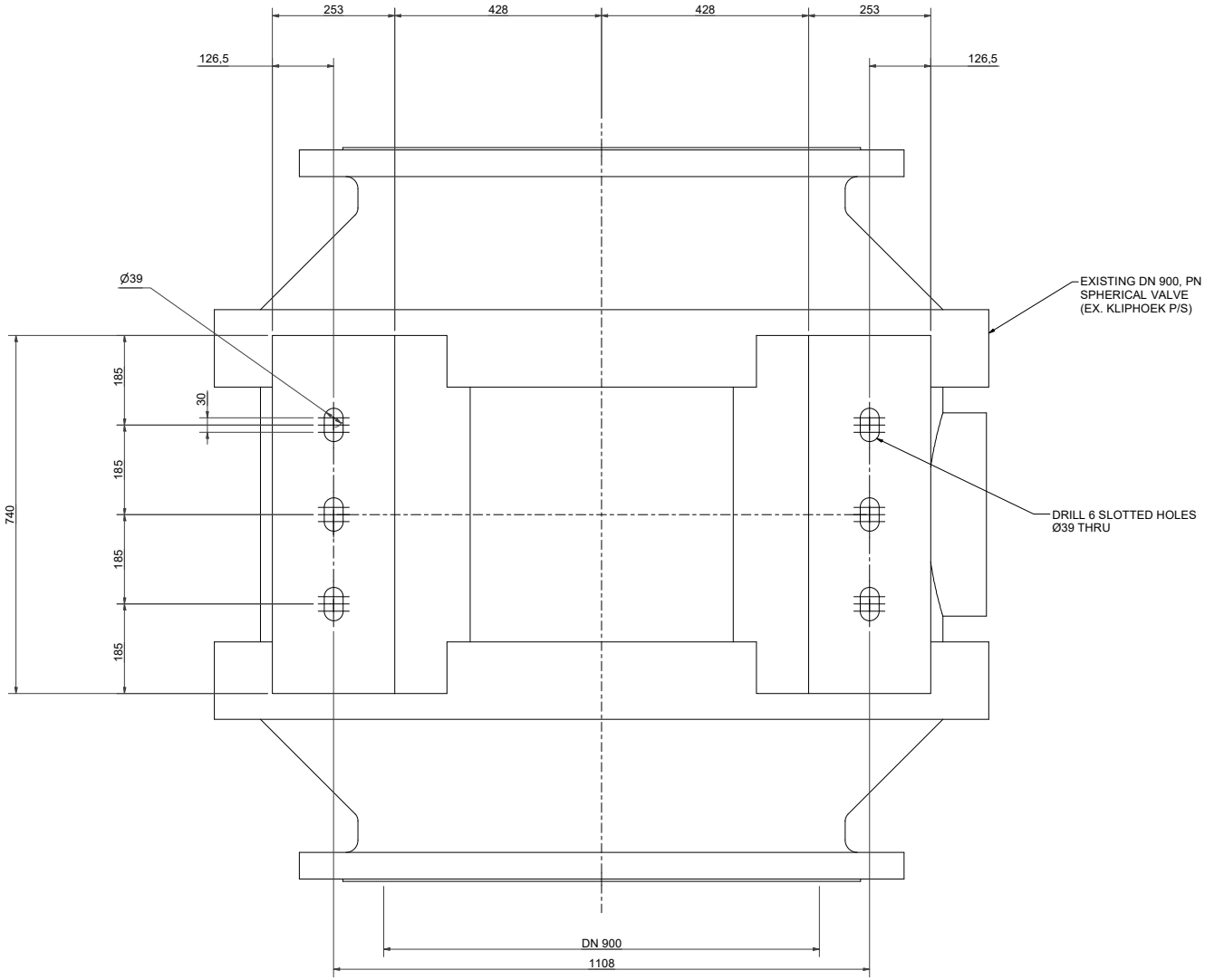
DESIGN: A VAN SCHALKWYK
DRAWN: A VAN SCHALKWYK
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER (Pr. Eng.): DATE:
DIRECTOR: DATE:

BERG RIVER WATER SUPPLY SCHEME

DRAKENSTEIN PUMP STATION

SKETCH A:
EXISTING DN 900, PN 40 SPHERICAL VALVE LEVER ARM MODIFICATION
-DETAILS-

PROVINCE: WESTERN CAPE
KEYCODES:
OTHER NUMBER
LOCALITY No.: G100-02
DISTRICT: WORCESTER
CALCULATION FILE:
TENDER/ CONTRACT No.
SHEET 1 OF 2
REG. No.
REV. No. 0



VIEW ON BOTTOM BASEPLATES
DN 900 SPHERICAL VALVE BASEPLATE MODIFICATION (4-OFF)
SCALE 1 : 5

GENERAL NOTES:

0 5 10 SCALE (mm) 100

ROUND ALL SHARP EDGES / REMOVE BURRS

ALL DIMENSIONS IN MILLIMETERS

DO NOT SCALE DRAWING

PROJECTION SANS 10111

REVISION			
REV No.	DATE	DESCRIPTION	SIGNED
0	07/2024	ISSUED FOR CONSTRUCTION	

DEPARTMENT OF WATER AND SANITATION
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
M / E ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 FRANCIS BAARD STREET
PRETORIA
(012) 336-7500

DIRECTOR GENERAL

DESIGN: A VAN SCHALKWYK
DRAWN: A VAN SCHALKWYK
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER (Pr. Eng.): DATE:
DIRECTOR: DATE:

BERG RIVER WATER SUPPLY SCHEME

DRAKENSTEIN PUMP STATION

SKETCH B:
EXISTING DN 900, PN 40 SPHERICAL VALVE BASEPLATE MODIFICATION
-DETAILS-

PROVINCE: WESTERN CAPE
KEYCODES:
OTHER NUMBER
LOCALITY No.: G100-02
DISTRICT: WORCESTER
SHEET 2 OF 2
REG. No.
REV. No. 0
CALCULATION FILE:
TENDER/ CONTRACT No.