

PART 4: SITE INFORMATION

Document reference	Title	No of pages
C4	This cover page	1
	Site Information	3
	Total number of pages	5

PART 4: SITE INFORMATION

1. General description

Eskom Kendal Power Station is situated approximately 40km Southwest of Witbank in the Mpumalanga province. Construction started in 1982 and took 11 years to complete. Kendal Power Station comprises six generating sets (Units) of 686 MW each, the station capacity is 4116 MW, which is indirectly dry-cooled. The generators produce electricity at a voltage of 22KV, the generator transformers step up the transmission voltage to 400kV.

On the conversion of AC to DC: the power is supplied from a 48V transformer. A rectifier is then used to convert the current from AC to DC before sending it to the electrolyser. Kendal uses a BBC Bi-polar electrolyser to produce hydrogen through a process called water electrolysis. Water is broken up into its elements hydrogen and oxygen by means of an electric current flowing from a positive current terminal to a negative terminal through a mixture of potassium hydroxide and water.

The electrolyser is made up of 20 cell blocks configured parallel to each other. The cell blocks are electrically insulated from one another by special diaphragms. Each cell is divided into two chambers and separated by a diaphragm. This diaphragm ensures that the oxygen produced on the anode side does not mix with the hydrogen produced on the cathode side. Two gas separators are provided and are situated on top of the electrolyser. One separator collects the hydrogen and the other collects oxygen.

On the gas holder: after the gas separators, the oxygen is vented to the atmosphere and the hydrogen is cooled to 20°C before sent to a temporary storage vessel (gas holder) which has a dynamic volume of 10m³ and a working pressure of ±20kPa. The gas holder controls the production of the electrolyser and the operation of the compressors using four limit switches and a mercury switch.

For Compressors: the plant is fitted with two low-pressure 3 stage reciprocating Sulzer Burchardt gas compressors for filling the hydrogen gas receivers. Under normal operating conditions one compressor is in service with the other on standby.

Hydrogen gas is drawn from the gas holder into the first stage of the compressor. After the first stage of compression the gas is passed through an air cooler before entering the second stage of compression. The gas is once again cooled before passed to the final stage of compression. After the final stage, the gas is cooled in the air before being routed to the gas filters and dryers.

When the compressed gas is cooled, moisture is released and separated from the gas stream. The moisture is then released back to the gas holder. The compressors are aided by a pressure maintain valve to sustain the pressure to below the receivers' maximum pressure of 3000kPa.

On the Gas Dryers: the hydrogen gas from the compressors still contains moisture and it must be removed. This is achieved by passing the gas through dryers filled with desiccant known as alumina. The moisture is absorbed by the desiccant resulting in dry gas leaving the drying chamber. There are two sets of gas dryers which can be utilised with any compressor. The dryers must dry the gas until a dewpoint of -65°C to -45°C is reached.

On the Gas Analyser: after the dryers, a portion of the gas is routed to an analysis station where hydrogen purity, oxygen content, and dewpoint are measured before sending the gas into the receivers. The analysis station is interlocked to only allow the gas into the receivers once the gas meets all the required specifications below.

On the receivers: the gas leaving the gas dryers, after all the analysis requirements are met, is sent to the hydrogen gas receivers. Four receivers are provided, each with a working volume of 20m³ at a maximum working pressure of 3000kPa. Receiver 3 was downrated to 2700kPa due to thinner walls.

The power station is a Zero Liquid Effluent Discharge Station and ISO 14001 compliant.

NEW HYDROGEN PRODUCTION PLANT AT KENDAL POWER STATION

1.1 Contractor's yard

Should the *Contractor* qualify for a site, the *Employer* will provide a site within the premises of the Power Station for the *Contractor* to establish himself for the execution of the *works*. The *Project Manager* together with the Site Manager will allocate a site to the *Contractor*. A site close to the connection points of water, electricity and toilet facilities cannot be guaranteed.

A Contractor qualifies for a site if the answer to at least one of the following questions is affirmative:

- 1.1.1 Is the contractor needed on site on a daily basis to carry out his/her contractual duties?
- 1.1.2 Does the nature of contract activities demand that the contractor be involved continuously, with his/her contractual duties for the whole day for four (4) or more days in a week?
- 1.1.3 In a case of a break down, is the contractor required to respond to the call out within 15 minutes?
- 1.1.4 Is there any statutory regulation/s that warrants that the contractor must operate within the premises of Kendal Power Station for the delivery of contractual obligations?
- 1.1.5 The *Contractor* is responsible for keeping the site in good state of maintenance and is responsible to ensure that at the end of the Contract period, he informs the Site Manager to inspect the site at least thirty days (30) before the Contract end date. The *Contractor* shall vacate the site allocated to him at the end of the Contract or on termination of the Contract

A written request, indicating the *Contractor's* requirements in locality and area of storage, office and workshop sites is submitted to the *Supervisor* as soon as possible after the Contract Date.

1.2 Roads

The *Employer* makes every effort to maintain the roads on the Site in a fair condition and all construction traffic is limited to using these roads. Kendal traffic regulations are adhered to at all times. Speed limits 40km/h.

1.3 Security

The *Contractor* is informed of the access procedures through Site regulations and should expect that such procedures may change depending on the prevailing security situation

Personnel may not be transported on the back of pick-ups or trucks. All persons entering the Kendal site pass through the control points at the main access gate and are required to have temporary entrance permits that are issued to contractors' staff on request. All persons submit ID documents with the completed application form for temporary permits. This must be arranged with the *Project Manager*. Lost permits will be paid for by the *Contractor* to Protective Services. All permits need to be returned to Security or the *Project Manager* upon completion of the contract. If it is necessary to bring tools and equipment onto site a list of tools is submitted which is verified by security staff prior to tools entering the security area.

Should any *Contractor* staff be transferred from Kendal or leave site, the person's permit are handed over to the supervisor. The *Contractor* ensures that personnel leaving site are transported out of the security area and that the permit is returned.

Only work vehicles with an approved permit will be allowed on site. These vehicles are to be in a serviceable condition and road worthy. Company vehicles must have the name of the company displayed on the vehicle. Magnetic signage may be used. Temporary vehicle permits are issued to contractors who are on site for less than 3 months. This must be arranged with the *Project Manager*. Speed limit is 40km/h.

No private vehicles will be allowed on site without a temporary permit.

Arrangements must be made with the *Project Manager* well in advance to allow sub-contractors and visitors onto site.

No firearms, weapons, alcohol, illegal substances and cameras are permitted on site.

No "Private Work" is carried out for or on behalf of any *Employer* Employee. Any person suspected of being under the influence of alcohol is tested and if proved positive, is refused entry to the security area. Only authorised persons are permitted to enter at the Security gate.

The transport of any equipment onto the site must be declared and documented at Protective Services in order to facilitate the future removal thereof. Pro-active comprehensive listing of all tools and equipment brought to Kendal will considerably speed up entrance to the power station

NEW HYDROGEN PRODUCTION PLANT AT KENDAL POWER STATION

Only authorised persons are permitted to enter Red Zone areas

1.4 Supply of electricity

Electric power for construction, both 220V AC and 380V 3-phase supply, is supplied at Site free of charge, but connection fees are for the *Contractor's* account. All installations comply with the details set out in Kendal Maintenance Procedure- Contractor's Temporary Electrical Equipment Supply, and Construction Power Supplies (Occupational Health and Safety Act - Act 85 of 1993) and the Kendal Safety, Health and Environmental Specification for Contractors.

The *Employer* does not guarantee continuity of supply and no claims for standing time as a result of power failures will be considered. The *Employer* connects distribution boards to a 380V three-phase AC power supply, only after the *Contractor* has submitted the valid Certificate of Compliance

A written request, indicating the *Contractor's* requirements is submitted to the *Project Manager* as soon as possible after the Contract Date.

1.5 Water

Potable and raw water for construction purposes are also available free of charge at the nearest point of supply installed.

A written request, indicating the *Contractor's* requirements is submitted to the *Project Manager* as soon as possible after the Contract Date.

1.6 Sanitary facilities

Permanent toilets to serve the Power Station and urinals at the boundary area have been constructed by the *Employer* and all the *Contractor's* personnel may make use of these facilities if within the allocated site for execution of the *Works*.

1.7 Permits

No work commences without the acceptance of the isolations by the Contractor's responsible person and the workman's register signed by all workers. The Contractor arranges for Two-(2) person to be appointed as the responsible person for permit requirements. Permit applications must be done at least the day before scheduled work need to commence to allow enough opportunity for the operator to issue the plant. .

The contractor must provide a Responsible Person (RP) to request the permit to work and submit the authorisation to the PM for approval.

1.8 Weather Data

Altitude	1624.0m above MSL
Terrace Level	1619.0m above MSL
Outside ambient air temperature	+40 degrees Celsius
Minimum dry bulb	-6 degrees Celsius
Maximum dry bulb	+30 degrees Celsius
Atmosphere	Dry/ Dusty
Rainfall:	
Mean annual rainfall	750mm
Maximum rainfall for 24 hour period	125mm
Relative humidity:	
Maximum	90%
Minimum	30%
Weighted average	61%
Mean annual barometric pressure	83.8kpa

2. Existing buildings, structures, and plant & machinery on the Site

At **Kendal Power Station**, several existing facilities, buildings, and operational systems are integral to the site and require careful coordination and integration during the execution of works. The Works Information

NEW HYDROGEN PRODUCTION PLANT AT KENDAL POWER STATION

outlines all interfaces, hook-up points, and refurbishment requirements for existing facilities to ensure seamless integration with the new works.

2.1 Offices, workshops and stores

The *Contractor* complies with the environmental policy given in Kendal Safety, Health and Environmental Specification for Contractors.

2.2 Electricity

The *Contractor* provides at his own expense all temporary wiring and cabling to lead power from the *Employer's* supply points, to where it is required, maintain same and remove on completion. These points of supply are transformers designated by the *Supervisor*. The *Contractor's* distribution boxes conform to the *Employer's* requirements and are approved by the *Project Manager* prior to use. All installations comply with the details set out in Kendal Maintenance Procedure- Contractor's Temporary Electrical Equipment Supply

Any electrical equipment or appliance used by the *Contractor* conforms to the applicable South African safety standards and maintained in safe and proper working condition. The *Employer* has the right to stop the *Contractor's* use of any electrical equipment or appliance which in the *Employer's* opinion does not conform to the foregoing

2.3 Conditions of supply for erection

In order to comply with the Electrical Installation Regulations under the Occupational Health and Safety Act, no 85 of 1993 the following requirements must be met:

- Before electricity is supplied the *Contractor* is in possession of a valid certificate of compliance. Arrangements for the temporary energising of the installation to perform the required tests must be arranged with the *Project Manager*.
- The *Contractor's* electrical installation is inspected and tested by an accredited person to ensure that it complies with the requirements of the Occupational Health and Safety Act, 1993 and the code of Practice for wiring of premises, SABS 0142.
- After certificate of compliance is obtained, the *Employer* inspects the electrical installation and if satisfied, it is connected and supplied from the construction power supply.

2.4 WARNING

Phase rotation may change during a power supply break. The *Contractor* checks rotation of their equipment before recommencing of work.

2.5 Sanitary Facilities

If sanitary facilities are required at the *Contractor's* site, the *Contractor* provides, services, maintains and removes on completion, temporary sanitary facilities, at his own cost, to the acceptance of the *Project Manager*

2.6 Telecommunications

Telephone line connections and telephone instruments can be arranged with the *Employer*. The *Contractor* is responsible for installation cost and his own telephone bill.
The contractor must provide their own communication radio.

3. SITE PROCEDURES AND INSTRUCTIONS**3.1 General**

- The *Contractor* complies with all Site procedures and instructions, copies of which if not included in this contract specification, are made available by the *Project Manager* at Kendal Power Station.
- The onus is on the *Contractor* to ensure his familiarity with the *Employer's* Site procedures, regulations and inspections. Contractor to work safe and have good hose keeping

3.2 Site Regulations

NEW HYDROGEN PRODUCTION PLANT AT KENDAL POWER STATION

The *Contractor* complies with *Employer's* site regulations as stipulated in Procedure, covering the following:

- Clean lines
- Storage of material
- Safety precautions and fire prevention
- Permits to work
- Other *Contractor's* work
- Representation of sub-*Contractors*
- Maintenance staff to witness erection
- Supervision
- Handing over of *works*
- *Contractor's* Site

3.4 Permits

- All Contractors will ensure that they are informed of all the requirements of Eskom's Plant Safety Regulations and ORHVS and that they at all times comply to the requirements of these Regulations.
- All Supervisors of contracting companies, who are directly involved with Eskom's Permit to Work System, shall be trained and successful completion of Kendal's authorization / evaluation process, and must be authorized as Responsible Persons.
- The Responsible Person shall ensure that:
 - The conditions of permits and cautionary notices are strictly adhered to.
 - The lockout procedures, mechanical as well as electrical, are strictly adhered to and any deviations shall be corrected immediately.
 - The safe work procedures as lay down by Kendal Power Station and as determined by the Risk Assessment, shall be followed.
 - The workers register and cautionary notices are discussed daily with workers

4. Subsoil information

Ground conditions consist of compacted coal and natural soil. The *Contractor* must make his own observations as to the specific soil conditions. Access to be arranged with the *Project Manager*.

5. Hidden services

N/A

6. Other reports and publicly available information

N/A