



Signed-off Scope Of Work

Title: The supply and delivery of strong acid cation and base anion ion exchange resin

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Signed-off scope of work

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1. PURPOSE

Eskom Tutuka Power Station is using ion exchange resins to polish the water on the steam cycle at the units via the Condensate Polishing plant (CPP), whereby each unit have 3 CPP's available. Condensate Polishing systems are based on ion exchange (IX) technology. Ion exchange is a reversible interchange of ions between a resin (ion exchange material) and a liquid in which there is no permanent change in the structure of the resin. An ion is an atom or group of atoms with an electric charge. Positive-charged ions are called Cations and are usually metals. Negative-charged ions are called Anions and are usually non-metals.

The impurity ions (positive and/or negative-charged) are taken up by the resin, which must be periodically regenerated to restore it to the original ionic form and depending on the application, there are two types of regeneration method, namely internal and external.

Condensate polishing plants are used for the purification of condensate in a steam cycle in coal fired and natural gas cogeneration plants that are using steam to drive the turbines that run the electric generators. When steam is passed through a series of turbines, expending most of its energy and condensed by heat exchanger system the condensate is treated by condensate polishing system then returned to the boiler where it is converted back into steam.

Condensate polishing system is a unique application of ion exchange resin that removes all soluble impurities created and protects the high-pressure boiler. The condensate polishing system needs to be regenerated from time to time to ensure the ion exchange resins are able to continue to capture soluble impurities and depending on the application, there are two types of regeneration method, namely internal and external. Internal regeneration is referred to when regenerate the resins takes place within the vessel and external regeneration, which is more complicated, is referred to when regeneration takes place outside of vessel used for purification where the resin is transferred to a regeneration vessel, regenerated and then returned to the operating vessel.

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The current resin within the unitised Polishers has reached the end of its operation life (>10 years) and is currently due for replacement. This Supply and Delivery contract seeks to procure thirteen full batches of Cation and Anion Resin for the CPP Polishers, where a replacement will be carried-out.

SCOPE OF WORK

2 Executive overview

To supply and deliver ion exchange strong cation (52 000 liters) and anion (39 000 liters) resins to Tutuka Power Station. This resin is to be used at the condensate polishing plant as a mixed bed batch.

Cation resin to be supplied must have the following properties:

Physical Properties; Copolymer: Styrene-divinylbenzene, Matrix: Gel, Type: Strong acid cation, Functional Group: Sulfonic acid, Physical Form: Dark amber, translucent, spherical beads

Chemical Properties

Ionic Form: as Shipped H⁺

Total Exchange Capacity: ≥ 2.0 eq/L (H⁺ form)

Water Retention Capacity: 46.0 – 52.0% (H⁺ form)

Ionic Conversion H⁺: ≥ 99%

Anion resin to be supplied must have the following properties:

Physical Properties

Copolymer: Styrene-divinylbenzene, Matrix: Gel, Type: Strong base anion, Functional Group: Trimethylammonium, Physical Form: White to yellow, translucent, spherical beads

Chemical Properties

Ionic Form as Shipped: OH, Total Exchange Capacity: ≥ 1.1 eq/L (OH-form), Water Retention Capacity: 55.0 – 65.0% (OH-form,) Ionic Conversion OH⁻ ≥ 95% CO₃²⁻ ≤ 5% Cl⁻ ≤ 0.5.

Both cation and anion resin must be compatible to be used as a mixed bed and it must be indicated on the SDS

2.2 Deficiencies and Modifications

- The *Contractor* must inform the *Employer* in writing of the deficiencies in their area of maintenance responsibility.
- The *Contractor* must inform the *Employer* about any factor known to them that may affect plant health performance.

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2.3 Clean up

The *Contractor* is responsible for cleaning up the site, free of rubble. After completion of the works and clean up, the *Service Manager* shall be called to inspect the site and ensure that it is in a presentable state. The *Employer's* Environmental Section will do ad-hoc inspections on your work site, as well as a final inspection on the dumping site.

2. PPE.

PPE to be provided by the contractor as per Eskom Regulations

2. MAN-POWER PLAN

N/A

CONTROLLED DISCLOSURE