

| | | |
|------------------|-----|--------|
| SPECIFICATION No | REV | Page |
| DSG-313-005 | 7 | 1 of 7 |

ESKOM
GENERATION NUCLEAR GROUP
(KOEBERG NUCLEAR POWER STATION)

Specification Title

| |
|---------------------------------|
| BORIC ACID NUCLEAR GRADE |
|---------------------------------|

PREPARED BY:  **UW LOUW**

REVIEWED BY:  **PF LOTZ
(CHEMISTRY)**

REVIEWED BY:  **T KANA (RFE)**

REVIEWED BY:  **S SWARTZ**

APPROVED BY:  **S EBRAHIM**

DATE: 2019-6-28

DATA CAPTURED:  **C HAUPT**

| | | |
|------------------|-----|--------|
| SPECIFICATION No | REV | Page |
| DSG-313-005 | 7 | 2 of 7 |

KOEBERG NUCLEAR POWER STATION
DESIGN & SPECIFICATION GROUP

| APPROVED | | DATE |
|--------------|-------------|-------------|
| PARAGRAPHS | PREPARED BY | REVIEWED BY |
| 1 Through 11 | L Trocado | A Marneweck |
| 11 | A v/d Merwe | |
| | | |
| | | |

RECORD OF REVISION

| Rev | Date | Description of Revision | Prep. | Rev | Approved |
|-----|----------|--|---------|--------|----------|
| 1 | 26/4/89 | 2.1 EVS 005 Reference added 8.1 EVS 005 Referenced | LT | AM | BD |
| 2 | 1/12/91 | 11.1,2,3 and 4 - Include requirement set-up by Boric Acid Working Group | A v/d M | | |
| 3 | 13/2/95 | 11.1 Include "the bags shall be hermetically sealed to prevent moisture ingress" | NR | GS | HW |
| 4 | 21/6/95 | 11.1 Include "the bags shall be suitably sealed to prevent moisture ingress" | NR | GS | HW |
| 5 | 23/10/95 | 11.1 Include "the bags shall be suitably sealed to prevent moisture ingress i.e. the open end of the plastic bag must be twisted, folded back onto itself and tied with a piece of string" | NR | GS | HW |
| 6 | 26/05/03 | 5.0 Changed the maximum impurities, and added Aluminium and Total Silica | JRM | SPM | ARL |
| 7 | 01/04/19 | Full review and updated section 5 | UWL | SS/PFL | SE |

| | | |
|------------------|-----|--------|
| SPECIFICATION No | REV | Page |
| DSG-313-005 | 7 | 3 of 7 |

**TECHNICAL SPECIFICATION
FOR
BORIC ACID NUCLEAR GRADE**

INDEX

- 1.0 SCOPE
- 2.0 REFERENCES
- 3.0 INTERFACES
- 4.0 ENVIRONMENTAL CONDITIONS
- 5.0 CHEMICAL PROPERTIES
- 6.0 VERIFICATION AND TESTS
- 7.0 SAFETY
- 8.0 QUALITY ASSURANCE
- 9.0 DOCUMENTATION
- 10.0 MARKING AND IDENTIFICATION
- 11.0 PACKAGING

| | | |
|------------------|-----|--------|
| SPECIFICATION No | REV | Page |
| DSG-313-005 | 7 | 4 of 7 |

1.0 SCOPE

1.1 General

- 1.1.1 The product covered by this specification is for application in Eskom's Koeberg Nuclear Power Station, Republic of South Africa.
- 1.1.2 If a conflict arises between this specification and other referenced documents, the Contractor/Vendor/Supplier shall not proceed, but shall request clarification, in writing, from the approved Eskom buyer.

2.0 REFERENCES

- 2.1 EVS 005 - Quality requirements for quality related items and equipment
- 2.2 Reference Document: Information Regarding Procurement Specifications for Nuclear Power Plant Bulk Chemicals: For Information Only. EPRI, Palo Alto, CA: 2011. 1022558
- 2.3 Classification 0343/86Q - High Purity boric acid.

3.0 DESIGN REQUIREMENTS

The boric acid is used in the primary circuit (RCP) and associated systems.

4.0 ENVIRONMENTAL REQUIREMENTS

Ambient conditions when

- Temperature : 0°C - 35°C
- Pressure : Atmospheric
- Relative Humidity : 100% max

5.0 SPECIFICATION

5.1 Chemical Composition Weight percent

- Boric acid (H₃BO₃), min : 99.9
- Boron-10 (atom percent) : 19.6 – 20.3

5.2 Impurities **Maximum ppm**

| | |
|------------------------------|-----|
| Sodium (Na) | 2 |
| Chloride (Cl) | 0,4 |
| Sulphate (SO ₄) | 1 |
| Phosphate (PO ₄) | 1 |
| Iron (Fe) | 2 |
| Heavy Metals (as Pb) | 0,5 |
| Calcium (Ca) | 1 |
| Water insoluble materials | 10 |
| Fluoride (F) | 0,4 |
| Arsenic (As) | 2 |
| Silica (SiO ₂) | 1 |

5.3 Physical properties

5.3.1 Material shall be in the form of granules free of dirt and other foreign material.

5.3.2 Sieve analysis-requirements when tested with U.S. Standard sieves.

| Sieve No. | Percent Retained (by weight) |
|-----------|------------------------------|
| 16 | 10 maximum |
| 50 | 55-75 |
| 100 | 75 minimum |

6.0 VERIFICATION AND TESTS

6.1 The supplier shall submit to Eskom a signed copy of the COA (Certificate of Analysis) in accordance with this specification. This chemical COA shall demonstrate that the chemical characteristics meet every requirement of this specification and shall be signed by the supplier's responsible person.

6.2 Eskom reserves the right to have the analysis of the boric acid checked by the analysing laboratory of its choice.

6.3 Should analysis show deviation from this specification, this will be cause for rejection of the analysed batch.

| SPECIFICATION No | REV | Page |
|------------------|-----|--------|
| DSG-313-005 | 7 | 6 of 7 |

7.0 SAFETY

Boric acid is a very mild substance which is safe to handle and does not pose a threat to health.

8.0 QUALITY ASSURANCE

8.1 All conditions and requirements required by this specification shall comply with Reference 2.1 provided with the tender enquiry or purchase order.

8.2 The boric acid has been classified NSF/NC/Q3 as per classification 0343/86Q.

9.0 DOCUMENTATION

The supplier shall provide the following documentation with delivery.

9.1 A Quality Assurance Data Package including a guaranteed vendors chemical analysis demonstrating compliance with this specification. This analysis shall identify the batch or lot number of the chemical.

9.2 Storage instructions to ensure chemical shelf life.

9.3 Supplier to complete Eskom (Koeberg) certificate of conformance or equivalent certifying that the product supplied meets the requirements of the purchase order.

10.0 MARKING AND IDENTIFICATION

Each package of boric acid shall be clearly labelled or marked with the following:

10.1 General description of package contents.

10.2 Concentration of contents.

10.3 Name of manufacturer.

10.4 Batch/lot number.

10.5 Eskom's SAP number – 0157140.

10.6 Eskom order number.

| SPECIFICATION No | REV | Page |
|------------------|-----|--------|
| DSG-313-005 | 7 | 7 of 7 |

11.0 PACKAGING

- 11.1 The boric acid shall be packed in heavy duty 25 kg plastic bags suitable for long term storage and handling. The bags shall be suitably sealed to prevent moisture ingress ie. the open end of the plastic bag must be twisted, folded back on itself and tied with a piece of string".
- 11.2 Handling precautions, if any, shall be marked on the containers.
- 11.3 The 25 kg bags are mandatory and shall be palletised on 120 x 800 1200 mm wooden pallets, each pallet limited to 8 layers of 5 bags per layer, i.e. total of 40 bags weighing 1000 kg in total.
- 11.4 Enclosing all the bags on the pallet shall be a plastic wrapping to act as additional environmental barrier.