ESKOM

KOEBERG NUCLEAR POWER STATION

DESIGN ENGINEERING

Specification Title

MONOETHANOLAMINE

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KOEBERG NUCLEAR POWER STATION

NUCLEAR ENGINEERING

	APPROVED: G SMITH	**DATE:** 1995-09-28
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RECORD OF REVISIONS

Rev	Date	Description of Revision	Prep.	Rev.	Appr.
0	1995-09-28	Original	JRM	NR	GS
1	2014-05-26	Updated impurity limits in paragraph 5.2. Changed classification number from 0020/91Q to 0029/99Q (paragraph 8.2).	XB	AMAS/ NvE	NR

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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 Should a conflict of interests arise between the requirements of this specification and any other referenced document(s), the contractor shall not proceed but shall request clarification, in writing, from the approved Eskom buyer.

1.2 Scope of Supply

1.2.1 The scope of supply covers 100% Monoethanolamine solution in approximately 210 kg drums for use in the secondary circuit at Koeberg Nuclear Power Station.

1.3 Definitions

1.3.1 2-Aminoethanol (trade name monoethanolamine/ethanolamine) is the chemical $HO\text{-}CH_2\text{-}CH_2\text{-}NH_2$ (see chemical properties in Section 6 of this specification), with a molecular weight of 61.08.

2.0 REFERENCES

2.1 Mandatory References

2.1.1 Occupational Health and Safety Act (OHSA), Act 85 of 1993

2.1.2 Koeberg Safety Manual - KSM-001 Chapter 3.1

2.1.3 EPRI TR 1022558: Information Regarding Procurement Specifications for Nuclear Power Plant Bulk Chemicals, February 2011

2.2 Useful References

2.2.1 Perry's - Chemical Engineers Handbook

2.2.2 Dangerous Properties of Industrial Materials, N. Irving Sax & Richard J Lewis, Snr,USA

2.2.3 Croner's Substances Hazardous to Health, Croner Publications Limited,UK

3.0 INTERFACES

3.1 Monoethanolamine is for use in the secondary circuit.

4.0 ENVIRONMENTAL CONDITIONS

4.1 See Safety - paragraph 6.0

5.0 CHEMICAL PROPERTIES

5.1 Product description

5.1.1 A clear, colourless, hygroscopic liquid with a characteristic mildly ammoniacal odour. It is completely soluble in water. A strong base, it reacts violently with acids and corroding amphoteric metals, e.g. aluminium, zinc, copper.

5.1.2 The 100% solution has the following physical characteristics:

Specific gravity	1.016 – 1 020 at 20°C
Viscosity	19 MPa.s at 25°C
Boiling point	170 4°C
Freezing point	10.5°C
Vapour pressure	0.2 mmHg
Flash point, Cleveland Open Cup	104 4°C
Flash point, Pensky-Mertens Closed Cup	96.1°C

5.2 Product specification

5.2.1 Note that the impurity concentration limits given below apply to the product IN THE SHIPPING CONTAINER (i.e. as delivered).

Name	Monoethanolamine (Ethanolamine)
Concentration	98% w/w (minimum)
Colour	15 (max) APHA units

Impurity Limits:

Parameters	Weight percent (maximum)	mg/kg (maximum)
Water	1	
Sodium	0.0001	1
Chloride	0.0001	1
Fluoride	0.0002	2
Sulphate	0.0001	1
Total Iron	0.0001	1
Copper	0.0001	1
Total Heavy Metals (as lead)	0.001	10

5.2.2 The product must be free of ethylene glycol.

5.2.3 The product as delivered shall be free from dyes or colouring agents.

5.2.4 A Certificate of Analysis (C.O.A) must be provided per batch delivery.

6.0 SAFETY

6.1 The CAS number for monoethanolamine is 141-43-5, the NIOSH: KJ 5775000 and DOT/SIN: 2491. The DOT classification of monethanolamine is as a corrosive material.

6.2 The handbook on Dangerous Properties of Industrial Materials gives monoethanolamine a hazard rating of HR3, which is their highest rating and indicates the following:

- LD50 < 400 mg/kg
- LC50 < 100 mg/kg
- or that the material is explosive, spontaneously flammable or highly reactive.

Croner's Substances Hazardous to Health indicates that the HAZCHEM rating for monoethanolamine is 2R.

Recommended exposure limits: TWA 8 hours 3 mg/kg, STEL 10 mins 6 mg/kg.

Notes:

- CAS is the Chemical Abstracts Service of the American Chemical Society (USA).
- NIOSH is the National Institute for Occupational Safety and Health (USA)
- DOT is the Department of Transport (USA)
- SIN is the Substance Identification Number (United Nations Number)
- TWA is the time weighted average exposure
- STEL is the short term exposure limit

6.3 When handling monoethanolamine, safety goggles and impervious clothing and/or gloves shall be worn, in addition to any other safety equipment normally required. Safety goggles may be replaced by a full face shield. If working in an enclosed area, respiratory protection may be required. If this is the case, chemical cartridge respirator (CCR) or self-contained breathing apparatus (SCBA) should be used. If respiratory protection is required, then gloves shall be worn.

7.0 VERIFICATION AND TESTS

7.1 The supplier shall submit to Eskom a chemical analysis report in accordance with this specification at each delivery. This chemical analysis report shall demonstrate that the chemical characteristics meet every requirement of this specification and shall be signed by the supplier's responsible person.

7.2 Should the analysis report show non-compliance with the requirements of this specification, Eskom's written approval, as per 1.1.2, is required for acceptance.

7.2.1 Eskom reserves the right to have check analysis carried out by the analytical laboratory of its choice in order to verify the quality of the received chemical.

7.2.2 Should the check analysis show that the chemical does not present the required characteristics, Eskom reserves the right to refuse the batch that has been received. This batch would be removed and replaced at the expense of the Vendor/Supplier/Contractor.

7.3 On receipt of a consignment of chemical, Eskom shall withdraw a sample at random from the batch and transfer it to a suitable container(s), which shall then be sealed and stored for future analysis in case of litigation. This container shall be appropriately labelled with sufficient detail to make it uniquely identifiable. Once all of the chemical in the batch has been used, this sample shall be disposed of in an appropriate manner.

The information to be recorded on the label is as follows:-

- Product Name:-
- Supplier's Name:-
- Batch Number:-
- Date:-
- Time:-
- Sampled by:- (signature and printed name of Eskom personnel)
- Witnessed by:- (signature and printed name of delivery person

8.0 QUALITY ASSURANCE

8.1 All conditions and requirements contained in this specification shall comply with the Eskom Quality Assurance standard provided with the tender enquiry or purchase order.

8.2 The safety classification and quality level of the chemical provided in accordance with this specification is:

- Classification No.: 0029/99Q
- Classification: NSF/NC/Q3/NEV

8.3 The Quality Assurance Data Package (QADP) shall consist of a guaranteed vendor's chemical analysis demonstrating compliance with this specification. This analysis shall identify the batch or lot number of the chemical.

9.0 DOCUMENTATION

9.1 The supplier/vendor shall provide the following documentation with each chemical delivery:

- Certificate of Compliance

9.2 The Certificate of Compliance shall state that the chemical supplied meets the requirements of this specification. It shall include a certified chemical analysis (as per Section 7.0) of the chemical and the purchase order number.

9.3 Eskom authorised personnel shall review the Certificate of Compliance prior to release and use of the chemical. All documentation must be completely legible and of microfilm quality.

9.4 In addition, at the time of, or prior to, the first delivery to Eskom, the supplier/vendor shall furnish the following documentation:

- Storage instructions to ensure chemical shelf life.
- Technical literature on chemical handling (if available).

9.5 The supplier shall undertake to provide updates of the above as and when they become available.

10.0 MARKING AND IDENTIFICATION

10.1. Each monoethanolamine container shall be clearly labelled with the following information:

- Name of contents.
- Concentration of contents.
- Name of manufacturer.
- Batch lot number.
- Pictogram -triangular (black border with yellow centre) - depicting health hazard of contents.

10.2 Marking notices and signs shall be in accordance with OHSA, Act 85 of 1993, requirements. These markings, notices and signs shall also correspond with Koeberg safety manual KSM-001 Chapter 3.1.

10.3 Marking notices and signs shall be weatherproof.

11.0 PACKAGING AND SHIPMENT

11.1 The monoethanolamine shall be supplied in sealed containers to prevent loss, contamination or deterioration of contents during transport, handling and storage.

11.2 The sealed containers shall be of a robust nature to facilitate the prevention of personnel contact with monoethanolamine during transport, handling and storage.

11.3 Handling precautions shall be prominently marked on the containers as per paragraph 10.1.