

 Eskom	Procurement Specification	NUCLEAR ENGINEERING
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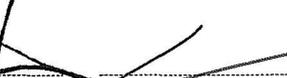
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1. Introduction

The specification is for procurement of valve positioners to be installed on the Steam Dump to Atmosphere (GCT) valve actuators.

2. Supporting Clauses

2.1 Scope

The specification covers the supply of the valve positioner. The scope shall include:

1. General description of package content.
2. Manufacturer's name and product part/model numbers.
3. ESKOM's SAP number (if applicable).
4. ESKOM's order number

2.1.1 Purpose

The purpose of the specification is to specify requirements of the valve positioner(s) as well as procurement quality requirements in support of the Purchase order to be met by the manufacturer or supplier of the valve positioner which will be controlling the position of Fisher 667 size 80 actuators.

2.1.2 Applicability

This specification shall apply to Koeberg Operating Unit.

2.1.3 Effective date

The document is effective from the date of authorisation.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems
- [2] IEEE 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
- [3] RCC-E – Design and Construction Rules for Electrical Equipment of Nuclear Islands
- [4] KBA 00 22 E01 020, Floor Response Spectra for the Design of Equipment and Piping Systems
- [5] RD-0034, South African Nuclear Regulator Requirements Document 034, "Quality and Safety Management Requirements for Nuclear Installations"

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2.2.2 Informative

[6] DSG-318-033, Specification for seismic qualification of electrical and mechanical equipment

2.3 Definitions

2.3.1 1E: The safety classification of electrical equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or are otherwise essential in preventing significant release of radioactive material to the environment.

2.3.2 K3 Qualification: The qualification procedure to ensure that equipment installed outside the containment building is capable of performing its specified functions under normal ambient conditions and under seismic loading as well as accident ambient conditions specified for certain equipment.

2.3.3 Mild environment: An environment that would at no time be significantly more severe than the environment that would occur during normal plant operation, including anticipated operational occurrences.

2.4 Abbreviations

Abbreviation	Explanation
EMC	Electromagnetic Compatibility
GCT	Secondary Circuit Steam Discharge System
IEEE	Institute of Electrical and Electronics Engineers
KOU	Koeberg Operating Unit
OBE	Operating Basis Earthquake
SSE	Safe Shutdown Earthquake
TRS	Test Response Spectra

2.5 Roles and Responsibilities

ESKOM's approval is required for any non-conformances to these requirements or to ESKOM-approved documents.

2.6 Process for Monitoring

ESKOM reserves the right of access to the supplier facilities and records for the purpose of inspection or audit for the scope of the associated Purchase Order.

2.7 Related/Supporting Documents

Not Applicable.

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3. Equipment Requirements

3.1 Functional Requirements

Pneumatic input	:	20.7 to 103. kPa (For pneumatic valve positioner)
Analog Input	:	4 to 20 mA (For electro-pneumatic valve positioner)
Maximum voltage	:	28 Vdc
Supply pressure	:	520 kPa (max)
Valve stem travel	:	0 mm to 63.5 mm
EMC	:	The positioner shall comply with IEC/EN 61326-1 standard (For electro-pneumatic valve positioner) and tested for immunity compliance as stated below.

Immunity Test	Test Level	Standard
Electrostatic Discharge (Enclosure)	i. 4 kV (contact) ii. 8 kV (air)	IEC 61000-4-2
Radiated Electromagnetic Field (Enclosure)	i. 80 to 1000 MHz at 10 V/m ii. 1400 to 2000 MHz at 3 V/m iii. 2000 to 2700 MHz at 1 V/m	IEC 61000-4-3
Burst (I/O signal/control)	1 kV	IEC 61000-4-4
Surge (I/O signal/control)	1 kV	IEC 61000-4-5
Conducted RF fields disturbances (I/O signal/control)	150 kHz to 80 MHz at 3 V	IEC 61000-4-6
Power Frequency Magnetic Field (Enclosure)	30 A/m at 50 Hz	IEC 61000-4-8

3.2 Mechanical Characteristics

Configuration	:	Sliding stem application
Mounting	:	The valve positioners shall fit directly onto Fisher valve actuator 667-80-EP-6"X7, Size 80
Housing Materials	:	The housing materials shall be suitable for service conditions specified in section 3.3
Process connection	:	¼" NPT
Electrical connection	:	Screw terminals via ½" NPT (Female) conduit entry

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3.3 Service conditions

3.3.1 Environment conditions

Temperature	:	60°C
Pressure	:	Atmospheric
Radiation	:	Negligible

3.3.2 Process Environment

Temperature	:	50°C
Pressure	:	520 kPa (max)
Radiation	:	Negligible
Medium	:	Instrument air

3.3.3 Accident conditions

The valve positioners are required to function during a design basis earthquake. Thus, the valve positioners shall be seismically qualified in accordance with IEEE-344 or K3 qualified in accordance with RCCE. The qualified valve positioners should meet seismic conditions defined by the horizontal and vertical spectra in Appendix A.

3.4 Performance characteristics

The GCT valve positioners are part of the 1E circuit and are installed in a mild environment. Thus, the valve positioners are required to function under seismic conditions to support the safety function of the GCT to Atmosphere valves.

3.4.1 Linearity

± 1% of output span or better

3.4.2 Reliability

To assure optimal and accurate performance, the manufacturer/supplier shall specify the following for the valve positioner:

- i. Mean Time Between Failure
- ii. Mean Time To Failure

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3.5 Seismic test requirements

. The tables in Appendix A provide the frequency and acceleration levels for:

- Horizontal Response:
OBE, 2% damping
SSE, 2% damping
- Vertical Response:
OBE, 2% damping
SSE, 2% damping

3.6 Documentation and Quality requirements

The GCT to Atmosphere valve positioners are classified as Quality level 3 according to Koeberg's classification system. Therefore, the manufacturer/supplier is required to supply the following:

- A Final Inspection and Test Certificate;
- Certificate of conformance (C.O.C);
- Shelf life and cure date for all elastomeric items included in the purchase order and
- A Seismic Test Certificate/Report confirming the capability of the equipment to function during a design basis earthquake.

In addition, the supplier of the valve positioner shall comply with Integrated Management System Level 2 in accordance with RD-0034.

Other procurement quality requirements shall be specified in the enquiry, contract or order documentation.

4. Acceptance

This document has been seen and accepted by:

Name	Designation
L Thomas	Manager: Specification Engineering (Acting)

5. Revisions

Date	Rev.	Compiler	Remarks
March 2020	1	MV Phalane	First Issue of the Specification

6. Development Team

The following people were involved in the development of this document:

Not Applicable

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7. Acknowledgements

Not applicable

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Appendix A –Floor Response Spectra

Frequency (Hz)	Acceleration (G)
0.10	0.015
0.70	2.20
1.00	2.20
1.60	1.10
15.00	1.10
33.00	0.40
80.00	0.40

Table 1 Horizontal Response SSE 2% damping

Frequency (Hz)	Acceleration (G)
0.10	0.010
0.70	1.40
1.00	1.40
1.60	0.64
15.00	0.64
33.00	0.25
80.00	0.25

Table 2 Horizontal Response OBE 2% damping

Frequency (Hz)	Acceleration (G)
0.10	0.011
0.17	0.031
0.31	0.072
0.47	0.14
0.64	0.14
1.16	0.34
3.14	0.92
3.87	1.02
5.00	1.02
6.00	1.20
6.71	1.58
8.06	1.99
10.9	1.99
12.3	1.93
16.7	1.93
12.3	1.93
16.7	1.93
21.0	0.78
33.0	0.47
90.0	0.47

Table 3 Vertical Response SSE 2% damping

Frequency (Hz)	Acceleration (G)
0.14	0.010
0.17	0.016
0.30	0.036
0.47	0.070
0.63	0.070
0.78	0.090
1.18	0.17
3.08	0.45
3.84	0.52
5.20	0.52
8.02	1.03
9.50	1.03
9.86	1.04
16.6	1.04
21.3	0.38
33.0	0.26
90.0	0.26

Table 4 Vertical Response OBE 2% damping

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