Eskom	Standard	Technology

Title: **Transformer and Reactor Rapid Pressure Rise Relay Standard**

Unique Identifier:	**240-56063867**
Alternative Reference Number:	**41-898**
Area of Applicability:	**Engineering**
Documentation Type:	**Standard**
Revision:	**1**
Total Pages:	**6**
Next Review Date:	**October 2015**
Disclosure Classification:	**CONTROLLED DISCLOSURE**

APPROVED FOR AUTHORISATION
☑ TECHNOLOGY ENGINEERING
DOCUMENT CENTRE ☎ X4962

Compiled by	Approved by	Authorised by
S. Mtetwa	S. Mtetwa	R. Cormack
Corporate Specialistt	Corporate Specialistt	Senior Manager HV Plant
Date: 30/11/2012	Date: 30/11/2012	Date: 30/11/2012

Supported by TDAC

D. Odendaal

TDAC Chairperson

Date: 4/3/2013

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1. INTRODUCTION

This document consists of transformer and reactor rapid pressure rise relay standard.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document shall be used as a minimum requirement for the selection and purchase of rapid pressure rise relays fitted to transformers and reactors.

2.1.1 Purpose

None

2.1.2 Applicability

Pressure rise relays fitted to new transformers and reactors
Purchase of new rapid pressure rise relays
Replacement of rapid pressure rise relays for transformers repaired in workshops

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

None

2.2.2 Informative

None

2.3 DEFINITIONS

None

2.3.1 Classification

a. **Controlled Disclosure:** Controlled Disclosure to External Parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
A	Amps
kPa	Kilo Pascal
UV	Ultraviolet

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2.5 ROLES AND RESPONSIBILITIES

None

2.6 PROCESS FOR MONITORING

None

2.7 RELATED/SUPPORTING DOCUMENTS

None

3. TRANSFORMER AND REACTOR RAPID PRESSURE RISE RELAY

3.1 REQUIREMENTS

3.1.1 General

Each new or repaired transformer and reactor rated ≥ 80 MVA and ≥ 132 kV shall be provided with at least one rapid pressure rise relay. In the case of large units ≥ 500 MVA and ≥ 400 kV, two units, one on each of the longitudinal end shall be fitted.

The function of the rapid pressure rise relay is to detect dynamic over-pressure conditions caused by abnormal activity inside the main tank and to provide a trip signal to remove the equipment from service.

3.1.2 Service Conditions

This specification gives detailed requirements for rapid pressure rise relays fitted to transformers and reactors:

a. out-of-doors;

b. altitude above sea level up to 1800 m;

c. ambient air temperatures;

- maximum 50 degrees Celsius
- yearly average 25 degrees Celsius
- minimum -10 degrees Celsius

d. average humidity 80%;

e. using modern good engineering practices.

3.1.3 Basic Construction and Operation

The relay shall withstand the affects of full vacuum at sea level and positive pressure of at least 100 kPa. The vibration of the transformer tank shall not produce wear and damage to the internal mechanism of the relay.

The relay shall not operate under normal pressure variations caused by temperature change, vibration, mechanical shock or surges caused by starting and stopping of oil circulation pumps. The relay shall be pressure calibrated and the operating pressure shall be stated on the nameplate. The operating pressure of the relay shall be provided by the transformer or reactor manufacturer.

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The relay shall have a protection class of IP55. Nitrile rubber shall be used as sealing material for "O" rings and flat rubber seals.

Each relay shall be installed on a double flanged gate valve to enable replacement without having to drain the oil from the main tank. Construction of the relay shall prevent collection of gas bubbles inside the casing as far as possible. A bleed screw situated at the highest point on the relay shall be provided to vent trapped air bubbles.

Each relay shall be supplied with a permanent nameplate (stick-on labels are not acceptable) with the following information: Make, Type, Operating Pressure Range and Serial Number.

3.1.4 Corrosion Proofing

Corrosion shall be eliminated by the use of non-corrodible materials, and by avoiding the contact of dissimilar metals. All fasteners shall be stainless steel grade 304 or better. Electro galvanising or electro plating of parts and fasteners is not acceptable. Thread lubrication shall be applied to all threaded areas on bolts, studs and screws. Any good quality high temperature grease is acceptable.

Where cast components are used they shall be of high quality and non-porous castings. Bare metal or aluminium castings shall be epoxy powder coated (exterior grade) or anodised. Corrosion treatment of metal parts and castings shall be subject to written approval from Eskom Transmission.

3.1.5 Trip Signalling and Termination Boxes

One normally open contact shall be provided to close in case of operation. The relay's dynamic operating pressure shall be pre-selected as per the transformer manufacturer's specifications and verified by Eskom Transmission. Electrical contacts shall be rated for 1 A at 220 V DC.

A seal-in relay with a manual reset facility shall be provided inside the Marshalling Kiosk to prevent re-energising of equipment after the device operation.

The relay electrical circuits shall withstand an applied voltage of 2 kV r.m.s. for a duration of 60 seconds at 50 Hz, applied in turn, between each electrically independent circuit and the casing of the relay, and between the separate independent electrical circuits.

A suitable watertight and weather resistant electrical conduit threaded cable entry shall be provided. Each instrument shall be provided with at least 1 compression type gland for fitting of control wiring. Stoppers shall be provided to block the gland holes when not in use.

Terminal boxes shall be mounted to allow cable entry from the side or the bottom – cable entry from the top is not acceptable. Terminal boxes and terminal strips shall allow sufficient space for fitting and securing of 2.5 mm control wiring and cabling. Termination strips shall be numbered and basic wiring diagrams shall be provided inside the lid of the terminal box and in the installation instructions.

The units contacts shall be cabled to the Marshalling Kiosk by means of steel wired armoured cabling that is heat, oil and UV resistant.

3.1.6 Installation

Rapid pressure rise relay shall be installed on the side of the transformer or reactor main tank at a level not higher than 1.5 m from the base of the tank. Installation shall not be directly to the main tank, but shall be fitted to a double flanged gate valve that can be closed to replace the relay if defective. Where two units are fitted they shall be installed on opposite sides of the main tank.

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3.1.7 Routine Testing

Routine testing of the relay shall be possible with the relay installed. Manual operation of the electrical contact shall be achieved by injecting air into a test plug provided for this purpose. Venting of injected air shall be via the air vent plug. Testing by shorting of electrical circuits is not acceptable.

3.1.8 Packing and Documentation

Each relay shall be individually packed inside a cardboard box. The relay shall be securely packed and protected against damage and moisture ingress during shipping and storage.

Original and fully detailed instructions for installation, testing, wiring and maintenance shall be included.

3.2 TECHNICAL EVALUATION AND FINAL APPROVAL

This specification serves as a minimum requirement for manufacturers that supply rapid pressure rise relays. Any deviation from this specification has to be approved by Eskom Transmission in writing.

Final written approval shall be provided once a technical evaluation has been completed and equipment found in compliance with this specification and Eskom Transmission requirements.

4. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
	This Document has been approved by TDAC ROD 13 February 2013

5. REVISIONS

Date	Rev.	Compiler	Remarks
November 2012	0	S. Mtetwa	Draft Document for review created from 41-898
June 2013	1	S. Mtetwa	Final Document for Publication

6. DEVELOPMENT TEAM

None

7. ACKNOWLEDGEMENTS

None

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