

Australian Standard 1025—1979

HIGH VOLTAGE SWITCHES

1025 High voltage a.c. switchgear and controlgear—
Switches and switch-disconnectors
Part 2—1989 For rated voltages of 52 kV and
above A4 43pp F

Technically equivalent to and reproduced from IEC 265-2 with changes to suit Australian requirements. Specifies requirements for a.c. switches and switch-disconnectors having making and breaking current ratings at rated voltages of 52 kV and above, for indoor and outdoor installations. It is intended to be read in conjunction with AS 2650.

Committee EL7: Supersedes AS 1025—1979 (withdrawn October 1984): Draft for comment DR 86115. Publication date 1989-07-21: ISBN 0 7262 5431 2.

STANDARDS ASSOCIATION
OF AUSTRALIA

- 7 MAR 1979

MELBOURNE LIBRARY



STANDARDS ASSOCIATION OF AUSTRALIA

Incorporated by Royal Charter

THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS were officially represented on the committee entrusted with the preparation of this standard:

Australian Electrical and Electronic Manufacturers Association

Australian-British Trade Association

Confederation of Australian Industry

Electricity Supply Association of Australia

Railways of Australia Committee

Testing Authorities

The Institution of Engineers, Australia

This standard, prepared by a subcommittee of Committee EL/7, Power Switchgear, was approved on behalf of the Council of the Standards Association of Australia on 23 November 1978, and was published on 1 March 1979.

To keep abreast of progress in industry, Australian standards are regularly reviewed. Suggestions for improvements to publish standards, addressed to the head office of the Association, are welcomed.

AUSTRALIAN STANDARD SPECIFICATION

HIGH VOLTAGE SWITCHES

AS 1025-1979

First published	..	..	..	..	1971
Revised	..	..	..	..	1979

**PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.**

ISBN 0 7262 0200 2

PREFACE

This standard was prepared by the Association's Committee on Power Switchgear as a revision of AS 1025—1971. In general, it is based on IEC 265, High Voltage Switches, including supplements 265A, 265B and 265C and Amendments No 1 and 2. Consideration was also given to a number of IEC documents dealing with common clauses in IEC/SC 17A publications. Acknowledgment is made of the assistance received therefrom.

The main changes from the 1971 edition relate to insulation levels, temperature rise, dielectric tests, artificial pollution tests, partial discharge tests, tests on auxiliary and control circuits and tests for measuring radio interference level.

The insulation levels are based on AS 1824, Insulation Coordination. The values of related voltages are in line with IEC recommendations except that the IEC values of 52 kV and 420 kV are not included. The requirements for temperature rise and the revised test methods closely follow the latest IEC proposals.

Because this standard has been based on various IEC draft documents as well as on IEC 265, and because various sections of the IEC work are being revised and are in a state of flux, it is not practicable to detail deviations from IEC 265. However the intent of the latest IEC proposals for rated normal current, temperature rise, insulation levels and dielectric tests has been incorporated in the standard.

In the application of this standard, reference may be necessary to the following standards:

- AS 1029 AC Contactors (up to and including 1000 V) (IEC 158)
- AS 1034 High Voltage Current-limiting Fuses
- AS 1052 Electromagnetic Interference Measuring Equipment
 - Part 2 — Equipment for the Frequency Range 0.15 MHz to 1000 MHz (CISPR Publications 1, 2 and 4)
- AS 1202 AC Motor Starters (up to and including 1000 V) (IEC 292)
 - Part 1 — Direct-on-line (Full Voltage) Starters
 - Part 2 — Star-delta Starters
 - Part 3 — Autotransformer Starters
 - Part 4 — Rheostatic Rotor Starters
- AS 1306 High Voltage Isolators (Disconnectors) on Earthing Switches
- AS 1307 Surge Diverters — Non-linear Resistor Type
- AS 1824 Insulation Coordination (IEC 71)
 - Part 1 — Basic Principles, Standard Insulation Levels and Test Procedures
 - Part 2 — Application Guide

- AS 1864 High Voltage Alternating Current Contactors (IEC 470)
- AS 1931 High Voltage Testing Techniques (IEC 60)
Part 1 — General Definitions, Test Requirements, Test Procedures and Measuring Devices
Part 2 — Application Guide for Measuring Devices
- AS 2024 High Voltage Fuse/Switch Combinations and Fuse/Circuit-Breaker Combinations (IEC 420)
- AS C320 Classification of Insulating Materials for Electrical Machinery and Apparatus on the Basis of Thermal Stability in Service (IEC 85)
- IEC 129A Alternating Current Disconnectors (Isolators) and Earthing Switches — 1st Supplement on IEC 129
- IEC 507 Artificial Pollution Tests on High Voltage Insulators to be Used on AC Systems
- BS 2725 Temperature Measurements.

© Copyright — STANDARDS ASSOCIATION OF AUSTRALIA 1979

Users of standards are reminded that copyright subsists in all SAA publications. No part of this publication may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing of the Standards Association of Australia.

CONTENTS

	<i>Page</i>
SECTION 1. SCOPE AND GENERAL	
1.1 Scope	7
1.2 Classification of Switches	7
1.3 Normal Service Conditions	7
Table 1.1 Altitude Correction Factor	8
1.4 Non-standard Service Conditions	9
SECTION 2. DEFINITIONS	
2.1 Application of Section	10
2.2 Types of Switches	10
2.3 Electrical Characteristics	10
2.4 Mechanical Characteristics	12
SECTION 3. RATINGS	
3.1 Rating Characteristics	15
3.2 Rated Voltage (<i>U</i>)	15
3.3 Rated Insulation Level	15
Table 3.1(A) Insulation Withstand Levels for Switches of Rated Voltages up to and Including 245 kV	16
Table 3.1(B) Insulation Withstand Levels for Switches of Rated Voltages of 300 kV and above	17
3.4 Rated Frequency	18
3.5 Rated Normal Current	18
3.6 Rated Breaking Capacities	18
3.7 Rated Short-time Withstand Current	19
3.8 Rated Peak Withstand Current	19
3.9 Rated Making Capacity	19
3.10 Rated Pressure of Compressed Gas Supply for Operation	19
3.11 Rated Pressure of Compressed Gas Supply for Interruption and/or Insulation	20
3.12 Rated Supply Voltage of an Operating Device or Auxiliary Circuit	20
Table 3.2 Standard Values of the Auxiliary Supply Voltage	20
3.13 Coordination of Rated Voltages, Rated Normal Currents, Rated Short-time Withstand Currents, Rated Peak Withstand Currents, Rated Making Capacities and Rated Breaking Capacities of General Purpose Switches	21
Table 3.3 General Purpose Switch Coordination	21
SECTION 4. DESIGN AND CONSTRUCTION	
4.1 Mechanical Design	22
4.2 Safety Requirements	22
4.3 The Movable Contact System and its Position Indicating Device	23
4.4 Auxiliary Equipment	23

	<i>Page</i>
SECTION 5. PERFORMANCE	
5.1 Behaviour on Test and in Service	25
5.2 Breaking Capacities	26
5.3 Temperature Rise	28
5.4 Undervoltage Release	28
Table 5.1 Temperature and Temperature-rise Limits	29
SECTION 6. CLASSIFICATION OF TESTS	
6.1 Type Tests	31
6.2 Routine Tests	32
6.3 Commissioning Tests	32
SECTION 7. DETAILS OF TYPE TESTS	
7.1 Dielectric Tests — General	33
Fig. 7.1 Diagram of Connections of a Three-pole Switch.. .. .	35
Table 7.1 Test Conditions for Impulse Voltage Tests on Switches	35
Table 7.2 Test Conditions for Power-frequency Tests	36
Table 7.3 Test Conditions for Switches of Rated Voltage of 300 kV and above	36
7.2 Impulse Tests	37
Table 7.4 Lightning Impulse Voltage Tests — Rounded-off Values for Opposite-terminal Power-frequency Voltage	38
Table 7.5 Switching Impulse Voltage Tests — Rounded-off Values for Opposite-terminal Power-frequency Voltage	42
7.3 Power-frequency Voltage Tests	43
Table 7.6 Power-frequency Withstand Voltages for Rated Voltages of 300 kV and Above	45
7.4 Radio Interference Test	45
7.5 Artificial Pollution Tests	46
7.6 Tests on Auxiliary and Control Circuits	47
7.7 Temperature-rise Tests	47
7.8 Measurement of the Resistance of the Main Circuits	48
7.9 Making and Breaking Tests	49
Fig. 7.2 Measurement of Test Voltage for Breaking Capacity Tests	52
Fig. 7.3 Circuits for Mainly Active-load Current Tests	54
Fig. 7.4 Circuits for Closed-loop Current Tests	55
Table 7.7 Application of Test Duties	58
7.10 Short-circuit Current-carrying Capability	59
7.11 Tolerances	60
7.12 Operation and Mechanical Endurance	60
7.13 Operation Under Ice Conditions	61

SECTION 8. DETAILS OF ROUTINE TESTS

8.1	Power-frequency Voltage Dry Withstand Tests on the Main Circuit	62
	Table 8.1 Test Conditions for Power-frequency Dry Tests on Switches	62
	Table 8.2 Power-frequency Withstand Voltages for Switches of Rated Voltages of 300 kV and above	63
8.2	Measurement of the Resistance of the Main Circuits	63
8.3	Operating Tests	63
8.4	Tests on Auxiliary Equipment	64

SECTION 9. MARKINGS

9.1	Nameplate	65
	Table 9.1 Nameplate Information	65

APPENDICES

A	Calculation of the Impedance of the Supply Circuit for Mainly Active Current Switching Tests	67
B	Procedure for Arranging Pre-arcing Condition when Testing at Reduced Voltage	68
C	Tests for Single Capacitor Bank Switching	69
D	Field Tests for Line-charging Breaking Capacity	74
E	Tests for Cable-charging Breaking Capacity	78
F	Information to be Supplied by the Manufacturer	81
G	Temperature Measurements	82
H	Recommended Test Circuit and Measuring Set for Radio Interference Tests	84
K	Calculation of Atmospheric Correction Factors for Dielectric Tests	86

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for HIGH VOLTAGE SWITCHES

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard applies to high voltage switches, as classified in Clause 1.2 below; designed for use outdoors or indoors on alternating current systems having rated voltages exceeding 1000 V. It should be noted that all switches covered by this standard satisfy the isolating requirements specified in AS 1306 for an isolator.

This standard also applies to the operating devices of the switches and to their auxiliary equipment.

NOTES:

1. Switches in which a fuse is an integral part are not covered by this standard (see AS 2024).
2. Motor starting switches are not covered by this standard (see AS 1202).
3. Contactors are not covered by this standard (see AS 1029 and AS 1864).
4. Earthing switches are not covered by this standard. Earthing switches forming an integral part of a switch are required to comply with the standard for earthing switches (see AS 1306).
5. Switches used in insulated neutral systems may be required to operate under earth-fault conditions. This standard does not include ratings or tests to meet these conditions. A special agreement between manufacturer and purchaser may be necessary.

1.2 CLASSIFICATION OF SWITCHES. For the purpose of this standard, switches shall be classified as follows:

- (a) General purpose switches (see Clause 2.2.4).
- (b) Limited purpose switches (see Clause 2.2.5).
- (c) Transformer off-load switches (see Clause 2.2.6).
- (d) Single capacitor bank switches (see Clause 2.2.7).

1.3 NORMAL SERVICE CONDITIONS. This standard applies to switches that have been designed for use under the following service conditions.

1.3.1 Temperature. The temperature conditions as follows:

- (a) Maximum ambient air temperature .. $\leq 40^{\circ}\text{C}$.