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ON-LOAD TAP-CHANGERS
Part 2—APPLICATION GUIDE

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STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian-British Trade Association

Australian Electrical and Electronic Manufacturers Association

Confederation of Australian Industry

Defence Standardization Committee

Electrical Testing Laboratories

Electricity Supply Association of Australia

Electricity Supply Engineers Association of N.S.W.

Railways of Australia Committee

The Institution of Engineers, Australia

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AUSTRALIAN STANDARD

ON-LOAD TAP-CHANGERS

Part 2
APPLICATION GUIDE

AS 2326, Part 2—1980

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PREFACE

This standard was prepared by the Association's Committee on Static Electrical Machinery.

The standard is Part 2 of a two-part standard. Part 1 specifies requirements for on-load tap-changers for power transformers and their motor-drive mechanisms; Part 2 is an application guide to assist in the selection of suitable on-load tap-changers.

Part 2 is based closely on IEC 542, Application Guide for On-load Tap-changers, and only minor changes have been introduced. Where this standard diverges from IEC 542, this is indicated by a rule in the margin.

It is intended that this standard should be used with reference to revisions of AS C61—1970, Power Transformers, and AS 1078, Part 1—1972, Guide to Loading of Oil-immersed Transformers; and to AS 1931, Part 1—1976, High Voltage Testing Techniques.

Attention is drawn to the following:

- AS C61—1970 is similar to superseded editions of IEC 76
- AS 1078, Part 1—1972 is a loading guide to AS C61—1963
- AS 1931, Part 1—1976 is based on IEC 60

This standard requires reference to the following Australian standards:

AS 1265 Bushings for Alternating Voltages Above 1000 V

AS 1939 Classification of Degrees of Protection Provided by Enclosures for Electrical Equipment

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Australian Standard for ON-LOAD TAP-CHANGERS

PART 2—APPLICATION GUIDE

1 SCOPE. This standard is intended to assist in the selection of suitable on-load tap-changers for use in conjunction with the tapped windings of transformers or reactors which, in the following text, are referred to as transformers.

The designation 'on-load tap-changer' is shortened to 'tap-changer' in the remainder of this standard and all the tap-changers referred to shall be presumed to comply with the requirements specified in AS 2326, Part 1.

The recommendations of the application guide are not mandatory and only represent advice to the tap-changer manufacturer and purchaser. The responsibility for the correct application of the fully assembled tap-changer in connection with the transformer is with the manufacturer of the transformer.

2 SELECTION OF A TAP-CHANGER.

2.1 General. Since the tap-changer represents only a small part of the total cost of the equipment in which it is used, it should be freely chosen to suit the equipment. However, account should be taken of the available standard types of tap-changers.

2.2 Insulation Level. The following values occurring on all tapping positions of the transformer should be checked against the tap-changer manufacturer's declared values in accordance with Clause 3.3.7.4 of AS 2326, Part 1:

(a) Normal power-frequency operating voltages appearing on the tap-changer in service.

(b) Power-frequency voltages appearing on the tap-changer during tests on the transformer.

(c) Impulse voltages appearing on the tap-changer during tests on the transformer or in service.

NOTE: With some winding arrangements, the voltages appearing on the transformer can be abnormally high, e.g.:

—neutral point tappings in auto-transformers,

—line-end tappings, and

—booster transformer arrangements.

These voltages can be affected considerably by the choice of linear, coarse/fine or reversing tapping arrangements. Methods of catering for voltage variation which involve variations in the magnetic flux in the transformer core can also affect the voltages appearing on various parts of the tap-changer (see AS ...., Power Transformers*).

2.3 Current. The tap-changer should satisfy the following conditions:

2.3.1 *Rated through-current.* The rated through-current of the tap-changer as defined in Clause 2.1.17 of AS 2326, Part 1, should be not less than that resulting from the highest value of tapping current of the tapped winding of the transformer (in accordance with Clause .. of AS ..., Part 1—General*).

2.3.2 *Overload current.* When a transformer is to be subjected to overload, the transformer purchaser shall advise the manufacturer of the expected load cycles (see Clause 5.4 herein).

If the transformer is to be overloaded only in accordance with Clause .. (Day-to-day Cyclic Loading) of AS 1078, then the ability of the tap-changers to carry such loading is met—

(a) if the maximum rated through-current of the tap-changer is at least 1.2 times the highest tapping current of the transformer; or

(b) if the tap-changer manufacturer is able to demonstrate that the temperature-rise limits given in Clause 3.3.1 of AS 2326, Part 1, are not exceeded when the contacts carry 1.2 times the maximum rated through-current.

NOTE: The values of current for the other tests of Clause 3.3 of AS 2326, Part 1, remain based upon the value of the maximum rated through-current.

The number of tap changes for each overload period should be limited to the number of operations corresponding to one-half of one complete operating cycle, and the peak temperature rise of the transition resistors should not exceed 360°C for air-environment tap-changers or 300°C for liquid-environment tap-changers.

2.3.3 *Short-circuit current.* The short-circuit current of the tap-changer as given in Clause 3.3.4 of AS 2326, Part 1, should be not less than that resulting from the overcurrent of the associated transformer as given in Clause 1.2 of AS ...., Part 5—Ability to Withstand Short-circuit.*

NOTE: Particular care should be taken to check this current on low-impedance and booster transformers. In some instances, the fault-current value could dictate the choice of tap-changer.

2.4 Breaking Capacity. The highest tapping current and the voltage per step of the transformer should be within the values of rated through-current and relevant rated step voltage declared by the tap-changer manufacturer for the particular tap-changer.

For values outside of those declared, the tap-changer manufacturer should be consulted.

For application to transformers with several different currents and step voltages, the transition

*Revised edition of AS C61 in course of preparation.