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Australian Standard®

ENGINEERS' VERTICAL COMPARATORS (ANALOGUE TYPE) FOR EXTERNAL MEASUREMENT—METRIC SERIES

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FOR EXTERNAL MEASUREMENT — METRIC SERIES NSC 5210]

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The following scientific, industrial and governmental organizations were officially represented on the committee entrusted with the preparation of this standard:

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CSIRO, Division of Applied Physics
CSIRO, National Measurement Laboratory
Department of Defence
Department of Productivity
Department of Technical and Further Education
Federal Chamber of Automotive Industries
Institute of Technology, South Australia
Institution of Engineers, Australia
Institution of Production Engineers
Metal Trades Industry Association of Australia
Railways of Australia Committee
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Australian Standard®

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PREFACE

This standard was prepared by the Association's Committee on Metrology as part of its program to provide standards for a comprehensive range of measuring instruments in the metric series. Initially the need for an Australian standard in the metric series was brought about by the Australian conversion to the metric system and subsequently, but equally importantly, by the need to take into account electronic comparators which are becoming more popular in modern industry.

During the preparation of this standard the committee noted the increasing popularity of engineers' comparators featuring a digital display readout facility, and consideration was given to their inclusion in this standard. There was, however, at the time, insufficient technical information (other than sales literature) available on which to base a specification, and so this standard does not include any reference to these types. In order to ensure that Australian standards reflect contemporary technology it was agreed that such a standard would be published in the near future. To achieve this objective, a small *ad hoc* group of the committee has been established to research and collate information on the performance characteristics of digital readout comparators and, as soon as sufficient information is available, a standard will be prepared.

As yet, engineers' comparators are not covered by international standards although it is anticipated that such standards will be developed by ISO/TC 3, Limits and Fits. Therefore, in order that this standard would be compatible with standards of other countries, the following standards were taken into account during the preparation of this standard:

BS 1054 1975	Engineers' Comparators for External Measurement (Metric Units)
DIN 879	Dial Indicators for linear Measurement
JIS B7519	Micro-indicators
JIS B7536	Electrical Comparators

The assistance received from the above sources is acknowledged.

This standard may require reference to the following Australian standards:

AS 1514	Glossary of Terms Used in Metrology
AS 1965	The Measurement of Surface Roughness by Direct Reading Stylus Electronic Instruments

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

ENGINEERS' VERTICAL COMPARATORS (ANALOGUE TYPE) FOR EXTERNAL MEASUREMENT—METRIC SERIES

SECTION 1. SCOPE AND GENERAL REQUIREMENTS

1.1 SCOPE. This standard specifies requirements for engineers' vertical comparators with an analogue scale and magnification factors of 250 up to and including 10 000. The standard includes requirements for the more important general dimensions, design requirements, finish, accuracy, scale markings, and material necessary to ensure convenience in use and repeatability of readings.

The standard does not include requirements for engineers' comparators with a digital readout facility (see Preface).

NOTE: The performance requirements of this standard are also applicable to comparators with pneumatic amplification having air jets as the sensing media.

1.2 DEFINITIONS. For the purpose of this standard the following definitions apply; those terms marked with an asterisk have been derived from AS 1514, Part 1:

1.2.1 Engineers' vertical comparator — a type of comparator which comprises a rigid stand supporting a measuring head over a work table. The measuring head is provided with a measuring contact whose movements are amplified and indicated on a scale. The means of amplification may be electronic, mechanical, optical or pneumatic.

1.2.2 Analogue comparator — a measuring comparator in which the indication is a continuous function of the corresponding value of the measurand.

***1.2.3 Scale mark**—one of the marks constituting a scale.

***1.2.4 Scale division**—a part of the scale delimited by two adjacent scale marks.

***1.2.5 Scale interval**—the increment of the measurand equivalent to a change in indication of one scale division.

***1.2.6 Scale range**—the interval between the nominal values of the measured quantities corresponding to the terminal scale marks.

NOTE: Scale range for comparators is normally expressed as $\pm A$, where A is the value of the terminal scale mark with respect to the centre zero.

***1.2.7 Repeatability**—the property which characterizes the ability of a measuring instrument to give identical indications, for repeated applications of the same quantity, over a short interval of time under stated conditions of use.

NOTE: Lack of repeatability is exhibited by a measuring instrument when scatter or dispersion of indications is observed in a series of measurements of the same quantity.

***1.2.8 Calibration**—all the operations for the purpose of determining the values of the errors of a comparator.

***1.2.9 Stability**—the property which characterizes the ability of a measuring instrument to maintain constant the mean indication, when used under defined conditions, and the indications are repeated on different occasions which are long compared to the time for observing the indications.

1.2.10 Limits of error—the positive and/or negative values of the errors which must not be exceeded under test.

1.2.11 Flatness tolerance—the maximum permissible distance separating two imaginary parallel planes within which the surface can just be enclosed.

***1.2.12 Magnification factor**—the inverse relationship between the displacement of the measuring anvil and the resultant displacement of the index, i.e.

$$N = \frac{P}{A}$$

where

N = magnification factor

P = displacement of the pointer

A = displacement of the measuring anvil

Example: If the measuring anvil is displaced by 0.01 mm and the resultant displacement of the index is 10 mm, the magnification factor is:

$$\frac{10}{0.01} = 1000$$

1.3 REFERENCE TEMPERATURE. All measurements for the accuracy of performance given in this standard shall be referred to the reference temperature of 20°C.

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