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Australian Standard 1539—1979

METHODS FOR THE ASSESSMENT OF THE MECHANICAL CONDITION OF MILKING MACHINES

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

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

Australian Dairy Farmers Federation

Australian Institute of Dairy Factory Managers and Secretaries

Australian Society of Dairy Technology Incorporated

Confederation of Australian Industry

Dairy Industry Authority of New South Wales

Department of Primary Industry

Hawkesbury Agricultural College

Metal Trades Industry Association of Australia

Departments of Agriculture (N.S.W., Tasmania, Victoria)

Tractor and Machinery Association of Australia

University of Melbourne

Victorian Farmers Union

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

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AUSTRALIAN STANDARD

METHODS FOR THE ASSESSMENT OF THE MECHANICAL CONDITION OF MILKING MACHINES

AS 1539—1979

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PREFACE

This standard was prepared by the Association's Committee on Dairy Farm Equipment under the direction of the Dairying Standards Board. The standard sets out methods designed for testing a milking machine while it is running but not milking. The information obtained by instrumental measurement of air flow, vacuum levels and pulsation systems can be used to predict the performance of the machine when milking and to indicate the necessary adjustments and recommendations to be made to improve milking performance.

Requirements concerning design, construction and performance criteria are not given in this standard as these are the subject of AS 1778, SAA Milking Machine Code. Appendices are included which list approximate losses in vacuum due to friction in airlines and give guidance in the design of a suitable report form on which to record data compiled in carrying out these standard tests.

This standard may require reference to the following Australian Standards:

AS 1349 Bourdon Tube Pressure and Vacuum Gauges

AS 1470 Code of General Principles for Safe Working in Industry

AS 1778 SAA Milking Machine Code.

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SECTION 1. GENERAL

1.1 SCOPE. This standard describes procedures for the assessment of the mechanical condition of milking machines. Essentially, the machine is tested while it is operating but not milking, using an air flowmeter and a vacuum recorder.

Requirements and performance criteria are not given as these are the subject of AS 1778.

NOTE: A guide to the design of test report forms is given in Appendix B.

1.2 PRINCIPLE AND PURPOSE. Instruments are used to measure air flow, vacuum levels and cyclic vacuum changes with the machine operating but not milking. The main objective is to provide information which can be used to predict the likely performance of the machine when milking.

1.3 DEFINITIONS. For the purpose of this standard, the definitions given in AS 1778 and the following apply:

Free air—the volume of air at ambient atmospheric temperature and pressure expressed in litres (L *F*).

Expanded air—the volume of air at ambient atmospheric temperature and at a given vacuum level (L *E*).

Air-flow rate—the volume of air measured as free air *(F)* or expanded air *(E)* per unit time, usually per minute or per second.

Vacuum—any pressure below atmospheric pressure, measured as the extent of the reduction below ambient atmospheric pressure. The site of measurement should be stated, e.g. line vacuum, pulsation chamber vacuum, claw vacuum.

Working vacuum—the mean vacuum level measured near the vacuum regulator when all units (with the liners stopped) and accessories, including the regulator, are operating.

Vacuum pump capacity—the air-moving capacity of the vacuum pump when it has attained working temperature, at specified pump speed and vacuum level at or near the inlet, expressed as litres of free air per minute (L/min *F*).

Reserve air (reserve)—the difference between vacuum pump capacity and the machine's consumption of air under any given conditions.

Total reserve—the surplus pump capacity, measured at the working vacuum level, when all units (with teatcups plugged) and accessories are operating and the vacuum regulator is disconnected.

Machine air consumption (machine consumption)—the total volume of air per minute represented by the sum of (a) to (e) below:

(a) *Releaser consumption*—the air required to operate the double-chambered releaser or the pulsator-controlled diaphragm releaser.

(b) *Pulsation consumption*—the air required to produce pulsation in the teatcups (all units).

(c) *Pulsator consumption*—the air required to operate the pulsators.

(d) *Claw air admission*—the air passing through the air admission holes or grooves in the claw pieces.

(e) *Ancillary equipment*—the air required to operate ancillary equipment installed, e.g. automatic cluster removers, milk meters.

Air leakage—all air entering the machine other than that which enters via the vacuum regulator or as required for machine consumption.

Pulsation—cyclic opening and closing of a teatcup liner.

(a) *Simultaneous pulsation*—when cyclic movement of all liners within a cluster is synchronized.

(b) *Alternate pulsation*—when cyclic movement of half the number of liners in a cluster alternates with the movement of the other half.

(c) *Pulsation cycle*—one complete liner movement sequence.

(d) *Pulsation rate*—the number of pulsation cycles per minute.

(e) *Pulsation chamber vacuum record*—each cycle of the record of pulsation chamber vacuum (see Fig. 1.1) is described as having four phases viz—

(i) increasing vacuum phase (designated *a*);

(ii) maximum vacuum phase (designated *b*);

(iii) decreasing vacuum phase (designated *c*);

(iv) minimum vacuum phase (designated *d*).

The duration of each phase is measured between the points at which the record intersects abscissae drawn at 4 kPa below maximum vacuum and above atmospheric pressure. The pulsation ratio is expressed as a percentage of the total cycle time by the following formula:

$$\frac{a+b}{a+b+c+d} \times 100$$

1.4 TEST EQUIPMENT.

1.4.1 General. The inspection and testing procedures described in the following Sections will require normal ancillary test equipment together with instruments to measure air-flow rate and vacuum level, and to record vacuum changes. These test instruments shall comply with the requirements specified in Clauses 1.4.2, 1.4.3 and 1.4.4 respectively.