Withdrawn : December 1995

Under revision see Drafts DR97241CP and (IN PART) DR97242CP (IN PART)

SUPERSEDED BY:
AS 4024.2-1998
AS 4024.3-1998
AS 4024.4-1998
AS 4024.5-1998

AS 4024.2(Int)—1992
(Expires 17 August 1994)

Interim Australian Standard®

Safeguarding of machinery

Part 2: Presence sensing systems

STANDARDS AUSTRALIA

This Interim Australian Standard was prepared by Committee SF/41, General principles for the safeguarding of machinery. It was approved on behalf of the Council of Standards Australia on 5 May 1992 and published on 17 August 1992.

The following interests are represented on Committee SF/41:

Department of Employment, Vocational Education, Training and Industrial Relations, Queensland

Department of Labour, South Australia

Department of Occupational Health, Safety and Welfare, Western Australia

Ergonomics Society of Australia

Federal Chamber of Automotive Industries

National Occupational Health and Safety Commission

Occupational Health and Safety Authority, Victoria

University of Melbourne

University of New South Wales

WorkCover Authority of New South Wales

AS 4024.2(Int)—1992

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Safeguarding of machinery

Part 2: Presence sensing systems

First published as AS 4024.2(Int)—1992.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW
ISBN 0 7262 7516 6

PREFACE TO AS 4024.2(Int)—1992

This Interim Australian Standard was prepared by the Victorian Occupational Health and Safety Authority and published by Standards Australia using the accredited document method.

This document was originally prepared in Victoria, with the intention of its being referenced in regulations. It has been endorsed by the Standards Australia Committee on General Principles for the Safeguarding of Machinery for adoption as an Interim Australian Standard in order to make it available nationally. The text has been left in the style of the Victorian Occupational Health and Safety Authority. The Committee was aware of numerous editorial and textual inconsistencies within the document.

Because this Interim Standard was prepared by the Victorian Occupational Health and Safety Authority, and the text remains unaltered, references within the text to 'department's', 'authority' and 'enforcing authority' are made. For the purpose of this Standard these references are to be replaced by 'regulatory authority', which is defined as follows:

> "a Minister of the Crown, a government department, commission or other authority having power to issue regulations, orders or other instructions having the force of law in respect of any subject covered by this Interim Standard".

Reference is also made to the 'State of Victoria', and for the purpose of this Standard this should be replaced by 'Australia'. Specific reference is also made to the Occupational Health and Safety Act 1985, which is applicable only in Victoria.

Standards Australia invites comment on this Interim Standard from persons and organizations concerned with this subject. The date of expiry for comment is 17 August 1994, at which time this Interim Standard will either be withdrawn or revised in the light of public comment, with the view to the preparation of an Australian Standard, or adoption of the proposed International Standards which are under preparation.

During the life of this document, Committee SF/41 will monitor all comment or field data as and when it is received.

Attention is drawn to the fact that this document is an Interim Australian Standard only and should be regarded as a developmental Standard and hence liable to future alteration.

PREFACE TO VOHSA CODE OF PRACTICE

This specifications document has been prepared by the Occupational Health and Safety Authority (known hereafter as the Authority or OHSA) to supersede the Department of Labour Bulletin 88-14 or any other documentation relative to this topic; and although responsive to the requirements of the Proposed Plant Safety Regulations is not necessarily incumbent to those regulations; being self supportive in their own right.

The document provides the minimum criteria acceptable by the Authority for presence sensing safeguarding systems (known hereafter as PSSS.) which includes pressure sensitive safety devices which encompasses pressure sensitive mats (PSM's) and pressure sensitive strips (PSS's) and their use on plant/machinery in Victoria.

Machinery in the context of this document means being an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits etc, joined together for a specific application, in processing, treatment, moving or packaging of materials.

Machinery within the document also covers an assembly of machines which in order to achieve the same end, are arranged and controlled so that they function as an integral unit.

Where the requirements refer to any tests or similar directives that may be deleterious to the health and safety of persons adequate precautions must be taken to protect those persons.

The content of the document and its technical suitability in no way absolves the designer, manufacture, supplier, installer, repairer, employer, occupier or any other person from any statutory obligation in relation to the health and safety of persons within this State.

The requirements detailed within this document are a compilation of Standards from various sources, in an endeavour to provide comprehensive information for all parties responsive to *The Occupational Health and Safety Act 1985* (or any other legislation).

In addition, for the sake of uniformity, the information introduces the elements of international accepted standards.

The document may be interim, dependent on the completed outcome of the CEN Standards, however in any case may be subject to change from time to time at the discretion of the Occupational Health and Safety Authority and the Tripartite Processes of the Occupational Health and Safety Commission.

The information is gathered from:

* Department of Labour Bulletin 88-14 Specifications for Photoelectric Guarding Systems.
* British Standard BS 6491 - 1988 Electro-sensitive Safety Systems for Industrial Machines both Part 1 and Part 2.
* Health and Safety Executive Guidance Note PM-41. The application of photo electric safety systems to machinery.
* European Standard - Safety of Machinery Pressure Sensitive Safety Devices - Mats and Floors CEN/TC 114.
* German proposal - Electro - Sensitive Safety Systems CLC/TC44X

FOREWORD

Objectives.

The objectives of the Presence Sensing Safeguarding Systems document are three fold, providing;

* designers, manufacturers and suppliers with all the necessary information to achieve conformity with the statutory requirements of "The Occupational Health and Safety Act 1985" and its Regulations; and as well

* provides verifiable performance specifications contributing to the raising of the level of quality of plant and their control systems and safeguards when the plant is supplied to workplaces, and as well

* promotes national uniformity and consistency of interpretation with recognised Australian and International Standards and principles.

To achieve the objectives the specification provides predominantly by design;

* the technical principles and establishes verifiable performance requirements to assist designers, manufacturers and suppliers etc, in achieving safety in the design of machinery; as well as

* for the installation, care and operation of presence sensing safeguarding systems and/or the machine control systems that perform safety functions.

To achieve the objectives and to engender the purpose of quality improvement of plant and the development of uniformity and consistency of interpretation the specification;

* brings together from many sources information not previously found in one place, and

* the content has been prepared with the aim of promotion of technical harmonisation, and

* the promotion of uniform interpretation of the prevention aspects of machinery and presence sensing safeguarding systems, in order

* to achieve a level of commonality with recognised Australian and International Standards.

Purpose.

The purpose of the specification is to provide guidance for those persons who have duties under "The Occupational Health and Safety Act 1985" and any other relevant (or Proposed) legislation, but the document is a verifiable performance standard which should not be construed to be or regarded as an interpretation of the law.

Responsibilities are predominantly assigned for the provision of safe plant and its associated safeguarding systems (regardless of the energy source) to the designer, manufacturer and supplier, however performance duties are also detailed for installers, commissioning agents, and repair as well as employers responsibilities such as maintenance auditing, testing and examination, and is appropriate to both new and existing and second hand plant.

The performance requirements should encourage designers, manufacturers and suppliers to raise the level of quality of the plant and its safety aspects before commissioning in the workplace, and as such provides for the designer, manufacturer, supplier or their authorised representative to declare that the plant and its safety system complies with the relevant specifications.

To achieve this the document requires risk assessment of the machinery to categorise the plant and achieve an equitable separation distance for the safe guarding systems.

Recognising the improbability of updating plant and equipment, and changing methods allied with the supply and use of plant with these systems; immediately, or in the short term after the introduction of the specification; a four year period has been established in equity with European Standards before the specific requirements as applicable to existing installation systems are required to be effective in total.

Additionally, the Authority recognises the words "safe" and "safety" are not absolutes, as safety is influenced by many factors. The specification should not be perceived to replace judgement but rather should be considered to positively contribute to the evaluation of the introduction of a safeguarding system into a concept giving consideration to all aspects of the plant and its environment.

The specification development was complicated by the wide variety and size of plant and its use, as well as the virtually infinite combinations of operating conditions; however it provides the emphasis for the design, manufacture, supply, installation and operation of plant, their controls and safeguards to satisfy the essential statutory health and safety requirements as well as mitigating potential dangers to operators and other persons.

These aspects include such things as materials used in construction, and the products used or created during its use, lighting, controls, stability, noise, vibration and maintenance.

Amongst other things the specification requires safeguarding devices and plant to:

- satisfy wide ranging health and safety requirements broader than the installation giving consideration to the machine and its use as well as the environment in which it will operate, and
- be subject to examination and type testing by the appropriate accredited body; and
- carry a label detailing specific information; and
- be required to provide a comprehensive adequate information package and the provision of training where necessary.

Justification.

* The quality of plant and its control systems are not keeping pace with the technological advancements being made within safeguarding systems
* Systems are becoming more difficult to verify and review due to the technology, for example logic controllers
* There is no comprehensive data available to provide designers etc with detailed information
* Statistics relative to this technology and use on equipment are increasing
* Existing prescriptive regulations are out of date with the technology
* Existing prescriptive regulations are not related with the technology effused within national and international requirements
* Lack of consistency (duplication) between existing requirements
* Existing requirements philosophically incorrect in onus of responsibility in that there is an apparent acceptance for defacto government acceptability for design review and audit

* Consolidation of information and self regulatory processes re third person accreditation removes economic penalties and frustration of long delays in obtaining government approval

* Importations and existing requirements comparable fostering opportunity for export etc

* Recognising the difficulty of small businesses to cope and their lack of knowledge in the field of this technology and plant (as well as the lack of control they have over plant supplied) quality emphasis is given to design, manufacture and supply etc.

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INTRODUCTION

1. This document provides the mandatory specifications for the general design and performance requirements for presence sensing safeguarding systems (PSSS) in the State of Victoria; and their applications on plant/machinery.

2. In addition, the contents also specify the application, installation and use of presence sensing safeguarding systems for the safe guarding of plant/machinery. It identifies the different functions performed by the safety systems, classifies the machinery for which the presence sensing safeguarding systems may be applicable and provides for each use and classification, the Authority's requirements on dimensions and disposition of the presence sensing safeguarding system, as well as the necessary machine characteristics and interfacing requirements. Requirements are also specified for examination, inspection, and testing.

3. Specifications are also provided detailing the Authority expectations relevant to notification obligations and verification of installers.

4. However each type of plant/machine presents its own particular hazards and it is the responsibility of the Designer, Manufacturer, Supplier, Employer or Occupier to identify these hazards associated with the machine and its use and to determine the most effective manner of application of the safety system and any particular machine.

5. The Authority takes the view that on such applications there will be a consultation and/or agreement between the Designer, Manufacturer, Supplier, Employer, Occupier and the machine user (or workers); and where necessary with the enforcing authority.

6. A presence sensing safeguarding system is a guarding system which is intended to be applied to machines that present risks to the health and safety of persons and which cannot be practicably guarded by the normally accepted hierarchy of control detailed in the appropriate Australian Standard dealing with general principles for machine guarding. It must provide protection at least equal to that of the normally prescribed methods of guarding and must cause the plant/machinery to revert to a safe condition before any person can come in contact with dangerous parts.

7. The presence sensing safety system incorporates a sensing device (or devices) that employ one or more forms of radiation either self generated or otherwise by pressure for detecting the proximity of persons to the dangerous parts.

8. An essential feature of any presence sensing safety system must be the high level of safety integrity required of the equipment, and to this end built in periodic functional self checks are required. These self checks are intended to ensure that failure of part of the equipment, interruption of power supply or spurious external effects do not reduce the level of protection provided.

9. **The contents of this specifications document are appropriate to all new machinery and new Presence Sensing Safeguarding Systems (including those machines and systems identified in Appendix 12) from the 1st February 1992.**

EXISTING APPLICATIONS

10. This document (except where specified in the attached Appendix 5) is not meant to be retrospective but industry/trade association, designers, suppliers, employers, occupiers, and users are encouraged to bring existing installations into line with the requirements.

11. **Except for those machines identified within Appendix 12 of this specification which shall be treated as new machinery; designers, manufacturers, suppliers, employers, occupiers and users shall only after a systematic and planned approach to hazard analysis and risk assessment of the plant, (including the associated equipment and systems of work); make a valued judgement whether existing machinery should either comply with the specifications document or comply with the existing standards.**

When considering this option and before making a decision persons should as a minimum pay particular attention to the machine performance factors in Section 4 Clause 4.1.2 and the General Performance Requirements of Section 4 Clauses 4.2 and 4.3.

The hazard analysis and risk assessment is to identify the hazards present at the machine during all modes of operation and at each stage of the machine life if the person decides to retain the existing machine componentary and circuits when installing an presence sensing safety system. The evaluation shall take into account the following factors; the probability of a dangerous event occurring, the frequency of the occurrence of the hazard and consequently person exposure to the hazard and the highest foreseeable severity of the injury arising from the hazard.

The determination of the level of risk must ensure that if the decision is made to retain the existing machine and/or its associated systems, then if a fault occurs, the level of the machine integrity does not lower the level of safety function (and its reliability) of the machine beneath that if it had been modified, and endanger any person.

All plant installed with presence sensing safeguarding systems shall satisfy the requirements of this specifications document by the 31st December 1995.

SCOPE

12. The requirements contained in this document are relevant only to presence sensing safeguarding systems to protect persons from dangerous parts of plant/machinery. The requirements do not apply to those devices used solely for sequence control of machinery processes or other production oriented purposes except if they affect the health and safety of any persons.

13. The specifications within this document require presence sensing safeguarding systems to be considered relative to the "total environment", i.e. for example the non contact safety device; the interface of the device and the machinery considerations relative to that device and interface.

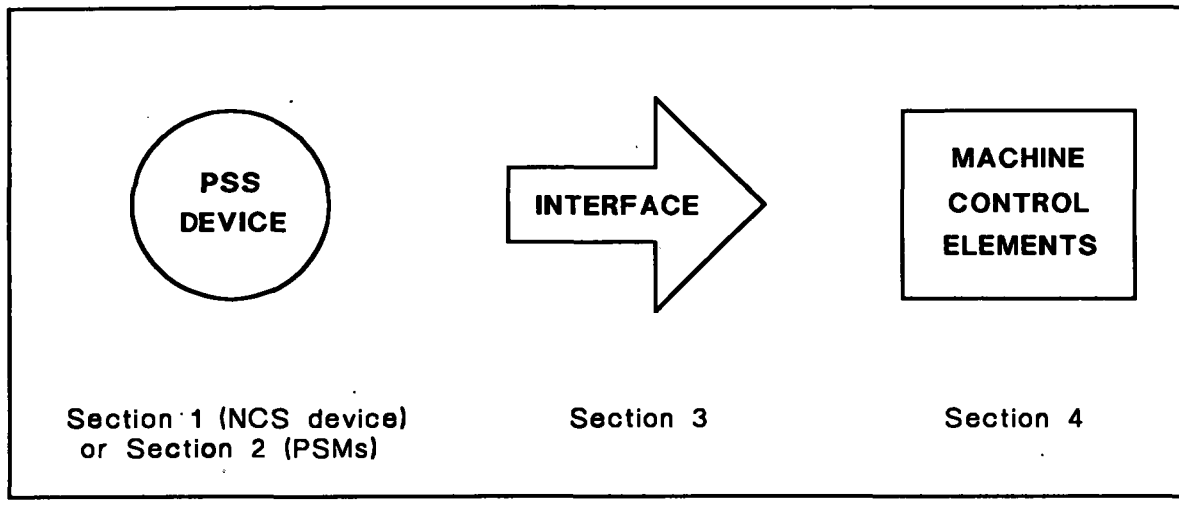

FIGURE 1 SCHEMATIC REPRESENTATION OF ELEMENTS OF PRESENCE SENSING SAFEGUARDING SYSTEMS
(authority verification will only be forthcoming after the three elements have been satisfied)

SECTION 1 : REQUIREMENTS FOR NON CONTACT SAFETY SYSTEMS

This section specifies the general requirements for design, construction and testing for non contact safety (NCS) systems which may be part of the presence sensing safeguarding system (PSSS) for the safeguarding of machinery.

1.1 DEFINITIONS

1.1.1 Area Of Detection

The area within which a response to the specified test piece will take place.

1.1.2 Automatic Check Interval

The automatic check interval is the maximum time between completions of successive automatic, or inherent checks which are made to ensure that the Sensing Unit (SU) is operating within the manufacturers specification.

1.1.3 Automatically Operating Supervisory Circuit

A means to automatically check the defect free operation of components upon which the safety performance of the non contact safety system is dependent. It should prevent the occurrence of a hazardous condition upon detection of a defect in any such component including any of the following:

- Detector
- Detector signal to control circuit interface devices
- Any device intended to mute the guard
- Any device which returns the guard from a muted condition to a guarded condition
- Final switching devices
- Interface circuitry connecting or controlling the final switching devices to the final machine control element.

1.1.4 Bottom Stop

A position in the stroke of, for example a power press and similar closing machines at which the dangerous parts are automatically stopped and the guard muted, not more than 10 mm from the lowest (*the term lowest is synonymous with highest in relation to up-stroking machines*) possible position of the machine stroke. To obtain further closing movement, the starting control should be released and reoperated and the sensing field subsequently restored to an effective condition prior to the next dangerous portion of the machine cycle.

1.1.5 Competent Person

Throughout this specification means a person whom the employer ensures has acquired through a combination of training, education, and experience, knowledge and skills enable that person to correctly perform a specified tasks.

1.1.6 Curtain Object Detection Capability

The minimum size of test piece which when placed anywhere at right angles into the sensing field will be detected, thereby causing the final switching devices to actuate.