1995 ED.

AS 1020—1984
UDC 621.319.7:621.316.9

ENDORSED BY CANZ
OCT. 1992

Australian Standard 1020—1984

THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

AS/NZS 1020:1995
The control of undesirable static electricity
(In Professional Packages 24A, 40A, 57A) 74pp
Provides recommendations relating to safe control of electrostatic charges generated incidentally by processes or activities. Its purpose is to assist in reducing fire, explosion and nuisance aspects associated with static electricity. It outlines conditions under which the presence of static causes a hazard and recommends methods for its safe dissipation or mitigation. Appendices provide information about the hazards caused by static electricity in the vicinity of flammable mixtures, on minimum ignition energies for a range of chemicals and give examples of solving problems resulting from static electricity.
(EL/25): Supersedes AS 1020—1984: Publication date 1995-03-05.

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

H

This Australian standard was prepared by Committee EL/25, Control of Undesirable Static Charges. It was approved on behalf of the Council of the Standards Association of Australia on 14 February 1984 and published on 6 April 1984.

The following interests are represented on Committee EL/25:

Australian Chemical Industry Council
Australian Institute of Petroleum Limited
Australian Institute of Physics
Australia Post
CSIRO, National Measurement Laboratory
Department of Defence Support
Department of Housing and Construction
Department of Industrial Affairs and Employment, S.A.
Department of Industrial Relations, N.S.W.
Department of Mineral Resources, N.S.W.
Department of Minerals and Energy, Vic.
Insurance Council of Australia Ltd
Plastics and Rubber Institute
Plastics Institute of Australia
Telecom Australia
University of Melbourne, School of Physics
Various industrial bodies

This standard was issued in draft form for comment as DR 82198.

AUSTRALIAN STANDARD

THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

AS 1020—1984

First published 1970
Second edition 1984

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

ISBN 0 7262 3363 0

PREFACE

This standard was prepared by the Association's Committee on the Control of Undesirable Static Charges and supersedes AS 1020—1970, Code of Recommended Practice for the Control of Undesirable Static Electricity (known as the SAA Static Electricity Code).

Static is generated by relative movement or separation between two dissimilar surfaces in intimate contact. It is of common occurrence in daily life but often causes danger, discomfort or inconvenience. Under some conditions electrostatic voltages can reach a value in excess of the dielectric strength of air (or other medium) and a spark discharge then occurs. Hazardous conditions exist where such a discharge is liable to occur in areas containing flammable materials. In other instances, static does not present a danger but can cause operational problems during manufacturing or handling processes. Articles sticking to each other or neighbouring objects, and the attraction of dust and foreign material are common examples.

The purpose of this standard is to outline recommendations for the safe control of electrostatic charges generated incidentally by processes or activities. It is emphasized that the standard comprises recommendations and is not intended to become a set of mandatory rules. The standard details the principal methods for safely controlling static generated by solid objects, persons, liquids, dusts and also gases which contain entrained solid or liquid particles (transfer of pure gas does not generate static). Recommendations are included for some specific processes in which the generation of static is a major hazard or inconvenience, but because of the multitude of processes in which static causes operating problems it is not possible that specific recommendations can be included for each case. In particular cases, however, the standard includes a comprehensive introduction on factors involved in the generation of static and the danger it can present in a given environment. Together with the principal control methods these introductions are intended to promote an understanding of the problems and control methods in general and therefore provide a sound basis on which judgement can be applied for solving problems not specifically mentioned.

To further facilitate application of the standard, Appendix D gives examples of how practical problems resulting from static have been solved.

In instances where static charges are liable to accumulate in hazardous locations, it is often necessary that the removal of flammable materials take precedence over, or at least be undertaken in conjunction with, the control of static. Appendix A, therefore, discusses the factors associated with determining the flammable limits of air and vapour mixtures and also outlines recommendations for the removal of flammable mixtures of all types.

For proper application of the control methods, the necessity for measurement of electrostatic parameters is often of fundamental importance. Electric potential and electric field strength detectors and methods for using them are therefore described. Similarly, equipment and methods are described for measuring the actual magnitude of an electric potential and electric field strength. Step-by-step procedures are also detailed for electric potential and electric field strength measurements in hazardous locations. The likelihood of a high-intensity static spark emanating from any object is, among other considerations, dependent on the electrical capacitance of the object, and methods and equipment are therefore described for measuring capacitance. Techniques and instruments for measuring liquid conductivity and the resistance of persons, earthing circuits, materials and products are also included.

Static control methods depend to a large extent on the resistance of the material under consideration. In most cases resistance is measured in terms of 'resistivity', but in the case of liquids it has been found more practicable to measure in terms of 'conductivity'. This standard has therefore adopted the use of volume resistivity (ohm metre) units for all products except liquids which have been measured in terms of conductivity (siemens per metre—see Clauses 1.4.4.5 and 1.4.5.3).

Two new sections have been added to the standard: Section 9, Powdered or Granular Solids, and Section 18, Handling of Electrostatic Sensitive Devices (ESD). Section 18 was added because of the large proportion of public comment requesting that ESD be included. The committee preparing the standard recognizes that Section 18 is incomplete, but because of the long delay that would be introduced in forming another subcommittee to draft an appropriate section, it was decided to mention the problems of ESD in this edition and expand on them when the standard is next revised.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard sets out recommendations for controlling static electricity (hereinafter referred to as 'static') which may be generated incidentally by processes or activities and which may present hazards, damage or inconvenience.

Considerations relating to the generation of static and the problems it presents in a given environment are given, together with a description of methods and equipment for measuring electric potential, charge, capacitance and resistance parameters associated with electrostatically charged objects. Specific control methods are given for some industries.

The provisions of the standard should not be regarded as overriding statutory requirements, but may be construed as working recommendations to be used in conjunction with such requirements.

Methods for minimizing the risk of static causing a fire or explosion arising from the use of flammable medical agents are not included, as they are given in AS 1169. Similarly, methods for affording protection from lightning are not included, as these are given in AS 1768, nor does this standard include the earthing systems of patient treatment areas in hospitals and the like.

NOTE: Examples of the solving of some practical problems resulting from static are given in Appendix D.

1.2 PURPOSE. Static often causes the inadvertent ignition of flammable mixtures. In other instances it can result in inconvenience or operating problems in industrial and commercial processes.

The purpose of this standard is therefore to assist in reducing the fire, explosion, damage and nuisance value associated with static, by promoting a better understanding of the principles relating to its generation, outlining conditions under which its presence causes these problems, and recommending methods for its safe dissipation or mitigation.

1.3 REFERENCED DOCUMENTS.

1.3.1 Standards. The following standards are referred to in this standard:

AS 1000	The International System of Units (SI) and Its Application
AS 1169	SAA Medical Agents and Gases Safety Code
AS 1596	SAA LP Gas Code
AS 1768	Lightning Protection
AS 1847	Carbon Dioxide Type Portable Fire Extinguishers
AS 1852	International Electrotechnical Vocabulary
AS 2017	Rules for Safety Procedures Affecting the Operation, Maintenance and Repair of Road Tank Vehicles for Flammable Liquids
AS 2106	Methods for the Determination of the Flashpoint of Flammable Liquids (Closed Cup)
AS 2187	SAA Explosives Code Part 1—Storage and Land Transport of Explosives Part 2—Use of Explosives
AS 2210	Safety Footwear
AS 2430	Classification of Hazardous Areas Part 1—Explosive Gas Atmospheres
AS 3000	SAA Wiring Rules
AS B282	Industrial Blastors
SAA MP30	Report on Effects of Current Passing Through the Human Body
IEC 417	Graphical Symbols for Use on Equipment
BS 2050	Electrical Resistance of Conducting and Antistatic Products Made from Flexible Polymeric Material
BS 2782	Methods of Testing Plastics Part 2—Electrical Properties: Method 250A—Antistatic Behaviour of Film. Charge Decay Method Part 2—Electrical Properties: Method 250B—Antistatic Behaviour of Film. Electroscope Method Part 2—Electrical Properties: Method 250C—Antistatic Behaviour of Film. Field Window Method
BS 3187	Specification for Electrically Conducting Rubber Flooring
BS 5451	Specification for Electrically Conducting and Antistatic Rubber Footwear
BS 5783	Code of Practice for the Handling of Electrostatic Sensitive Devices
BS CP102	Protection of Buildings Against Water from the Ground.

1.3.2 Other publications. The following other publications are referred to in this standard:

IP	The Institute of Petroleum (UK) Model Code of Safe Practice Part 1—Electrical Safety Code Part 2—Marketing Safety Code Part 7—Airfield Safety Code Part 9—Liquefied Petroleum Gas
AIP CP8	Australian Institute of Petroleum Ltd Code of Practice for Precautions Against Electrostatic Ignition During Tank Vehicle Loading
API RP2003	American Petroleum Institute Recommended Practice for Protection Against Ignitions Arising Out of Static, Lightning and Stray Currents