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SAA PACKAGING CODE

Part 4—PROTECTION AGAINST SPOILAGE OF PACKAGES AND THEIR CONTENTS BY MICRO-ORGANISMS, INSECTS, MITES AND RODENTS

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Agricultural and Veterinary Chemicals Association of Australia

Adhesives and Sealants Manufacturers Association

Ansett Airlines of Australia

Australian Institute of Packaging

Bureau of Steel Manufacturers of Australia

Canmakers Institute of Australia

Confederation of Australian Industry

Department of Defence

Department of Primary Industry

Department of Productivity

Glass Packaging Institute of Australia

Packaging Council of Australia

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PREFACE

This standard was prepared by the Association's Packaging Code Committee under the direction of the Packaging Standards Board. It is Part 4 of the SAA Packaging Code (based on BS 1133, Packaging Code) and supersedes AS 1471—1973.

Packed goods and their containers are liable to attack by microorganisms, (i.e. moulds and bacteria), and by insects, mites and rodents. Foods and textiles are the products most likely to suffer such attack with consequent deterioration. Damage to other products includes the infestation and decay of wood, rotting of paper, moulding of leather, disintegration of laminated articles, etching of optical glass, and discoloration and staining of many kinds of materials.

No attempt has been made in this standard to detail techniques for the protection of particular commodities since the many problems involved are too specialized and are best dealt with individually.

The appropriate method for preventing attack will depend on the anticipated environment, and also on the susceptibility of the package and its contents to spoilage. Although the treatment of the commodity may not be the direct concern of the packer, it will influence what forms of protection may subsequently be required. As it is not possible to specify in detail the most satisfactory method for every set of circumstances, this standard gives general guidance and indicates when expert advice should be sought.

The SAA Packaging Code (AS 2400) has been divided into parts dealing with specific subjects, as follows:

Part	*Title*
1	Glossary of Packaging Terms*
2	Basic Principles of Packaging Practice
3	Mechanical Aids in Package Handling
4	Protection against Spoilage of Packages and their Contents by Microorganisms, Insects, Mites and Rodents*
5	Metal Protection
6	Paper and Board, Wrappers and Containers
7	Wooden Containers
8	Textile Bags, Sacks and Wrappings
9	Metal Containers
10	Cushioning Materials
11	Cordage
12	Adhesive Closing and Sealing Tapes
13	Tensional Strapping
14	Adhesives for Packaging
15	Glass Containers
16	Transparent Cellulose Films, Plastics Films, Metal Foils and Flexible Laminates
17	Plastics
18	Use of Desiccants in Packaging
19	Packaging for Airfreight*
20	Handling of Goods in Freight Containers*
21	Packaging of Dangerous Goods
22	Closures
23	Shrink and Stretch Wrapping

*Published.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
SAA PACKAGING CODE

PART 4—PROTECTION AGAINST SPOILAGE OF PACKAGES AND THEIR CONTENTS BY MICROORGANISMS, INSECTS, MITES AND RODENTS

1 SCOPE. This standard provides information and recommendations intended to assist packers in taking reasonable precautions against damage to packages and their contents from attack by microorganisms (e.g. moulds, fungi, bacteria, yeasts) as well as insects (including termites), mites and rodents.

2 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 1157	Methods of Testing Materials for Resistance to Fungal Growth
AS 2400	SAA Packaging Code
	Part 1 —Glossary of Packaging Terms
	Part 18—Use of Desiccants in Packing

3 DEFINITIONS. For the purpose of this standard, the definitions given in AS 2400, Part 1, apply.

4 TYPES OF SPOILAGE.

4.1 By Microorganisms. Fungi, bacteria, moulds and yeasts are ubiquitous and their ability to adapt themselves to varied environmental conditions should never be underestimated. Their food may be supplied by the packaging material itself or by films or dirt or grease thereon. They usually inflict damage far greater in extent than their food requirements; this damage may also encourage attack by insects.

Packaging materials may become discoloured or stained, but this does not necessarily indicate a reduction of protective properties. More important damage includes penetration into and loss of strength of the packaging materials or their bonding agents, sometimes leading to partial or complete disintegration. Such damage can lead to contamination or degradation of the contents, which in turn may result in the production of discoloration, undesirable odours, or toxic substances.

The development of microorganisms cannot take place without moisture, but they are capable of using atmospheric moisture. They can grow over a wide range of temperatures, some at the temperature of cold storage, others at 60° C or above. The temperature which is optimal for growth of many is about 25° C; others favour 37° C. They will not generally grow at relative humidities of less than 70 percent. They require oxygen for growth, but some tolerate and others require the absence of oxygen.

4.2 By Insects, Termites and Mites. Packaging materials and many packed products are liable to damage and spoilage by insects and mites, both in transit and in store. The infestation may be revealed by bore holes (usually emergence holes), by living or dead insects or their cast skins, or by debris; or it may be hidden with little or no external sign. Evidence of their presence as 'fouling' agents within packages, particularly those containing foods, often causes much more concern than the loss of product by consumption or leakage.

The conditions favouring the development of insects and mites vary greatly according to the species concerned. Most insects will not develop satisfactorily at temperatures below 15° C, but some of the important mites will do so. In general, high climatic temperatures are more favourable than low ones, the optima being lower for mites than for insects.

For most insects 70 percent to 75 percent is a very favourable relative humidity range. Species that are primarily fungus feeders may require more moist conditions, but some, including several of the important pests of cereal products, will develop and increase rapidly at relative humidities below 50 percent. In general, mites are less tolerant of dry conditions than insects but a few survive and develop slowly at about 60 percent relative humidity.

Insects are much more likely to bore exit holes through wrapping materials in order to escape from the infested contents than to perforate the materials with entrance holes, although this can occur. Infestation usually starts from eggs laid on the packaging materials, penetration then being made by the very small newly hatched insect through the mesh of the material, pinhole faults, stitch holes, tears, unsealed overlaps, or through poor seals; even metal containers are not always free from such defects. Holes caused by these processes can then allow air, moisture and further pest entry.

Textiles and felts can be damaged by larvae of certain moths and beetles and can be spoiled by cockroaches, etc, which stain them.

Papers, cartons, films and laminates may be perforated by certain beetles, beetle larvae, and moth caterpillars and show varying degrees of resistance to the majority of insects. Some may be bitten through and stained by cockroaches, etc.

Timber, wooden crates and packing cases, and wooden products can be damaged by certain beetles and wood wasps, whose tunnelling, and particularly that of their larvae, impairs the structural strength and mars the appearance. Some live in unseasoned timber only and the attack dies out as the wood dries; others live only in seasoned timber.

Termites may be important in tropical and subtropical regions. Timber, paper, textiles, foods and a wide range of other materials can be rapidly damaged. Even when packages are made of termite-proof