Australian Standard®

SAA PACKAGING CODE—Part 6—PAPER AND PAPERBOARD

This Australian standard was prepared by Committee PK/25, Packaging Code. It was approved on behalf of the Council of the Standards Association of Australia on 25 March 1986 and published on 2 June 1986.

The following interests are represented on Committee PK/25:

Agricultural and Veterinary Chemicals Association of Australia
Adhesives and Sealants Manufacturers Association
Australian Airline Company
Australian Institute of Packaging
Australian and New Zealand Pulp and Paper Industry Technical Association (Inc.)
Australian Timber Producers Council
Bureau of Steel Manufacturers of Australia
Canmakers Institute of Australia
Confederation of Australian Industry
Cordage Institute of Australia
Department of Defence
Department of Primary Industry
Department of Industry Technology and Commerce
Glass Packaging Institute of Australia
Packaging Council of Australia
Plastics Institute of Australia Incorporated
Printing and Allied Trades Employers Federation of Australia
Railways of Australia Committee

Review of Australian Standards. *To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.*

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

This standard was issued in draft form for comment as DR 85029.

First published 1986

ISBN 0 7262 4179 2

PREFACE

This standard was prepared by the Association's Packaging Code Committee under the direction of the Packaging Standards Board, as a proposed further part of AS 2400, SAA Packaging Code.

The purpose of this standard is to provide information on the choice and use of paper and paperboard products.

The SAA Packaging Code 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 Micro-organisms, Insects, Mites and Rodents*
5	Metal Protection
6	Paper and Paperboard
7	Timber Containers
8	Textile Bags, Sacks and Wrappings
9	Metal Containers
	9.1 Metal Cans and Tubes*
10	Cushioning Materials
11	Cordage
12	Adhesive Closing and Sealing Tapes*
13	Tensional Strapping*
14	Adhesives for Packaging*
15	Glass Containers*
16	Flexible Packaging*
17	Packaging in Plastics Containers*
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*

During the preparation of the SAA Packaging Code, account is being taken of material included in BS 1133, Packaging Code, and the assistance obtained from this source is acknowledged.

---

* Published

CONTENTS

FOREWORD

In AS 2400, Part 1, paper is defined as 'a continuous felted web of vegetable fibres deposited from a water suspension onto a fine wire screen'. Paperboard is 'a fairly rigid paper with a grammage usually greater than 225 g/m^2'. In most cases, the vegetable fibres are wood fibres which may be derived either from hardwoods or softwoods. These are mechanically treated (refined) to increase their plasticity in the wet state.

The mechanical properties of paper are largely determined by the properties of its constituent fibres, in particular their length and their ability to bond to one another. A wide variety of non-fibrous materials may be incorporated into the paper sheet during the papermaking operation or applied subsequently as coatings. These may impart special properties which are needed for a particular end use (e.g. water resistance) or may provide a balance of properties which cannot be achieved by refining alone (e.g. improved strength at high bulk). However, when paper or paperboard is used as a packaging material, it must always be remembered that the base sheet is made from natural fibres with certain inherent properties which must affect the behaviour of the paper made from them.

THE PAPERMAKING FIBRE.

Although a wide variety of vegetable fibres are used for specialty papers, most packaging papers and paperboards are made from wood fibres. A typical wood fibre is a long thin tube, tapering towards the ends. If derived from coniferous woods (softwoods), they are 3 mm to 4 mm long and 30 μm to 40 μm in diameter; if obtained from deciduous woods (hardwoods), they are typically 1 mm to 1.5 mm long and 15 μm to 25 μm in diameter. The wall of each fibre is made up from smaller elements (known as microfibrils) which are arranged in a spiral pattern at a small angle to the fibre axis. It is this construction, together with the chemical nature of the cell wall substance, which gives the fibre its unique properties. These fibres are quite strong, even when wet, but wetting markedly reduces their elastic modulus and also the strength of the bonds between the fibres. Water resistance of the bonds can be improved by appropriate treatment with a wet-strength resin, but no effective method of maintaining elastic modulus has yet been introduced. Thus, a sheet of paper may retain a significant proportion of its tensile strength when wetted, but its wet stiffness will always be much less than the stiffness in the dry state. Wood fibres also swell when wet. There is little change in fibre length, but a considerable increase in fibre diameter. Thus, changes in moisture content of a paper sheet result in dimensional changes, greatest in the thickness of the sheet.

The properties of individual fibres depend both on the type of wood from which they are obtained (which controls fibre dimensions) and on the pulping process used to convert the wood to individual fibres. Methods used for reducing wood to pulp range from those in which the lignin which holds the fibres together in the tree is removed by a suitable chemical treatment to those in which the fibres are separated from one another by purely mechanical means. A variety of combinations of chemical and mechanical treatments are also used to produce pulps with properties suitable for a particular end use. In general, the so-called chemical pulps give papers which is relatively strong and dense. This is the preferred raw material for products such as sacks, bags and strong wrapping papers. Mechanical pulp fibres are stiffer and give papers which are somewhat weaker, but less dense. The lower density is used to advantage in paperboards, where the additional thickness per unit mass of fibre provides the stiffness required for applications such as box boards.

Waste paper is also a significant source of raw material. The quality can range from mixed household waste to high quality cuttings from converting operations. Mixed waste contains a considerable amount of mechanical pulp (from newsprint) and is largely used in multi-ply liners and boxboards. Higher grade wastes may be used, either alone or in admixture with virgin pulp, in better quality papers and paperboards. When paper is recycled, characteristics will change.

PREPARING THE FIBRE.

Once the original raw material (wood chips, waste paper etc.) has been separated into its component fibres, two further steps are needed before it can be fed to the paper machine. Firstly, the fibres, in the presence of water, are subjected to severe mechanical stresses. This process, known as beating or refining (but not to be confused with chip refining) makes the fibres more plastic and better able to adhere to one another when pressed and dried. Other side effects occur at the same time, especially fibre cutting and the formation of fine debris. These effects may be desirable or otherwise, depending on the type of paper being made. Careful control of the operation is needed to ensure that the balance of properties obtained is appropriate to the intended end use.

The second step is the incorporation of non-fibrous additives into the fibre suspension. A judicious addition of appropriate materials can provide a paper sheet with properties which cannot be obtained otherwise. For example, the addition of a resin size can reduce rate of penetration of liquids into the body of the paper, while a wet-strength resin can reduce the amount of strength lost when the paper is wetted. Dyestuffs can be added at this point to produce coloured papers, or pigments (fillers) may be used to provide increased opacity. Availability of these non-fibrous additives provides the papermaker with the means of producing a wide range of paper types, each with a different combination of properties.

THE PAPER SHEET.

A paper machine is made up of three basic units: the forming section, the press and the dryers. The forming section converts a suspension of 1 percent or less of fibre in water into a web of fibres containing about 20 percent solids. This wet web is consolidated in the press section and more water is removed. The wet web, now at about 40 percent solids, passes to the dryers, where the remaining water is evaporated on steam-heated drums.

In the forming section, the dilute suspension of fibre in water is drained through a wire mesh. Most of the water passes through, leaving the web of fibres on the wire. Several different designs of former are available, some of which can produce paperboards made up of a number of plies, each having different composition. Whatever the type of former, the fibres in the web are preferentially oriented in the machine direction, to a degree which depends on the hydrodynamics of the former in question. This preferential orientation means that the mechanical properties of any machine-made paper in the direction of travel on the wire (machine direction or MD) are not the same as in the direction at right angles to this (cross direction or CD). This effect is increased during the drying stage. Here, the wet web is able to shrink in the cross direction but is under tension in the machine direction, this adds to the degree of variation between MD and CD properties (anisotropy). The end result is that tensile and compression strength are higher in the machine direction, while stretch and tearing resistance are higher in the cross direction. Dimensional changes caused by a change in moisture content are also more pronounced in the cross direction.

The surface finish of a sheet of paper or paperboard may be modified once the base sheet has been formed. Papers with a smooth surface on one side are produced by replacing the normal series of drying cylinders by a single, highly polished cylinder (the MG cylinder). The surface of the paper in contact with the cylinder dries with a very smooth finish. Calendering or supercalendering involves passing the paper web through the nips of a series of heavy rolls set one above another. In this case, paper surfaces are subjected to combined pressing and polishing at high speed. Alternatively, the paper surface may be coated with a pigment suspended in an appropriate binder solution—an operation analogous to applying a coat of paint. The coated surface may be smoothed as part of the coating operation or may be subsequently calendered to produce an extremely smooth and glossy finish.

Despite the limitations imposed by the characteristics of the constituent fibres and by the mechanics of the papermaking process, paper and paperboard can be tailored to fit a wide range of end-use requirements. Even in the packaging field, one can produce products as diverse as soft wrapping tissues and rigid fibreboard drums, transparent glassine bags and multiwall paper sacks. Furthermore, for some applications, several alternative papers having similar properties, but differing in composition, may be available. It should also be realized that the composition of papers used for packaging a particular product may vary from country to country, usually because the wood resource available for pulp production in any area is unique to that area. This can create confusion when a packer wishes to purchase paper made according to an overseas specification. Often, paper specifications are written with the intention of describing a product which has been found to be satisfactory in practice. A change in the raw material from which the paper is made can result either in a product which complies with the specification but does not perform well or a product which will produce a satisfactory package but does not comply with the specification. This type of problem arises because of the lack of standard test methods which correlate well with use requirements. Specialist advice should be sought and appropriate trials conducted to ensure that a new or changed packaging system will be effective.

Performance requirements of paper products depend on moisture content which under equilibrium is a function of relative humidity. It may vary markedly due to condensation or exposure to weather. User should establish that the type of paper or paperboard used in any form of packaging provides adequate protection for the contents under the anticipated conditions of abuse.

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
SAA PACKAGING CODE

PART 6—PAPER AND PAPERBOARD

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard provides guidance on the use of paper and paperboard products.

1.2 APPLICATION. Detailed guidance on specific products made of pulp is given in the following sections:

Section 2 Wrapping papers
Section 3 Paper bags
Section 4 Multiwall paper sacks
Section 5 Paperboard boxes
Section 6 Fibreboard boxes
Section 7 Moulded pulp
Section 8 Composite cans and drums

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

AS 1048 International Fibreboard Box Code

AS 1301 Methods of Test for Pulp and Paper
- P403rp — Bursting Strength of Paper
- P405s — Grammage of Non-creped Paper and Board
- P414m — Conditioning of Paper for Testing
- P415m — Standard Atmosphere for Paper Testing
- P421m — Determination of the pH Value of Aqueous Extracts of Paper—Cold Extraction Method
- P440ts — Bendtsen Porosity of Paper

AS 1764 Vegetable Parchment for Wrapping Dairy Products

AS 1814 High Wet-strength Greaseproof Paper for Wrapping Dairy Products

AS 1990 Corrugated Fibreboard Containers for Export of Dried Vine Fruit

AS 1991 Fibreboard Containers and Container Blanks for Export of Non-refrigerated Canned Goods

AS 1992 Solid Fibreboard Containers and Container Blanks for Export of Frozen Boneless Meat

AS 1993 Corrugated Fibreboard Containers and Container Blanks for Export of Frozen Boneless Meat

AS 2001.4.2-1982 Part 4— Colourfastness Tests—Determination of Colourfastness to Daylight

AS 2173 Corrugated Fibreboard Containers and Container Blanks for Export of Butter

AS 2222 Adhesives for Unit Loads (Palletizing Adhesives)

AS 2322 Corrugated Fibreboard Boxes for the Export of Rindless Cheese

AS 2348 Guide to the Determination of Optimum Dimensions of Packages for Unit Load Handling

AS 2400 SAA Packaging Code
- Part 1 — Glossary of Packaging Terms
- Part 2 — Basic Principles of Packaging Practice
- Part 3 — Mechanical Aids in Package Handling
- Part 11 — Cordage*
- Part 12 — Adhesive Closing and Sealing Tapes
- Part 13 — Tensional Strapping
- Part 14 — Adhesives for Packaging
- Part 23 — Shrink and Stretch Wrapping

AS 2516 Corrugated Fibreboard Boxes for Export of Apples in Containerized Shipments

AS 2517 Corrugated Fibreboard Boxes for Export of Pears

AS 2582 Complete, Filled Transport Packages—Methods of Test

AS 2583 Complete, Filled Transport Packages—Distribution Trials—Information to be Recorded

AS 2584 Complete, Filled Transport Packages—General Rules for the Compilation of Performance Schedules

AS 2609 Materials Used for the Packaging of Food and Beverages—Methods for the Assessment of Odour and Taint

AS 2838 Classification System for Corrugated and Solid Fibreboard.

AS 2852 Packaging-Pictorial Markings for the Handling of Packages

BS 3110 Methods for Measuring the Rub Resistance of Print.

1.4 DEFINITIONS. For the purpose of this standard the definitions of AS 2400, Part 1 apply.

* In course of preparation.