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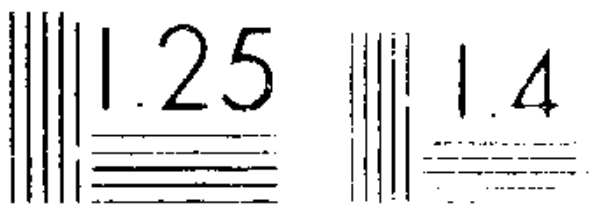
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English

CONSOLIDATION OF THE MEXICAN INSTITUTE FOR ASSISTANCE TO INDUSTRY

PACKAGING STANDARDS

DP/MEX/78/011

MEXICO

Terminal report *

Prepared for the Government of Mexico
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Colin Swinbank, packaging expert

United Nations Industrial Development Organization
Vienna

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CONTENTS.

February 1980.

SUMMARY.

The project, as written, was concerned solely with food packaging standardization but the responsibilities and current work programme of IMAI covered all forms of package and related distribution equipment. In view of the author's wide experience in these areas, and specially on standards for the packaging of dangerous goods, agreement was obtained to extend the terms of reference.

All current Mexican packaging standards and all the items on the 1980 programme of standardization were discussed in detail and suggestions made or advice given as the need arose. Detailed information was given on other standards of potential interest, not only those of ISO and national standards bodies such as BSI, but also important commercial standards developed by international associations of package manufacturers, plus the ECE/OECD recommendations on the packaging of fresh fruit and vegetables for international transport.

The impact of legislation on standards for packaging materials and packages was emphasized in three major areas, viz.

- packaging materials in contact with food;
- permitted quantities of pre-packaged goods;
- constructional and/or test requirements for packages for dangerous goods.

The various test procedures for packages for dangerous goods were discussed in detail, and advice given on the development by IMAI of a capability to act as an official testing station for the approval and certification of packages for dangerous goods.

Recommendations were made with a view to improving the standards making activity, on the possible content of a future standardization programme and on further action to consolidate IMAI's position in the field of packaging and distribution.

1. INTRODUCTION.

1.1. Project background.

The Instituto Mexicano de Asistencia a la Industria (IMAI) was created in 1977 by decree of the Presidency of the Republic integrating the Mexican Packaging Institute (the subject of project DP/MEX/72/007 - January 1974 to December 1976) and the departments of design and industrial information from other institutions. The packaging sector has been kept as a major area of work for the new Institute which, for the time being, is directing its activities on design and industrial information exclusively towards the packaging field.

The purpose of the project is to consolidate the Mexican Institute of Assistance to Industry from the technical and performance points of view, with regard to its basic activities in the field of packaging. Particular emphasis is to be put on the enlargement, complementation and specialization of the Institute's technological capabilities in order to accomplish its role in providing the country with permanent services on packaging information, standardization, training, design, applied research, testing and quality control, and advice on appropriate packaging industries development.

The project makes provision for the appointment of a packaging project manager and several individual experts. However no project manager had been appointed at the time the author took up his duties on 3 January 1980, and IMAI had been visited by only one expert, namely Eng. Luis Fernando C. Madi (DP/MEX/78/011/11-02/31.7E) on laboratory testing equipment and procedures. Inevitably this had an effect on the duties and responsibilities of the author.

1.2. Job description.

Job description DP/MEX/78/011/11-05/31.7E called for an expert in food package standardization with the following specific duties :-

1. Get acquainted with the status of food packages standardization in the country, specifically with existing standards, standards under preparation and standards being requested at present.
2. Prepare a programme of food package standards to be agreed upon and proposed by the Mexican Institute of Assistance to Industry for a certain period, such as two years, taking into consideration the prevailing national conditions and priorities.
3. Elaborate a list of international standards and national standards from other countries suitable to be used for the study and drafting of the food package standards proposed in the above paragraph.
4. Co-operate actively with the counterparts in the preparation of drafts for national food package standards, according to its priorities which, in principle, will be agreed upon by the Mexican Institute of Assistance to Industry and the General Direction for Standards.
5. Participate as an observer and/or adviser whenever requested during his mission in the meetings of the National Committee for Packages Standardization.

Before accepting the appointment it had been made quite clear to both UNIDO and IMAI that the author, whilst having considerable experience in the

organization and control of national and international work on package standardization, was not an expert in food packaging nor had a command of the Spanish language.

In discussions which took place shortly after taking up the assignment IMAI stated that whilst food packaging was a priority task their responsibilities and current work programme covered all forms of package and related distribution equipment such as pallets and freight containers. Having in mind the author's wide experience in these areas, and specifically on standards for the packaging of hazardous goods, IMAI was anxious that the assistance provided was not limited to food packaging standards. The agreement of the UNDP office was obtained to this extension of the terms of reference, following which a detailed work programme was arranged - See Appendix 3.

1.3. Latin American seminar on packaging standarization.

Arrangements were also made, with UNIDO approval, for the author to speak on "The international situation of packaging standardization" at the above-mentioned seminar which is to be held in Mexico City on April 9 - 11, 1980.

2. FINDINGS.

2.1. Mexican organizations.

IMAI is responsible to the Secretaria de Patrimonio y Fomento Industrial. It is located on the same site as the Laboratorios Nacionales de Fomento Industrial (LANFI) and the Asociacion Mexicana de Tecnicos de las Industrias de la Celulosa y del Papel (ATCP). These associations have the same Director and enjoy a close relationship in complementary fields of activity.

The organizational structure of IMAI is as follows :-

GENERAL DIRECTION

- PACKAGING DEPARTMENT
  - Laboratory
  - Simulation
  - Standards
- INDUSTRIAL DESIGN
  - Product design
  - Structural design
  - Graphic design
- ADMINISTRATION
- TRAINING

The author's work was carried out primarily within the Packaging Department.

The national organization responsible for standardization in Mexico is the Direccion General de Normas (DGN) which is a member of the International Organization for Standardization (ISO). DGN has a number of industrial sector committees one of which is responsible for packaging standarization, i.e. Comite Consultivo Nacional de Normalizacion de Envase y Embalaje (CONNEE). The Director of IMAI is the president of this DGN packaging standards committee, and members of IMAI staff serve as executive officers of CONNEE and its eight

sub-committees, which are :-

SC.1 - Paper and board.
SC.2 - Wood.
SC.3 - Glass.
SC.4 - Plastics.
SC.5 - Textiles.
SC.6 - Metal.
SC.7 - Testing procedures.
SC.8 - Transportation and cargo management.

2.2. General observations.

2.2.1. Reference documents.

The author's September 1978 report "Co-ordination of national, regional and international standardization in packaging" (1), hereafter referred to as the 'Helsinki report', which was endorsed by the 'Helsinki Group of Experts' (2) and commended for further study by the 'Helsinki Consultation' (3), and which at the time was regarded as a definitive survey, was taken as a point of departure for the present work. The Helsinki report is available at both IMAI and UNIDO, Vienna, and reference should be made to it, and associated documents, when this appears to be necessary.

To avoid undue repetition reference should also be made, where necessary, to the regulations listed in Appendix 5, particularly the UN publication "Transport of Dangerous Goods" (known as the UN recommendations) and the author's text book "Packaging of chemicals and other industrial solids and liquids" (4) which are also available at IMAI and UNIDO.

2.2.2. Observations on the Mexican scene.

From the necessarily limited observations made in the environs of Mexico City and from a few personal purchases, most of the forms of package and many of the sophisticated packaging materials used in the Western world are in use in Mexico. Much of this is no doubt due to a transfer of technology by international companies, either by licence or investment, and to the long common border with the USA which, as a potential market, must have a substantial influence on packaging practice.

The immediate problems appear to be :-

1. A substantial reduction in the dependence on imported tinplate which accounts for approximately 50% of the total requirements. This important part of the overall project is not relevant to the present report, other than in the preparation of any standards necessary when the work is brought to a successful conclusion.

2. Lack of standards for manufactured packages, packaging accessories and materials - see 2.2.3. below.

3. Lack of knowledge of regulations affecting packaging standards, particularly for hazardous goods, the need for which will become increasingly important with the development of a petro-chemical industry based on Mexico's

References: (1) Appendix 6, item 8. (2) Appendix 6, item 10.
(3) Appendix 6, item 11. (4) Appendix 6, item 17.

production of oil.

4. An appreciation of the need to develop improved distribution techniques, nationally and internationally, in order to reduce costs and meet marketing requirements, and the consequential effects such methods could have on packaging standards.

The IMAI staff, who as a result of the visit are becoming aware of these requirements, are in general keen, intelligent and well qualified academically, but are young and inexperienced, the majority having been in the job only a few months. Whilst visits are paid to manufacturers of packages in the standards making procedures the urgent need is for the staff as a whole to become more closely aware of the practices and needs of the industries they are endeavouring to serve.

2.2.3. Types of standard.

The Helsinki report drew attention to the widely differing types of standard used in the packaging field, and suggested that they could be divided into four basic groups. This grouping, which is used in this report, is as follows:

Group A. Standards relating to the style, construction, capacity, dimensions, quality and terminology of manufactured packages which may be for :-

- A.1. - general use, e.g. a drum or a fibreboard case; or
- A.2. - a specific use, e.g. an egg box.

Group B. Standards relating to materials or components used in packaging, regarding which it is necessary to distinguish between :-

- B.1. - materials and components designed specifically for use in the packaging operations, e.g. speciality films/laminates for foodstuffs;
- B.2. - materials which have many uses, e.g. paper, wood, steel and plastics.

Group C. Standards relating to test methods and/or test requirements, regarding which there are three distinct groups:

- C.1. - tests on complete, filled transport packages.
- C.2. - tests on empty containers for quality assurance.
- C.3. - tests on materials.

Group D. Other standards relating to the distribution of goods:

- D.1. - marking and labelling.
- D.2. - dimensional co-ordination.
- D.3. - pallets.
- D.4. - freight containers.

Within ISO, and in national standards bodies such as the British Standards Institution (BSI), Group B.2 and C.3 standards are not the responsibility of the packaging committees, but of the appropriate industry sector committee, e.g. ISO TC.6, 'Paper, board and pulps'. It is customary for the packaging committee in the preparation of a Group A standard for a manufactured package to make reference only to (a) the material standard, and (b) the test method or methods which are appropriate. The requirements/procedures of these materials standards should NOT be repeated in the packaging standard as it is unnecessary and could lead to confusion or even a mistake if the original standard is amended and the package standard is not. Providing the number of the materials standard, or testing standard, remains unchanged then any amendments are automatically taken into account.

The work of IMAI staff on Group B.2 and C.3 standards was questioned, but was justified on the grounds that the standards were necessary and would not otherwise be prepared. Care should be taken, however, not to "reinvent the wheel", and where an appropriate ISO standard exists that standard should be adopted.

2.3. DGN packaging standards.

As at January 1980 73 standards had been published in the "Official Diary", 24 of that number having been published in 1979. In addition work on a number of other standards had been completed and these were being processed. The 73 official standards are listed in Appendix 2, classified into the Groups mentioned in 2.2.3 above. They may be summarised as follows :-

Group.	Number of standards.
A.1.	13
A.2.	23
B.1.	10
B.2.	2
C.1.	6
C.2.	4
C.3.	8
D.1.	1
D.2.	0
D.3.	2
D.4.	4

Each of these standards was discussed in detail with the responsible IMAI staff member and, where appropriate, suggestions were made or advice given. Some of the older standards were already scheduled for review under the 1980 programme, and a few others, e.g. Nos. 56, 63 and 64, were identified as requiring examination in the light of the latest position within ISO. Additionally the range of ISO standards on package testing has only been partially implemented.

In general the standards are well written and - subject to the comment in the next paragraph - comprehensive in that they cover materials, constructional details including dimensions, tolerances, testing requirements and criteria of acceptance. In the writer's view, however, some are over elaborate in that they repeat the contents of other standards instead of only making reference to them - see the comments in the paragraph at the foot of page 4.

Only a few of the A.1 and A.2 standards contain a standard range of sizes (capacities) of package, or even an indication of a preferred range of sizes. The determination of such a preferred range of sizes is an essential first step in the standardization process. Given a range of standard sizes (capacities) the development of standardized shapes and dimensions is possible for each of those sizes (with the possible exception of certain plastics containers) and eventually lead to the complete interchangeability of components made by different manufacturers.

As indicated in the Helsinki report, section 7.1, 'The different aspects of standardization', the existence of proprietory designs of package should not and does not reduce the economic desirability of a range of completely

standardized packages. Such proprietory packages could still meet the quality requirements of the relevant standard as, presumably, they do at present.

2.4. 1980 programme of work on package standardization.

The programme of work for each of the 8 sub-committees had been determined prior to the author's visit. The individual items on these programmes were discussed with the responsible IMAI staff member, usually on two different occasions, and suggestions made or advice given when this was appropriate. Details of the 1980 programme, together with the author's brief comments, appear in Appendix 3.

2.5. Lists of other packaging standards of potential interest.

The Helsinki report showed that in 1978 there were over 1500 national standards both on manufactured packages (see appendix 5 of the Helsinki report), e.g.

265 standards on glass bottles
100 standards on metal drums
99 standards on wooden boxes and crates

and on the packaging of specific products or product groups (see appendix 6 of the Helsinki report) e.g.

198 standards on the packaging of fruit and vegetables
175 standards on the packaging of preserved foods
82 standards on the packaging of textiles.

This large number of standards, the many languages in which they are written, and in many cases the lack of any common ground would make any attempt to produce a comprehensive list difficult and unrewarding.

The lists of standards appearing in Appendix 4 (grouped in the appropriate subcommittees) are therefore restricted to standards for which the author is administratively responsible within BSI, standards of the American National Standards Institute (ANSI) because of the proximity of the USA market, and to standards from other sources which are known to be important, viz.

- United Nations' Recommendations on the "Transport of Dangerous Goods". (UN).
- International Air Transport Association's "Restricted Articles Regulations". (IATA).
- USA Department of Transportation's Package Specifications. (DOT).
- International Technical Centre for Bottling and Packaging. (CETIE).
- Federational of European Aerosol Associations. (FEA).
- European Solid Fibreboard Case Manufacturers' Association. (ASSCO).
- European Corrugated Fibreboard Case Manufacturers' Association. (FEFCO).

As it is understood that IMAI is a member of the American Society for Testing and Materials (ASTM) and that ATCP has close links with the Technical Association of the Pulp and Paper Industry (TAPPI) the ASTM and TAPPI standards have not been listed other than in a few specific instances.

2.6. ISO work on packaging and distribution.

Some years ago ISO created Technical Division 4 (TD.4), "The distribution of goods", in order to provide an overall view of the work being carried out in a number of autonomous Technical Committees, e.g. packaging, pallets, freight containers, materials handling equipment etc. Whilst TD.4 has no power to

direct the Technical Committees to work in any given manner, its papers and discussions require careful monitoring because of the inevitable publicity given to its conclusions.

In addition the following Technical Committees and Sub-committees operate in the field of packaging and distribution. It is understood that Mexico has 'O' (observer) member status on some of these committees, but the position needs review and the question of 'P' (participating) member status should not be ruled out where the programme of work is likely to be of direct concern to Mexico, as could be the case in TC.52 and TC.63 following the extension of the terms of reference of these committees.

ISO Technical Committees and Subcommittees.	DGN group.
TC.51 - Pallets.	SC.8
TC.52 - Metal containers.	SC.6
TC.58 - Gas cylinders. (Not normally regarded as being in the packaging sector).	-
TC.63 - Glass containers.	SC.3
TC.104 - Freight containers.	SC.8
TC.122 - Packaging.	CCNNEE
TC.122/SC.1 - Packaging dimensions.	SC.7
TC.122/SC.2 - Sacks.	*
TC.122/SC.3 - Package testing.	SC.7
TC.122/SC.4 - Terminology.	SC.7

* Coverage of ISO's work on sacks could be difficult with the present sub-committee structure as TC.122/SC.2's responsibilities cover sacks made from any material, e.g. kraft paper, plastics film, plastics tape, natural fibres. In the writer's opinion the major forms of transport package, i.e. sacks, drums, cases and crates, should be considered in their generic forms and thus one should have a sack committee, a drum committee and a case/crate committee for the characteristics of handling and use are the same irrespective of materials of construction of the sack, drum or case.

2.7. Constraints which may influence future package standardization.

Mandatory requirements of three different types can have a direct affect on the standards for packages and packaging materials, namely

- regulations which are designed to ensure there is no harmful interaction between the package/packaging material and products intended for human consumption.
- regulations which control the weights or volumes in which certain products may be sold.
- regulations which specify the type, method of construction and/or performance test requirements for packages for dangerous products.

In addition the requirements of distribution are having an ever increasing influence on packaging standards.

2.7.1. Packaging materials in contact with food.

The most widely known regulations are those administered by the USA Food and Drug Administration (FDA) under the authority of the Food, Drug and Cosmetic Act, 1958. Details are set out in the "Code of Federal Regulations - Title 21 - Food and Drugs", and the regulations require that if the food (or drink) is adulterated or contaminated by other substances whatever their source, including

migration from the package or packaging material, it must be within the tolerance limits set by the FDA, except for carcinogens where the tolerance is 'Nil'. Unless a material is listed by the FDA it may not be used for the packaging of food or drink. The concurrent project of Professor Seymour G. Gilbert (DP/MEX/78/011/11-11/31.7E) deals explicitly with methods for determining the migration of substances from flexible packages/packaging materials and he and the author wish to emphasize that the same regulations and the same principles apply equally to rigid packages.

Similar but not identical legislation has been in existence for some years in other countries such as the Federal Republic of Germany and the United Kingdom. More recently the European Economic Community (EEC) has published, or has in preparation, a whole family of directives relating to "Materials and articles intended to come into contact with foodstuffs", e.g.

Parent Directive	- 76/893 of 23 November 1976.
Subsidiary Directives -	
Vinyl chloride monomer	- 78/142 of 20 January 1978.
Plastics materials	- Proposal COM (78) 115.
Ceramics	- Proposal COM (78) 2173.
Regenerated cellulose film	- Under development.
Glass	- Under development.

All of the nine countries which are members of the EEC, including the Federal Republic of Germany and the United Kingdom, are required to incorporate these Directives into their national legislation.

Requirements such as those of the FDA and EEC are not expected to affect directly packaging standards, but rather those for packaging materials. However the Agricultural Stabilisation and Conservation Service (ASCS) of the USA Department of Agriculture has published detailed specifications (CMO-1) for the packaging of dairy products, processed grains. salad oil and shortening which include (a) the materials permitted by the FDA, and (b) outer transport packages which meet the appropriate Federal Specification or the requirements of the Uniform Freight Classification (UFC) - see 2.7.4. below.

2.7.2. Permitted quantities of pre-packaged goods.

In order to protect the consumer some countries have had for many years legislation providing that certain essential foodstuffs may only be sold in specified quantities, the increments in size (weight) being such that there is no possibility of the customer being deceived. More recently the EEC has taken this principle further and prepared a whole series of Directives on the pre-packaging of all forms of drinks, foodstuffs sold by weight, other products such as cleaning products sold by weight, foodstuffs sold by volume, other products such as paints and lubricating oils sold by volume and cosmetics sold by volume. This important development was fully discussed in section 2.2 of the Helsinki report and details of the permitted weights or volumes for each class of product are set out in appendices 3 and 4 of that report. The following examples illustrate the principles which, with the growth of consumerism, are likely to be followed by many other countries in the coming years.

Product group.	Pre-packaged quantities.
Wines.	100 ml 250 ml 500 ml 750 ml 1 l 1.5 l 2 l
Edible oils.	100 ml 250 ml 500 ml 1 l 2 l
Paints.	125 ml 250 ml 375 ml 500 ml 750 ml 1 l 2.5l
Lubricating oils.	125 ml 250 ml 500 ml 1 l 2 l
Cereal flours	125 g 250 g 500 g 1 kg 2.5 kg 5 kg 10 kg
Jam and marmalade.	125 g 250 g 500 g 750 g 1 kg 1.5 kg 2 kg 2.5 kg 5 kg 10 kg

It will be seen that where products are sold by volume there is a very strong incentive for the packaging industry to develop a range of standardised capacity containers in metal, glass and plastics. Where products are sold by weight, because of the variations in density of the products, there would seem to be a no incentive to develop standardised containers. However the EEC work includes the development of a standard range of nine cartons for cleaning and washing powders (which is now in use and the subject of CEN standard EN 23) and a range of standardised capacity glass and metal containers for foodstuffs, regarding which it should be noted that the EEC target for the number of different capacities of hermetically sealed metal can is 13 as compared with the 32 capacities listed in ISO 3004/1 and the 24 capacities of can listed in NOM-EE-64-S-1979.

2.7.3. Constructional and/or test requirements for packages for dangerous goods.

International and national regulations can and do have a major influence on the construction and design of packages, including the test methods employed. Some countries incorporate these requirements in national standards, whilst in other countries the international or national legislation is considered to be sufficient.

The Helsinki report recommended that ISO and its member bodies should not work independently of the UN in packaging standards for dangerous goods, i.e. standards for manufactured packages, test methods for such packages and pictorial marking, but that consideration should be given to the development of international standards for specific types of package which met the UN requirements, and that any such standards must provide for the use of the international, not a national, certification mark. This recommendation was incorporated in a resolution adopted by the Helsinki Consultation.

2.7.4. Requirements of distribution.

The imperative need to reduce distribution costs, and particularly transport costs, the development of unit load systems of handling from the factory through to the point of use or the point of retail sale, and the use of the intermodal ISO Series 1 freight container have combined to focus attention on the need for dimensional compatibility between the package, the pallet or unit load, the storage equipment and the vehicle or freight container in which the goods are moved. There is no single solution as is apparent from section 7.3 and appendices 9 and 10 of the Helsinki report, but these factors will become increasingly important in the preparation of packaging standards.

Of specific interest and potential importance for Mexican exports to Europe are the recommendations made jointly by the Economic Commission for Europe (ECE) and the Organization for Economic Co-operation and Development (OECD) on the

"Standardization of packaging for the international transport of fresh or refrigerated fruit and vegetables" which was reproduced in Appendix 8 of the Helsinki report, and a copy of which has been handed to IMAI. These ECE/OECD recommendations cover "the dimensions and mechanical strength characteristics of rectangular packagings usuable on one or both types of standardised pallet (800 x 1200 mm and 1000 x 1200 mm), together with the tests to be passed".

Mexican exports to the USA market by rail are likely to be required to be packed in accordance with the requirements of Rules 40 and 41 of the Uniform Freight Classification - see Appendix 5.

2.8. Future work in Mexico on packaging standards.

It would be imprudent for any visitor to Mexico for such a brief period as two months to attempt to indicate the priorities for further standardization work. A large number of suggestions and comments have been made in sections 2.2 to 2.7, and amongst the more obvious possibilities are the following:-

Paper sacks. Plastics film sacks. Plastics tape sacks.	General standards (rather than for specific products) indicating the types of sack, materials and methods of construction, methods of measurement and specification.
Closed end metal drums. Removable head metal drums	Range of standard capacities, dimensions, closures and methods of test. NB. There will be different levels of performance.
Closed end plastics drums Removable head plastics drums	Range of standard capacities, closures, and method of measurement and test, plus dimensions if possible. NB. There will be different levels of performance.
Fibreboard cases.	General standard covering styles of case including fitments (see International Case Code), qualities of fibreboard available, test methods and guidance on case selection.
Metal cans	
- small aperture for liquids.	Range of standard capacities and dimensions.
- wide aperture for paints.	Range of standard capacities and dimensions.
- for lubricating oil.	Range of standard capacities and dimensions.
Glass bottles.	Range of standard capacities and dimensions for general use. Range of standard screw threads and caps.
Plastics bottles.	Range of standard capacities, and methods of measurement, for general use. Range of standard screw threads and caps.
Plastics films.	Quality standards for various films for (a) wrapping foodstuffs. (b) general use.
Plastics film bags.	Quality standards, dimensional standards (if possible) and methods of measurement.

2.9. Regulations on the packaging of dangerous goods.

A summary, with brief comments, of the most important national and international regulations on the classification, packaging, labelling and transport of dangerous goods appears in Appendix 5. This matter has been discussed with the IMAI staff and detailed notes provided to them.

It is anticipated that by 1982 all the undermentioned international agencies, conventions and agreements will be working on the UN system :-

Sea. The International Maritime Dangerous Goods (IMDG) Code is already based on the UN system.

Air. The International Civil Aviation Authority (ICAO) has at an advanced stage of preparation regulations based on the UN system.

Rail. The "International Regulations Concerning the Carriage of Dangerous Goods by Rail (RID)", to which all European countries and a few Middle East and North African countries are signatories, is currently being revised to conform to the UN.

Road. The "European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)", to which all European and some Middle East countries are signatories is being revised simultaneously with RID.

Unfortunately the IATA regulations and the DOT regulations governing transport by rail and road in the USA (but not water) are different from the UN system and, for the time being, Mexican exporters by air to any destination, and by road or rail to the USA, will need to conform to the IATA or DOT requirements respectively.

2.10. Testing of packages for dangerous goods.

Detailed explanations have been given to the IMAI staff of the underlying philosophy of the UN recommendations, the details of the test procedures for each of the various forms of transport package destined to carry dangerous goods, and of the UN system for marking packages which have been successfully type tested. Notes have been provided but in all cases direct reference should be made, as necessary, to the actual text of the recommended test procedures which appears both in the UN "Transport of Dangerous Goods" and in Vol.1 (Annex 1) of the IMDG Code. It was not possible to carry out any test work due to the lack of suitable packages and the lack of appropriate equipment.

In the same way the test procedures required by IATA and DOT, which are clearly set out in the respective regulations, were explained to the IMAI staff and written notes provided including details of where a DOT certified package is acceptable to IATA in lieu of an IATA specification package. Once again it was not possible to carry out any actual tests.

2.11. Approval and certification procedures for packages.

There are three basic systems known to the writer of approval and certification procedures for packages, although minor variations to the basic principles may occur. These three systems have been discussed with the IMAI staff and may be summarised as follows.

2.11.1. Certification by the standards organization.

BSI maintain a Quality Assurance Department which is quite separate from the normal standards making activity. This department has certain testing facilities and is responsible for the operation of the "Kitemark" certification scheme.

The Kitemark is the registered certification trade mark of BSI. A licence to use the mark on or in relation to a product is granted to any manufacturer who demonstrates the capability of consistently making that product to a specified British Standard. This capability is initially assessed by inspection of the production process, quality control organization and test facilities, and by independent testing of a sample of the product against all the criteria of the relevant standard. The licensee is required to accept, and operate in accordance with, a BSI scheme of supervision and control which identifies the tests to be carried out during manufacture and on the completed product, and specifies the frequency of such testing. BSI carries out unannounced inspection visits to the manufacturer's works and audit testing of the product, and may withdraw the licence for any failure of the manufacturer to comply with the standard or with the scheme of supervision and control.

The presence of the Kitemark on a product is an assurance of quality, the 'certification' being essentially that of BSI. The scheme is widely used, particularly for household goods, and is actively encouraged by the organised consumer groups. It is rarely used for packaging.

2.11.2. Certification by the package manufacturer.

Under the provisions of some regulations such as those of the USA Department of Transportation the package manufacturer, at the start of production and usually at stated intervals thereafter, is required to test specimen packages in accordance with the terms of the package specification. The samples tested are required to be retained for inspection until the next series of tests is carried out.

If the packages meet the test criteria then the package manufacturer is required to mark his production in the prescribed manner. For example a 55 US gallon steel drum made to DOT Spec.17E would be marked :-

STC	Single trip container.
DOT-17E	Specification number.
18-55-80	Gauge of metal/capacity/year made.
#	Maker's symbol which must be registered with the Bureau of Explosives.

By these marks the package manufacturer is 'certifying' that the package conforms fully to the specification and is of a quality at least as good as the packages which were tested. The user is entitled to rely on these markings. The regulatory authority at any time may wish to see the retained samples and to require other specimens, selected at random to be tested under their supervision.

In the non-regulatory field many trade associations in many countries, e.g. fibreboard case manufacturers, have association schemes for indicating that the package meets the standards of that association. This type of mark is

in effect a 'warranty' by the manufacturer but its legal significance will depend on national legislation and custom.

2.11.3. Registration of test results by an authoritative body.

Some countries maintain an official scheme for registering the results of tests on prototype packages and authorise the use of a unique mark on replicate packages. By using such a mark the package manufacturer certifies that the marked package is of a quality equivalent to the packages which have ben tested satisfactorily, i.e. as in the DOT 17E example above. In the event of package failure the unique mark enables any organization with the right so to do, to seek from the registration authority details of the original test certificate and, if necessary, to question the validity of the mark.

A proliferation of national schemes is undesirable and for that reason the UN recommendations make provision for the use of a universally recognisable yet unique mark, which would be controlled by national registration schemes of the type referred to above. For example a 210 litre closed end metal drum made in the United Kingdom and tested to Packing Group II requirements would be marked in the following manner. This example has been selected as the package would be virtually identical with the DOT 17E example above.

(Ⓤ) 1A1 / Y / 80	UN package type/performance level/year made.
GB / 1 / 123	National mark/testing laboratory/test serial no.
#	Maker's symbol.

Official approval of testing houses, filing of test reports with the registration authority and the issue of test certificates is implicit in the UN scheme. In the United Kingdom a temporary scheme of this type is in operation with PIRA acting under the authority of the relevant Government Departments. A register of 'UN tested and certified packages' is published by PIRA and updated every six months.

In order to facilitate international trade the Helsinki Consultation in October 1978 passed the following resolution :-

"All national and international, regional and interregional bodies concerned with the transport of dangerous goods should adhere to the UN Recommendations on the Transport of Dangerous Goods, establish certification schemes to authorise the use of UN markings on packages made within their jurisdiction which meet the UN requirements, and provide for the acceptance of packages from other countries bearing the UN markings".

2.12. Sources of information, text books and education.

The list appearing in Appendix 6 does not attempt to be comprehensive, being limited to items for which the writer can personally give assurances. In any event item 2 on the list, UNIDO Guide No.27, is such a comprehensive document.

2.13. Instructional lectures.

A number of instructional lectures were given to the IMAI staff, and notes issued to the staff for future reference - see list in Appendix 7.

3. RECOMMENDATIONS.

1. The initiative of IMAI in seeking membership of the International Association of Packaging Research Institutes (IAPRI) should be supported as this will lead to a closer association with packaging laboratories which have accumulated considerable experience over the past 30 years.

2. Every opportunity should be taken, by visits and other means, to familiarise the IMAI staff with the practices and needs of the industries they are endeavouring to serve, i.e. the production, filling and closing, handling, storage, transport and distribution of packages.

3. The practice of circulating only the 'contents page' of packaging journals received in the library should be reviewed having in mind that the news items and advertisements in such journals contribute to an individual's total knowledge.

4. The staff should be made aware of the sources of information available to LANFI/IMAI and the circumstances under which such sources may be used, e.g. enquiries to the UNIDO Industrial Inquiry Service or the PIRA computer base.

5. The editorial practice in the preparation of standards should be reviewed and, where reference to another standard is essential, consideration given to simply making reference to it in mandatory terms, e.g. " ... shall comply with the requirements of NOM-EB-1234", omitting the year of publication from the reference.

6. Wherever practicable standards for manufactured packages should have the widest possible application rather than be restricted to specific products.

7. Every opportunity should be taken to develop a rational range of capacities for each type of rigid package, e.g. drums, bottles, cans and jars, preferably based on a 1 - 2.5 - 5 - 10 type of progression.

8. Following the rationalisation of capacities of rigid packages every encouragement should be given to industry to adopt standardised shapes, and hence standardised dimensions, for such packages.

9. A review should be made of Mexico's participation in the work of the ISO technical committees and sub-committees which are listed in section 2.6 and which are concerned with packaging and distribution.

10. Consideration should be given to monitoring the work of such ISO committees and sub-committees whatever grade of membership is thought to be appropriate.

11. It is strongly recommended that the terms of reference of the COVENED and its sub-committees be amended to cover "all national and international standards work" in their defined areas of interest, and thus bring about a closer identity of purpose in national and international standards making.

12. Wherever Mexico has voted in favour of an ISO standard, and in all other cases unless there is a strong objection to the contrary, the ISO standard should be adopted without change as a DGN standard.

13. In the planning of future standardisation programmes consideration should be given to the specific items listed in section 2.[illegible] plus some of the more important national and international (non-ISO) standards listed in Appendix 4.

14. IMAI should become thoroughly familiar with the regulations of the FDA and the EEC regarding packages and materials used in contact with food, in order to provide support to Mexican exporters, whether the support be in the form of advice, testing facilities or standards preparation.

15. IMAI should become thoroughly familiar with the various international and national regulations regarding the classification, packaging, labelling and transport of dangerous goods listed in Appendix 5, in order to be able to offer expert advice to industry.

16. IMAI should seek clarification of the intentions of the Government Departments responsible for sea, road, rail and air transport regarding the implementation of the UN recommendations, having in mind the international developments referred to in section 2.9.

17. In the light of the foregoing IMAI should proffer such advice as is thought to be appropriate on the setting up of a scheme for the UN testing and certification of packages, having in mind that Mexican exporters may be required, at some future time, to use UN certified packages. Care should be taken not to seek a monopoly of such UN testing as this might antagonise industry; care should also be taken to avoid a premature mandatory requirement for the use of UN tested packages because of the physical problems of testing large numbers of packages which are already in use.

18. IMAI, having assessed the equipment necessary to carry out the UN tests, the need to accommodate several large drums at a time in cold and hot rooms, and the safety problems involved in the handling of and the drop, stack and hydraulic pressure testing of such large packages up to 250 kg in weight, should take urgent action to obtain such additional facilities as are necessary to enable them to act as an official testing station for the approval and certification of packages for dangerous goods.

19. Consideration should be given to the possibility of a member of IMAI staff being seconded to PIRA for a short period in order to gain first hand experience of the UN testing, approval and certification procedures.

20. UNIDO should consider the publication of a detailed guide to the various regulations concerning the packaging of dangerous goods for transport as there is a serious lack of knowledge amongst developing and developed countries alike. The author would be prepared to consider the preparation of such a document.

21. When the immediate task of consolidating the position of IMAI is well advanced IMAI should become thoroughly familiar with other trends in distribution (e.g. the use of freight containers, shrunk-wrapped or stretch-wrapped unit loads whether on a pallet base or using an expendable sling, cage pallets and other retailing devices, and intermediate bulk containers for, say, 1000 litres or 1000 kg of liquid or solids) in order to be able to offer such advice and encouragement as is necessary to Mexican industry, to prepare the necessary standards, and provide test facilities to ensure a high degree of safety.

Appendix 1.

WORK PROGRAMME FOR UNIDO EXPERT.

1. Examine existing DGN standards relating to packages, packaging materials, pallets and freight containers and recommend any action thought to be necessary regarding those standards.

2. Examine the 1980 programme of work on package standardization already agreed by DGN, and assist and advise the IMAI staff in the implementation of the individual projects.

3. Prepare lists of standards of potential interest to each of the eight packaging subcommittees.

4. Ascertain the current work programme of the ISO technical committees in the field of packaging and distribution, and make recommendations as to Mexico's participation in such work.

5. Identify any constraints which may influence the future packaging of products, particularly foodstuffs, whether on the grounds of compatability with packaging materials, prescribed units of sale or dimensions.

6. Make recommendations on such future work on packaging standards as appears to be appropriate having regard to the needs of Mexican industry.

7. List the various international and national regulations regarding the classification, packaging, labelling and transport of dangerous goods with which Mexican industry may be required to comply.

8. Instruct and advise the staff of IMAI on the testing of individual types of package to comply with such regulations, and on the differences in test requirements which exist between the regulations.

9. Inform and advise IMAI on existing schemes for the approval and certification of packages to meet specific regulations for both non-dangerous and dangerous goods.

10. Inform and advise the staff of IMAI on sources of packaging information, text books and educational aids.

11. Prepare and deliver a series of instructional lectures to the IMAI staff on various aspects of packaging.

DGN PACKAGING STANDARDS.

Group A.1. Standards relating to manufactured packages for general use.

NOM-EE-

4 - 1954. Sacks made of henequen (sisal).

10 - 1949. Terms used for tinplate containers.

11 - 1949. Tinplate containers for food.

14 - 1973. Plastics crates for the handling, transport and storage of bottles.

16 - 1952. Wooden cases for packing.

30 - 1977. Glass containers for food in general.

32 - 1977. Glass containers for alcoholic drinks in general.

34 - 1977. Glass containers for industrial products in general.

45 - 1977. Lead collapsible tubes.

46 - 1978. Tin collapsible tubes.

51 - 1973. Polyethylene coated waterproof cylindrical fibreboard containers.

64-S-1979. Dimensions of cylindrical tinplate packages.

72 - 1979. Wooden packages - terminology.

Group A.2. Standards relating to manufactured packages for specific use.

NOM-EE-

1 - 1970. Canvas mail bags for surface routes.

2 - 1972. Valises for air mail.

5 - 1948. Palm fibre bale wraps for cotton.

7 - 1966. Cotton fabric sacks for wheat flour.

8 - 1965. Cotton fabric sacks, unbleached, for sugar.

12 - 1974. Glass bottles for medicines for oral or external use.

13 - 1975. Glass ampoules for medicinal use.

15 - 1951. Wooden crates for fruit.

17 - 1964. Wooden casks for 'oxido arsenioso'.

20 - 1951. Barrels for pulque.

21 - 1974. Containers for essential oils.

24 - 1976. Glass containers for milk and cream.

25 - 1976. Glass containers for water, with or without gas.

26 - 1976. Glass containers for edible oils.

27 - 1978. Glass containers for beer.

28 - 1957. Thermal bottles.

Group A.2 contd.

NOM-EE-

29 - 1979. Glass containers for perfumery and cosmetics.

31 - 1977. Glass containers for infant foods.

33 - 1978. Glass containers for injectable medicines.

35 - 1968. Milk cans of tinned steel.

36 - 1972. Pouch type envelope for melted cheese.

48 - 1979. Polypropylene sacks for sugar.

71 - 1979. Telescopic corrugated fibreboard case for citrus fruits.

Group B.1. Standards for packaging materials and components made specifically for packaging.

NOM-EE-

6 - 1964. Cloth for the fabrication of sacks for cotton.

9 - 1961. Blackplate, tinplate and terneplate for the fabrication of containers.

22 - 1957. Regenerated cellulose film used in the cigar industry.

23 - 1957. Regenerated cellulose film for general wrapping.

47 - 1979. Low density polyethylene closing and sealing caps.

60 - 1979. Low density polyethylene conical seals.

61 - 1979. Press-on polyethylene caps.

66 - 1979. Press-on caps of polypropylene or high density polyethylene for aerosols.

70 - 1979. Staples for corrugated fibreboard cases.

83 - 1979. Press-on caps of polypropyleneor high density polyethylene - dimensions.

Group B.2. Standards for materials for general use, including packaging.

NOM-EE-

3 - 1974. Twine of henequen (sisal) for baling.

50 - 1961. Paper covers.

Group C.1. Tests on complete, filled transport packages.

NOM-EE-

40 - 1973. Stacking test for fibreboard packages.

41 - 1979. Vibration test.

57 - 1979. Identification of parts when testing.

58 - 1979. Conditioning for testing.

62 - 1979. Inclined plane test.

65 - 1979. Pendulum test.

Group C.2. Tests on empty containers.

NOM-EE-

18 - 1964. Test method to determine class of wooden casks for 'oxido arsenioso'.

19 - 1964. Test method to determine dimensions of casks for 'oxido arsenioso'.

39 - 1979. Vertical compression test.

49 - 1964. Determining the impermeability of wooden casks for 'oxido arsenioso'.

Standards completed but not published.

Determining the dimensions of the threads on the necks of plastics packages.

Determining the capacity of bottles and flasks.

Group C.3. Tests on materials.

NOM-EE-

37 - 1973. Resistance to water absorption of fibreboard containers.

38 - 1973. Tests for adhesives for closing and sealing fibreboard packages.

42 - 1973. Flat crush test for corrugated fibreboard.

43 - 1973. Determination of the longitudinal direction of paper for packaging.

44 - 1973. Flat crush test for the corrugating medium.

67 - 1979. Conditioning of paper and fibreboard.

68 - 1979. Determination of basis weight of paper and fibreboard.

69 - 1979. Determination of moisture content of paper and fibreboard.

Group D.1. Marking and labelling.

NOM-EE-

59 - 1979. Symbols for handling, transport and storage.

Group D.2. Dimensional co-ordination.

None.

Group D.3. Pallets.

NOM-EE-

55 - 1979. Terminology of pallets.

56 - 1979. Wooden pallets - dimensions.

Group D.4. Freight containers.

NOM-EE-

52 - 1979. Terminology of containers.

53 - 1979. Marking of series 1 freight containers.

54 - 1979. External dimensions and resistance of containers series 1, 2 and 3.

63 - 1979. Internal dimensions of series 1 freight containers.

SUBCOMMITTEE 1 - PAPER AND BOARD.

PROGRAMME.	COMMENTS.
Project B.5.1.1.1.	
Tear resistance of paper and board.	It is understood that a standard has been drafted based on established tests, e.g. ASTM D.689-62.
Project B.5.1.1.2.	
Paper bags for various uses.	Presumably the work will identify the sizes of bag on which the standard will be based and then specify method of measurement (particularly important with block or satchel bottomed bags), dimensions, capacity and (possibility) strength, weight and type of paper to be used for the various sizes.
Project B.5.1.1.3.	
Paper bags to protect foodstuffs.	It is understood that this is intended to cover the large bags used at the store into which is put other packages of food. If this is so then the comments above apply here also. If the bags are to be used directly to contain food then the considerations of B.5.1.1.4 will need to be taken into account.
Project B.5.1.1.4.	
Wrapping paper for foodstuffs.	It is assumed that this project will deal with the properties of the wrapping papers and the sheet sizes in which they are supplied. Reference to the following may be useful: BS.1133:Section 7. Paper and board wrappers, bags and containers. BS.1820. Vegetable parchment for wrapping dairy and other food products. BS.2758. Vegetable parchment/aluminium foil laminates for wrapping dairy and other food products. If the papers are to be in direct contact with food then the question of legislation may arise, e.g. USA F.D.A. approval, or EEC Directives on materials in contact with food.

Project B.5.1.1.5.

Types of adhesives used in sealing paper and board.

It is not quite clear whether this is intended to be merely an informative standard. If so BS.1133 : Section 16, 'Adhesives in packaging', may be useful, and also BS.5350, 'methods of test for adhesives'.

The adhesives used in the manufacture of paper or board packages is often a closely guarded commercial secret.

Methods of closing fibreboard cases range from simple adhesives such as sodium silicate to pva based adhesives and holt melts. They cases may, however, be closedxonly with adhesive tape (see BS.1133,:Section 14 on 'Adhesive closing and sealing tapes') or stapling.

Project B.5.1.1.6.

Determination of resistance to flame of treated paper and board.

I have no knowledge of this other than there are accepted methods of flame retardance. PIRA has a bibliography on the subject - See abstract no. 269 of February 1979.

Project B.5.1.1.7.

Compression testing of corrugated fibreboard cases.

The standard should be based on the ISO standard method set out in ISO.2872 which relates to complete filled transport packages.

It is sometimes necessary to test the strength of a case in its unfilled condition and for this a compression test on the empty case recommended by TAPPI and by FEFCO (the European Association of corrugated fibreboard case manufacturers) is widely used. Details can be obtained from either organization if necessary.

Project B.5.1.1.8.

Determination of the coefficient of friction of corrugated and solid fibreboard using the inclined plane method.

No comment other than (a) the kraft liner on the exterior of the corrugated board may be the same as on the exterior of the solid board, and (b) the presence of product in the form of fine particles can substantially change the frictional properties of a surface.

Appendix 3/2.

SUBCOMMITTEE 2 - WOOD.

PROGRAMME.	COMMENTS.
Project B.5.1.2.1.	
* Wooden cases to hold fresh lemons.	It is understood that a standard has been agreed and officially forwarded to the DGN.
Project B.5.1.2.2.	
* Nailed wooden cases for tomatoes.	A draft standard has been prepared and is being reviewed. BS.2892:1974 for 'Non-returnable wooden trays for tomatoes' may be of interest.
* Wirebound wood cases for citrus fruits.	Proposals have been made for this standard.

* Attention is drawn to the OECD scheme for the application of international standards for fresh or refrigerated fruit and vegetables of which 19 nations are members. These include packaging requirements, including dimensions and methods of test, for wooden and fibreboard containers.

Project B.5.1.2.3.	
Determination of the moisture content of wooden packages.	It is understood that standard methods are available, e.g. see Australian standard 1080 : Part 1 : 1972 on 'Methods of test for timber. Moisture content' and ISO 3130.
Project B.5.1.2.4.	
Determination of the apparent density of woods for manufacture of packages.	It is not clear as to the motive behind this project other than educational, e.g, what types of wood are being used successfully in Mexico for different types of package. Unless there are particular applications, such as oak for liquid barrels, then the type of wood used is more a matter of economics assuming dimensional stability and strength is satisfactory. e.g. in Europe softwood is predominant whilst in Australia the native hardwoods are used. See ISO 3131.
Project B.5.1.2.5. Project B.5.1.2.6.	
Determination of compression strength of wooden packages across, parallel to and perpendicular to the grain.	It is assumed that standard methods will be used. Australian standard Z 55 - 1970, 'Methods of test for wooden cases' may be helpful, also BS1133, Section 8. ISO has these tests on the wood.
Project B.5.1.2.7.	
Determination of the defects in wood.	It is intended to define the various defects such as knots, splits etc. There are several ISO standards - 1029, 1030, 2300, 2299 and 2301

SUBCOMMITTEE 3 - GLASS.

PROGRAMME	COMMENTS.
Project B.5.1.3.1.	
Air pressure testing of glass containers.	It is understood that proposals have been made by IMAI. Presumably these are based on ASTM 147-69, 'Standard method of internal pressure test on glass containers', which is standard practice also in United Kingdom.
Project B.5.1.3.2.	
Impact testing of glass products.	It is assumed that the objective is to simulate the lateral impacts received by a bottle on the packing line. The Glass Manufacturers' Federation (GMF) in the U.K. have an impact test in which the container is held in an upright position and squeezed between two horizontal rollers. This is one of three mechanical tests which are applied to control quality - details have been provided to IMAI.
Project B.5.1.3.3.	
Terminology in the glass container industry.	Reference to BS.3130 : Part 3 : 1974, Glossary of packaging terms - Glass containers and closures may be helpful.
Project B.5.1.3.5.	
Carboys for purified water.	These 20 litre carboys are usually transported naked in vehicles with honeycomb cells. It is expected that capacity, dimensions, weight of glass and neck finish will be specified. It is difficult however to prescribe a reproducible impact test for a container of this size. When carboys were made in the UK an experienced workman used to tap them with a hammer. The test prescribed by the USA DOT for a protected carboy involves swinging the carboy in its outer against a wall. Perhaps a standard test rig complete with cushioned cradle (into which the test carboy would be placed) could be developed. The need for an impact test is questioned however. Control over dimensions, weight and distribution of glass should result in a sound container. Experience with carboys many years ago showed that if there

was substantial residual stress in the carboy it would fail when first filled, not later.

Project B.5.1.3.4.

Plastics coated glass aerosols.

I have no experience of these.

The Federation of European Aerosol Associations (FEA) in Zurich have some standards for glass aerosols, but these may only relate to the dimensions of the finish of the neck.

Project B.5.1.3.6.

Determination of the capacity of glass flasks and bottles.

The GMF publication 'Glass container tolerances' may be helpful. Brief details have been given to IMAI.

Attention is drawn to the EEC Directive 75/107 of 19 December 1974, 'Bottles used as measuring containers'.

Project B.5.1.3.7.

Testing glass packages by polarised light.

The problem is to interpret what is seen. The British Glass Industry Research Association (BGIRA) has produced strain discs for this purpose, and no doubt similar aids can be obtained elsewhere.

Project B.5.1.3.8.

Testing glass packages for resistance to chemical attack.

It is understood that there is an ASTM method that is likely to meet this requirement.

SUBCOMMITTEE 4 - PLASTICS

PROGRAMME.	COMMENTS.
Project B.5.1.4.1. Plastics valves for aerosols.	The Federation of European Aerosol Associations (FEA), Waisenhausstrasse 2, CH-8001, Zurich, Switzerland, has a number of standards which are widely used. These include standards for valves. They would probably help if asked to do so, probably through the UNIDO Industrial Inquiry Service.
Project B.5.1.4.2. Standardization of plastics coated paperboard cartons for milk and orange juice, covering capacity, dimensions, materials and compatibilty. NB. Project only refers to the coating of polyethylene on the inside.	1. It is very doubtful whether the standard can do more than cover - capacity; - shelf life. 2. Compatibility in the sense that the package may impart some taste or odour to the product is a matter of subjective judgment. See BS. 3755 : 1964 on testing for odour. 3. Most carton systems are covered by patents and vary in shape and dimensions so they cannot be standardized other than by capacity. 4. In the same way the different carton systems use various barrier materials and so the point for standardization would appear to be the minimum period for which the product must remain fit for consumption, i.e. safe storage life.
Project B.5.1.4.3. High density polyethylene bottles. Performance requirements.	1. In what way does this project differ from 5 and 6 ? The principles are the same. 2. BS. 4839 (in three parts according to the capacity of the container) covers all polyolefin bottles and drums, i.e. LDPE, HDPE and PP. 3. There is a separate standard for PVC bottles.
Project B.5.1.4.4. Dimensions of screw threads of necks of plastics bottles.	It is believed that this project is complete but reference should be made to BS.5789 : 1979 on the special threads necessary for plastics.
Project B.5.1.4.5. Test methods for permeability and compatibility with products contained.	1. Consult BS. 4839 which may be helpful. 2. Compatibility (particularly for stress crack

resistance) can be determined by :-
- a test strip of the plastics material being immersed in the liquid in accordance with ASTM D.1693-66 or ASTM D.2552-66T
- storage of the product in the package, probably at an elevated temperature and under a superimposed load.

3. Permeability can be checked by any loss of weight after the storage period, and if there is substantial loss of, say, solvent this will be visually apparent by concaving of the container walls.
4. Major polymer producers publish tables of compatibility of specific polymers with well known products. It is usually only necessary to test for compatibility in doubtful cases. A test with the product in the actual package is wise as there may be residual stresses in the package from the conversion operation.
5. The following ISO standards may be helpful:-
   ISO/R.175-1961. Determination of the resistance of plastics to chemical substances.
   ISO/R.462-1965. Recommended practice for the determination of change of mechanical properties after contact with chemical substances.

Project B.5.1.4.6.

Plastics bottles. Test method to determine resistance to impact.

This project is understood to be complete. Presumably the drop test is included. If there has been any degradation of the container either as a result of the product, or of UV light, it will be shown on a drop test.

SUB-COMMITTEE 5 - TEXTILES.

PROGRAMME.	COMMENTS.
Project B.5.1.5.1.	
Terminology relating to textile packages.	Work on this has started. The BS.1133 : Section 9 on 'Textile bags, sacks and wrappings' may be helpful, also chapter 6 of the text book 'Packaging of chemicals'.
Project B.5.1.5.2.	
Specifications for the fabric used in manufacture of sacks of sisal.	Work has not started. Presume it will include the different types of weave (see above references), the weight and number of threads per 100 mm, the weight of the cloth, finish etc.
Project B.5.1.5.3.	
Specifications for sisal nets for cargo handling at ports.	Not familiar with any standard for 'nets' although there must be commercial standards. The data in the next project should be helpful, also Australian standard AS.1380 - 1972 'Fibre rope slings' may be useful.
Project B.5.1.5.4.	
Sisal ropes. (revision of NOM-A-14-1947)	Suggest you consult BS.2052, 'Ropes made from coir, hemp, manila and sisal'.
Project B.5.1.5.5.	
Sewn sacks of sisal fibres. (revision of NOM-EE-4-1954)	A revised document has been prepared and submitted to DGN but it is understood DGN have indicated a preference for separate standards for individual products - see below - with which I disagree in principle.
Sisal fabric sacks - specifications of construction for Cacao.	Standard prepared and forwarded to DGN.
Sisal fabric sacks - for maize.	In preparation
Project B.5.1.5.6.	
Sisal twine for baling. (Revision of NOM-EE-3-1974)	See BS. 1133 : Section 13, 'Twines and cords for packaging', and BS.3543 : Part 1 'Sisal twines'.

Appendix 3/6.

SUBCOMMITTEE 6 - METAL CONTAINERS.

PROGRAMME.	COMMENTS.
Project B.5.1.6.1.	
Tinplate packages for edible oils - dimensions.	What quantities (volumes) is it desired to sell? Preferably a standard range of capacities should be agreed, e.g. 250 ml, 500 ml, 1l, 2.5 l and 5 l, which could be applicable to many products. Given such agreement standard dimensions can be developed using (a) the most suitable diameter, or (b) the most suitable rectangular base section, to give the nominal capacity plus approx. 5% for ullage. Any standardization of diameters should use the sizes in ISO 1361.
Project B.5.1.6.2.	
Tinplate packages for edible oils - types of coating.	Whether or not any lacquer coating is necessary will depend on the quality of tinplate. The actual lacquer which is known to be compatible (by experience or tests) will need to be specified and other matters such as surface preparation (if any) of the metal, method of application, curing, thickness and adhesion of the lacquer. No doubt roller coated phenolic lacquers are satisfactory, but I have no direct experience. BS. 1817 may help.
Project B.5.1.6.3.	
Tinplate packages for jellies and marmalade in bulk.	The above comments apply. ISO diameters should be used. In the UK a roller coated golden lacquer is probably used, but the tin is fitted with a polyethylene cap for reclosure after the seamed-on tinplate end has been cut out by the user.
Project B.5.1.6.4.	
Tinplate packages for evaporated milk.	See ISO 2735.
Project B.5.1.6.5.	
Tinplate packages for edible oils - determination of capacity.	Provided the procedure suggested in 1 above is followed this is unnecessary. A check on the dimensions will show whether the package is to specification.
Project B.5.1.6.6.	
Tinplate packages for edible oils - test for airtightness.	A method has been drafted and discussed in the subcommittee.

SUBCOMMITTEE 7 - TESTING METHODS.

PROGRAMME.	COMMENTS.
Project B.5.1.7.1.	
Packaging terminology.	The procedure appears to be exactly the same as in BSI (see BS.3130 which is in 5 parts). The need for some general terms should not be overlooked.
Project B.5.1.7.2.	
Methods of testing ISO Series 1 freight containers. (All 8 tests to be in same standard).	The tests are established by ISO and are required for certification of batches of freight containers under the provisions of the International Container Convention. It is understood that it is desired to specify the equipment on which such tests are carried out. Such equipment is likely to be purpose built and exists only in a few places, e.g. Lloyds in the UK. UNIDO enquiry service may help but the need is questioned as it is understood that, as yet, Mexico does not make freight containers.
Project B.5.1.7.3.	
Method of determining the permeability of packages to oxygen, carbon dioxide and water vapour. (All 3 tests to be in same standard).	It is understood that the requirement is for complete packages not packaging materials. ANSI standards MH.12.12, 12.17 and 12.18 may be helpful; also ASTM. D.3078 and 3079. Reference should also be made to the current work in the laboratory under the direction of Professor Gilbert.
Project B.5.1.7.4.	
Revolving drum test.	ISO decided not to draft a standard because inter-laboratory comparisons are unreliable. See ANSI standard MH.12.3 - 1973.
Project B.5.1.7.5.	
Shock testing.	This is related to the S.Q. Wave Prog. equipment installed in the laboratory by MTS Systems Corpn., Minneapolis, but a generic test procedure is required. ASTM. methods D.2956, D.3331 and D.3332 should be consulted.
Project B.5.1.7.6.	
Tear resistance of plastics films.	The "Handbook of plastics test methods" by G.C. Ives, J.A. Mead and M.M. Riley devotes a section (pp.454 to 460) to the various methods. DOT Spec. 44P and BS. 4932 should also be consulted for specific requirements for polyethylene film sacks.

Project B.5.1.7.7.

Determination of the quality of the materials used to make rectangular packages for milk.

It is understood that this has arisen from problems which have occured with Purepak cartons, and that it is desired to predict what materials are likely to cause trouble. Presumably the licensor provided a specification for the paperboard which should work, and the problem is to identify the variations (probably within the permitted tolerances) which may be causing the trouble. The possibility of variability in machine setting, maintenance and operation should not be overlooked. The laboratory work mentioned above may help.

SUBCOMMITTEE 8 - TRANSPORTATION AND CARGO MANAGEMENT.

PROGRAMME.	COMMENTS.
Project B.5.1.8.1.	
Air containers (classification, use, characteristics and marking)	Work done so far relates to IATA approved 'Unit Load Devices'. If the ISO Series 1 Air-mode freight container is to be covered, as is being proposed, then the differences should be made quite clear. Separate standards, or one standard in two parts, would be best with a careful choice of words in the title.
Project B.5.1.8.2.	
Methods of test of air containers.	Again it is understood that the testing refers to IATA approved 'Unit Load Devices'. If the intermodal Series 1 freight container is to be covered then the above comments apply.
Project B.5.1.8.3.	
Nets for securing cargo on aircraft pallets.	It is very likely that there is an agreed IATA standard which should be obtainable from either IATA or a member airline. It is understood that requests have been made, so far without success. UNIDO enquiry service may be able to help. Also a check should be made in the ISO catalogue to see whether the ISO committee on aircraft has published a standard.
Project B.5.1.8.4.	See BS.1133 : Section 15, and BS.4853 : 1972 for specifications and applications of metal strapping.
Metal bands for securing rolls of metal in transport on platform vehicles and trailers.	Metal strapping is not usually used in United Kingdom for securing cargo on platform vehicles: ropes (with or without a separate tarpaulin) are used for this purpose.
Project B.5.1.8.5.	Rolls of sheet metal would probably be sitting in a type of wooden pallet base, and strapped to it. Pipes are often formed into unit loads using metal strapping and suitable wooden battens. Unit loads of both types would be secured to the vehicle deck by ropes.
As above but for metal sewer pipes	
Project B.5.1.8.6.	
Metal bands for baling cotton or chemical fibres, or securing automotive parts and electric cables.	Refer to BS.1133 : Section 15 and BS.4853. Where compression baling is involved the degree of compression achieved has an important bearing on the number and strength of the metal straps.

PAPER & BOARD PACKAGING - LIST OF STANDARDS.

ISO STANDARDS.

None on packages but one on paper sacks is in preparation.

ISO TC.6 has published many standards on paper and fibreboard which are listed in the ISO Catalgue: these include test methods on materials which should be used only if they are relevant to the packaging requirements.

EEC STANDARDS.

Regulation No.1636/74 dated 17 June 1974.	Three specifications of paper sack for 25 kg skimmed milk powder.

OECD and ECE.

(applicable to wood, fibreboard and plastics containers)	Recommendation on the standardization of packaging for the international transport of fresh or refrigerated fruit and vegetables.

BSI STANDARDS.

BS. 1133	Packaging Code.
Section 7 : 1967	Paper and board wrappers, bags and containers.
Section 7 Chapter 7.5 : 1976	Fibreboard packing cases. (Revised draft handed to IMAI).
Section 16 : 1968	Adhesives for packaging.
BS. 1596 : 1974	Fibreboard drums for shipment of goods overseas.
BS. 1679	Containers for pharmaceutical dispensing.
Part 1 : 1976	Paperboard containers for strip and blister packs.
BS. 1820 : 1961	Vegetable parchment for wrapping dairy and other food products.
BS. 1758 : 1956	Vegetable parchment/aluminium foil laminates for wrapping dairy and other food products.
BS. 3043 : 1973	Storage envelopes for processed X-ray films for medical radiography.
BS. 3130	Glossary of packaging terms.
Part 2 : 1979	Paper and board packaging.
BS. 3440 : 1965	Recommendations for the identification marking of pulpable paper and board (pernicious contraries).
BS. 3596 (Parts 1, 2 and 3)	Containers for home produced dressed poultry.
BS. 3725 : 1964	Non-returnable multiwall paper sacks for loose ware potatoes.
BS. 3789 : 1975	Non-returnable fibreboard tomato trays.
BS. 4413 (Parts 1 and 2)	Non-returnable fibreboard containers for flowers.
BS. 4879 : 1973	Waxed board for packaging ice cream and frozen confectionary.
BS. 5167 : 1978	Packages for washing and cleaning powders (dimensions and volumes). This corresponds exactly with CEN standard EN23.
BS 5407 : 1976	Classification of adhesives.

BSI STANDARDS (contd)

BS. 5637 : 1978	Non-returnable fibreboard cases for apples.
PD. 6459 : 1971	Guidance on avoiding odour from packaging materials used for foodstuffs.

DRAFT BRITISH STANDARDS.

78/64234 DC	Paper for steam sterilization - paper bags and pouches.
78/64235 DC	Paper steam sterilisable bags.

ANSI STANDARDS.

MH.3.4 - 1976	Specifications for round composite motor oil cans.
MH.3.5 - 1975	Dimensions for fibre boxes for round motor oil cans.

OTHER STANDARDS OF INTEREST.

ASSCO (Zurich) and FEFCO (Paris)	a. International fibreboard case code. b. Test methods for solid and corrugated fibreboards. c. Test methods for fibreboard cases.
Fiber Box Association (Chicago)	Standards for fibreboard cases.
* AFNOR Q.12-008	Experimental standard on 'Properties of single wall and double wall corrugated fibreboard for packaging'.
* SIS SS 84 30 01 E	Corrugated fibreboard.
* SS 84 30 02 E	Sampling and inspection of corrugated fibreboard boxes. Constructional details etc.

* copies handed to IMAI.

MANDATORY STANDARDS.

For dangerous goods.

UN and IMDG Code.	Test requirements for fibreboard cases, fibreboard drums and paper sacks.
USA DOT.	Constructional and test requirements for fibreboard boxes (Specs. 12A to 12P and 23F to 23H) , fibreboard drums (Specs. 21C and 21P) and paper sacks (Specs. 44B to 44E).

For non-hazardous goods to the USA.

Uniform freight classification (UFC)	Rule 41.

STANDARDS ON TESTING PAPER AND BOARD.

ISO TC.6	See ISO catalogue.
ASTM.	See list.
TAPPI.	See list.

BSI standards.

BS. 2644 : 1955	Sizing properties of paper. Method of testing the degree of water resistance.

STANDARDS ON TESTING PAPER AND BOARD (contd)

BS. 2922 : 1958	Methods of testing the strength of wet paper.
BS. 2924 : 1968	Methods for determination of pH value, conductivity and chloride and sulphate content of aqueous extracts of paper and board.
BS. 2925 : 1958	Methods for determining the air premeability and air resistance of paper.
BS. 2987 : 1958	Notes on the application of statistics to paper testing.
BS. 3110 : 1959	Methods for measuring the rub resistance of print.
BS. 3137 : 1972	Methods for determining the bursting strength of paper and board.
BS. 3177 : 1959	Method for determining the permeability to water vapour of flexible sheet materials used for packaging.
BS. 3430 : 1968	Sampling of paper and board for testing.
BS. 3431 : 1973	Method for the conditioning of paper and board for testing.
BS. 3432 : 1971	Method for the determination of the grammage (basis weight) of paper and board.
BS. 3433 : 1961	Sampling and testing of paper for moisture content.
BS. 3748 : 1964	Method for the determination of stiffness of board.
BS. 3755 : 1964	Methods of test for the assessment of odour from packaging materials used for foodstuffs.
BS. 4415 : 1969	Method for the determination of tensile strength of paper and board.
BS. 4468 : 1969	Method for the determination of the internal tearing resistance of paper.
BS. 4685 : 1971	Method for the determination of the wax content of waxed paper and board.
BS. 4686 : 1971	Method for the determination of the flat crush resistance of single faced and single wall corrugated fibreboard.
BS. 4816 : 1972	Method for the determination of the puncture resistance of board.
BS. 4817 : 1972	Method for the determination of the thickness of corrugated fibreboard.
BS. 4818 : 1972	Recommendations for a method for the determination of the creasing quality of carton board as measured by the PIRA carton board creaser.

Appendix 4/2.

WOOD PACKAGES - LIST OF STANDARDS.

ISO STANDARDS.

None on packages but see various standards for wood published by TC55.

BSI STANDARDS.

BS. 565 : 1972.	Glossary of terms relating to timber and woodwork.
BS.1133 Section 8 : 1950.	Packaging Code. Wooden containers.
BS.1455 : 1972.	Plywood manufactured from tropical hardwoods.
BS.2892 : 1974.	Non-returnable wooden trays for tomatoes.
BS. 3018 : 1958.	Returnable wooden crates for vegetables.
BS.3493 : 1962.	Information about plywood.
BS.4144 : 1967.	Non-returnable wooden boxes for apples and other products.
BS.2548 : 1954.	Wood wool for general packaging purposes.

OTHER STANDARDS.

IATA (for dangerous goods), e.g.		Similar USA DOT Specs.
T4A	Wooden boxes.	15A, 15B
T4B	Wooden boxes, glued plywood.	15P, 19A, 19B
T4C	Wooden boxes, wirebound.	16A, 16B
T4E	Wooden drums. glued plywood.	22A, 22B

OECD and ECE.

(applicable to wood, fibreboard or plastics containers)	Recommendation on the standardization of packaging for the international transport of fresh or refrigerated fruit and vegetables.

SAA (AUSTRALIA).

1080 : Part 1 : 1972	Methods of test for timber. Moisture content.
N 54 - 1965	Wooden containers for bulk deciduous fruit.
Z 55 - 1970	Methods of test for wooden cases.

USA DOT.

10A, 10B and 10C	Wooden barrels and kegs (tight).
11A and 11B	Wooden barrels (slack).
22A, 22B and 22C	Plywood drums.

GLASS CONTAINERS - LIST OF STANDARDS.

ISO STANDARDS.

ISO/R.1115.	Finishes with external screw thread for glass containers and gauges for the inspection of screw closures.

NB. The scope of ISO.TC.63 has recently been expanded and a great deal of work on glass containers is being proposed.

BSI STANDARDS.

BS. 795 : 1961	Ampoules.
BS. 830 : 1953	80 oz and 90 oz Winchester bottles.
BS.1133 : Sec.18 : 1967	Glass containers and closures.
BS.1679	Glass containers for pharmaceutical dispensing.
Part 5 : 1973	Eye dropper bottles.
Part 6 : 1967	Glass mecicine bottles.
Part 7 : 1968	Ribbed oval glass bottles.
BS.1777 : 1951	Glass honey jars.
BS.1918	Glass container finishes.
Part 1 : 1978	Specification for continuous thread finish.
Part 2 : 1970	Crown finish.
BS.1925 : 1962.	Capacity of glass milk bottles.
BS.2812	Dimensions of glass milk bottles.
Part 1 : 1957	Bottles of the aluminium foil cap type.
Part 2 : 1962	Bottles for sterilized milk.
BS.4590	Non returnable soft drink glass bottles.
Part 1 : 1970	Bottles with crown finish.
BS.4602 : 1977	Specification for the use of metric units in specifications for glass containers and finishes.
BS.5144 : 1974	Cider flagons.
BS.3263 : 1960	Rubber closures for injectable products.
BS.3130	Glossary of packaging terms.
Part 3 : 1974	Glass containers and closures.

CEN STANDARDS.

EN 76	Packages for certain pre-packed foodstuffs. Capacities for glass and metal containers.

EEC DIRECTIVES.

75/107 of 19 Dec 1974.	Bottles used as measuring containers.
Proposal	Materials and objects in glass intended to come into contact with foodstuffs.

OTHER STANDARDS.

Centre Technique International
de L'embouteillage et du
Conditionnement (CETIE), Paris.

CETIE (contd)

Very important European trade standards for glass containers for beer, wine and similar products e.g.

BV-1 : January 1. 3.	Crown finish 26 mm high.
EV-1b : February 1969.	50 cl beer bottle.
DT 5 : May 1976.	Strength properties for carbonated beverage bottles.
GME 320 : May 1976.	Pilferproof neck for pressurised beverages.

Glass Manufacturers' Federation (GMF), London.

	Strength and performance standards for carbonated beverage bottles.
	Glass container tolerances.
	Quality control in the glass container industry.

British Glass Industry Research Association (BGIRA), Sheffield.

	Strain discs (for examination of containers under polarised light

ASTM.

C.149-71.	Standard method of thermal shock test for glass containers.
147-69.	Standard method of internal pressure test on glass containers.

AFNOR.

Large number of standards for glass bottles, particularly for wine, beer and water.

National Bureau of Standards (NBS), Washington.

PS 73 - 77.	Carbonated soft drink bottles.

Federation of European Aerosol Associations (FEA), Zurich.

206	Aerosol glass bottles - Dimensions of 20 mm finish.
207	Aerosol glass bottles - Dimensions of 15 mm finish.
208	Aerosol glass bottles - Dimensions of 18 mm finish.
209	Aerosol glass bottles - Dimensions of 27 mm finish.

PLASTICS PACKAGES - LIST OF STANDARDS.

ISO STANDARDS.

None on packages. ISO TC.61 has published many standards on plastics which are listed in the ISO Catalogue. Test methods for plastics materials included in those standards should be used for packaging purposes only if they are relevant.

BSI STANDARDS.

BS. 1133	Packaging Code.
Section 21 : 1976	Regenerated cellulose film, plastics films, aluminium foil and flexible laminates.
Section 22 : 1967	Packaging in plastics.
BS. 1679	Containers for pharmaceutical dispensing.
Part 4 : 1969	Plastics containers for tablets and ointments.
BS. 1763 : 1975.	Thin pvc sheeting (calendered, flexible, unsupported).
BS. 3130	Glossary of packaging terms.
Part 5 : 1976	Plastics and flexible packaging (excluding paper).
BS. 3887 : 1965.	Regenerated cellulose and unplasticized pvc pressure sensitive closing and sealing tapes.
BS. 4806 : 1972.	Rigid plastics pots for dairy products.
BS. 4839	Blow moulded polyolefin containers.
Part 1 : 1972	Containers up to 5 litres.
Part 2 : 1974	Containers over 5 litres and up to 60 litres capacity.
Part 3 : 1977	Closed head containers over 60 litres up to and including 210 litres.
BS. 4855 : 1973	Recommendations for the use of flexible wrapping materials for cheese packaging.
BS. 4932 : 1973	Heavy duty polyethylene sacks.
BS. 4994 : 1973	Vessels and tanks in reinforced plastics.
BS. 5124 : 1975	Plastics crates to hold 20 one pint milk bottles.
BS. 5496 : 1977	Specification for plastics catering containers and lids.
BS. 5597 : 1978	Specification for non-refillable plastics aerosol containers up to 300 ml capacity.
BS. 5638	Blow moulded unplasticised pvc containers.
Part 1 : 1978	Specification for containers up to 5 litres.
BS. 5789 : 1979	Screw thread finishes for plastics containers.
OECD/ECE (applicable to wood, fibreboard or plastics)	Recommendation on the standardization of packaging for the international transport of fresh or refrigerated fruit and vegetables.

EEC DIRECTIVES.

78/142 of 20 Jan 1978.	Materials and articles which contain vinyl monomer and are intended to come into contact with foodstuffs.

EEC DIRECTIVES (contd)

Proposal	Materials and articles in regenerated cellulose film intended to come into contact with foodstuffs.
Proposal	Materials and articles in plastics intended to come into contact with foodstuffs.

ANSI STANDARDS.

MH.17.1 - 1974.	Plastics containers (Jerry Cans) for petroleum products.

SAA (AUSTRALIAN) STANDARDS.

1326 - 1972	Polyethylene film for packaging and allied purposes.
Supplement 1 (1974)	Polyethylene film for packaging dairy products.
1440 - 1974	Single use rigid and semi-rigid plastics containers for dairy products.
1936 - 1976	Plastics containers for transport of materials.
2070	Plastics materials for food use.
Part 1 - 1977	Polyethylene.
Part 2 - 1977	Polyvinylchloride (pvc) compound.
2183 - 1978	Flexible wrappings (including laminates) for rindless cheese.

TESTING OF PLASTICS.

The 'Handbook of plastics test methods' published by the Butterworth Group on behalf of the British Plastics Institute (ISBN 0 592 05449 7) and available in the IMAI library is a reliable guide to ISO, ASTM and BSI test methods for plastics materials.

MANDATORY TEST PROCEDURES ON PLASTICS PACKAGES.

Plastics drums and jerricans.	UN recommendations and IMDG Code. Drop - stacking - hydraulic pressure - leakage.
	USA DOT Spec. 34. Drop - stacking - hydraulic pressure - vibration.
Plastics sacks.	UN and IMDG Code. Drop.
	USA DOT Spec. 44P. Dart impact, tensile, elongation and tear on film. Drop on sacks.

Appendix 4/5.

TEXTILE PACKAGES - LIST OF STANDARDS.

ISO STANDARDS.

None.

BSI STANDARDS.

BS. 1133	Packaging Code.
Section 9 : 1967	Textile bags, sacks and wrappings.
Section 11: 1968	Packaging felt.
Section 13: 1954	Twines and cords for packaging.
BS. 2019 : 1972	Lines made from cotton and hemp.
BS. 2052 : 1965	Ropes made from coir, hemp, manila and sisal.
BS. 2570 : 1973	Natural fibre twines.
BS. 2628 : 1972	Needleloom felts.
BS. 3408 : 1977	Specification for tarpaulins.
BS. 3543	Agricultural baler twines for automatic pick-up balers and similar machines.
Part 1 : 1972	Sisal twines.
Part 2 : 1973	Polypropylene fibrillated film twines.
BS. 3695 : 1963	Polyethylene monofilament twines.
BS. 3736 : 1970	Tubes and inserts for textile piece goods.
BS. 4002 : 1966	Cotton . es (hawser laid).
BS. 4060 : 1972	Pressed wool felts.
BS. 4928	Man-made fibre ropes.
Part 1 : 1973	Polypropylene ropes (3 strand hawser laid and 8 strand plaited).
Part 2 : 1974	Polyamide (nylon), polyester and polyethylene filament ropes
Handbook No. 11 : 1974	Methods of test for textiles.
In preparation	Flexible intermediate bulk containers (e.g. 1000 kg capacity made from woven polypropylene tape)
In preparation	Polypropylene tape fabric sacks.

OTHER STANDARDS.

Standards for jute sacks are traditional rather than written, and based on the practice in Calcutta when it was the centre of the world trade, e.g. see :-

Textbook on "Packaging of chemicals", chapter 6, especially page 74, and

USA DOT Regulations, Specification Nos. 36A, 36B and 36C.

METAL PACKAGES - LIST OF STANDARDS.

ISO STANDARDS.

Hermetically sealed metal cans for food and drink.

ISO 90 : 1977	Specifications.
ISO 1361	Internal diameters of round cans.
ISO 2735	Capacities and diameters of round open-top and vent hole cans for milk.
ISO 3004/1 : 1979	Part 1. Round open top general purpose foods cans.
ISO 3004/2 : 1979	Part 2. Food cans for meat and products containing meat for human consumption.

NB. The scope and responsibilities of TC.52 has been extended recently and a wide ranging programme of standardisation is envisaged.

BSI STANDARDS.

For metal drums.

BS 814 : 1974.	Mild steel and tinplate drums (light duty: fixed ends).
BS 1702 : 1950.	Mild steel drums (heavy duty: fixed ends).
BS 2003 : 1974.	Mild steel drums (light duty: removable head).

For cans.

BS 1262 : 1970.	Round tins for liquid paints, varnishes and allied products (packed by volume).
BS 1764 : 1973.	Nominal diameters of round built up tins.
BS 1817 : 1963.	Tins for honey.
BS 2469 : 1973.	Round tins for lubricating grease.
BS 5567 : 1978.	Apertures in tinplate containers to receive plug in plastics closures.
BS 5596 : 1978.	Hermetically sealed metal cans for food and drinks - Specifications. (ISO 90)
BS 5614 : 1978.	Round sealed metal cans for motor oil and allied products.

For pressurised containers.

BS 1101 : 1977.	Specification for pressure containers for paint and other substances.
BS 3914	Aerosol dispensers.
Part 1 : 1974.	Non-returnable metal containers up to 1400 cm^3 and 85 mm diameter.
BS 5188 : 1975.	Non-refillable metallic containers up to 1.4 litres capacity and 85 mm diameter for liquefied or compressed non-flammable gases.
BS 5329 : 1976.	Non-refillable metallic containers up to 1.4 litres capacity for liquefied petroleum gases.

For collapsible tubes.

BS 2006 : 1966.	Metal collapsible tubes.
Bs 4230 : 1967.	Metal collapsible tubes for eye ointment.

Metal foils.

BS 1683 : 1967.	Coated aluminium foil for wrapping processed cheese.
BS 3313	Aluminium capping foil and strip for dairy product containers.
Part 1 : 1968.	Aluminium capping foil for glass containers.
Part 2 : 1968.	Aluminium capping foil for skirted closures for plastics containers.

General.

BS 1133	Packaging Code.
Section 6 - 1966	Temporary protection of metal surfaces against corrosion (during transport and storage).
Section 10 - 1966	Metal containers.
Section 15 - 1975	Tensional steel strapping.
BS 2038 : 1953.	Rolled sheet metal screw threads and associated threads in moulded plastics and die cast materials for general purposes.
BS 2611 : 1955	Crates for 1 pint and 1 quart milk bottles.
BS 2920 : 1973	Cold-reduced tinplate and cold-reduced blackplate.
BS 3130	Glossary of packaging terms.
Part 4 : 1976	Metal containers and aerosols.
BS 4615 : 1970	Metal cans for processed 35 mm motion picture film.
BS 4853 : 1972	Tensional steel strapping.

DRAFT BRITISH STANDARD.

78/64236 DC	Screw necks (soldered type), caps and inner seals.

CEN STANDARD.

EN 76	Packages for certain pre-packed foodstuffs. Capacities of glass and metal containers.

OTHER STANDARDS.

USA DOT Hazardous goods regulations.	
Steel Shipping Container Institute, Union N.J.	Standards for most sizes and shapes of metal drums used in North America.
ANSI MH.2.1 to 18 incl.	
ANSI MH.3.1 - 1974	Requirements for round metal motor oil cans.
ANSI MH.3.3 - 1975	Requirements for 201.5 x 904.5 grease cartridge.
FEA (Zurich).	Many specifications for aerosols and components.

PACKAGE TESTING - LIST OF STANDARDS.

NB. This list is primarily concerned with tests on complete filled packages and does not include tests on packaging materials or on empty packages for the purpose of quality assurance. Standards on sampling and quality assurance are included.

ISO STANDARDS.

	Testing of complete, filled transport packages.
ISO 2206 : 1972.	Part 1. Identification of parts when testing.
ISO 2233 : 1972.	Part 2. Conditioning for testing.
ISO 2234 : 1972.	Part 3. Stacking test.
ISO 2248 : 1972.	Part 4. Vertical impact test by dropping.
ISO 2244 : 1973.	Part 5. Horizontal impact tests. (Inclined plane test; pendulum test).
ISO 2247 : 1973.	Part 6. Vibration test.
ISO 2872 : 1973.	Part 7. Compression test.
ISO 2873 : 1973.	Part 8. Low pressure test.
ISO 2874 : 1973.	Part 9. Stacking test using compression tester.
ISO 2875 : 1973.	Part 10. Water spray test.
ISO 2876 : 1973.	Part 11. Rolling test.

DRAFT ISO STANDARDS.

DIS 4178 — Information to be recorded when carrying out distribution trials.

Guide to the compilation of performance test schedules.

DIS 4180/1. Part 1. General principles.

DIS 4180/2. Part 2. Quantitative data.

BSI STANDARDS.

BS. 4672. Guide to hazards in the transport and storage of packages.
- Part 1 :1971. Climatic hazards.
- Part 2 :1971. do (Maps and diagrams).

BS. 4778 : 1971 — Glossary of terms used in quality assurance.

BS. 4826 : Parts 1 to 11. Correspond to ISO standards listed above.

BS. 4891 : 1972. A guide to quality assurance.

BS. 5179 — Guide to the operation and evaluation of quality assurance systems.
- Part 1 : 1974. Final inspection system.
- Part 2 : 1974. Comprehensive inspection system.
- Part 3 : 1974. Comprehensive quality control system.

BS. 5321 : 1975. Reclosable pharmaceutical containers resistant to opening by children.

DD.30. Part 2 : 1973 Resistance of pharmaceutical packages to opening by children. Non reclosable unit packages.

BC. 5350 (several parts) Methods of test for adhesives.

BS. 6000 : 1972. Guide to the use of BS.6001.

BS. 6001 : 1972. Sampling procedures and tables for inspection by attributes.

ANSI STANDARDS.

MH.12.2 - 1973.	Drop test for shipping containers.
MH.12.3 - 1973.	Shipping containers in a revolving hexagonal drum.
MH.12.4 - 1973.	Incline plane test for shipping containers.
MH.12.6 - 1973.	Drop test for bags.
MH.12.8 - 1973.	Penetration of liquids into submerged containers.
MH.12.9. - 1973.	Vibration test for shipping containers.
ANSI/ASTM D.1008 - 64 (1977)	Water vapor transmission of shipping containers.
MH.12.11 - 1973.	Large shipping cases and crates.
MH.12.12 - 1973.	Water vapor transmission of shipping containers by the cycle method.
MH.12.17 - 1973.	Water vapor permeability of packages.
MH.12.18 - 1973.	Water vapor permeability of packages by cycle method.
ANCI/ASTM D.642-76.	Standard method of compression test for shipping containers.
ANSI/ASTM D.2956 - 71 (1977)	Controlled shock input tests for shipping containers.
ANSI/ASTM D.3078 - 72 (1977)	Test for leaks in heat sealed flexible packages.
ANSI/ASTM D.3079 - 72 (1977)	Water vapor transmission of flexible heat sealed packages for dry products.
ANSI/ASTM D.3103 - 72 (1977)	Standard method of test for thermal insulation quality of packages.
ANSI/ASTM D.3331 - 77.	Test for assessment of mechanical shock fragility using package cushioning materials.
ANSI/ASTM D.3332 - 77.	Test for mechanical shock fragility using shock machines.

MANDATORY TEST PROCEDURES.

UN 'Transport of dangerous goods') IMCO's 'IMDG Code'.)	Drop, stacking, hydraulic pressure and air leakage tests.
IATA's Restricted articles regulations	- Drop, hydraulic pressure and air leakage tests.
USA DOT regulations.	Drop, stacking/compression, hydraulic pressure, air leakage and (for plastics drums) vibration tests.

TEST PROCEDURES FOR NON-HAZARDOUS GOODS PACKAGES.

Joint OECD/ECE recommendations on "Packages for international transport of fresh or refrigerated fruit and vegetables".

USA's Uniform Freight Classification - Rules 40 and 41.

IATA's 'Register of containers and pallets'.

TRANSPORTATION AND CARGO MANAGEMENT - LIST OF STANDARDS.

ISO STANDARDS.

ISO 668 : 1979	Freight containers - external dimensions and ratings.
ISO 790 : 1973	Marking of series 1 freight containers.
ISO/R 830 : 1968	Terminology relating to freight containers.
ISO 1161 : 1976	Series 1 freight containers - corner fittings - specifications.
ISO 1496	Series 1 freight containers - specification and testing.
/1 : 1978	Part I. General cargo containers.
/2 : 1977	Part II. Thermal containers.
/3 : 1974	Part III. Tank containers for liquids and gases.
/5 : 1977	Part V. Platform (container).
/7 : 1974	Part VII. Air mode containers.
/6c: 1977	Part VI(c). Platform based containers, open sided, with complete superstructure.
ISO 1894 : 1979	General purpose series 1 freight containers - minimum internal dimensions.
ISO 2716 : 1972	Identification marking code for freight containers.
ISO 3874 : 1979 Add.1 : 1977	Series 1 freight containers - handling and storage.
* ISO/R 198	Double deck flat pallets for through transit of goods.
* ISO/R 329	Large pallets for through transit of goods.
* ISO/R 445	Vocabulary of terms relating to pallets.
* ISO/R 509	Principal dimensions of pallet trucks.
* ISO/R 780	Pictorial markings for handling of goods - general symbols.
* ISO/R 884	Pictorial marking of transit packages containing photographic materials sensitive to radiant energy.

* these standards are being revised.

ISO 3394 : 1975	Dimensions of rigid rectangular packages - transport packages

DRAFT ISO STANDARDS.

DIS 1496/6(a)	Series 1 freight containers - specification and testing. Platform based containers with incomplete superstructure and fixed ends.
DIS 3676.3	Packaging - Unit load sizes suitable for use in ISO series 1 freight containers - Base dimensions.

BSI STANDARDS.

BS. 3951 (in several parts)	Freight container standards identical to ISO.
BS. 5073 : 1974	The carriage of goods in freight containers.
BS. 1133	Packaging Code.
Sec. 4 : 1965	Mechanical aids in package handling.

BS. 1133 (contd)

Sec. 12	: 1967	Cushioning materials.
Sec. 15	: 1975	Tensional strapping.

BS. 2629		Pallets for materials handling for through transit.
Part 1	: 1976	Dimensions, construction and marking.
Part 2	: 1970	Pallets for use in freight containers.
Part 3	: 1978	Pallet testing.

BS. 2770		Recommendations for the pictorial marking of goods in transit.
Part 1	: 1969	Handling instructions for non-dangerous goods.
Part 2	: 1969	Packages containing photographic materials sensitive to radiant energy.

BS. 2837 : 1970	Steel link and strap assemblies for lifting attachments to packing cases.
BS. 4155 : 1967	Dimensions of pallet trucks.
BS. 4337 : 1968	Principal dimensions of hand operated stillage trucks.
BS. 4853 : 1972	Tensional steel strapping.

plus standards for lifting slings, particular expendable slings which travel with the cargo.

ANSI STANDARDS.

MH.1.2.2 - 1975	Pallet sizes.
MH.1.4.1 - 1977	Procedures for testing pallets.
MH.10.1 - 1972	Unit load sizes for dimensioning transport package sizes.
MH.10.2 - 1973	Transport package sizes for MH.10.1 unit load sizes.
MH.14.1 - 1978	Industrial loading dockboards (ramps).

SAA STANDARDS.

1899 - 1976.	Flat pallets for materials handling (1100 mm x 1100 mm) suitable for use in ISO series 1 freight containers).
2068 - 1977.	Flat pallets for materials handling (1165 mm x 1165 mm general purpose, not intended for use in ISO series 1 freight containers.
1353 - 1974.	Synthetic webbing flat slings.
1380 - 1972.	Fibre rope slings.
1438 - 1974.	Wire coil flat slings.
1666 - 1976.	Wire rope slings

DRAFT BRITISH STANDARD.

78/76328 DC.	Cage pallets for retail use (including distribution from product manufacturer).

REGULATIONS ON THE PACKAGING OF DANGEROUS GOODS.

Note. The regulations marked * are considered to be essential to the work of the IMAI if testing of packages for hazardous goods is to be undertaken, and the documents need to be available in the laboratory. When the current issues are obtained standing orders should be placed for any amendments and/or revised publications.

INTERNATIONAL REGULATIONS.

United Nations.	* "The transport of dangerous goods" is republished periodically the last issue being circa. 1977. This is the basis for all international regulations in the future. It is now in a single volume.
Intergovernmental Maritime Consultative Organization. (IMCO).	* International Maritime Dangerous Goods (IMDG) Code. Republished entirely in late 1978 and now consists of four volumes. Vol. 1 is of particular importance as it includes Annex 1 which contains all the package testing requirements and the illustrated glossary of packages. Amendments are published at least once a year, the most recent (No.16) comes into effect in March 1980.
International Civil Aviation Authority (ICAO)	* ICAO has in preparation regulations based on the UN covering the despatch of dangerous goods by air.
International Air Transport Association. (IATA)	* IATA's "Restricted Articles Regulations", which are republished at least once a year, is not based on the UN. The IATA rules govern the carriage of dangerous goods by air and will continue to do so until the ICAO regulations are published and are adopted by Governments.
Rail.	"International Regulations Concerning the Carriage of Dangerous Goods by Rail (RID)" which govern all international transport of dangerous goods within Europe and other neighbouring Asian and North African countries who are signatories to the Convention, are being revised in line with the UN.
Road.	"European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)" has identical packaging requirements to RID, and is being simultaneously revised.

NATIONAL REGULATIONS.

United Kingdom.	"Report of the Standing Advisory Committee on the Carriage of Dangerous Goods in Ships (The Blue Book)". This was entirely republished to coincide with the new edition of the IMDG Code. It is now a small matching volume which provides that the IMDG Code is the law of the land other than for the exceptions listed.
Mexico.	* Codigo Internacional Maritimo de Mercancias Peligrosas published by the Secretaria de Marina, Direccion General de Operacion Portuaria, is in effect the IMDG Code. It is not known whether the current edition incorporates Annex 1.

NATIONAL REGULATIONS (contd).

United States of America.

Regulations governing the transport of dangerous goods in the USA are published in two forms, i.e.
The Code of Federal Regulations, Title 49, with amendments being published as they arise in the Federal Register,
or
* R.M. Graziano's Tariff, "Hazardous Materials Regulations of the Department of Transportation, including Specifications for Shipping Containers". This is published on behalf of the carriers from 1920 "L" St. N.W., Washington, D.C., with amendments issued from time to time.

It should be noted that whilst the USA has adopted the UN/IMDG regulations for marine shipments, the rules for internal transport by road and rail within the USA do not follow the UN, and despatches by rail or road from Mexico to the USA will need to comply with the USA DOT regulations.

NON-HAZARDOUS GOODS.

In addition to the above regulations for hazardous goods there are certain carrier regulations which cover the quality of the packages which are to be used for non-hazardous goods. The following may apply to exports from Mexico by rail, road and air.

USA.

* Uniform Freight Classification (UFC).
This is published on behalf of the railroads by J.D. Sherson, Room 202 Union Station, 516 W.Jackson Blvd., Chicago. Rules 40 and 41 are especially relevant to packaging.
A similar, but not identical, document covering transport by road, National Motor Freight Classification (NMFC) by the National Motor Freight Traffic Association, Inc.

IATA.

* IATA Register of Containers and Pallets.

SOURCES OF INFORMATION, TEXT BOOKS AND EDUCATION.

United Nations Industrial Development Organization (UNIDO), Vienna.

Information.

1. UNIDO Industrial Inquiry Service.

Publications.

2. Guide No. 27. Information sources on the packaging industry.
3. Guide No. 19. Information sources on the canning industry.
4. Monograph No.9. Food processing industry.
5. Monograph No.12. Standardization.

International Trade Centre (UNCTAD/GATT), Geneva.

Reports.

6.	ITC/DFO/INF/78/Rev.2. September 1978.	Reference document on international standardization of selected products, packaging and labelling - J.Selin.
7.	ITC/CONF/P/2. September 1978.	The co-ordination of technical assistance in packaging - A.M. Hatt-Arnold.
8.	ITC/CONF/P/4. September 1978.	Coordination of national, regional and international standardization in packaging - C.Swinbank. (The Helsinki report).
9.	ITC/CONF/P/6. September 1978.	Coordination of national, regional and international regulations affecting packaging and labelling - E.A.Leonard.
10.	ITC/CONF/P/7. October 1978.	Report of the Expert Group Meeting. (The Helsinki Group of Experts).
11.	ITC/CONF/P/8. October 1978.	Report of the ITC/WPO International Consultation on Packaging. (The Helsinki Consultation).

International Organization for Standardization (ISO), Geneva.

12.	ISO Catalogue.	Published annually, with supplements, and listing all ISO standards.
13.	ISO Memento.	Lists all ISO committees and sub-committees with their secretariats and terms of reference.

Institute of Packaging, Stanmore, Middlesex.

Textbooks.

14. Packaging Media - F.A. Paine (Ed).
15. Packaging Evaluation: the testing of filled transport packages - J.M. Montresor, H.P. Mostyn and F.A. Paine.
16. Packaging for Climatic Protection - J.A. Cairns et al.
17. Packaging of Chemicals and other industrial liquids and solids - C. Swinbank.
18. Packaging of pharmaceuticals - C.F. Ross.

Institute of Packaging (contd).

Education.

19. Correspondence course.

20. Short term residential courses (1 or 2 weeks).

PIRA (Research Association for the Paper and Board, Printing and Packaging Industries), Leatherhead, Surrey.

Information.

21. Packaging Abstracts.

22. Printing Abstracts.

23. Paper and Board Abstracts.

24. Marketing Abstracts.

25. 'PIRASCAN' computerised information system.

Education.

26. Various training aids.

27. One day seminars.

Appendix 7.

LECTURES GIVEN TO IMAI STAFF.

(Notes for each of these lectures have been circulated.)

January 7. Packaging organizations in the United Kingdom.
Insitute of Packaging, British Standards Institution, PIRA (Packaging Research Association) and trade associations.

January 8. International Organization for Standardisation (ISO) and the work of its committees on packaging and related distribution matters.

January 9. Regulations governing the packaging of food and other products for human ingestion.

Steps to be taken in the selection of a package.

January 10. 1. Consideration of all the facts regarding the product.
2. Knowledge of the properties of the packaging materials which might be used to contain the product.

January 11. 3. The requirements of the production methods and of the storage of the finished product.
4. The requirements of transport and the system of distribution of the product, including final use.

January 14. 5. Freight charges. The importance of space, shape and weight.
6. Requirements which may limit the choice of the package.

January 15. 7. Testing - laboratory and field trials.
8. Preparation of a detailed specification.
9. Inspection of incoming supplies.
10. Systematic review of the decision.

Regulations on the classification, labelling, packaging and transport of dangerous goods.

January 21. 1. Work of the UN Committee of Experts on Dangerous Goods. Contents of their recommendations in "The Transport of Dangerous Goods".
2. Intergovernmental agencies and conventions which have adopted, or are in course of adopting, the UN recommendations. IMCO, ICAO, RID and ADR.

January 22. 3. Regulations which differ from the UN recommendations. IATA and USA DOT.

January 23. 4. Testing and certification of packages to UN recommendations.

January 24. 5. Testing and certification of packages to IATA and USA DOT regulations.

January 28. Practical examples - solid products.

January 30. Practical examples - liquid products.

Appendix 8.

ABBREVIATIONS USED IN THIS REPORT.

ADR	European agreement concerning the international carriage of dangerous goods by road.
AFNOR	Association Francaise de Normalisation.
ANSI	American National Standards Institute.
ASSCO	European Solid Fibreboard Case Manufacturers' Association.
ASTM	American Society for Testing and Materials.
ATCP	Mexican Technical Association for Cellulose and Paper Industries.
BGIRA	British Glass Industry Research Association.
BSI	British Standards Institution.
CCNNEE	Mexican National Packaging Standardization Committee.
CEN	European Committee for Standardization.
CETIE	International Technical Centre for Bottling and Packaging.
DGN	Mexican National Standards Organization.
DOT	USA Department of Transportation.
ECE	United Nations Economic Commission for Europe.
EEC	European Economic Community.
FDA	USA Food and Drug Administration.
FEA	Federation of European Aerosol Associations.
FEFCO	European Corrugated Fibreboard Case Manufacturers' Association.
GMF	Glass Manufacturer's Federation.
IAPRI	International Association of Packaging Research Institutes.
IATA	International Air Transport Association.
ICAO	International Civil Aviation Authority.
IMAI	Mexican Institute for Assistance to Industry.
IMCO	Intergovernmental Maritime Consultative Organization.
IMDG	International Maritime Dangerous Goods Code.
ISO	International Organization for Standardization.
ITC	International Trade Centre (UNCTAD/GATT).
LANFI	Laboratorios Nacionales de Fomento Industrial.
OECD	Organization for Economic Cooperation and Development.
PIRA	Research Institute for the Paper and Board, Printing and Packaging Industries.
RID	International regulations concerning the carriage of dangerous goods by rail.
SAA	Standards Association of Australia.
SIS	Swedish Standards Institution.
TAPPI	Technical Association of the Pulp and Paper Industry.
UFC	Uniform Freight Classification.
UN	United Nations' recommendations on 'The transport of dangerous goods'.
UNDP	United Nations Development Programme.
UNIDO	United Nations Industrial Development Organization.