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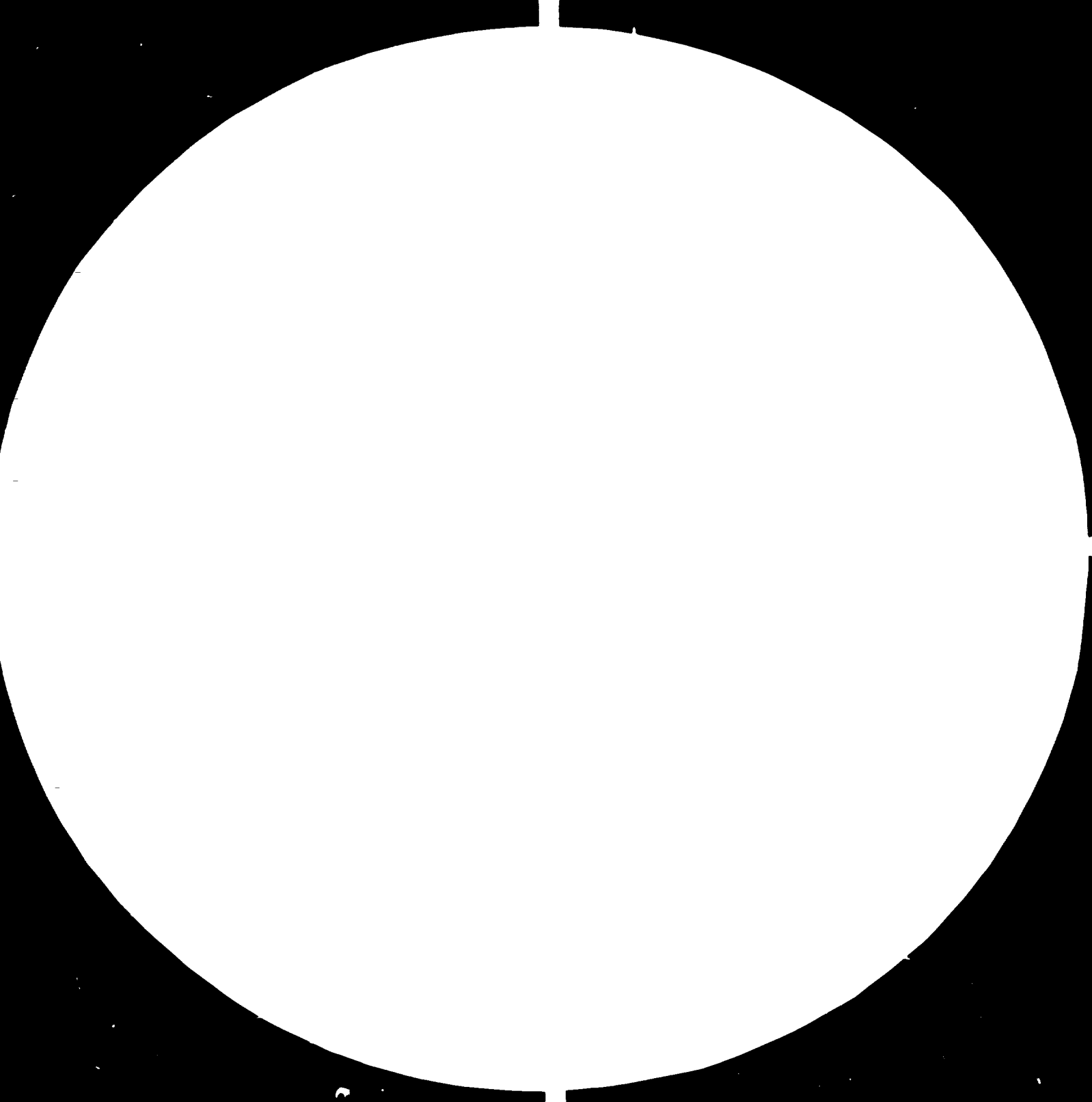
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Resolution test targets are available from the National Institute of Standards and Technology, Gaithersburg, MD 20899. For more information, contact the NIST Information Service, Telephone: 301-975-3000, Fax: 301-975-2850, or visit the NIST website at <http://www.nist.gov>.

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28 January 1981  
English

CONSULTANCY IN DRUMS, SACKS AND INTERMEDIATE BULK CONTAINERS  
AT THE PACKAGING RESEARCH, TESTING, DEVELOPMENT, AND INFORMATION  
DEPARTMENT AT THE JAMAICAN BUREAU OF STANDARDS, KINGSTON.

DP/JAM/77/CO8

JAMAICA

Technical report\*

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

based on the work of Colin Swinbank, expert in  
drums, sacks and intermediate bulk containers

United Nations Industrial Development Organization  
Vienna

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ABBREVIATIONS USED IN THIS REPORT

ARD	European Agreement concerning the International Carriage of Dangerous Goods by Road.
AFNOR	French National Standards Body.
ANSI	American National Standards Institute.
BSI	British Standards Institution.
CARICOM	Caribbean Common Market.
CDB	Caribbean Development Bank.
CEN	European Committee for Standardisation
DOT	U.S.A. Department of Transportation.
DIN	German National Standards Body.
ECE	UN Economic Commission for Europe.
EEC	European Economic Community.
FDA	U.S.A. Food and Drug Administration.
HDPE	High Density Polyethylene.
IATA	International Air Transport Association.
IBC	Intermediate Bulk Container
ICAO	International Civil Aviation Organisation.
IMCO	Intergovernmental Maritime Consultative Organisation.
IMDG	International Maritime Dangerous Goods Code.
ISI	Indian Standards Institute.
ISO	International Organisation for Standardisation.
ITC	International Trade Centre.
JBS	Jamaican Bureau of Standards.
JPI	Jamaica Packaging Industries Limited.
LDPE	Low Density Polyethylene.
OECD	Organisation for Economic Co-operation and Development.
PIRA	British Packaging Research Association.
PP	Polypropylene.
RID	Annex 1 to the International Convention concerning the Carriage of Goods by Rail (CIM).
UN	United Nations Committee of Experts on the Transport of Dangerous Goods.
UNIDO	United Nations Industrial Development Organization.
UV	Ultra violet light.
WIPP	West Indies Pulp and Paper Limited

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SUMMARY.

A survey has been made of the containers produced in Jamaica for the packing of industrial quantities of liquid and solid products. Those which are produced locally, i.e. steel drums, plastics pails, paper sacks, jute sacks and woven polypropylene sacks, appear to be satisfactory for their purpose, but the maintenance of this position is dependent on continued imports of the requisite quality of sheet steel, plastics polymers, kraft paper and jute cloth. For other types of container such as composite drums, plastics drums for liquids and certain types of sack Jamaican industry has to rely on imports, e.g. composite and plastics drums filled with product which are then reused for Jamaican products, or new packages specially imported. Studies are necessary to determine whether the potential demand for packages of these types is such as to ensure the viability of local production.

The staff of the packaging laboratory have been given detailed instruction on the design, manufacture and use of all types of drum, sack and intermediate bulk container; their specification and standardization; the advantages and disadvantages of such containers in use; how they may be formed into unit loads and the practical considerations of distribution.

The United Nations' recommendations on the classification, labelling, packaging and transport of dangerous goods have been explained in detail, together with the package testing procedures which are required. Having in mind the fact that Jamaican exporters of such goods are likely to be required in the future to use UN tested and certified packages it is recommended that, with the approval of the interested government departments, the packaging laboratory should act as the Jamaican testing and certifying body under the UN scheme.

As requested suggestions have been made regarding the possible organization of standards work in the field of packaging and distribution.



1. INTRODUCTION

1.1 Project background

The Government of Jamaica, realizing the importance of upgrading the general level of packaging technology existing in the country and appreciating the needs of Jamaican industry for better and less expensive packaging which will meet the quality specifications required by potential export markets, is establishing a Packaging Department at the Jamaican Bureau of Standards (JBS). It is intended that the Department will provide the testing facilities necessary to formulate technical specifications for packaging standards and also act as an independent packaging laboratory offering its services to manufacturers and users of packages.

A UNIDO project was implemented in March 1979 to assist in the activity, and is fully described in the project document "Establishment of a Packaging Research, Testing, Development and Information Department at the Jamaican Bureau of Standards, Kingston", JAM/77/008/A/01/37, April 1978.

1.2 Job description

The author is the second of twelve specialists being recruited by UNIDO to help train the staff of the Packaging Department in packaging technology. This consultant concentrated on problems associated with the use of transit packs, such as sacks, drums and intermediate bulk containers made from paper, fibreboard, metal and plastics, and with the following terms of reference:-

- (a) Carry out a survey of materials and containers at present in use in Jamaica, commenting on their technical efficiency and cost effectiveness.
- (b) Identify problem areas and assist in preparing details of development work necessary to resolve these problems.
- (c) Advise counterpart staff on the use of common laboratory equipment for evaluation of physical and chemical properties and the techniques used in evaluating pack performance.

- (d) Advise counterpart staff on the preparation of buying specification, standards and common quality control tests and procedures.
- (e) Present a round table conference on the selection, specification and control of transit packs of this type.
- (f) Write a brief report describing the work carried out, the problems identified and outlining development work suggested.

In discussions which took place shortly after taking up the assignment it was agreed with the Project Manager and the Jamaican Bureau of Standards that in view of the author's wide experience in the national and international standardization of all forms of package and related distribution equipment such as pallets and freight containers, and specifically on standards for the packaging of hazardous goods, the assistance provided should be extended to cover these aspects as well.

### 1.3 Conduct of the Mission

The consultant arrived in Kingston on 12 April 1980 and, a work programme was arranged which is reproduced in Appendix 2. Plans were also made for a series of visits to local industry and details of these visits, plus other contacts made, are set out in Appendix 1.

On 29 May 1980 a Round Table discussion was held with interested members of industry on "Technical problems involved in the packaging and transport of dangerous goods." A list of participants appears in Appendix 3.

The consultant's appointment in Jamaica terminated on 3 June 1980, with debriefing in Vienna on June 5/6, 1980.

2. FINDINGS AND OBSERVATIONS

2.1 Information and references

The following documents contain all the necessary basic information regarding the manufacture, filling, closing, handling, storage and transport of the package types referred to in the report, and reference should be made to them as frequently as is necessary. All the documents were available at the time of the consultant's visit for study by the staff but as that marked with an asterisk was the property of the consultant a copy has been ordered by Jamaican Bureau of Standards. A number of private confidential papers were also made available for the staff to read as background information.

- "The Packaging Media" - Ed. F.A. Paine
- "Packaging of Chemicals" - Colin Swinbank
- \* "Paper Sacks in packaging handling and distribution" - Paper Sack Development Association.

"The Packaging and Transport of dangerous goods- Technorama, Feb.1980  
Various manufacturers' technical brochures.

The standards and specifications listed in Appendix 4 also are a valuable source of technical information. The list is not exhaustive and consists chiefly of British (BSI) and American (ANSI) national standards and USA Department of Transportation (DOT) specifications, all of which are available at the Jamaican Bureau of Standards.

The various regulations listed in Appendix 5 contain a considerable amount of data on packages and package testing, but these are discussed in more detail in section 2.7 of this report.

2.2 Drums

The term 'drum' as used in this report covers all rigid packages up to 250 litres capacity made from metal, fibreboard and plastics (including plastics/steel and plastics/fibreboard composite drums) whether cylindrical or rectangular which are designed to hold solid or liquid products and which are normally transported without any form of over-packaging. This includes packages known by such terms as 'keg', 'pail', and 'jerrican'

### 2.2.1 Metal drums

Metal drums are made in Jamaica by Van Leer (Jamaica) Limited which is a subsidiary of one of the two largest drum manufacturers in the world, i.e. Royal Packaging Industries Van Leer B.V., Amstelveen, Netherlands. The Jamaican company, therefore, has access to up-to-date technology in the design and manufacture of metal drums made from mild steel sheet.

The plant, which was set up approximately 16 years ago when an oil refinery was built in Jamaica, is capable of producing fixed end drums for liquids, full opening drums for liquids or solids and restricted aperture drums for post setting liquids such as bitumen. The equipment has the necessary flexibility to produce several different capacities of drums using 3 internal diameters, viz:

<u>Diameter</u>	<u>Capacities</u> <u>(US gallons)</u>
572 mm (23½ in)	54
354 mm (14 in)	20 and 16
286 mm (11½ in)	10, 6.4 and 5

with either an uncoated or a stoved lacquer (phenolic or epoxyphenolic) interior. The quality of the drums seen by the consultant was good, as is to be expected, and Van Leer stated that, when required, they supplied drums certified to given USA DOT specifications. The majority of the output of the drum plant goes to the oil refinery which, it is understood, exports at least 60% of its output. Without this base load the supply of new metal drums in Jamaica could be a problem.

The only other source of metal drums is the import of products packed in such drums. This can be the supply of goods from a multinational company to its Jamaican subsidiary for further processing or goods used directly by the importer. In the first case the drums, if suitable, are reused by the Jamaican subsidiary for the processed product: in the second case it is assumed that the importer will reuse the drum, if he has a use for it or sell it. The important point is that unlike the situation in countries such as the U.K. and the U.S.A. there is no organization which professionally cleans, refurbishes and tests second hand drums either as a service to the owners of the drums or as a dealer in second hand drums.

### 2.2.1 Metal drums (Cont'd).

This could be important where UN tested and certified packages are needed - see section 2.7 of this report.

### 2.2.2 Fibreboard drums

There is no production of fibreboard drums in Jamaica nor would there appear to be any economic justification for the building of such a plant, particularly for fibre/steel drums where expensive presses are necessary. All fibre drums, which are less robust, can be produced on more simple equipment but the raw material - chip board plus kraft paper - would have to be imported.

As in the case with metal drums some fibre/steel drums arrive in Jamaica containing imported goods and appear to be reused for Jamaican products.

### 2.2.3 Plastics drums

So far as can be ascertained there is no production in Jamaica of fixed end plastics drums suitable to contain liquids, particularly dangerous liquids.

Plastics drums of the quality necessary to safely contain corrosive liquids must, therefore, be imported either as empty packages or containing a product of the same type as the Jamaican product for which the plastics drums are required - this to avoid the possibility of cross contamination which could arise from traces of the original product being ingrained in the plastics drums.

Thermo Plastics (Jamaica) Limited make injection moulded plastics full opening drums, i.e. pails with snap on lids, up to approx. 5 US gal./20 litre capacity which are used for such products as ice-cream. Larger blow-moulded full opening plastics drums, e.g. 120 litre, which are capable of carrying either liquids or solids, are imported containing such products as adhesives from the Federal Republic of Germany.

2.2.3 Plastics drums (Cont'd).

These packages are sent out to Jamaican customers as "returnable package" subject to a substantial deposit, e.g. JA\$20, to ensure their return to and reuse by the Jamaican subsidiary of the parent company.

The chemical industry has a need for plastics drums (or plastics/steel) or plastics/fibreboard composite drums which are discussed in subsection 2.2.4 below) for corrosive or other products which cannot be safely packed in steel or lacquered steel drums, and the food/drink industries should have an interest in plastics containers for fruit pulps, purees and juices. Whether such needs would warrant a local production facility is a subject requiring study. Of the 3 possible production techniques, i.e. rotational moulding, blow moulding and injection moulding, the first is the one most suited to a small scale operation as the moulds are relatively inexpensive. The unit cost per package is, however, the most expensive but such rotationally moulded drums, pigmented with carbon black to prevent degradation from UV light, could be expected to have a life of up to 10 years.

The Van Leer group have the necessary technology and in other countries produce containers by both the rotational and blow moulding techniques, the latter being the most usual method. Thermo Plastics Limited, although primarily injection moulders, have the necessary back-ground in plastics technology should they feel it advantageous to extend their product range but would probably need to acquire machinery and know how! It is understood that 1 gallon blow-moulded high density polyethylene bottles are produced locally by Plastics Containers Limited and by Orbit Industries Limited. These companies have the necessary technology but possibly not the 'know-how' and machinery to provide 25 litre and larger drums.

2.2.4 Composite containers

Plastics containers (usually blow moulded but possibly rotationally moulded) protected by an outer metal drum, fibreboard drum or crate are extensively used for the types of product described in subsection 2.2.3 above. None are produced in Jamaica and the fact that Van Leer do not offer their metal drums fitted with a plastics inner is prima facie an indication that local demand does not justify production facilities for the plastics component.

Nevertheless considerable numbers of composite containers with both steel and fibre outers are brought in to the island and appear to be reused for corrosive and similar products. Such reuse of imported containers will need to be reviewed carefully if and when UN tested and certified packages are required in the future.

As indicated in 2.2.3 above the free standing plastics drum and the plastics composite drums are competitive with each other and must be considered together.

### 2.3 Sacks

The term 'sack' as used in this report means any flexible package designed to contain solid products and which is normally intended to be handled and transported without overpacking.

The maximum practicable size is 100 kg but such heavy weight sacks are rarely seen and the majority of sacks now contain weights of the order of 25kg or 50 kg according to the density of the contents and/or the custom in the trade. It is understood that the Jamaican sugar industry has a current programme to replace 100 kg sacks with 50 kg sacks. The term 'bag' is also used at times to describe such large packages but preferably the term should be confined to smaller packages which require over packing for transport and distribution.

Sacks may be made from any flexible material but commercially there are four basic materials, i.e. fabric of a natural fibre such as jute, kraft paper, plastics film and a fabric woven from tapes of either polypropylene (PP) film or high density polyethylene (HDPE) film.

#### 2.3.1 Jute sacks

Jute sacks are made up in Jamaica by Saycon Limited from cloth imported from India, and it is a reasonable assumption that made up sacks are also imported directly by users. Examination at the Jamaican Bureau of Standards of two or three sample sacks, which were the subject of complaint, showed that although the seam construction appeared to be satisfactory the fabric itself had rotted in places.



2.3.1 Jute sacks (Cont'd).

The Indian Standards Institution (ISI) have published a number of standards covering specific types of jute cloth (e.g. 'L' twill) and of sacks made from such cloth. These ISI standards are available at J.B.S. It would be prudent, therefore, for Jamaican importers of either cloth or sacks to specify that in future the product should conform to the appropriate standard and that this be verified in the Jamaican Bureau of Standards laboratory.

The successful development in Jamaica of the woven PP sack - see sub section 2.3.4 - could reduce the demand for jute sacks, although work may be necessary to confirm or disapprove the need to use a jute fabric rather than a plastic fabric for certain crop products, e.g. pimento seeds, to enable the product to breathe. Traditional practices in the produce trade, however, tend to ensure that only the type of jute sack associated with each product is used despite the fact that the jute industry itself might be able to offer a cheaper or stronger sack.

2.3.2 Paper sacks

There are two manufacturers of paper sacks in Jamaica - Jamaica Packaging Industries Limited (JPI) and Reliable Packaging Limited. The larger of the two, JPI, is a subsidiary of Canadian International Paper Corp. (CIP) and produces about 15 million sacks/annum on a single 8 hour shift. Reliable Packaging Limited, a subsidiary of Musson Jamaica Limited, has been in the paper sack business about a year having acquired the plant from National Packaging Ltd. Within the limitations of their equipment both companies produce sacks of reasonable quality from imported kraft paper.

The source of the raw material varies according to lines of credit available to Jamaica and at the time of the consultant's visits the two companies were using respectively kraft from Venezuela and from the United Kingdom (probably Scandinavian).

### 2.3.2 Paper sacks (Cont'd)

JPI produce 4 ply flush cut block bottomed valved sacks with 90 mm ends for cement and hydrated lime and sewn open mouth gusseted sacks, usually 3 ply, for animal feeds and other products. The proportion of valved to open mouth is 60:40. They endeavour to standardise on a 71 g/m<sup>2</sup> natural kraft paper and produce sacks of a standard width.

Reliable Packaging Limited produce only sewn open mouth sacks and use both extensible kraft and natural kraft of somewhat higher basis weights - 80 to 85 g/m<sup>2</sup>. Neither company uses either bitumen laminated kraft or polyethylene coated kraft, and if a moisture barrier or chemical resistance is required this is provided by a separate liner of polyethylene film.

The sugar industry uses some valved sacks with 140 mm (or larger) block bottoms but these are imported. To produce such a sack in Jamaica would need substantial capital investment in a "stepped-end" tuber and a new bottomer which, JPI claim, cannot be justified. Similar valved sacks may be also be imported for packaging alumina.

### 2.3.3 Plastics film sacks

In some countries there is an extensive film sack industry, the the major uses being for fertilizers, plastics polymers, chemicals certain animal feedstuffs such as mineral supplements and calf milk equivalents and some food products. The principal material used is low density polyethylene (LDPE) film extended in a continuous lay flat tube 200 micro millimetres thick from polymers with a melt flow index of circa.0.3 and a density of 0.923 g/cm<sup>3</sup>.

Such a polymer differs considerably from that used for small bags, or even liners for sacks, and is more difficult to extrude. The necessary technology exists in Jamaica but suitable extrusion and sealing equipment (for both manufacturer and user of the sacks) plus 'know how' would have to be acquired should it be decided to manufacture plastics film sacks in Jamaica.

2.3.3 Plastics film sacks (Cont'd).

It is emphasised that, given good quality control and a reasonably consistent level of demand to maintain 'in line' production, the plastics film sack is potentially the cheapest form of sack for products which are either corrosive or which require protection from moisture. LDPE film sacks are considered to be satisfactory for road/rail transport provided the vehicles are in sound condition, and for export in ISO freight containers. They are not suitable for despatch in conventional deep hold ships unless they are in protective unit loads.

2.3.4 Woven polyolefin tape sacks

Circular woven polypropylene (PP) tape sacks are made in Jamaica by Jamaica Bags Limited on a fully integrated plant identical to those the consultant has been familiar with in the past and consisting of three units - tape manufacture, weaving operation and conversion to sacks. Imported PP granules are extruded into flat film, slit, stretched and the resultant tapes reeled. The reels of tape are used on the circular looms producing large rolls of tubular cloth of given widths. These in turn are printed as necessary, cut into the required sack length, and the sack completed by folding over one end and sewing. Where necessary a polyethylene film liner is inserted manually into the finished sack. Whilst any width of tube can be woven the manufacturer is endeavouring to standardise on two i.e.

27 in/690 mm as used for sugar

23 in/585 mm as used for fertilizer

The larger width is produced in a 46 x 40 warp and weft tapes per 100 mm weave, and the narrower width in a 40 x 40 weave.

Sacks of this type are very strong and, being suitable for deep sea shipment, have largely replaced jute sacks in Western Europe. This development should be of considerable benefit to Jamaican industry and it comes as no surprise to the consultant that the plant capacity is to be doubled.

### 2.3.5 Sack filling and closing equipment

It is considered unlikely that there is any local manufacture of sack filling and closing equipment as the machinery is very specialised. The consultant did not see any sack packing points but was informed that one feedmill had recently installed an automatic packing machine for open mouth paper sacks.

The Jamaican Bureau of Standards should be aware of overseas developments in this important area in order to assist sack users in the selection of the type of equipment most suited to their needs and, where appropriate, to advise sack suppliers on any points which require attention, e.g. absence of creases and cross pasting of plies to ensure trouble free pickup and opening of sacks on the equipment referred to above

### 2.4 Intermediate bulk containers

The term 'Intermediate Bulk Container (IBC)' covers packages larger than conventional drums or sacks and which are designed for mechanical handling. Such jumbo packages are also referred to as 'Semi bulk containers', 'Pallet tanks', 'Big Bags' and 'Portable tanks'.

It will be seen in sub section 2.4.3, however, that in the international law governing the transport of dangerous goods 'Portable tanks' and 'Tank containers' are very precisely defined in terms of construction, testpressure etc. In this report the term IBC excludes such pressure vessels.

#### 2.4.1 Basic types of IBC

IBC's may conveniently be sub divided into four groups, viz

1. Rigid returnable IBC's made from aluminium alloy, mild steel stainless steel and rotationally moulded plastics (usually in a metal frame). These are suited for liquids or solids, but are expensive and need to be returned to the manufacturer when empty.
2. Collapsible returnable IBC's made from polyester or nylon fabric coated with pvc/ neoprene/ nitrile rubber with high frequency (HF) welded or vulcanised seams, as appropriate, to contain either solids or liquids .

2.4.1 Basic types of IBC's (Cont'd).

3. Rigid expendable IBC's for solids, often fitted with a large LDPE film liner, and made from corrugated fibreboard (frequently octagonal in shape) wood-framed fibreboard or hard board, or wire-bound wood, with a conventional pallet base.
4. Collapsible expendable IBC's for solids usually made from polyolefin tape fabric either (PP or HDPE) often fitted with a large LDPE film liner and with means of handling from the top.

The only IBC seen in Jamaica by the consultant was one of Group 1, i.e. a rectangular rotationally moulded LDPE container for liquids mounted in a metal frame which had undoubtedly been shipped from Europe containing an acidic product. It is not considered likely that in the next decade there will be sufficient demand from Jamaican industry to warrant the local manufacture of any of the IBC's in Groups 1 to 3 inclusive.

2.4.2 Polyolefin tape fabric IBC's

The relatively inexpensive PP (or HDPE) fabric IBC in Group 4, however, could offer a useful alternative to conventional sacks when the ability to handle mechanically loads of say, 1 ton is more general than is the case in 1980. Such IBC's can be handled by overhead crane or ships derricks, and can be loaded into ISO freight containers using fork lift trucks; in the latter case the freight containers should have a removable curtain top to enable the IBC's to be lifted out. A very large world - wide demand is envisaged for such IBC's, and they are particularly suited to island to island traffic. Care must be taken to ensure the PP (or HDPE) tapes contain an adequate amount of ultra violet (UV) light inhibitor to guard against catastrophic weakening of the IBC's in outside storage whether the storage be intentional or inadvertent, e.g. IBC's standing on a dockside.

In due course IBC's of this type should be considered for the export from Jamaica of such products as sugar and alumina

#### 2.4.3 IBC's for hazardous goods

Although various types of IBC are used in several countries for certain hazardous goods the IBC, as a class of receptacle, is not recognised in international law and IBC's may not be used for the international transport of hazardous goods without special permission. Work has commenced at the United Nations to prepare recommendations concerning IBC's and a brief summary of the position, written by the consultant shortly before the present mission, is reproduced in Appendix 9 for information.

#### 2.5 Portable tanks

Appendix 9 sets out briefly the requirements of the International Maritime Dangerous Goods (IMDG) Code for 'Portable tanks.' No other tanks may be used for the marine transport of dangerous goods except by special permission of the 'Competent Authority', e.g. the government department or organization which is responsible for the membership of the Inter-governmental Maritime Consultative Organization (IMCO). As is seen in Appendix 4 not all receptacles which are called 'portable tanks' conform to the IMCO requirements.

#### 2.6 Cases and crates

Although these will be covered in greater detail by other consultants two lectures were given on the construction and use of fibreboard and wooden cases and crates. This was thought to be desirable in view of :

- (a) the test requirements for cases containing hazardous goods;
- (b) ECE/OECD recommendations for the standardization of cases and crates for the international transport of fresh or refrigerated fruit and vegetables.

The following observations may be helpful although they do not purport to be a comprehensive review of the situation in Jamaica.

#### 2.6.1 Wooden cases/crates

There are a number of manufacturers but none were visited by the writer. One of the most familiar wooden packages is the returnable compartmented tray for soft drink bottles, the height of the sidewalls extending about 1/3rd the way up the bottle, i.e. the bottles carry the entire load.

The possible use of indigenous sources of wood, such as bamboo, was raised by the Chairperson of the Packaging Standards Committee. The writer is not in any position to comment other than to say that if such a development is technically and economically possible the resultant packages should be capable of withstanding the tests described in sub section 2.6.3 below or, if the goods to be packed are hazardous, the tests prescribed in the regulations set out in section 2.7. It is understood, however, that commercial use of dead coconut trees (estimated at more than 3 million with a possible availability of 40 million cubic feet of timber) has been developed by Moxon Community Projects Limited. A variety of uses are claimed ranging from lumber for house construction, parquet flooring, pallets, particle board and fibre board (presumably resin bonded hardboard).

#### 2.6.2 Fibreboard cases

Returnable beer bottles of all types are packed in rigid returnable solid fibreboard compartmented cases, which obviously have a very long life. The case blanks are imported and the cases erected on arrival at the Jamaican brewery: this is necessary as solid fibreboard is not made on the island.

There are two manufacturers of corrugated fibreboard, i.e. Jamaica Packaging Industries Limited (JPI - see sub section 2.3.2 above) and West Indies Pulp and Paper Limited (WIPP). The writer did not visit WIPP but understands they have two corrugators. JPI have one corrugator capable of producing single wall or double wall board in 'B' and 'C' flutes.

2.6.2 Fibreboard cases (cont'd).

The fluting material seen was semi-chemical and the liners were kraft. JPI also offer a board made from a pre-waxed fluting medium which, after combining with the outer and inner liners, is waxed by curtain coating. Cases made from such waxed board are offered as alternatives to the solid fibreboard beverage case referred to above, but obviously cannot be printed as effectively as the solid board cases with the required 'house designs.'

2.6.3 Cases and crates for the international transport of fresh or refrigerated fruit and vegetables.

One of the principal objectives of the project is to encourage the development of better practices in the presentation and packaging of Jamaican produce for sale in world markets.

As indicated in section 4 of the report "Co-ordination of national, regional and international standardization in packaging", ITC/CONF/P/4, September 1978, which the writer prepared for the International Trade Centre/World Packaging Organization Consultation in 1978 (hereafter referred to as the Helsinki report, copies of which are held by J.B.S., the UN project manager and UNIDO, Vienna) there are many international standards on the quality of foodstuffs published by organizations such as

- International Organization for Standardization (ISO)
- Codex Alimentarius Commission
- UN Economic Commission for Europe (ECE)
- Organization for Economic Co-operation and Development (OECD)

Few of these standards, in any, state how the product is to be packed. The ECE has, however, published recommendations fixing the dimensions, mechanical strength characteristics and test requirements for rectangular packages for fresh or refrigerated fruit and vegetables whether the cases/crates are made from wood, fibreboard or plastics. These recommendations, which are endorsed by the OECD, are reproduced in Appendix 10.



2.6.3 Cases and crates for the international transport of fresh or refrigerated fruit and vegetables (Cont'd).

These joint ECE/OECD recommendations merit careful study particularly in respect of the test methods which are to be used and the levels of test required. It will be noted that palletised loads are an integral feature of the scheme but care must be taken on the actual dimensions of the packages, pallets and resultant unit loads as the two pallet sizes referred to will not give efficient loading in the insulated or refrigerated ISO freight containers which would often be used to ship such products from Jamaica. This problem is common to several OECD countries outside Europe, e.g. Australia, Canada, New Zealand and the USA, and this is the reason for the footnote on page 1 of the recommendations.

It is understood that in November 1979 the International Trade Centre (ITC) and the Caribbean Development Bank (CDB) jointly promoted a Commonwealth Caribbean Seminar on "Export packaging for fresh fruit and vegetables." The intention was to co-ordinate the moves to standardise the containers for fruit and vegetables being used in exports from the Caribbean. It would appear that the Packaging Centre of the Jamaican Bureau of Standards could play an important role in providing the package test facilities that are bound to be an important facet of this work.

2.7 Regulations on the packaging of dangerous goods

A list of the most important international and national regulations on the classification, packaging, labelling and transport of dangerous goods appears in Appendix 5. As this is seen as an important area of work for the packaging laboratory the matter has been discussed in depth with the JBS staff. Such regulations can and do have a major influence on packaging standards, both as regards the construction/design of packages and their testing. Up-to-date copies of the UN Recommendations, the IMDG Code, IATA Restricted Articles Regulations (eventually to be replaced by the regulations to be published by ICAO) and the USA DOT Regulations should be available in the laboratory for reference as the need arises.

2.7.1 United Nations' Recommendations on "The Transport of Dangerous Goods"

These recommendations were published under the authority of the UN Economic and Social Council (ECOSOC) to provide the basis for a harmonisation of the various and different national and international regulations. It is now anticipated that by 1982-83 all the undermentioned international agencies, conventions and agreements will be working on the UN systems:-

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.

It will be seen that all exports from Jamaica by sea or by air should eventually conform to the UN system. Unfortunately the current IATA regulations and the DOT regulations governing transport by road or rail in the USA are different from the UN system and, for the time being, Jamaica exporters (a) by air to any destination will have to conform to IATA and (b) by sea to USA (and Canada) will have to conform not only to the IMDG Code but also to the DOT regulations to enable their products to move inland from the port of entry.

#### 2.7.2 Testing of packages for dangerous goods

Detailed explanations have been given to the JBS 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. 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 JBS staff 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.

2.7.3 Certification of packages by the manufacturer

Under the provisions of the DOT regulations 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 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.

2.7.4 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 been tested satisfactorily, i.e. as in the DOT 17E example above.

In the event of package failure the unique mark enables any organisation 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 Packaging 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".

With the approval of the various interested Government Departments the JBS could act as the Jamaican testing and certifying body as PIBAdo in the UK.

#### 2.7.5 Labelling of packages

An integral part of the UN scheme is the use of diamond shaped pictorial labels with a distinctive symbol and background colour for each hazard class. Such labels have been adopted almost universally for transport packages and their use for transport in Jamaica should be encouraged, possibly supported by a publicity campaign such as that in the UK stressing that "Diamonds are for Danger".

It is understood that draft recommendations have been prepared in the JBS for the labelling of packages containing dangerous goods for use in the home based on a Canadian series of symbols which are different from the UN symbols. Before any final decision is taken it is suggested that:

- (a) thought be given to the advantages and disadvantages of using on the inner package the same symbol as that likely to be used on the outer package and;
- (b) reference be made to the Directives of the European Economic Community (EEC) e.g. the 'Substances Directive' and the 'Solvents Directive' which not only specify the symbol to be used but also the 'risk' phrases and 'safety' phrases for each product. Regretably the symbols used by the EEC - rectangular labels with an orange background - were those formerly used on transport packages to comply with the RID and ADR regulations and abandoned in order to harmonise with the UN. In the writer's view the EEC symbols should NOT be adopted.

## 2.8 Standardisation

There are no standards for packaging in Jamaica and one of the principal aims of the new JBS packaging laboratory is to plan and implement a programme of standardisation work which is relevant to the needs of Jamaican industry.

As indicated in section 1.2 of this report the author, having in mind his experience as chairman of the Packaging and Freight Container Standards Committee of the British Standards Institution (BSI) and as a member of the BSI Executive Board, was asked to give advice on such a programme.

Reference has already been made in section 2.6.3 of this report to the Helsinki report. This is a definitive survey of standardization activity in the field of packaging and distribution and, to avoid undue repetition, should be referred to as necessary.

### 2.8.1 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 the International Organization for Standardization (ISO) and in national standards bodies such as 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 only to make reference 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.

### 2.8.2 ISO work on packaging and distribution

A list of ISO committees and sub-committees working in the field of packaging and distribution appears in Appendix 6.

The Bureau of Standards is the Jamaican member body of ISO, and thought should be given to requesting 'O' (observer) member status, or even 'P' (participating) member status on each of these committees. 'O' and 'P' members receive the working papers of the committee for study and comment, which represents a valuable source of information.

Appendix 7 lists the standards published by ISO in the field of packaging and distribution. Any of these standards which are appropriate to Jamaica's needs should be adopted as a JBS standard: those marked with an asterisk, however, are currently being revised by ISO and it would be prudent to defer any action until the revisions have been completed.

### 2.8.3 Organization of standards work

A Packaging Standards Committee was appointed circa. April 1979 with a broadly based membership and with the Head of the JBS Packaging Laboratory as its Technical Secretary. The writer was privileged to attend a meeting of this committee when he felt that its function was analogous to his own BSI Packaging

and Freight Container Standards Committee, i.e. the formulation of policy and general supervision of packaging standards work including the determination of priorities.

This type of committee, however, is unlikely to be able to give the necessary consideration in depth to what are often highly detailed techno-commercial matters. Such work necessitates the manufacturers and users of the particular form of package meeting together with other interested parties and reaching a common view which all can support, i.e. a subordinate structure of technical committees or sub-committees would appear to be necessary.

The organizational structure of the BSI Packaging and Freight Container Standards Committee is shown in Appendix 2. The terms of reference of each of these Technical Committees make it clear that they are responsible for "all national and international standards work" in their defined areas of interest and their cross-linking with the ISO committees is also shown in Appendix 8. Other long established national standards bodies such as the French (AFNOR) and German (DIN) have similar but not identical organizations. Such a structure, other than to illustrate the principles involved, is too complex for Jamaica's needs and it is suggested that the following matrix may be suitable as a basis for future planning, the committees only being brought into being operation when the need arises. Provision should be made for the periodic disbanding and/or restructuring of such committees.

<u>JBS activity</u>	<u>ISO activity</u>
Packaging Standards Committee	TD.4 and TC. 122
<u>Technical Committees or Sub-committees:-</u>	
Metal containers	TC.52
Glass containers	TC.63
Flexible wrapping materials, including bags	-
Cases/crates (of all materials)	-
Sacks (of all materials)	TC.122/SC.2
Drums (of all materials)	-
Package testing	TC.122/SC.3
Transport & cargo management	TC.51, TC.104, TC.122/SC1 & SC 4

#### 2.8.4 Standards making procedures

It is assumed that the standards making procedures in JBS is generally similar to that of BSI, viz.

1. Approval of the project by Packaging Standards Committee.
2. First draft prepared by secretary (which can be an ISO standard or submitted by an accredited organization).
3. Technical committee work.
4. Draft standard available for public comment. The draft is also submitted to the Packaging Standards Committee at this stage.
5. Consideration of comments by Technical Committee.
6. Agreed draft authorised for publication by signatures of the Technical Committee Chairman, the Packaging Standards Committee Chairman and the Director of the Standards Organization.

as a general rule when a vote has been cast in favour of an ISO standard, and in all other cases unless there is a strong objection to the contrary, the ISO should be adopted without change.

#### 2.8.5 Other sources of standards

In addition to ISO there are a limited number of regional standards organizations such as the Caribbean Common Market Standards Council, the Comision Panamericana de Normas Tecnicas (COPANT) and the European Committee for Standardization (CEN). The first two organizations do not appear to have any packaging standards but CEN does, details of which are set out in section 3.2 of the Helsinki report.

In addition mandatory requirements of three different types can have a direct effect on the standards for packages and packaging materials, namely,

- test requirements for packages for dangerous products, (see section 2.7 of this report).
- 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 packaged products may be sold.

2.8.6 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. These 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'. If a material is not listed by the FDA it may not be used for the packaging of food or drink.

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) with its parent Directive No.76/893 of 20 November 1976, "Materials and articles intended to come into contact with foodstuffs", and the family of subsidiary directives (published or in preparation) relating to such products as 'Vinyl chloride monomer' and 'Plastics materials', has introduced international legislation as each of the member countries of the EEC is required to adopt these Directives.

It is not expected that the FDA and EEC requirements will affect national standards for complete packages, but the packaging materials used for Jamaican exports to such markets will be affected.

2.8.7 Permitted quantities of prepackaged goods

In order to protect the consumer some countries have had for many years legislation providing that if certain essential food-stuffs are pre-packaged they 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 has prepared a whole series of Directives on the prepackaging of all forms of drink, foodstuffs sold by weight and by volume, and non-food products sold by weight (e.g. cleaning products) and by volume (e.g. paint and lubricating oil).

Full details of these "permitted quantities" appear in Appendix 3 and 4 of the Helsinki report, but from the few examples given below 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.

Solid products.

Cereal flours may only be sold in the following pre-packaged weights

125 g 250 g 500 g 1 kg 2.5 kg 5 kg 10 kg

whilst jams and marmalade are to be sold in

125 g 250 g 500 g 750 g 1 kg 2 kg 2.5 kg 5 kg and 10 kg.

Liquid products.

The pre-packaged volumes for wines and for edible oils are as follows:

- wines	100 ml	250 ml	500 ml	750 ml	1.0 l	1.5 l	2.0 l
- oils	100 ml	250 ml	500 ml		1.0 l		2.0 l

whilst those for paints and lubricating oils are slightly different:-

- paints	125 ml	250 ml	375 ml	500 ml	750 ml	1.0 l	2.5 l	5.0 l
- lubricating oils	125 ml	250 ml		500 ml		1.0 l		5.0 l

Jamaican exports to all EEC countries of prepackaged rum and liqueurs, for example, must be in containers of the prescribed capacities, and it is understood that future exports to the USA are required to be in bottles of 50, 200, 500 and 750 ml and 1.0 l and 1.75 litres capacity.

Whilst the great majority of products packed in Jamaica for local consumption will be unaffected any long term standardization programme should take these trends into account.



3. RECOMMENDATIONS

1. Every opportunity should be taken, by visits and other means, to familiarise the JBS 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.
2. An assessment should be made of the potential demand in Jamaica, and possibly in the Caricom area, of rotationally moulded or blowmoulded plastics containers of 20 litres/5 US gallons up to 210 litres/55 US gallons capacity for use either as the inner component of a steel/plastic composite drum or as a free standing plastic drum.
3. A study should be made in Jamaica and the Caricom area of the extent to which (if any) domestically made woven polyolefin tape sacks could replace sacks made from imported jute cloth for the packaging of primary produce, taking into account the traditional practices in the marketing of such primary products.
4. The future export arrangements for bulk products such as sugar and alumina (aluminium oxide) should be assessed in order to determine (a) the tonnages likely to be required in bulk and in packaged form, and (b) whether the use of a flexible IBC would be advantageous to both the Jamaican producer and consignee overseas.
5. The use of indigenous sources of wood, e.g. dead coconut palms, in packaging applications should be considered either as a replacement for traditional types of wood or as reconstituted board.

6. In the programme of work following the Commonwealth Caribbean Seminar and in the development of cases and crates of any material for the export of fresh or refrigerated fruit and vegetables to overseas markets regard should be paid to:
  - (a) the performance test requirements set out in the ECE/OECD recommendations, and
  - (b) the dimensional constraints of the ISO series 1 insulated/refrigerated freight containers.
  
7. JBS 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.
  
8. JBS 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 subsection 2.7.1.
  
9. In the light of the foregoing JBS 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 Jamaican exporters may be required, at some future time, to use UN certified packages. Care should be taken
  - (a) not to seek monopoly of such UN testing
  - and (b) 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.

10. JBS, should (a) assess the equipment necessary to carry out the UN tests, especially taking into consideration the likelihood of being required to test plastics drums for which hot & cold rooms are necessary, and the safety problems involved in the handling of large packages up to 250 kg in weight and their subsequent drop stack and hydraulic pressure testing; and (b) take urgent action to obtain such additional facilities as are necessary to enable the JBS to act as an official testing station for the approval and certification of packages for dangerous goods.
11. Consideration should be given to the possibility of a member of JBS staff being seconded to PIRA for a short period in order to gain first hand experience of the UN testing, approval and certification procedures.
12. UNIDO should consider the publication of a detailed guide to the various regulations concerning the packaging of dangerous goods for transport, including operational testing procedures, 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.
13. A review should be made of Jamaica's participation in the work of the ISO technical committees and sub-committees which are listed in Appendix 6 and which are concerned with packaging and distribution.
14. Consideration should be given to monitoring the work of such ISO committees and sub-committees whatever grade of membership is thought to be appropriate.

15. It is strongly recommended that careful consideration be given to the role of the present Packaging Standards Committee and the suggestions made in sub-section 2.8.3.
16. It is further recommended that the terms of reference of the Packaging Standards Committee, and of any Technical Committees or Sub-committees which may be set up, cover "all national and international standards work" in their defined areas of interest, and thus bring about about a close identity of purpose in national and international standards work.
17. Wherever Jamaica has carefully studied and has voted in favour of an ISO standard, and in all other cases unless there is strong objection to the contrary, the ISO standard should be adopted without change as a JBS standard.
18. Wherever practicable standards for manufactured packages should have the widest possible application rather than be restricted to specific products. For example there should be a single standard for hermetically sealed cans for foodstuffs not a range of standards for cans for product A, B, C etc.
19. 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 a progression.
20. 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.

21. In the preparation of such standards where reference to another standard is essential this should be done in mandatory terms e.g. "..... shall comply with the requirements of JBS 1234", omitting the year of publication from the reference.
22. JBS 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 Jamaican exporters, whether the support be in the form of advice, testing facilities or standards preparation.
23. When the immediate task of establishing the packaging laboratory is well advanced JBS should become thoroughly familiar with other trends in distribution (e.g. the use of freight containers, shrink-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 solids) in order to be able to offer such advice and encouragement as is necessary to Jamaican industry, to prepare the necessary standards, and provide test facilities to ensure a high degree of safety.

APPENDIX 1

VISITS AND OTHER CONTACTS MADE IN JAMAICA

Jamaican Bureau of Standards  
6 Winchester Road  
Kingston 10 Telephone:926-3140

Dr. Artnell S. Henry	-	Director
Mrs. J. Crawford		Deputy Director
Dr. O.A. Thomas	-	Deputy Director
Mr. Ken Garfield	-	Materials Science
Mrs. Marguerite A. Domville	-	Packaging Laboratory(Tel:929-6475)
Mr. Errol Williams	-	Packaging Laboratory
Miss Pat Douce	-	Packaging Laboratory
Miss Ingrid Bennett	-	Packaging Laboratory
Miss Yvonne Allen	-	Packaging Laboratory
Mrs. Jasmin McKenzie	-	Packaging Laboratory
Miss Paulette Innerarity	-	Packaging Laboratory
Mrs. M. Lettman	-	Librarian
Miss Fay Wilmot	-	Regulations and Compliance
Miss Evelyn Sirjue	-	Regulations and Compliance

United Nations Development Programme  
1-3 Lady Musgrave Road  
Kingston (Tel: 926-5500)

Miss Kathleen Roberts	-	Programme Officer
Mrs. Valerie Watt	-	Senior Administrative Assistant
Miss Elsie Ellwood	-	Library Assistant

British High Commission  
Trafalgar Road  
Kingston 10 (Tel:926-9050)

Mr. James Graham

Ministry of Industry and Commerce  
12 Ocean Boulevard  
Kingston Mall  
Tel. 922-0100

Mrs. Irena Cousins	Director of Consumer Affairs Chairperson, Packaging Standards Committee.
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Ministry of the Public Utilities and Transport  
2 St. Lucia Avenue  
Kingston 5.  
Tel. 926-1509

APPENDIX 1

Dr. H.B. Desai  
Visits - 14 and 27 May 1980

Shipping Adviser

Civil Aviation Department  
9 Trinidad Terrace  
Kingston 5  
Tel: 926-9115

Mr. Osbourne  
Visit - 25 April 1980

- Deputy Director

Federated Pharmaceutical Co. Ltd.  
and  
Lascelles Laboratories Ltd.  
2 Torrington Avenue  
P.O. Box 432  
Kingston  
Tel. 922-1060

Mr. Ian M.D. Murphy  
Mr. Jim Brennan

- Managing Director  
- BESO Consultant (UK)

Kem Products Ltd.  
and  
Kem Chemicals Ltd.  
68 Riverton Boulevard  
Kingston  
Tel: 923-5101

Mr. Ronald West  
Mr. Noel Cockett  
Visit - 23 April 1980

- Production Manager  
- Production Supervisor

Jamaica Bags Ltd.  
P.O. Box 30  
May Pen  
Tel.986-2435

Mr. Roy Lankester  
Visit - 13 May 1980

Managing Director

Jamaica Packaging Industries Ltd.  
214 Marcus Garvey Drive  
Kingston 11  
Tel:923-7031

Mr. Prendergast  
Mr. A. Williams  
Mr. Rogers  
Visit - 21 May 1980

- Plant Manager  
- Plant Manager, Sacks (leaving)  
- Staff Supervisor - Sacks

APPENDIX

Musson Jamaica Ltd.  
Spanish Town Road  
Kingston 11  
Tel: 923-8922

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Mr. A. Desmond Blades  
Visit - 24 April 1980

- Managing Director

Mr. Harold A. Narva

- BESO Consultant (UK)

Reliable Packaging Ltd.  
11 Diamond Avenue  
Kingston 11  
Tel: 923-6839

---

Mr. Derek Lowe  
Mr. Glen Ferguson  
Visit - 8 May 1980

- Manager

- Plant Manager

Scientific Research Council  
Hope, Kingston 6  
Tel: 927-4471 to 4

---

Mrs. Sadie Campbell

- Member of Packaging Standards  
Committee

Saycon Ltd.  
2 Ripon Road  
Kingston 5  
Tel: 926-1570

---

Mr. M. Vaida

- Member of Packaging Standards  
Committee

Van Leer (Jamaica) Ltd,  
Spanish Town Road  
Ferry, Kingston 10  
Tel: 923-6674

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Mr. William L. McLeod  
Mr. Denis Hornett  
Visit - 17 April 1980

- General Manager

Factory Manager

West Indies Pulp & Paper Ltd.  
19 West Kings House Road  
Kingston 10  
Tel: 926-7423

---

Mr. A. Pickersgill

- Managing Director

Member of Packaging Standards  
Committee



APPENDIX 2

WORK PROGRAMME - C.SWINBANK

1980

- April 14 Registration at UNDP.  
General introduction at J.B.S.
- 15 Discussion and planning of work programme.
- 16 Lecture: Closed - end metal drums.
- 17 Lecture: Full opening and restricted aperture metal drums  
Visit: Van Leer (Jamaica) Ltd.
- 18 Lecture: Wooden casks, plywood kegs and fibreboard drums.
- 21 Lecture: Plastics drums and composite containers
- 23 Visit: Kem Chemicals Ltd.
- 24 Visit: Musson Jamaica Ltd.  
Lecture: Paper sacks  
Sack filling and closing equipment.
- 25 Lecture: Fabric sacks made from natural fibres or plastics tape.  
Visit: Civil Aviation Department
- 28 Lecture: Plastics film sacks
- 29 Lecture: Portable tanks  
Metal and rigid plastics IBC's
- 30 Lecture: Fibreboard and fabric IBC's  
Lunch: British Executive Service Overseas  
British High Commission.  
Visit: UN Library
- May 1 Lecture: Solid and corrugated fibreboard cases
- 2 Lecture: Wood, plywood and wireboard cases and crates
- 5 Lecture: ISO committee structure and method of working  
ISO standards for packages, package testing, pallets and freight containers.
- 6 Lecture: ECE/OECD recommendations for the standardization of packaging for the international transport of fresh or refrigerated fruit and vegetables
- 7 Lecture: USA DOT regulation on the classification, packaging and transport of dangerous goods.

APPENDIX 2

1980

- May
- Visit: Reliable Packaging Ltd.
- 8 Lecture: UN recommendations on the "Transport of Dangerous Goods" e.g. Hazard classes; criteria; symbolic labels; classification of products and their grouping by degree of danger.
- 9 Lecture: UN recommendations (contd)  
Packaging requirements for dangerous goods.
- 12 Lecture: UN recommendations (contd)  
Testing of metal drums, plastics drums and composite container to hold liquids.
- 13 Visit: Jamaica Bags Ltd.  
Lecture: UN recommendations (cont)  
Testing of metal drums, plywood drums, fibreboard drums, plastics drums and composite containers for solids Testing of sacks and cases of all types.
- 14 Lecture: UN recommendations (contd)  
UN certification marks.  
Procedure adopted in the UK for the testing, registration and certification of packages for dangerous goods.
- Visit: Ministry of Public Utilities and Transport
- 15 Lecture and slide presentation  
IATA Restricted Articles Regulations.  
Meeting: Review of progress with J.B.S. and Project Manager.
- 16 Lecture: International Maritime Dangerous Goods (IMDG) Code.  
Discussion: Mrs. Irena Cousins,  
Director of Consumer Affairs  
Ministry of Industry and Commerce.
- 9 Lecture: Selection of a package - Part 1. Product characteristics - Evaluation of materials - Production, storage and handling requirements.
- 21 Meeting: Packaging Standards Committee  
Visit: Jamaica Packaging Industries Ltd.
- 22 Lecture: Selection of a package - Part 2  
Distribution considerations - mechanical and climatic hazards - dimensional co-ordination - freight charges.
- 23 Public holiday
- 26 Lecture: Pallets - construction and standards
- 27 Visit: Ministry of Public Utilities and Transport.

APPENDIX 2

1980

May	28	<u>Discussion:</u> with Director of J.B.S.
		<u>Lecture:</u> Pallets - testing and safety standards.
	29	Round table discussion with industry.
	30	Completion of consultant's report.
June	1	Final discussions with J.B.S. staff,
	2	Consultant leaves Jamaica.

APPENDIX 3

LIST OF PARTICIPANTS IN ROUND TABLE  
DISCUSSION ON 29 MAY 1980

<u>NAME</u>	<u>ORGANIZATION</u>
Naval Harley	Afonal Products
Ralph Avery	Caribbean Manure Co.
Noel DaCosta	Desnoes and Geddes Limited
James Fairweather	Esso W.I. Limited
Roy Reynolds	Gleaner Company Limited
Roy Lankester	Jamaica Bags Limited
Keith Amiel	Jamaica Livestock Association Limited
Robert Coote	Metal Box (Jamaica) Limited
Delaine Montieth	Mead Johnson (Manufacture) Jamaica Limited
Erwin Burton	National Processors Limited
Florence Lergie	National Processors Limited
Derek Lowe	Reliable Packaging Limited
Angela HoChoy	Seprod Limited
Hopton Brown	Seprod Limited
Oswald Roberts	Shell Company (W.I.) Limited
C. Ho Tung	Stacote Finishes Limited
Errol Dunkley	West Indies Pulp & Paper Limited
Ronald Reeves	Whandotte Chemicals Jamaica Limited
Irena Cousins	Chairperson - Packaging Standards Committee
Herman Van Asbroeck	UNIDO
Ken Garfield	Bureau of Standards
K. Thilakan	Bureau of Standards
Jean Wellington	Bureau of Standards
Ovida Lewis	Bureau of Standards
M. Galloway	Bureau of Standards
Fay Wilmot	Bureau of Standards

PLUS

A. Henry	Director, J.B.S.
M. Domville	Head, Packaging Laboratory, J.B.S.
J. Salisbury	UNIDO Project Manager
H. Wolfrum	UNIDO Consultant
C. Swinbank	UNIDO Consultant
E. Williams	Packaging Laboratory, J.B.S.
P. Douce	Packaging Laboratory, J.B.S.
I. Bennett	Packaging Laboratory, J.B.S.
Y. Allen	Packaging Laboratory, J.B.S.
J. McKenzie	Packaging Laboratory, J.B.S.



Ansi Standards (Cont'd).

MH2.8 - 1979	16 gallon (61 liter) full removable head lug cover Universal Steel Drums.	UFC Rule 40 NMFC 260
MH2.10 - 1979	5 gallon (19 liter) straight side lug cover Universal Steel Pails.	DOT 37A80 DOT 37A60 UFC Rule 40 NMFC 260
MH2.11 - 1979	57 gallon (216 liter) full removable head Universal Steel Drums	UFC 40 NMFC 260
MH2.12 - 1979	30 gallon (114 liter) full removable head Universal Steel Drums.	UFC Rule 40 NMFC 260
MH2.13 - 1979	" " " " "	DOT 17H UFC Rule 40 NMFC 260
MH2.14 - 1979	16 gallon (61 Liter) full removable head Universal Steel Drums.	UFC Rule 40 NMFC 260
MH2.15 - 1979	5 gallon (19 liter) nesting lug cover Universal Steel Pails.	DOT 37A80 DOT 37A60 UFC Rule 40 NMFC 260
MH2.16 - 1979	5 gallon (19 liter) straight sid lug cover Universal Steel Pails.	DOT 37C80 UFC Rule 40 NMFC 260
MH2.17 - 1979	5 gallon (19 liter) nesting lug cover Universal Steel Pails.	DOT 37C80 UFC Rule 40 NMFC 260

3. FIBRE BOARD DRUMS

British Standards

B.S. 1596; 1974      Fibre board drums for shipment of goods overseas.

USA DOT Specifications

DOT 21C      Fibre Drum

4. COMPOSITE DRUMS

USA DOT Specifications (examples only)

Inner

DOT 2S      Polyethylene Container

COMPOSITE DRUMS (CONT'D).

DOT 2SL Moulded or Thermoformed  
Polyethylene Container

Overpacked in

DOT 37M Cylindrical Steel overpack straight sided  
for inside plastic container; non-re-usable  
containers.

DOT 22C Plywood drum overpack for plastic inside container.

DOT 21P Fiber drum overpack for inside plastic container.

DOT 12P Fiber board boxes. Non re-usable containers for  
one inside plastic container greater than one  
gallon capacity.

5. PLASTIC DRUMS

British Standards

B.S. 4839 Blow moulded polyolefin containers.

Part 2; 1974 Containers over five litres and up to 60 litres  
capacity.

Part 3; 1977 Closed head containers over 60 litres up to and  
including 210 litres.

USA DOT Specification

DOT 34 Re-usable moulded polyethylene containers for use  
without overpack.

6. PAPER SACKS

N.B. See typical specification on page 164  
of "Packaging of Chemicals."

British Standards

B.S. 3725 : 1964 Non returnable multiwall paper sacks for loose  
ware potatoes.

B.S. 1133 : Sec. 7 : Paper and board wrappers, bags and Containers.  
1967

ISO Standard

In preparation by ISO TC.122/SC.2

USA DOT Specifications

DOT 44B to 44E Multiwall paper bags.





11. FIBERBOARD CASES

British Standards

BS.1133 : Section 7  
Chapter 7.5 : 1976

Packaging Code  
Fiberboard packing cases.

USA DOT Specifications

DOT 12A to 12H

Fiberboard Boxes.

USA Carrier Regulations

Uniform Freight  
Classification

Rule 41

National Motor Freight  
Classification

Items 222-1 to 222-6.

12. WOODEN CASES AND CRATES

British Standards

BS.1133 : Section : 1950

Wooden containers.

USA DOT Specifications

DOT 14, 15A - 15E

Wooden boxes, nailed.

DOT 16A and 16B

Wooden boxes, wirebound,

DOT 19A and 19B

Wooden boxes, glued plywood.

REGULATIONS

HAZARDOUS GOODS - INTERNATIONAL

1. United Nations Committee of Exports' Recommendations on the Transport of Dangerous Goods.
2. International Maritime Dangerous Goods (IMDG) Code  
Published by Intergovernmental Maritime Consultative Organization (IMCO), 101-1-5, Piccadilly, London, England.
3. IATA Restricted Articles Regulations  
Published by the International Air Transport Association, Geneva, Switzerland.
4. (In preparation) Regulations concerning the transport of dangerous goods by air, by the International Civil Aviation Organization (ICAO), Montreal, Canada.
5. Annex I (RID) To the International Convention Concerning the Carriage of Goods by Rail (CIM)
6. The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

HAZARDOUS GOODS - NATIONAL

1. USA  
49 CFR: Code of Federal Regulations, Transportation Title 49, Parts 100-199  
Which are also republished by R.M. Graziano, 1920 L Street N.W., Washington, D.C. 20036, U.S.A. "Hazardous Materials Regulations of the Department of Transportation."
2. U.K.  
Merchant Shipping (Dangerous Goods) Rules 1978  
Incorporated in the 1978 Report of the Department of Trade's Standing Advisory Committee on the Carriage of Dangerous Goods by Sea (the Blue Book).

NON DANGEROUS GOODS

1. IATA Register of Container Specifications  
Published by the International Air Transport Association, Geneva, Switzerland.

2. Uniform Freight Classification (UFC)

Published by Railroad Freight Classifications, 222 South Riverside Plaza, Room 1106, Chicago, Ill. 60606, U.S.A.

3. National Motor Freight Classification (NMFC)

Published by American Trucking Associations Inc., Tariff Order Section, 1616 P Street N.W., Washington D.C. 20036, U.S.A.

ISO COMMITTEES WORKING IN THE  
FIELD OF PACKAGING AND DISTRIBUTION

TC.51 - Pallets for unit load method of materials handling

Secretariat: United Kingdom (BSI)

Scope: Standardization of pallets in general use in the form of platforms or trays on which goods may be packed to form unit loads for handling by mechanical devices.

Sub-committees: None.

Working Groups: WG1 - Terminology relating to pallets  
WG2 - Performance requirements and methods of test for pallets.

TC.52 - Metal Containers

Secretariat: France (AFNOR)

Scope: Standardization in the field of hermetically sealed food containers normally used for foodstuffs submitted to heat processing, including nomenclature, terminology, designation and inspection, and for each a series of capacities and bottom dimensions.

(N.B. Provisional. Scope is to cover all types of metal can).

Sub-committees: SC1 - Can sizes (France - AFNOR)  
SC2 - Milk cans (Netherlands - NNI)  
SC3 - Fish and other fishery products cans. (France - AFNOR).

TC.58 - Gas cylinders

Secretariat: Sweden (SIS)

Scope: Standardization of specifications for gas cylinders, their fittings, and features relating to the use of cylinders.

Several sub-committees and working groups.

TC.63 - Glass Containers

Secretariat: Czechoslovakia (Research and Development Institute of Glass).

Scope: Standardization of glass containers and of their corresponding closures, if any, especially with respect to terminology, methods of test, specification of types, forms and dimensions, including tolerances related thereto.

Sub-committees: SC1 - Terminology ((UK - BSI)  
SC2 - Test methods (Czechoslovakia)  
SC3 - Dimensions ( - )

TC.104 - Freight Containers

Secretariat: United States of America (ANSI)

Scope: Standardization of freight containers, having an external volume of one cubic metre (35.3 cubic feet) and greater, as regards terminology, classification, dimensions, specifications, test methods and marking.

Several sub-committees and working groups.

TC.122 - Packaging

Secretariat: Canada (SCC)

Scope: Standardization in the field of packaging with regard to terminology and definitions, packaging dimensions, performance requirements and tests.

Excluded: Matters falling within the scopes of particular committees (e.g. TC.6,52 and 104).

Sub-committees and working groups: SC1 - Packaging Dimensions, (Canada - SCC)  
SC2 - Sacks (Finland - SFS)  
WG1 - Methods of calculation (France - AFNOR)  
WG2 - Conditioning and sampling (Finland - SFS)  
WG3 - Drop testing of sacks (Sweden - SIS)  
WG4 - Sacks made of other material than paper (UK - BS1)  
WG5 - Test methods for seam strength (West Germany - DIN)

Sub-committees and working groups: (Cont'd).

- SC3 - Performance requirements and tests for transport packages and unit loads (within the scope of ISO/TC.122)  
(UK - BSI)
- WG1 - Hazards (UK - BSI)
- WG2 - Standardised test schedules (UK - BSI)
- WG3 - Performance requirements for closing devices and methods of test for child proof containers (UK - BSI)
  
- SC4 - Terminology, codification, classification and symbols (West Germany - DIN)
  
- WG1 - Classification and terminology of packaging (France - AFNOR).

Technical Divisions

ISO has three three technical divisions (including TD.4 - Distribution of Goods) which were created to survey broader technical fields and to assess the needs for International Standards in them, and to ensure a coherent planning and programming of the ISO technical work in co-operation with other international organizations.

- Secretariat: Central Secretariat, Geneva.
  
- Membership: Any interested member body as P or O members.
  
- Terms of reference: To study and assess the needs for International Standards in the field of the technical Division with a view to ensuring coherent sectoral planning.  
  
To review the work of other international organizations, having an important activity or interest in the field of the technical division.  
  
To consider particular aspects of planning, programming or co-ordination in the field of the technical division, especially those which are causing difficulties.  
  
To make resulting recommendations to the technical committees concerned or to the ISO Council Council Committees or Secretary - General, as appropriate.

ISO STANDARDS IN THE FIELD  
OF PACKAGING AND DISTRIBUTION

NOTE: \* indicates standard is being reviewed/revised

1. TC.51 PALLETS

- \* ISO/R.198 : 1961 Double deck Flat pallets for through transit of goods.
- \* ISO/R.329 : 1963 Large pallets for through transit of goods.
- \* ISO/R.445 : 1965 Vocabulary or terms relating to pallets.

Documents under discussion

DP 6780 Double deck flat pallets for through transit of goods.

2. TC.52 METAL CONTAINERS

- Hermetically sealed metal cans for food and drinks.
- ISO 90 : 1977 Specifications.
- ISO 1361 : 1977 Internal diameters of round cans.
- ISO 2735 : 1973 Capacities and diameters of round open top and vent hole cans for milk.
- ISO 3004/1 : 1979 Part 1 - Round open top general purpose food cans.
- ISO 3004/2 : 1979 Part 2. Food cans for meat and products containing meat for human consumption.

Document under discussion

- DP 3004/3 Part 3. Cans for drinks
- DIS 3004/4 Part 4. Cans for edible oil.
- DP 3004/5 Part 5. Food cans for fish and other fishery products.

3. TC.58 - GAS CYLINDERS

ISO 32 - 1977

Gas cylinders for medical use. Marking for identification of content.

ISO 448 - 1977

Gas cylinders for industrial use. Marking for identification of content.

ISO 3807 - 1977

Dissolved acetylene cylinders basic requirements.

Documents under discussion

DIS 448

Revision of 448 - 1977

DIS 4705

Refillable seamless steel gas cylinders .

DP 4706

Design and construction of welded steel gas cylinders.

DP 5145

Classification of industrial gases .

DP 6406

Periodic inspection and testing of seamless steel gas cylinders.

4. TC 63 - GLASS CONTAINERS

ISO/R.1115 - 1969

Finishes with external screw thread for glass containers and gauges for the inspection of screw closures.

5. TC 104 - FREIGHT CONTAINERS

13 Standards including:

ISO 1894 1979

General purpose series 1 freight containers - Minimum internal dimensions.

6. TC 122 - PACKAGING

(a) TC 122/SC.1 - Packaging Dimensions

ISO 3394 - 1975

Dimensions of rigid rectangular packages - Transport packages.

Documents under discussion

DIS 3676.3

Packaging - Unit Load sizes - Basic dimensions.



(b) TC. 122/SC/2 - Sacks

Documents under discussion

DP 6590

Packaging - Sacks - Vocabulary  
and Types.

DP 6591/1

Packaging - Paper Sacks - Measurement  
of dimensions and expression of sizes  
Part 1 - Empty sacks.

(c) TC.122/SC.3 Package Testing

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. 3 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

Documents under discussion

DIS 4178

Distribution trials - Information to be  
recorded.

DIS 4180

General rules for the compilation of  
performance test schedules

/1

Part 1. General principles

/2

Part 2. Quantitative data.

(d) TC 122/SC.4 - Terminology

\* ISO/R 780 - 1968

Pictorial markings for handling of goods  
(General symbols).

\* ISO/R 884 - 1968

Pictorial marking of transit packages  
containing photographic materials sensitive  
to radiant energy.

Documents under discussion

DP 5988

Packaging - Terminology and classification.

ORGANISATION OF PACKAGING COMMITTEES WITHIN THE  
BRITISH STANDARDS INSTITUTION (BSI)

	<u>Equivalent ISO committee</u>
<u>Packaging and freight container standards committee</u>	- TD4 and TC.122
Distribution advisory group	- TD4
<u>Policy committees</u>	
Package testing	- TC.122/SC.3
Package and unit load dimensions	- TC.122/SC.1
Terminology and packaging code	- TC.122/SC.4
Package marking	- TC.122/SC.4
Freight containers	- TC.104
<u>Transit packages</u>	
Drums	
Sacks	- TC.122/SC.2
Cases and crates	
Pallets	- TC.51
Intermediate bulk containers	
<u>Unit packages</u>	
Metal containers	- TC.52
Pressurized packages	- TC.52
Glass containers	- TC.63
Rigid boxes and folding cartons	
Moulded plastics packages	
Bags, sachets and envelopes	
<u>Materials and accessories</u>	
Flexible packaging materials	
Strapping, taping and tying materials	
Cushioning and insulating materials	
Reels, tubes and composites	
<u>Packaging technology</u>	
Protection against pest and micrological attack	
Adhesives for packaging	
Temporary prevention of corrosion	
Use of desiccants in packaging	
Packaging for air-freight (other than livestock)	
Compatibility of packaging materials and products	
Child resistant containers	TC.122/SC.3/WG.3
<u>Packaging of products</u>	
Packaging of fresh fruit, vegetables and flowers	
Packaging of pharmaceutical and surgical products	
Packaging of photographic materials	
Packaging of washing and cleaning powders	

INTERMEDIATE BULK CONTAINERS FOR HAZARDOUS GOODS.

1. Definition. In the UK agreement has been reached between industry, Health and Safety Executive and Government representatives that an IBC has a capacity of 0.45 to 3.0 m<sup>3</sup> and is suited only to contain substances with a vapour pressure not exceeding 1.1 kg/cm<sup>2</sup> absolute (15.64 psia) at 50°C which are dischargeable without the application of pressure.
2. Packages. The UN recommendations on "The Transport of Dangerous Goods" which are intended as the basis for all regulations, put upper limits on the capacity or net contents of conventional package types, e.g.

Drums - 250 litres/400 kg

Sacks - 50 kg

from which it is clear that IBCs cannot be regarded as packages. The only other receptacles which are recognised nationally and internationally for hazardous goods are 'Portable tanks' and 'Tank containers'.

3. Portable tanks are defined by IMCO (and in the British 'Blue Book') as tanks of a capacity of 450 litres or more which, when loaded, are capable of being lifted on and off the ship and which are intended for the transport of dangerous liquids with a vapour pressure of not more than 5 kg/cm<sup>2</sup> absolute (43 psia) at 50°C. There is no specific reference to solid products.

Excluding gases only two types of tank are now allowed, both of which must be fitted with relief valves. Very detailed design and testing requirements are specified in terms of cylindrical tanks made from mild steel, e.g.

	<u>Type 1.</u>	<u>Type 2.</u>
Total containment pressure to be not less than	1.724 bar (25 psig)	0.98 bar (14.2 psig)
Minimum shell thickness up to 1.8 m diameter.	5 mm	5 mm or 3 mm with outer protection.

Section 10 to Annex 1 to the Blue Book lists which type of tank may be used for given liquids, the minimum design pressure, etc. For any hazardous liquid not listed, and all hazardous solids, advice must be sought from the authorities.

4. 'Tank container' is the term used in both the European rail regulations (RID) and the European road regulations (ADR) to cover containers with a capacity of more than 0.45 m<sup>3</sup> which are built to contain liquid, gaseous, powdery or granular substances. There are detailed design requirements with minimum shell thicknesses as for Portable tanks.

Four types of tank are provided for identified by the vapour pressure at 50°C of the product to be carried and its intended method of filling and discharge -

<u>Vapour pressure of product.</u> (kg/cm <sup>2</sup> absolute)	<u>Test pressure of tank.</u>
1. Not more than 1.1 (15.64 psia) with gravity discharge.	2 x static pressure of liquid but not less than 2 x static pressure of water
2. Not more than 1.1 with pressure filling or discharge.	1.3 x filling or discharge pressure.

- 3. Not less than 1.1 (15.64 psia) and not more than 1.5 (24.88 psia)      1.5 kg/cm<sup>2</sup> (21.33 psig)  
OR, if higher,  
1.3 x filling or discharge pressure.
- 4. Not more than 1.75      1.5 x pressure at 50°C less 1 kg/cm<sup>2</sup>  
with a minimum of 4 kg/cm<sup>2</sup> (56.88 psig)  
OR, if higher  
1.3 x filling or discharge pressure.

5. UK proposals. Faced with the wide gap between conventional packages and portable tanks/tank containers, work in the UK two or three years ago resulted in (a) the definition of IBCs in 1. above; (b) draft statutory requirements for these of IBCs for hazardous products to be carried by road; and (c) a formal submission to the UN of proposals for test methods and provisional specifications for various types of IBC including certain minimum wall thicknesses, e.g.

	Steel.	Aluminium.	Plastics in frame.
For liquids.	2 mm	2.5 mm	6 mm up to 2 m <sup>3</sup>
For solids.	1.25 mm	2.0 mm	4 mm up to 2 m <sup>3</sup>

6. CEPIC proposal to UN. Amongst the other proposals to the UN is one which has the support of CEPIC (the European Council of Chemical Manufacturers' Federations). This covers metal containers of any shape carrying liquids and solids with a vapour pressure at 50°C of not more than 1.5 bar absolute (21.75 psia). Minimum thickness, prototype tests and initial and periodic tests are proposed, e.g.

<u>Capacity (m<sup>3</sup>)</u>	<u>IBC for solids with vapour pressure &lt; 1.1 bar.</u>		<u>IBC for liquids with v.p. &lt; 1.5 bar, plus solids &gt; 1.1 &lt; 1.5 bar.</u>	
	Unprotected.	Protected.	Unprotected	Protected
Thickness:				
Up to 1.0	1.5 mm	1.25 mm	2.0 mm	1.5 mm
Over 1.0 up to 2.0	2.0 mm	1.5 mm	3.0 mm	2.0 mm
Over 2.0 up to 3.0	3.0 mm	2.0 mm	3.5 mm	3.0 mm
Hydraulic pressure:				
- Prototype tests	No, unless intended for pressure filling/discharge		2 bars (29 psi) above atmospheric pressure.	
- Periodic tests (gravity discharge)	No		1.3 x pressure at 50°C less 1 bar with a minimum of 2 x static pressure of the liquid or water (if greater).	
- Periodic tests (pressure fill/discharge)	1.3 x working overpressure for filling or discharge (Maximum overpressure is 0.5 bar)			

December 1979.

RECOMMENDATION ON THE STANDARDIZATION OF PACKAGING  
FOR THE INTERNATIONAL TRANSPORT OF FRESH  
OR REFRIGERATED FRUIT AND VEGETABLES 1/

I. OBJECT

The object of this recommendation is to fix the dimensions and mechanical strength characteristics of rectangular packagings usable on one or both types of standardized pallets (800 x 1200 and 1000 x 1200 mm), together with the tests to be passed.

II. FIELD OF APPLICATION

This recommendation applies to packagings, whatever the nature of the constituent material or materials (woods, paperboard, plastics materials), used for the dispatch or storage of fruit or vegetables. It also applies to cold storage or long-term storage.

A packaging used for carriage may be used for dispatch once only.

III. DEFINITIONS

Bottom: Base part of the packaging; by extension: base part of a packaging consisting of two half-boxes fitting together.

Sides: The two longer vertical walls.

Ends: The two shorter vertical walls, which may be higher than the sides.

Lid: Upper closing component of the packaging; by extension: upper part of a packaging consisting of two half-boxes fitting together.

IV. CLASSIFICATION

The packaging to which this recommendation refers is classified in two groups, according to its ability to withstand stacking and storage, up to a maximum height of:

1. 2.5 metres: group A;
2. 8 metres; group B.

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1/ The present Recommendation does not apply to the long distance transport of fresh or refrigerated fruit and vegetables by sea.

V. DESCRIPTION

A packaging conforming to this recommendation is identified by:

- The name of the packaging (for example: box, tray, case);
- Its constituent material or materials;
- The group to which it belongs (group A or B);
- Its nominal external dimensions in millimetres;
- The height of the sides in millimetres;
- Where appropriate, the height of the ends in millimetres;
- The presence or absence of a lid;
- In the case of paperboard packagings only, the maximum weight of the packaging when full.

Examples: Wirebound wooden box, group B, 400 x 300 x 500, with lid.

Paperboard box, group A, 600 x 400 x 235 with lid, maximum weight 20 kg.

VI. OVERALL DIMENSIONS

The dimensions given below are the maximum external dimensions.

600 x 400 mm;

500 x 300 mm;

400 x 300 mm.

For each of these dimensions, a tolerance of minus 10 mm is permitted; no plus tolerance is permitted.

No heights are prescribed for the sides or ends. <sup>1/</sup>

VII. CONSTRUCTION

All packagings covered by this recommendation shall have the form of a rectangular parallelepiped. <sup>2/</sup>

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<sup>1/</sup> On account of the diversity of the fruit and vegetables packaged, it is not possible to prescribe a compulsory height for the ends and sides; also, their height is only of secondary importance for palletization.

<sup>2/</sup> The sides and ends will normally be perpendicular to the bottom, but may be sloped; the angle formed with the bottom by a side or an end should be between 75° and 105°.

Packagings shall have two sides, two ends and a bottom and may have a lid.

In the case of packagings without a lid, the height of the ends or corner parts may be greater than that of the sides, but the additional height must not exceed 50 per cent of the height of the sides if the height of the packaging is 110 mm or greater. This limitation does not apply to packagings whose corner parts are reinforced.

Packagings without a lid or considered as such<sup>3/</sup> must be specially designed in order to prevent any shifting of one packaging in relation to others of the same dimensions and design located immediately below or above it.

Packagings may be mixed, i.e., they may comprise different materials; construction methods may also differ.

Packagings must withstand the laboratory tests described in chapter X.

#### VIII. TECHNICAL CHARACTERISTICS OF CONSTITUENT MATERIALS

The materials used must not impart any unusual odour and/or taste to the produce and must conform to the regulations in force concerning materials which may be in contact with foodstuffs.

##### 1. Wood

- (a) Species: Any species of wood may be used.
- (b) Quality: The wood should be sound, without bark and free from any active decay or insect attack. Abnormal discolouring of the heart, as well as knots of a diameter less than one-third of the width of a component, are permitted. However, there shall be no knots at points where the components are fastened together.

##### 2. Derivatives

All particles of vegetable origin are permitted.

##### 3. Paperboard

All types of paperboard are permitted (solid paperboard, corrugated, double-face and double-double corrugated paperboard).

##### 4. Plastics materials

Any plastics material may be used, provided it is not toxic.

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<sup>3/</sup> Any paperboard packaging having a lid with an opening wider than 25 mm is considered to be a packaging without a lid.



## IX. TEST SAMPLES

Depending on whether the tests are for approval or control purposes, 19 or 10 packagings of the same series shall be required. These packagings shall be numbered 1 to 19 or 1 to 10. However, for approval tests of packagings including plastic materials 24 packagings, numbered 1 to 24, shall be required.

## X. TESTS

### 1. Object

The tests defined below are designed to classify packagings according to their strength under the various stresses they are likely to meet in the course of carriage or storage (pressure, vibration, fall).

### 2. Nature

Packagings of groups A and B, with or without lids, shall be subjected to the following tests:

- Compression (suitability for stacking);
- Vibration;
- Free fall.

### 3. Methods

The various tests shall be carried out as described below:

#### 3.1 Loading

The loading used for certain tests shall consist of:

- (a) The actual product for which the packaging is intended;
- (b) Failing this, a product whose specific gravity is close to 0.5, the packaging being completely filled with bags of the said product;
- (c) Failing this, potatoes.

#### 3.2 Conditioning (ISO standard 2233)

Wooden packagings: none.

Packagings in corrugated paperboard: for the 48 hours immediately before the tests, the packagings shall be kept in an atmosphere of relative humidity  $90 \pm 2$  per cent and temperature  $20 \pm 2$ °C. The time interval between removal from the conditioning chamber and the start of each test should not exceed 30 minutes.

Packagings in plastic material: for the 48 hours immediately before the tests, some of the packagings shall be kept in an atmosphere with a temperature of  $40^{\circ} \pm 2^{\circ}\text{C}$  and the remainder in an atmosphere with a temperature of  $-10^{\circ} \pm 2^{\circ}\text{C}$ . The time interval between removal from the conditioning chamber and the start of each test should not exceed 10 minutes.

### 3.3 Compression test (ISO standards 2872 and 2874)

This test shall be carried out on empty packagings (with their internal fittings if these contribute to the strength of the packaging) placed in their normal position of use on the lower platform of a press.

With the relative speed of the two platforms adjusted to  $10 \pm 3 \text{ mm/min}$ , a compressive resistance shall be applied which is given by the formula:

$$F = 1.5 \left( \frac{H}{h} - 1 \right) P$$

where: F is the resistance in kilogrammes;

H is the storage height of the packagings, in centimetres (250 for group A; 800 for group B);

h is the overall height of a packaging, in centimetres;

P is the weight of a full packaging, in kilogrammes.

The packagings shall be considered satisfactory if the resistance F does not cause vertical deformation of 5 per cent or more of the height of the packaging; such deformation must not be greater than 10 mm.

Approval test: five packagings (Nos. 1 to 5) shall be tested in succession.

Control test : five packagings (Nos. 1 to 5) shall be tested in succession.

### 3.4 Vibration test (ISO standard 2247)

The tests shall be carried out on three loaded packagings placed on top of one another, in their normal position of use, on the platform of the vibrating table.

An additional load, the weight of which is given by the following formula, shall be placed on a rigid tray on top of the upper packaging:

$$p = \left( \frac{220}{h} - 3 \right) P$$

where:  $\bar{p}$  is the additional load, in kilogrammes;  
 $h$  is the height of a packaging, in centimetres;  
 $P$  is the gross weight of a full packaging.

Packagings which do not have their own securing device shall be kept stacked by some suitable means.

The vibrations shall be as follows:

Displacement of the table:

9 mm horizontally,  
9 mm vertically.

Frequency: 4Hz.

Duration: 2 x 10 min.

The packagings shall be so arranged that for an initial period their length, and then for a second period their width, is parallel to the direction of the horizontal vibration.

Packagings shall be considered satisfactory if they show no visible permanent deformation.

Approval test: 3 groups of 3 packagings (Nos. 6 to 14) shall be tested in succession.

Control test: 1 group of 3 packagings (Nos. 6 to 8) shall be tested.

### 3.5 Free fall test (ISO standard 2248)

The loaded packaging shall be held over a flat, horizontal impact surface of sufficient mass to resist any displacement and sufficiently rigid to suffer no deformation during the tests.

The height of fall in centimetres is given by the formula:

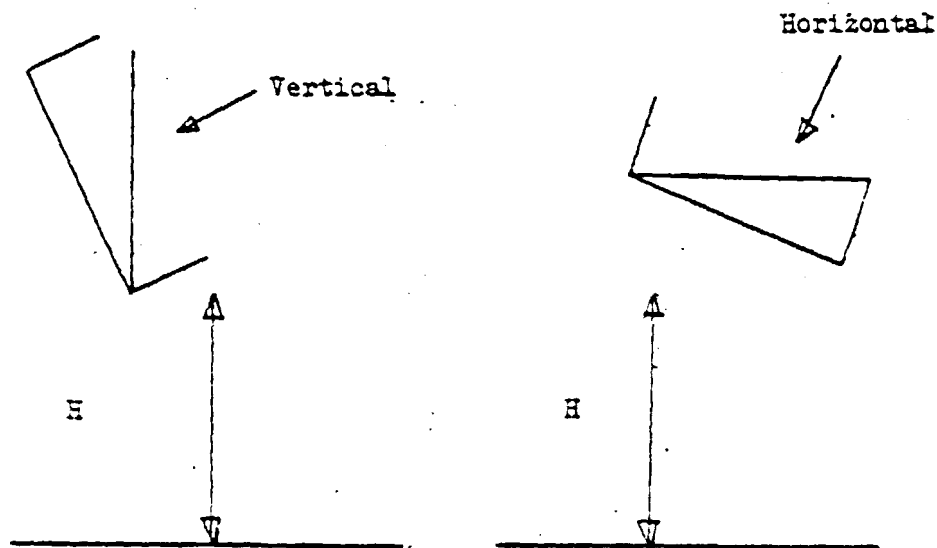
$$H = 70 - P$$

where:  $P$  is the weight of the full packaging in kilogrammes.

The number of falls shall be two per package, one fall on a bottom-end edge and the other on a bottom-side edge, the packagings being held as shown below:

Packaging with lid

Packaging without lid



The packaging shall be considered satisfactory if it shows no permanent visible deformation.

Approval test: 5 packagings (Nos. 15 to 19) shall be tested in succession.

Control test: 2 packagings (Nos. 9 and 10) shall be tested in succession.

4. Tests on constituent materials: absorption of water by paperboard (Jobb test)

The test shall be carried out by the method defined in International Standard ISO 535.

The time of test (clause 8.4 of this ISO Standard), and the times at which excess water is removed and at which blotting is carried out, are as follows:

Recommended time of test: 1800 seconds.

Symbol  $C_{180}$ .

Time at which excess water is removed: 1785 seconds.

Time at which blotting is carried out: 1800 seconds.

The test results shall be considered satisfactory if for each face the arithmetic mean of the weight increases does not exceed 150 grammes per  $m^2$ .

## XI. APPROVAL AND CONTROL

### 1. Approval certificate

In respect of every pre-approval check a certificate shall be made out which, in addition to stating the results of the aforesaid tests shall give a full description of the packaging (shape and dimensions), its closure, the material or materials of which it is made (morphological and technical specifications) and its internal fittings, if any, together with any other identifying features.

### 2. Control

Where samples of new packaging are taken at the place where the packaging is manufactured or where the produce is packed, the control operations shall be the same as those performed at approval, but they shall be performed on a smaller number of packagings.

Where samples of packagings are taken in the course of the distribution of foodstuffs, the control operations shall consist of an inspection to determine whether the packaging conforms to the characteristics stated in the approval certificate and whether it has actually been used in the manner prescribed in that certificate. The control operations should therefore be carried out in conjunction with the authority which made out the approval certificate. In respect of each control operation, a control certificate shall be made out.

## XII. MARKING

Every packaging shall be marked with:

The name or mark of the manufacturer or some other symbol identifying the manufacturer;

The group to which it belongs.

On receipt of the approval certificate, the competent authority of each country may authorize the packaging manufacturer to affix the corresponding stamp on packaging which strictly conforms to the specifications and other data given in the said certificate.

SYNOPTIC TABLE OF TESTS

Tests	Prior conditioning			Tests	Number of packagings tested	
	Wood	Paperboard	Plastic materials		Approval	Control
Compression	(Not applicable)	48 hours at $90 \pm 2\%$ (humidity) and $20^{\circ} \pm 2^{\circ}\text{C}$ (temperature)	Approval: 48 hours at $40^{\circ} \pm 2^{\circ}\text{C}$ Control: 48 hours at $40^{\circ} \pm 2^{\circ}\text{C}$	$F = 1.5 \left( \frac{H}{h} - 1 \right) P$	5, separately	5, separately
Vibration				Additional load $n = \left( \frac{220}{h} - 3 \right) P$ Amplitude: 9 mm horizontally 9 mm vertically Frequency: 4 hertz Duration: 2 x 10 mm	3 groups of 3	1 group of 3
Free fall				$H = 70 - P$ 2 falls per packaging <sup>a/</sup>	5 packagings <sup>b/</sup>	2 packagings
					Total 19 packagings <sup>c/</sup>	Total 10 packagings

<sup>a/</sup> For the free fall test for the approval of packagings including plastic materials, an additional series of tests shall be carried out with 5 packagings conditioned for 48 h at  $-10^{\circ}\text{C} \pm 2^{\circ}\text{C}$ .

<sup>b/</sup> 10 for packagings including plastics materials.

<sup>c/</sup> 24 for packagings including plastics materials.

