



Carefully to Carry

Carriage of cocoa



Cocoa beans

Cocoa beans are the dried seeds of the cocoa pod, which is the fruit of the cocoa tree grown in tropical regions of the world.

The cocoa bean is generally of a grey to dark brown appearance (external grey appearance not necessarily being indicative of inferior quality), the outer shell being brittle and the inner 'nib' being the important part of the cocoa bean. Cocoa beans emit an acidic odour (variable according to origin), the nib having the odour reminiscent of chocolate (of which it is an important constituent).

Cocoa beans are used primarily in the human food chain with alternative uses in cosmetics and, to a limited extent, in pharmaceuticals. The shell is normally discarded, being more or less valueless. The inner nib is used to produce cocoa butter, cocoa liquor, cocoa cake, cocoa powder.

It is generally accepted that a moisture content of maximum 7.5 per cent is indicative of stable cocoa beans.

Traditionally cocoa beans are packed into jute bags of 60 to 65 kg nett per bag and subject to sanitary certification prior to shipment. In view of the fact that cocoa beans and jute bags are an ideal medium for harbouring infestation, fumigation is frequently carried out prior to shipment.



Traditionally cocoa beans are packed into jute bags.

Ideally, cocoa beans should be shipped in well-ventilated conditions – particularly for transportation from the warm tropical producing areas to the invariably much colder destinations.

When shipped in traditional break bulk stowage, adequate ventilation in general should be allowed with ample dunnage and, in particular, bags should not be



"The carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried."

Hague Rules,
Articles iii, Rule 2

Carefully to Carry Advisory Committee

This report was produced by the Carefully to Carry Committee – the UK P&I Club's advisory committee on cargo matters. The aim of the Carefully to Carry Committee is to reduce claims through contemporaneous advice to the Club's Members through the most efficient means available.

The committee was established in 1961 and has produced many articles on cargoes that cause claims and other cargo related issues such as hold washing, cargo securing, and ventilation.

The quality of advice given has established Carefully to Carry as a key source of guidance for shipowners and ships' officers. In addition, the articles have frequently been the source of expertise in negotiations over the settlement of claims and have also been relied on in court hearings.

In 2002 all articles were revised and published in book form as well as on disk. All articles are also available to Members on the Club website. Visit the Carefully to Carry section in the Loss Prevention area of the Club website www.ukpandi.com for more information, or contact the Loss Prevention Department.

stowed directly in contact with the ship's side or bare steel-work and should be given adequate head space for ventilation. It is imperative that vessels used should have ventilation capable of a sufficient number of air changes per hour within the cargo holds.

The usual air changes recommended are between 10/20 changes per hour. The required ventilation of a Cocoa cargo requires a proper regime of ventilation to be drawn up and implemented based on external air temperatures, cargo temperatures, relative humidities with details recorded.

Respiration and post fermentation factors result in cocoa beans evolving carbon dioxide. Care should be taken when entering enclosed spaces.



Containers should be lined, preferably with rattan matting and/or kraft paper.

When shipped in containers it is preferable that fully ventilated/ super ventilated containers are employed, these containers preferably being lined with rattan matting, and/or kraft paper and bags being correctly stowed therein in order to allow ventilation.

The containers themselves should be subject to careful inspection to confirm their integrity and cleanliness, freedom from taint etc. However, neither shippers nor consignees can dictate to the carriers the stowage location of containers on board the carrying vessel – nevertheless, under-deck stowage within cargo holds which are well ventilated is the best which can be offered.

The use of bags of a moisture absorbing 'desiccant' material is commonplace within containers but, once saturated, they serve no further purpose.

When cocoa beans are shipped in non-ventilated or dry van containers there is no control over the ventilation of the contents.

Dry van containers are subject to condensation problems resulting from cargo being loaded in warm climates with temperatures of 25°C upwards and then shipped to colder climates in Northern Europe, USA etc. The main cocoa shipping season is during the European winter.

The mechanics of condensation forming in containers are well established and various attempts have been made to reduce the effects but with limited success.

It is frequently found, when cocoa beans are shipped with a higher than desirable moisture content, that the incidence

of condensation with resultant wetting and deterioration (mostly by way of mould to the cocoa beans) increases considerably.

It is customary that, during receiving bags of cocoa beans, any bags exhibiting external wet stains and/or external contamination are segregated by the receivers.

Bags which have become wet damaged may be externally stained and/or mouldy, and cocoa beans within wet bags may show signs of external bloom (white spotting) as a result of the wetting as well as subsequent mould growth development. In instances of heavy wetting the beans will become blocked together.

If the bags are found to be contaminated with foreign substances this should, wherever possible, be identified and/or analysed as to its likely properties, particularly as cocoa beans invariably are destined for use in the human food chain.

Cocoa beans from wet damaged bags can be subjected to a reconditioning operation (but only if acceptable to final receivers who, if they are food manufacturers, may be unwilling and/or unable to accept reconditioned cocoa), sound Cocoa Beans (skimmings) having a lower value for use in alternative (normally non-food) outlets.

Apart from standard containers, cocoa beans may also be shipped in open or flat-rack containers, or bolsters which are essentially containers without side walls or roof. The bags are stacked upon the base of these containers to which they are secured by means of lengths of timber, held in place by steel bands around the girth of the stow. This is an effective method of shipping cocoa beans in bags provided that:

- the bags are well stowed on the flat-rack
- the securing timber is clean and dry
- the securing steel bands do not cut into any bags
- bags do not overhang the base section of the container, and
- there are tarpaulin covers available at both the load-port and the dis-port which may be used to cover over the fully laden bolster or flat-rack container at times when rainfall is experienced.

Shipment of cocoa beans in bags on bolsters allows full all round ventilation, and therefore allows the dispersal of moisture (from the cocoa) and hence represents a well proven and effective method of shipment of cocoa beans in bags.

Bags which have become wet damaged may be externally stained and/or mouldy and cocoa beans within wet bags may show signs of white spotting and mould.



There has been a more recent development in the shipment of cocoa beans in bulk within the cargo holds of vessels/containers/barges (Bacoliners) The reason for shipment in bulk are primarily economic e.g. a standard 20 foot container can carry approximately 13 tonnes of cocoa beans in bags as opposed to approximately 18 tonnes in bulk.



Bulk shipment of cocoa beans - bulk containers are often plywood-lined.

In some instances a crust of mouldy cocoa beans forms on parts or all of the surface of the cargo, which if possible should be removed and segregated in order to maintain the good overall quality of the bulk.

Cocoa beans are shipped in bulk containers (which are often plywood-lined) these being non-ventilated containers - once again, in some instances, a crust forms on the top of the bulk. However, it is very difficult (more or less impossible) to separate the crust within the container and may have the effect of reducing the quality of the bulk overall when discharging.

Care must, therefore, be taken in discussing with consignees/receivers ways of solving the problem effectively. It is possible for some receivers to blend cocoa beans, therefore an allowance for depreciation can be negotiated in respect of bags which contain a percentage of damaged cocoa beans. If cocoa beans are destined for storage for sampling and sale to the 'Liffe Terminal Market' reconditioning is not permitted, i.e. the reconditioned sound cocoa beans will not be accepted on to the terminal market.

Damaged cocoa beans generally retain a good salvage value.

Cocoa butter

Cocoa butter in its pure prime pressed form is produced from cocoa beans by way of 'pressing' the inner nib of the cocoa beans. Cocoa butter, the most valuable product of cocoa beans, usually has a distinctive 'chocolate-like' odour and is of a cream colour, being customarily packed into blocks of 25 kg nett weight and packed within polythene-lined fibreboard cartons. Cocoa butter is normally shipped within containers in such packaging.

Cocoa butter will be susceptible to the effects of heating and will become soft and malleable at 30-32°C, and will melt at 32-35°C. Having become warm or molten, it can retain the latent heat and remain in such a condition down to as low as 17°C. Depending upon the structure of the constituent fats, the effect of heating cocoa butter is to raise

the FFA (free fatty acid) level which, in turn, affects the fat structure and thus the shelf life of the cocoa butter and also any product which it is used in the production of. If severe, it will cause rancidity of the cocoa butter. Upon heating, the cocoa butter will expand which may, in turn, cause it to burst the polyliner packaging of the cartons and seep out, thereby staining adjacent cartons.

The very nature of cocoa butter will allow it to retain the latent heat for a long period of time, thus aggravating the major extent of any damage or stain.

Bacteria will develop on the fat-stained cartoning and may well affect the cocoa butter, rendering it unacceptable to manufacturers (of human food chain products). If wet damage is sustained to cartons of cocoa butter and if the water is able to ingress into the blocks of cocoa butter within the inner poly packaging, it will cause the cocoa butter to discolour. Wetting of cocoa butter cartons can also result in microbial contamination of the cocoa butter, rendering it unfit for human consumption.

If cartons of cocoa butter are found to be infested, fumigation should not be carried out as the chemical residue will be absorbed by the butter and render it tainted and unfit for use in the human food chain. It is preferable to arrange for a careful stripping, examination and sorting of cartons and their contents according to degree of infestation if indeed it has entered into the blocks of cocoa butter.

Other grades of cocoa butter are frequently carried in a molten condition in heated tanks at a minimum temperature of 35°C, at which it remains liquid. This is normally carried in road tankers between producers and manufacturers and may, of course, be subject to claims for contamination and/or temperature abuse.

Shipments of liquid cocoa in bulk is made in vessels fitted with heated stainless steel tanks and usually carried at a maximum of 45°C. Ships tanks have to be inspected carefully before shipment to confirm their cleanliness and suitability for carriage of cocoa butter. Details of the vessels previous three cargoes should be established.

Similarly, receiving shore tanks need to be inspected.

Cocoa liquor

Cocoa liquor is similar in all respect to cocoa butter with the exception that it is a much harder product, having a lower fat content than cocoa butter and, therefore, being lower in value. It is otherwise subject to the same difficulties.

Cocoa powder

A product resulting from the ground cocoa cake, cocoa powder is customarily packed in multi-ply paper bags, which must be handled carefully in order to avoid tearing/loss of contents. Cocoa powder is more or less inert; however, if it becomes hot, it may smoulder or burn owing to the residual fat content of the powder.

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