FACT SHEET Number 01/2010    January 2010

INDUSTRY STANDARD FOR PACKING OF GRAIN IN CONTAINERS

INFORMATION FOR SHIPPING COMPANIES AND PACKERS OF CONTAINERS

The use of Containers for the carriage of grain is increasing rapidly and proving to be an effective means for exporting these commodities.

Improper packing of cargo into containers, without the use of proper blocking, bracing and securing may cause serious injury to personnel when these units are handled or transported. In addition costly damage may occur to the equipment. A number of people in the transport chain will be relying on the packer to ensure that the load is safe for handling and transport:

- Crew members of the ship (note the severe conditions that a ship is exposed to during the voyage)
- Stevedores and terminal staff at the port of loading and discharge
- Road and rail drivers and other workers involved in the transport
- Regulatory authorities, who may wish to inspect the contents.
- Unpackers of the unit

It is the responsibility of the packer and the exporter to ensure that the container to be packed is suitable for the carriage of the cargo and the cargo is packed in a manner adequate to withstand the risks of carriage. The Merchant shall indemnify the shipping company against all claims, losses, damages, fines and expenses arising or resulting from insufficiency of or defective condition of packing or marking, which results in any loss or damage to the cargo, the container, other cargo in the vicinity and damage to the vessel.

It is the responsibility of the packer and the exporter to ensure that all staff engaged in the process is appropriately trained to carryout the task.

It is the responsibility of the packer and the exporter to ensure that adequate precautions are taken in the packing of the container to arrest any problems that may arise due to the improper packing of the container which can result in the integrity of the containers being compromised because of distortion of the unit resulting in ‘bulging’ of the unit and spillage of contents through container doors. Container distortion has results in serious damage to ship’s cell guides and delays to vessel cargo operations. Improper preparation of containers has sometimes resulted in Occupational Health & Safety issues (e.g. bulkheads failing to hold the cargo in place when doors are open), directly affecting the health and safety of stevedores and unpackers. Cargo should be stowed and secured in such a manner so that it is presented in a condition that can be easily, efficiently discharged in a safe manner.

This standard has been developed to minimise the incidents which have led to numerous damages to containers packed with grain. It also deals with the use of Liners.
The heightened risks associated with heavy grain containers cannot be overemphasised. There have been numerous incidents where the improper loading of grain has resulted in the failure of container floors and doors. In the majority of cases 30 tonne rated 20’ containers are requested to pack grain. Allowing for the normal tare of a 20’ unit of 2.2 tonnes, standard contents would be up to and not exceeding 28T (total weight of a 30T rated unit can not by Australian regulation exceed 30.4T). As guidance, the height of a load of grain packed in a container should be in relation to the density of the cargo held within. It is recommended therefore that prior to loading a calculation of the optimum height of a load of grain should be carried out on the basis of the density of the cargo.

The density of the various forms of grain products varies from 500kg/m3 – 1000kg/m3 and as such weight rating of containers should be adequate for the carriage of the cargo presented for loading.

The standard measure for density of grain is Hectolitre weight or the number of kg per 100 litres.

The following is data on hectolitre weights of various commodities:
- 80 kg/100l is considered reasonably heavy for wheat. The heaviest load of wheat received into ABB Grain’s system throughout the 2008/09 harvest was 84.2kg/100l. The average was 79.1kg/100l.
- 70 kg/100l is considered reasonably heavy for barley. The heaviest load of barley received in ABB Grain’s system throughout the 2008/09 harvest was 74.2kg/100l. The average was 65.9kg/100l.
- Oats, Cottonseed and Malt are much lighter than barley.
- Chickpeas and other pulses are typically between barley and wheat.
- Lentils can be heavier than the above commodities.

To achieve the 28mt payload, the density of wheat would have to be higher than 84.9 kg/hl, which based on the density of the wheat delivered into ABB storage last year (84.2mt) appears to be unlikely.

The packer must ensure that the maximum gross weights indicated on the container and are not exceeded. State weight legislation must be strictly adhered to by the packer. The packer must also ensure that Container Weight Declarations as required by State legislation accompanies all containers.
Installation of a False Bulkhead

A false bulkhead must be installed when a container is used to pack grain. It is recommended that the bulkhead acts independently and should not be supported by the doors. Materials used in bulkheads are plywood, various types of fibre board and MDF. Though the ‘half or one door’ model is widely used, it provides no significant weight-bearing benefit to a ‘full or two door’ model – as shown in Figure 5. The actual thickness of the bulkhead should be adequate to withstand the rigours of carriage by all forms of transport during its journey from the packing shed to the place of delivery for unpacking. It is estimated that transport by rail may result in accelerations exceeding 4g. It cannot be overemphasised that the LHS door must be secured properly to reduce the movement of grain during transport, which has led to a number of instances of leakage.

Labelling of Containers

It is recommended that containers are appropriately labelled to make all those involved in the transport chain aware of the risk when opening the doors. It is recommended that a) it is noted that the commodity held within the container is of a bulk nature and b) it is noted that a bulkhead has been utilised (it is recommended that the label differentiates as to whether a full or half door model is used).

Sealing the LHS Door

As a means to ensure that both container doors are properly and correctly closed, it is recommended that a supplementary container seal is affixed to the closed LHS door prior to the commencement of the loading of the bulk commodity. The practice itself is a means to entail that the LHS door is properly secured thus confirming the packer has met their duty of care. At this time it is advised that there is no difference between using a strip or bolt seal as the aim of the process is to ensure only that the door is properly closed. It must be noted that sealing of the LHS door is in addition to the existing requirement for a seal on the RHS door.

Current practices

There are mainly four methods used for packing grain containers. There appears to be no association between the particular packing method and the geographical area.

Method 1 (Horizontal Load)

Container preparation – LHS door is closed and a false bulkhead fitted inside, being affixed to the door (but not supported by the door). It is also important to place a label on the door if a half bulkhead is fitted.

Loading – Method for packing involves having the container in an upright position while feeding the product into the unit with the use of a conveyor belt or funnel shoot.

Overall process takes between 10 - 25 minutes.
Figures 4, 5 & 6 showing container prepared with bulkhead for loading through horizontal load.

Figure 7 showing loading in progress

Figures 8, 9 & 10 showing loaded containers

This method of loading is highly recommended not only for the safety of staff engaged in loading operations but also to reduce the incidence of damage to containers. Containers are not put at risk and there is little chance of ‘leakage’ (notwithstanding container impact). The incidents of damage to containers is minimised to a great extent. The packer must ensure that the weight is evenly distributed along the whole surface area of the container.

**Method 2 (Tilt Load)**

Container preparation – Left Hand Side (LHS) door is closed and a false bulkhead is fitted inside, being affixed to the door (but not supported by the door). It is also important to place a label on the door if a half bulkhead is fitted.
Loading – Method for packing involved tilting the container to a 45° angle with the grain product loaded and distributed through an overhead funnel. On completion, container is returned to upright position. It is critical that every precaution is taken to ensure that there is no undue force on the front wall. It is possible that the front wall load may exceed 0.4 x payload during loading. Overall process takes between 7 – 10 minutes.

This can be an alternative to method 1 above. The packer must ensure that the weight is evenly distributed along the whole surface area of the container.

**Method 3 (Vertical Load)**

Container preparation – LHS door is closed. A false bulkhead is still fitted on the RHS door before loading.

Loading – Method for packing involves inverting the container to an upright position with the grain product loaded and distributed through an overhead funnel. On completion, container is returned to an upright position. The packer must ensure that the weight is evenly distributed along the whole surface area of the container.

Overall process takes between 7 – 10 minutes.
This method can place an unnecessary strain upon the front wall of the container and is likely to cause damage to the container unless the front wall is properly supported during the loading process. Some shippers have a secondary ‘ram plate’, which supports and lifts the base of the container during and after loading fitted to the ‘inverter’. This framework is designed to support the inverted container, thereby reducing the strain placed on the front wall of the container. It is strongly recommended that if this loading method is used then a false bulkhead is used in the packing process.

**Method 4 (Roll Load)**

Container preparation – LHS door is closed. No false bulkhead is fitted.

Loading – Method for packing involves turning the container onto its LHS. The closed LHS door subsequently takes the role of the false bulkhead. Grain product is feed into the unit with the use of a conveyor belt or funnel shoot.

Overall process takes between 10 – 25 minutes.

Note that though this method for packing has been listed above, there was no actual packer who confirmed they used this method onsite. Although it is believed that this practice is used in Australia.

This places an unnecessary strain upon the LHS wall of the unit and is likely to cause considerable damage to the unit. At no time **MUST** method 4 be used to pack grain containers.

**Use of Liners**

There have been approaches made to Australian Quarantine and Inspection Service (AQIS) by various interested parties to use Liners as an inexpensive way to upgrade a basic General Purpose (GP) containers to the standard required for food and grain, thereby avoiding the costly exercise of bringing containers to a “Food Quality Standard”.

AQIS has issued the attached directives (Annex 1 and annex 2) on containers used for exporting grain and plant products.

AQIS inspection procedures are designed to make sure containers meet legislative requirements, and that Australia’s reputation as a producer and exporter of clean, pest and disease free products is maintained.
AQIS administers the *Export Control (Plants and Plant Products) Orders 2005* — the Plant Orders — which set out explicit requirements for the inspection and treatment of container system units.

The Plant Orders mandate two types of inspection for containers:

- for grains and plant products for consumption, AQIS inspects the container system unit for insects and other pests, for residues that could provide a food supply or shelter for pest infestations, and for contaminants and other conditions that could affect the goods in the container

- for grains and plant products that aren’t intended for consumption, AQIS inspects container units to ensure there are no pests or residues that could harbour pests, or other conditions that could permit cross infestation.

The Plant Orders currently regulate both phytosanitary and quality conditions relating to containers. A container will be rejected if any of the following conditions are detected:

- one or more live pests in residues or on the interior or exterior structure of the container
- one or more live rodents, or evidence of rodents behind linings
- any residue that could be infested by pests
- structural damage that could enable pests to enter the container after loading
- non-infestible materials, odour, water, rodent carcases or droppings in containers to load grain.

These are the requirements for export containers carrying grains and plant products.

Please also refer to the AQIS Industry Advice Notice no. 2004/15: Standards for Food Quality Shipping Containers issued on 29 July 2004, AQIS endorsed the updated version 'Pink Book', the Standards for Food Quality Shipping Containers produced by Shipping Australia Limited. AQIS advised all that the updated PDF version and not the Pink Book should be used as the general guide and reference for standards for food quality shipping containers from that date. Companies that were operating Co-regulation Arrangements for empty (dry box) container inspections were asked to ensure that their accredited inspectors have access to and are using the updated PDF version (printed in colour) by the time of the next AQIS audit of their arrangement. The Standards for Food Quality Shipping Containers is available on the SAL and ACCC websites.

One option for shippers wishing to ensure that their cargo is satisfactorily packed and protected is the use of full or partial disposable liners. In some cases, these liners are an economical and acceptable alternative to carrying out maintenance such as painting, floor sanding or stain treatment.

It must be borne in mind that some consignees in importing countries are opposed to the use of any Liners as disposal becomes costly and it is not an environmentally sound practice.

AQIS inspectors will accept linings on condition that the normal standards set for the carriage of the prescribed goods are met, and that the liner is not being used to mask normally unacceptable features.

Linings are generally acceptable for stained floors, as they provide protection, prevent transference of stains, and avoid costly floor sanding and other treatments, which in many cases are expensive, and often only a cosmetic enhancement.
Acceptable lining materials include:

- Composite water resistant paper
- Polyethylene film
- Cardboard, Plywood and unbroken Particle Board.
- Foils

It is important to note that when the commodity is in direct contact with the lining, the lining must comply with Australian Standards AS 2070 and AS 2171 - 1992.

Containers must meet the required standards ‘PRIOR’ to the fitting of any Liner. Liners fitted before inspection will be moved to ensure that they do not conceal unacceptable features, in particular pests and infestible residues, or damage allowing the entry of pests. Although the AQIS Industry Notice states that “The correct and appropriate use of a liner may overcome superficial problems such as flaky paint...” with internal flaky paint, the liner is an effective barrier in transit. However, a liner full of grain rubbing against the flaky paint on the wall of a container will result in the customer tipping the flaky paint out with the goods at the destination, which may be detrimental to the quality of the goods.

Unnecessary time wastage and expense would be avoided if the containers are inspected prior to the fitting of liners and/or their associated fastening devices.

The following containers should be acceptable for carriage of grain without taking any further remedial action in the preparation of the container.

Fig 18 - Interior panels gauged, non-transferable rusty stains.
Fig 19 - Interior panels gauged, non-transferable rusty stains.
Fig 20 - Interior panels gauged, non-transferable rusty stains.

Fig 21 - Interior panels gauged, non-transferable rusty stains.
Fig 22 - Floor and wall marked with, non-transferable rust and oil stains.
Fig 23 - Burnt paint non-transferable.
Fig 24 - Wall with non-transferable stains.
Fig 25 - Floor and wall marked with, non-transferable rust and oil stains.
Fig 26 - NOT ACCEPTABLE - Splinters and debris – remove debris, sand down rough edges and make prepare surface smooth.
INDUSTRY ADVICE NOTE 1999/8
CONTAINER LINERS AND EMPTY CONTAINER INSPECTION

Many areas are experiencing a shortage of ‘grain grade’ shipping containers. To address this problem the Grains Program have, at the request of industry, recently assessed the use of liners to upgrade containers.

Such containers must pass a “P” Plant product level inspection. *The correct and appropriate use of a liner may overcome superficial problems such as flaky paint,* light rust, transferable stains but not odour.

The liners we have been requested to assess fall into two categories, pre-fabricated cardboard liners and bladder style woven polypropylene liners.

**Pre-fabricated liners:**
The liners are considered suitable if correctly installed. The liner needs to be assembled progressively with loading, therefore correct installation needs to be monitored to ensure the liner effectively negates defects such as oil, rust and flaking paint. As the liner is constructed progressively it is suitable only for bagged products.

**Bladder style woven liners:**
The liners may be installed at the time of inspection, the container may be sealed and loaded at a later date with bulk commodities. Please note that woven liners have a limited capacity to prevent transfer of moisture, hence they may be considered an effective barrier for light oil stains only. All accredited empty container inspectors are authorised to upgrade a container from Plant grade to Prescribed grain grade, the upgrade should be reflected accordingly on the Empty Container Inspection Record, in the comments column. After the appropriate liner is fitted the Declaration of Inspection (DOI) issued by the accredited inspector should state that the container meets the ‘G’, Prescribed grain standard.

Please bear in mind that the container should still be inspected in accordance with Empty Container Inspection checklist and that once installed the fully lined container must meet all criteria for transport of prescribed goods.

Mike Robbins
Program Manager
Grains Program Section
Animals and Plant Programs Branch
Contact Officer: Fiona Macbeth
Telephone: (02) 6272 4154
LEGISLATIVE REQUIREMENTS FOR CONTAINERS USED FOR EXPORTING GRAIN AND PLANT PRODUCTS

The Australian Government, through the Australian Quarantine and Inspection Service (AQIS), regulates the export of grain and plant products. AQIS certifies that grain and plant product exports, meet both domestic export legislation and importing country phytosanitary requirements.

A key element of this process includes the inspection of the transport unit in which the goods are to be exported in.

The Export Control (Plants and Plant Products) Orders 2005 (Plant Orders) are administered by AQIS, and they set out the requirements for the inspection and treatment of container system units.

There are two levels of inspection required, and this is dependent on the end use of the commodity being exported.

1. For prescribed grain and prescribed goods for consumption – the container system unit must be inspected for pests, infestible residues, contaminants and other conditions that could affect the goods;

2. In any other case – the container system unit must be inspected to ensure that there are no pests, or residues that could harbour pests, or conditions, which could permit cross infestation.

The Plant Orders state that if any of the following conditions are found during the inspection of the container system until then it must be rejected:

a. one or more live pests in residues or on the structure of the container, inside or out.

b. one or more live rodents, or evidence of rodents harbouring behind linings.

c. any residue infestible by pests

d. structural damage such that pests could enter after loading

e. non-infestible materials, odour, water, rodent carcasses or rodent droppings in containers to load grain.

The Use of Liners

The use of liners by exporters outside this requirement is a commercial matter between the relevant commercial parties. There is no requirement in the Plant Orders for AQIS to approve container liners and there are no provision prohibiting their use as long as the requirements of the Orders have been met.

The Concept of Food Grade Containers

The Plant Orders do not mandate the use of “food grade containers”. It would appear that the concept has evolved over time. This is an industry concept not a legislative requirement.