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Container carriage

A selection of articles previously published by Gard AS

Contents

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Introduction

This booklet contains a collection of loss prevention material relating to the carriage of containers, which has been published by Gard over the years.

Container cargo claims account for a large proportion of all cargo claims, both in terms of frequency and cost. This booklet contains material with numerous examples of incidents resulting in large container cargo claims.

The following ten points serve as a reminder of what should assist in avoiding container claims and the accompanying liability.

1. The contractual carrier, who will often face liability to cargo interests in the first instance, needs to be satisfied that the operations of sub-contractors, e.g terminals, and performing carriers, e.g feeder vessels, are of an acceptable standard. Contractual terms also need to ensure that ultimate liability falls on the responsible party. To meet those liabilities, the contractual carrier also needs to be satisfied that sub-contractors and performing carriers have an acceptable financial standing and that their liabilities are covered by a financially sound insurance company.

2. The contractual carrier often provides the cargo interests with the container itself. Clearly, the container should be fit for its purpose and in good condition. Cargo care systems, such as refrigeration systems, should be in good working order. There should be a system in place for checking containers before they are used (e.g. pre-trip inspection) and for dealing with containers that suffer problems during the carriage. Contractual duties can be placed on performing carriers, such as dealing with a breakdown of a container's refrigeration system. More detailed instructions can be issued separately.

3. If the shipper uses his own container, the contractual carrier should have a system in place for spotting unfit containers. Similarly, if the shipper stuffs the container himself, there should be a system in place for spot checks on container weights. Suspected fraud and/or breaches of safety, including the misdeclaration of the contents of the containers (particularly where undeclared dangerous goods are shipped), should be taken seriously and contractual carriers are encouraged to share information on "rogue" shippers with other carriers. The securing of contents within the container is often found to be lacking and the contractual carrier should be prepared to work with shippers to ensure that securing arrangements can adequately withstand the typical forces encountered during the carriage.

4. Shippers' carriage instructions, eg set point temperature, should be checked and cross-referenced. Ambiguous instructions should be clarified. Carriers should ensure that instructions can be complied with in practice. Instructions also need to be properly communicated to sub-contractors and performing carriers.

5. It is in both the contractual and performing carriers' interests to ensure that containers are properly stowed, taking into account limiting weights, such as tier and stack weights. In general terms, heavy containers in the upper tiers should be avoided.

6. Dangerous goods deserve special mention. Both the contractual and performing carriers need to be satisfied that dangerous goods are properly declared and documented and that containers are properly labeled. Reference should be made to the IMDG code. Amongst other things, dangerous goods have specific stowage/segregation requirements and it is very important that these are adhered to.

7. The securing of containers on board should be checked before departure. Securing arrangements on vessels not purpose built for containers deserve particular attention. Reference should be made to the cargo securing manual. The securing equipment used on board should be of the same type/design. This is particularly relevant to twistlocks, where the locking position can differ depending on type/design. A system should also be in place for checking that securing equipment is maintained in good order and condition. Records are required to be kept in the Cargo Securing Manual.

8. The vessel's courses and speeds should be adjusted to minimise the forces on the container stows/securing arrangements. Weather forecasts should be checked before and regularly during the voyage. The vessel may also be able to adjust it's stability so as to avoid excessive rolling.

9. Other checks, documentation and records. Containers should be fitted with security seals and a system should be in place to check the status of the seal and the seal number each time the container is handled. Documentation issued by the carrier needs to be checked to ensure that it is accurate and that details are consistent throughout. Proper records need to be kept for all checks. Contractual obligations can be placed on performing carriers to provide their documentation/records to contractual carriers.

10. If an incident does occur, a Gard office and/or the local correspondent should be contacted to assist.

Expanded commentary on the above points can be found in the material enclosed in this booklet. So please read on and challenge your operation to improved container claims record.

New cargo reporting requirements in the US

Gard News 198,
May/July 2010

Vessel operating ocean carriers are now required to submit two additional data elements to the US Customs and Border Protection for all containerised shipments to the US.

As of 26th January 2010, the US Customs and Border Protection (CBP) is enforcing new cargo reporting requirements for importers and vessel operating ocean carriers who are transporting cargo to the US. This rule is known as both the Importer Security Filing (ISF) and 10+2. 10+2 is shorthand for the number of advance data elements CBP is requiring be submitted. This article will concentrate on the "+2" aspect of the rule, as those two requirements apply to carriers.1 However, it should be noted that carriers may, in certain instances, also be considered importers and required to file ISFs2 for containerised cargo, bulk and break-bulk shipments including Ro-Ro shipments, and cruise vessels that are required to file cargo declarations.3

Under the new reporting requirements, vessel operating ocean carriers are required to electronically submit two additional data elements to the CBP for all containerised ocean vessel shipments loaded in TEUs, FEUs, reefers and ISO tanks inbound to the US: Vessel Stow Plan (VSP) and Container Status Messages (CSM). The purpose is to better assess and identify high-risk shipments to prevent terrorist weapons and materials from entering the US.

The following are exempt from the carrier's +2 reporting requirements: (1) bulk and break-bulk carriers including ro-ro carriers that are exclusively carrying bulk and break-bulk cargo and (2) carriers of goods (including containerised cargo) arriving by vessel into Canada or Mexico and afterwards trucked or railed into the US.

Vessel Stow Plan
A VSP (also known as BAPLIE, which stands for bay plan/stowage plan occupied and empty locations message) will be used to transmit information about the physical location of cargo, in particular dangerous goods and other high-risk containerised cargo, loaded aboard the vessel for the US. The CBP will use the VSP information to compare with the containers listed on the vessel's manifest in an effort to identify un-manifested containers. The carrier must transmit the VSP for vessels transporting containers no later than 48 hours after the carrier departs from the last foreign port. For voyages of less than 48 hours, the information must be transmitted prior to the vessel's arrival at the first port in the US. The VSP must be transmitted via Automated Manifest System (AMS), a secure file transfer protocol (sFTP), or e-mail. The VSP must include the following information:

With regard to the vessel:
- Vessel name (including IMO number)
- Vessel operator
- Voyage number

With regard to the container:
- Container operator
- Equipment number
- Equipment size and type
- Stow position
- Hazmat code (if applicable)
- Port of loading
- Port of discharge

According to the CBP, the vessel operating carrier, not the non-vessel operating carrier (NVOC), is responsible for filing the VSP. The carrier must submit accurate and timely plans for containerised cargo and submit new and accurate VSPs immediately upon discovering any inaccuracies. For bulk and break-bulk carriers shipping part container cargo, the CBP requires the carrier to submit a VSP for all the containerised cargo aboard the vessel.

Container Status Messages
CSM report container movement and changes in status (e.g., full or empty). If a carrier is currently creating or collecting CSM in an internal equipment tracking system, that carrier must submit CSM daily to CBP regarding certain events relating to all containers destined to arrive within the limits of a port in the US by vessel. Carriers are not required to create or collect any CSM data other than what the carrier already internally creates or collects. If a carrier does not have an internal tracking system, then the CBP does not require carriers to create or collect CSM information. The carrier must electronically transmit the information via a CBP-approved sFTP no later than 24 hours after messages are entered in the carrier's system.
The following are events for which CSM are required:
- Booking confirmation
- Terminal gate inspection
- Container arrives at/departs from a facility or terminal port
- Loaded or discharged during transport (includes ship, barge, rail or truck movement)
- Vessel arrives at/departs from a port
- Intra-terminal movement
- Order from container loading or discharge
- Confirmation after completed loading or discharge
- Container being taken out of circulation for repairs

arriers may transmit their "global" CSM, including CSM relating to containers that do not contain cargo which will enter the US and CSM relating to events other than those required. By doing this, a carrier authorises CBP to access and use that data. For each CSM submitted by the carrier, the following information must be included:
- Event code being reported, as defined in the American National Standards Institute (ANSI) X.12 or the United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport (UN EDIFACT)
- Container number
- Date and time of the event being reported
- Status of the container (empty or full)
- Location where the event took place
- Vessel identification associated with the message if the container is associated with a specific vessel

As with the VSP, the CBP requires the vessel operating carrier, not the NVOC, to submit CSM.

Violations
The CBP will impose fines of at least USD 5,000 per violation with a maximum fine of USD 100,000. The fine level will depend on whether violations are in connection with international consignments with a final destination in the US, whether the goods are in transit

through the US, or whether the advance information has not been submitted on time, is insufficient or incorrectly reported on the VSP or CSM.

Further information concerning the new requirements can be obtained from the CBP website at www.cbp.gov/xp/cgov/trade/cargo_security/carriers/security_filing/.

Footnotes
1 Gard has recently issued Loss Prevention Circular No. 03-10, "US Customs regulations Importer Security Filings and Additional Carrier Requirements" on these reporting requirements. This article provides a more in-depth look at the specific requirements for carriers, while the circular is a more general overview of the Rule as it applies to both importers and carriers.
2 See Federal Register, Vol. 73, No. 228. 25th November 2008. pp 71731-71733. For certain limited purposes, the carrier may be treated as an importer; for example, with respect to foreign cargo remaining on board (FROB)and be required to submit information concerning five of the 10 importer data elements to CBP prior to the cargo being laden aboard a vessel destined for the US. The five data elements that must be submitted are (1) booking company, (2) foreign port of discharge, (3) pace of delivery, (4) ship to name and address, and (5) commodity HTSUS number.
3 Tankers are also exempt from filing ISFs, as they are considered outside the scope of the rule.

	Existing requirements	New requirements	
Requirements	Advance cargo information (i.e., Trade Act Requirements or 24 Hour Rule)	Vessel Stow Plan	Container Status Messages
Timing	24 hours prior to loading	48 hours after departure; prior to arrival for voyages of less than 48 hours	24 hours after the message is entered into carrier's equipment tracking system
Submission method	essel AMS	essel AMS, sFTP, or e-mail	sFTP
Elements	- Bill of lading number - Foreign port before vessel departs for US - Carrier SCAC - Carrier assigned voyage number - Date of arrival at first US port - Quantity - Unit of measure of quantity - First foreign place of receipt - Commodity description (or six digit HTSUS number) - Commodity weight - Shipper name and address - Consignee name and address or IS number - Vessel name - Vessel flag - Vessel IMO number - Foreign port of loading - Hazmat code - Container number - Seal number - Date of departure from foreign port - Time of departure from foreign port	With regard to the vessel: - Vessel name - Vessel IMO number - Vessel operator - Voyage number With regard to each container: - Container operator - Equipment number - Equipment size and type - Stow position - Hazmat code (if applicable) - Port of loading - Port of discharge	- Event code reported, as defined in ANSI X.12 or UN EDIFACT - Container number - Date and time of the event being reported - Status of the container (empty or full) - Location where the event took place - Vessel identification associated with the messages if the container is associated with a specific vessel

New guidance for stuffing containers

Gard News 197
February/April 2010

The International Chamber of Shipping (ICS) and the World Shipping Council (WSC) have published new industry guidance for shippers and container stuffers concerning the safe transport of containers by sea.

Much has been written recently, both in Gard News and other publications, about the importance of properly and correctly stuffing containers and accurately declaring the contents, and of the risk of loss and damage to people, the environment and property if this is not done. Gard has direct experience of a major casualty caused by a shipper's failure to accurately describe to the carrier the nature of goods loaded in a container.1

One other example may stand for many. In September 2007, the UK Marine Accident Investigation Branch (MAIB) published its report into the collapse, on the laden passage of a short-sea container vessel, of a stack of seven 30-foot containers, the top three of which contained dangerous cargo. The synopsis of the report2 noted that the cause of the collapse was the fact that the maximum allowable stack weight had been exceeded, with some of the individual containers exceeding their declared weights.

The MAIB made a number of comments and recommendations as to the need for better cargo planning operations and clearer communication between the relevant parties. In particular, it recommended the International Chamber of Shipping (ICS) to "work with industry to develop, then promote adherence to, a best practice safety code".

Together with the World Shipping Council (WSC), the ICS has done just that. This guidance, "Safe Transport of Containers by Sea - Industry Guidance for Shippers and Container Stuffers", is also supported by the Global Shippers' Forum. The guidance is extracted from "Safe Transport of Containers by Sea - Guidelines on Best Practices", which was published by ICS and WSC late last year.

The "Industry Guidance for Shippers and Container Stuffers" is being distributed free of charge throughout the shipping industry and can be downloaded from www.marisec.org/containers. The guidance is short (eight pages, of which six are text) and is sub-divided into sections covering, for example, "Checking the Container" and "Safety and Securing". Section 4, entitled "General Stowage", is one of the most important; it identifies the need for uniform stowage and covers the way in which different types of goods, e.g., bagged cargo, drums and barrels and bulk liquids, should be stowed and secured.

Although the guidelines are not legally binding, it is hoped that they will be followed by shippers and carriers world-wide. Owners and operators are recommended to use this guidance when receiving bookings from shippers.

Footnotes

1 See the article "English law - has justice finally been done on the calcium hypochlorite cases?" in Gard News issue No. 196.

2 The synopsis of the report can be found at www.maib.gov.uk/cms_resources.cfm?file=/Annabella_Synopsis.pdf.

English law - Has justice finally been done on the calcium hypochlorite cases?

Gard News 196,
November 2009/January 2010

By Rory Butler and Julian Clark, Holman, Fenwick & Willan, London.

English High Court considers shipper's liability for dangerous goods in a case involving carriage of calcium hypochlorite in its dry form.

The High Court has recently issued a potentially far-reaching judgment in the first substantive English decision concerning the dry form of calcium hypochlorite (classified as UN1748).[1] Calcium hypochlorite is a cargo which has been linked to a number of serious casualties that occurred in the late 1990s, including the CMA DJAKARTA, DG HARMONY and CONTSHIP FRANCE, although these cases all involved calcium hypochlorite in its hydrated form (UN2880).[2]

The case concerned a major fire and explosion on board the container ship ACONCAGUA (entered with Gard on behalf of the charterer/carrier) on 30th December 1998, resulting in extensive damage to vessel and cargo on board. The source of the explosion was immediately identified to be a container loaded with 334 kegs (plastic drums, known as quadritainers) of calcium hypochlorite (declared to be UN1748), shipped by a major Far Eastern shipper. Mr Justice Clarke found the shipper liable to the carrier under the bill of lading contract for shipping dangerous goods in breach of Article IV(6) of the Hague Rules, with an initial judgment amount in the sum of USD 27.75 million, and further extensive quantum issues still to be dealt with.

The issues

The judgment, which runs to over 100 pages and is highly technical from an expert evidence viewpoint, contains useful guidance on the interpretation of the IMDG Code, on the legal test to be applied in dangerous goods cases, the burden of proof, unseaworthiness, the carrier's defences and guidance on expert evidence in complex cases. In summary, the case dealt with the following four issues:

(a) What characteristics should a prudent carrier have expected of goods declared as UN1748 in 1998?
(b) Did the calcium hypochlorite actually shipped have such characteristics, or did it have abnormal characteristics which rendered it more dangerous than was to be anticipated?
(c) Was the explosion and resultant damage the result of such abnormal characteristics or of the stowage of the container on top of a bunker tank that was heated, or both? (the container was placed on top of and next to a heated bunker tank. The carrier admitted that the stowage of the cargo was in breach of the IMDG Code requirement that calcium hypochlorite be stowed "away from" sources of heat.); and
(d) what is the legal consequence where bunker heating is found to be either the or a cause of the incident?

The ACONCAGUA: the entirety of the cargo was destroyed by the initial fire and explosion.

The answers developed by the court will have application in other dangerous goods cases.

Issue (a) - Critical Ambient Temperature (CAT) and UN1748

In considering causation, it was first necessary to investigate the self-heating properties of calcium hypochlorite and its Critical Ambient Temperature, or CAT. The judgment notes that a CAT of a product is the ambient temperature at or above which thermal runaway or ignition will occur and below which only sub-critical heating will occur (with the key to the time to ignition being how far above the CAT the ambient temperature is and for how long).

The court considered the history of UN1748, including the previous incidents, and detailed academic papers. The submission that a prudent carrier would, in 1998, have known a CAT as low as 40° C could be expected if calcium hypochlorite was containerised (larger bodies of material including a container of kegs have a lower CAT than a single keg) was rejected, as was a suggestion that a carrier could be expected to be aware of the details of and information contained within a body of complex academic literature.

It was held that while the permitted moisture content of UN1748 was up to 5.5 per cent, and not 1 per cent as previously suggested, (the IMDG Code is arguably not clear in this regard and the judgment contains useful guidelines for future disputes), the lowest CAT a prudent carrier would have in mind would be 60° C, which was the warning given in the then edition of the IMDG Code and that a carrier should assume that it was safe to carry the product in containers on or under deck (where it should be stowed away from sources of heat), as such temperatures would not normally be exceeded on container ships.

Issue (b) - The actual characteristics of the product

One of the difficulties of the case was that the entirety of the subject cargo was destroyed by the initial fire and explosion and it proved very difficult for all parties involved to access other material from the same source following the casualty. During the trial the shipper adduced little evidence as to the characteristics of the product shipped but did confirm the identity of the factory that had originally manufactured the product. Fortunately for the carrier their main expert had managed to obtain and test samples of the product from that same factory after the incident. These tests revealed that the product had an unusually low CAT and behaved in an inconsistent manner when heated. Mr Justice Clarke found that this suggested poor quality control, but said that since there was no direct information as to what was actually shipped it was necessary to look at what occurred on the voyage to determine the characteristics of what had actually been carried. He accepted the approach suggested by the carrier, namely to see if normal UN1748 would have withstood the temperature regime in the hold of the ACONCAGUA. If the answer to that question was "yes", then the fact of the explosion would itself indicate that the material shipped had abnormal characteristics.

It was therefore necessary to determine what effect heating of the bunker tank had on the container in question.

Issue (c) - Bunker heating

The evidence of the crew as to the duration and temperature of the bunker heating, together with expert evidence as to the effect this actually had on the container was considered closely by the court. The finding was that even an unheated hold could have reached temperatures in the mid 30° Cs and above, and that there was little or no appreciable difference between the temperature the container experienced due to heating of the bunker tank below/next to it and in the same position without such heating (with other bunker tanks in the hold being heated to the same extent).

The carrier's main expert produced models to show the probable back calculated CAT of the material shipped based on the probable temperature regime on board the vessel. This showed that to explode in the time that it did (a known parameter) the material must have had an unusually low CAT, somewhere in the region mid to high 20° Cs or low 30° Cs.

Accordingly, the court held that normal UN1748 should not have exploded if subjected to such temperatures and that this itself implied that the material actually shipped was rogue material. The CAT was also abnormally low and as such the cargo was of a dangerous nature of which the carrier neither had, nor ought to have had knowledge. The carrier had not knowingly consented to the shipment of such cargo. The explosion was not therefore the result of bunker heating but of the characteristics of the cargo itself.

Issue (d) - What if heating was "a" cause?

Having found that the cargo shipped was dangerous, the court then had to consider if the admitted negligent stowage had a causative effect and the effect of possible competing causes (for example if the cargo had been stowed "away from" heat would it still have exploded?). The court was faced with three further issues as follows;
(i) the burden of proof in this regard;
(ii) the seaworthiness obligation under Article III(1)(a) of the Hague Rules; and finally,
(iii) the Article IV(2)(a) defence of an "Act, neglect or default of the master, mariner, pilot, or the servants of the carrier in the navigation or in the management of the ship".

Significantly, the case decides that it is for a shipper to establish that a particular stowage arrangement has some causative effect once the carrier has established that the goods are dangerous. On the facts of this case the shipper had failed to meet this burden. Also of significance is the finding that in any event a carrier in such circumstances as those in this case will not be in breach of its seaworthiness obligation. Referencing Steel v The State Line Steamship Company,[3] Mr Justice Clarke held that a vessel is not unseaworthy merely because at the commencement of the voyage there is something which may need a correction, so long as such a correction can readily be made and the need for the same has not been hidden. In the current case he held the ACONCAGUA was only in danger if the bunker tank had been heated. On the facts of the case the crew had not needed to use the bunker tank next to the container and could have used alternative tanks. To heat the tank was negligence on the part of the crew but did not amount to unseaworthiness. Given that the vessel was seaworthy, the carrier was able to rely on the Article IV(2)(a) defence to defeat any breach of Article III(2) ("properly and carefully to keep, care for and carry"). Bunker heating was clearly an act in the management of the ship. Therefore, even if the heating had been causative, the carrier would still be entitled to an indemnity under Article IV(6).

Expert evidence

The decision sets out some useful guidance on the correct approach to expert evidence at Appendix 3 of the judgment. The court criticised the volume of expert evidence submitted and suggested that this may have been a case whereby some form of preliminary "tutorial" would have been of assistance, as contemplated by the Long Trials Working Party Report.

Summary

The case is interesting in that it illustrates the dangers of UN1748 which if not subject to rigorous quality control in terms of raw materials and manufacture may have a very low CAT of well below normal carriage temperatures.

The case also demonstrates the considerable exposure that a shipper of goods may have (in this case the shippers did not manufacture the goods themselves). The burden of proof will be on the shipper once the carrier establishes dangerous goods were shipped. Further, it demonstrates that potential unseaworthiness, for example bunker heating where a heat-sensitive cargo is involved, may not amount to unseaworthiness where the crew could remedy the problem after the commencement of the voyage and that, in any event, the carrier may rely on the Article IV(2)(a) defence providing the vessel is seaworthy to defeat any breach of Article III(2).

The decision is one which shippers of dangerous goods (and their insurers), shipowners and charterers carrying UN1748 or other similar heat sensitive, self-heating dangerous goods should read carefully.

At the time of going to press an application by shippers for leave to appeal to the Court of Appeal was pending. Readers will be kept informed in case leave is granted and an appeal filed.

Footnotes
1 CSAV v. Sinochem Tianjin Limited [2009] EWHC 1880 (Comm).
2 See articles "The CMA DJAKARTA case settles" in Gard News issue No. 183, and "US law - Carriage of calcium hypochlorite - The DG HARMONY on appeal" in Gard News issue No. 191.
3 [1877] 3 A.C. 72.

Carriage of liquids in flexi-tanks

Gard News 186,
May/July 2007

There are many types of containers in use today, purpose-built for quick and efficient handling and stowage, and for easy exchange between transport modes. The latest newcomer is the so-called "flexi-tank".

Essentially, a flexi-tank is a flexible bag which is placed inside a dry freight container and thereafter filled with liquid cargo. Transport of liquids in flexi-tanks is becoming a regular alternative to tank containers and to drums and canisters also placed in dry freight containers. Gard has experienced quite a few claims already due to leakages from such flexi-tanks, involving both cargo losses and expensive clean-up operations.

The flexi-tank

Flexi-tanks are made of nylon, rubber, plastic or polyethylene, a flexible "inflatable" bag type, which is rolled out inside a conventional 20-foot dry freight container, before being filled with the liquid cargo through a valve opening either on top or at the bottom end at the dry freight container door. In compressed, empty condition the flexi-tank itself will occupy only a volume of 250 litres, but in loaded condition may contain as much as 24,000 litres of liquid, depending on the specific gravity of the liquid. The use of flexi-tanks started around 2003, the initial use being the transportation of various edible oils and wines from South America.

There are several different types of flexi-tanks on the market:
– Cheap single layer bags made of plastic or polypropylene. These may be very vulnerable to cuts, which can lead to the partial or complete loss of the cargo.
– More expensive multi-layer bags consisting of five to six-ply polyethylene and a polyethylene fibre woven outer mantle. These are stronger and more resistant to damage than single layer bags.
– Rubber bags.

Procedures for loading and discharging

Installation of a flexi-tank can take place at the consignee's premises or at the container yard. It takes just about half an hour to install a flexi-tank into a 20-foot container, rolling it out on the bottom. To load the flexi-tank, a hose is connected to the loading connection and the liquid is pumped in. Depending on the type of cargo, it takes about half an hour to fill up the flexi-tank, and after completion the container and flexi-tank are ready for transportation by road, rail or sea. At the place of delivery the only equipment which is needed is a pump to discharge the cargo.

Some liquids display certain chemical and physical properties whereby they become more viscous during storage or lower temperatures. In order to allow the smooth unloading of such cargoes, a heating pad is installed in the container, together with the flexi-tank. Steam or hot water is then used to warm the pad and the cargo prior to commencement of unloading, allowing the cargo to be easily discharged.

According to manufacturers of flexi-tanks, it is possible to transport almost any non-hazardous liquid in this way, whether for chemical, industrial or food application. However, flexi-tanks are not suitable for the carriage of dangerous cargoes.

Apparent advantages of flexi-tanks

Shippers may see some clear advantages in the use of flexi-tanks in dry freight containers instead of using tank containers or drums. There may be a significant reduction in costs, compared to the use of tank containers or drums because of:
– Widespread availability of dry freight containers, compared to that of tank containers.
– Only one-way freight of the 20-foot container has to be paid. There is no return freight as may be required for tank containers.

– As the flexi-tank is disposable, there is no need for cleaning, like there is for tank containers.
– The material used in the manufacture of the flexi-tank is apparently cheaper than drums or other alternative packaging means.
– It takes less time to load and unload the cargo.
– Within a dry freight container there is increased cargo-carrying capacity when using a flexi-tank compared to using drums.

Gard's experience

During the last six months Gard has experienced several cases of flexi-tanks having been punctured during sea transportation. Surveyors who have been involved in several such incidents report that leaking flexi-tanks are quite common. A Gard vessel involved in one such incident did not experience boisterous or bad weather during the voyage, but the flexi-tanks stowed inside a container in the hold were found to be leaking and as a consequence other containers stowed in the hold were also affected. Leaking flexi-tanks represent not only a loss of cargo, but at times cause serious damage to other (expensive) cargo within the same cargo hold. Often there is a need to clean the cargo hold and sometimes other cargo. Depending on the liquid, such leakages may also represent a pollution problem when entering bilges and bilge pumping systems.

One particular case illustrates the problems of leaking flexi-tanks. One flexi-tank containing 25 tons of Chilean crude salmon oil started to leak while in transit on board a vessel from South America to the Far East and the oil flowed from the container into the lower hold. The oil ended up covering the tank top and filled the port and starboard aft bilge wells. As a result of the leakage, many containers stowed in the hold, containing dry cargo, were affected by the oil and by the smell. Containers, vertical cell guides, the tanktop, bilges and the bilge system had to be cleaned. Hatch-covers, hatch coamings and deck areas were also smeared with fish oil during the discharge and had to be cleaned. The cleaning operation alone came to a cost of USD 30,000.

Common causes of damage

From experience so far and from reports from cargo surveyors, the following have been noted as being the most common causes of leaking flexi-tanks:
– The seams are leaking. This is probably a manufacturing problem. The same type of flexi-tank has been identified in several cases.

Example of a five-ply plastic flexi-tank.

– Leakage at the double patch around the valve/filling opening at either the top or the bottom of the flexi-tank. This would also seem to be a manufacturing problem.
– Leakage caused by puncturing of the flexi-tank, by sharp edges, nails or screws inside the dry freight container.
– Securing belts (some flexi-tanks have such belts) pulling off lashing eyes of the dry freight container. These pieces of steel, screws, etc., may thereafter puncture the flexi-tank.
– No over-pressure valve fitted. Such valves must be fitted if the liquid may give off gas, like wine starting to ferment.

Responsibility

Nearly all shipments with flexi-tanks are on a FCL/FCL basis, i.e., the shippers are responsible for the stuffing/lashing/bracing and securing of the flexi-tank inside the container. It is recommended that members shipping cargoes in flexi-tanks ensure that it is properly identified, labelled and declared. The shipper should be required to provide, in writing, any particular carriage instructions. It is also important that, as far as possible, members involved in the carriage of various cargoes in flexi-tanks ensure that the flexi-tank itself is properly and carefully loaded and secured inside the dry container.

The bill of lading should be claused to reflect the fact that the shipper was responsible for the loading of the flexi-tank and for its securing inside the dry container. A clause in the bill of lading along the following lines may be used: "Flexi-tank supplied, loaded, packed and secured inside the dry container by shippers, at their sole risk and responsibility."

The following clause is suggested for use in a charterparty:
"Charterers are to bear all costs and expenses, risks and liabilities arising out of or in connection with the carriage of flexi-tanks inside dry freight containers. Such costs and expenses, risks and liabilities include, but are not limited to, loss of or damage to the cargo, loss of or damage to other cargo carried on board resulting from the leakage of any cargo carried in a flexi-tank and/or the cost of cleaning the vessel and/or her equipment, fixtures and fittings following such leakage and any/all consequential losses arising out of or in connection with such carriage. In the event that owners are legally obliged to and do settle such costs and expenses, risks or liabilities directly with the claimant(s), owners shall be fully indemnified by charterers in respect thereof."

Recommendations before installing the flexi-tank

It is still difficult to take a stand on the suitability of the flexi-tank as a container for transportation of liquids by sea. However, as it becomes more popular, the following precautions may be necessary to limit the risk of leaking flexi-tanks. Before the flexi-tank is placed within the container, the following should to be carried out:

– The inside of the dry freight container must be carefully inspected for any flaw or damage.
– Any protruding nail or screw in the floor plating and any other sharp/protruding part needs to be removed.
– The lower half of the container should be lined with cardboard lining, properly fixed to the container sides and floor.
– Sharp edges, welding seams; etc., should be covered with tape.
– Wooden bracing must be used at the door, with an opening in the lower part for the valve of the flexi-tank, to prevent any excessive force having to be applied to close the door at completion of loading a flexi-tank.
– When the flexi-tank is positioned inside the container, it should be ensured that there is sufficient space between the filling valve and the container doors when they are closed. If not, the doors can damage the valve.
– Over-pressure valves should be installed if the cargo may start fermentation or otherwise give off gas.
– If securing bands are used, flexi-tanks should be full, to avoid excessive stresses from the belts on the lashing eyes of the container.

Damage to the container

Standard ISO freight containers are designed to handle a broad range of bulk and packaged cargoes, but they are not specifically designed to carry liquid cargoes in flexi–tanks. Flexi-tanks never occupy the full volume of the container. Apart from the floor, the stresses caused by flexi-tanks are never uniformly distributed over the total surfaces of the wall and end panels. During container handling, additional dynamic forces are experienced and, if full flexi-tanks are carried, may exceed the limits for a freight container. This may result in damage to the walls and ends of the container.

The distortions to the side panels could exceed the ISO allowable dimensional tolerances, resulting in stacking problems on the wharf and stowage problems on board (cell-guides or on deck slots). Freight containers loaded with flexi-tanks tend to bulge. When filled, flexi-tanks can cause sideways pressure on the container, especially at the weakest areas of the side panel. This pressure may exceed the pressures for which the container was designed and constructed. Gard has experienced several instances where the containers have bulged beyond the accepted tolerance (ISO) of 10 mm, causing permanent deformation of the sidewalls.

Conclusion

The use of flexi-tanks looks likely to continue and possibly increase. This is not necessarily bad news for shipowners, but as with all containerised cargo, it is important to ensure that the cargo is properly identified and labelled and that the flexi-tank is properly and carefully packed and secured inside the dry container. In the event that the shipowners supply the dry container, they should ensure that it has no sharp edges, or protruding nails, screws, etc., that could damage the flexi-tank.

US law - COGSA's USD 500 per package or customary freight unit limitation

Gard News 184,
November 2006/January 2007

By Alan Nakazawa, Cogswell Nakazawa & Chang, LLP, Long Beach, CA

Can a container be the relevant "package" or customary freight unit for purposes of United States COGSA's USD 500 limitation?

United States COGSA applies as a matter of law to every bill of lading which is evidence of a contract of carriage of goods by sea to or from the United States in foreign trade.[1] Section 1304(5) of COGSA provides that a carrier may limit its liability to USD 500 per package, or for goods not shipped packaged, per customary freight unit, unless the nature and value of the goods have been declared by the shipper before shipment and inserted in the bill of lading. COGSA does not define what is a "package" for purposes of the limitation. Over the years, courts in the various circuits of the United States have varied in their approach on the issue of what constitutes a "package" and as a result, there was lack of certainty and consistency in their decisions. In recent years, the courts have taken a more cohesive approach to determining what constitutes the relevant "package" in a case and we have seen more predictability and consistency in their decisions.

Under more recent case law, the manner in which the parties describe and designate the container and cargo in the bill of lading is significant. Where a bill of lading discloses what is inside the container, and those objects can be reasonably considered a COGSA "package" (e.g., where the number of cartons or skids or pallets inside the container are specified in the bill of lading), each object, not the container, is usually deemed the relevant "package" for purposes of the USD 500 limitation.[2] On the other hand, where the bill of lading lists the container as the "package" and does not describe objects that can reasonably be understood from the description as being packages, the container may be deemed the relevant "package".[3] The parties' designation of the number under the "number of packages" column in the bill of lading is the starting point for the court's analysis, and unless the number is plainly contradicted by contrary evidence of the parties' intent, or unless the number refers to items that can not qualify as "packages", it is also the ending point of the analysis.[4]

Applying this standard, if the bill of lading describes on its face the number of cartons, pallets or skids of cargo within the container, the courts will likely find that the cartons, pallets or skids, not the container, are the relevant COGSA "package" even if the bill of lading lists "one container" in the "number of packages" column. On the other hand, if the bill of lading unambiguously lists the container as the "package" (e.g., "one container" is inserted in the "number of packages" column) and the bill of lading does not otherwise describe objects within the container that can be reasonably be understood from the description as being packages or packaged (e.g., number of pieces), or the items specified do not qualify as a "package", the courts will likely find that the container is the relevant "package" for purposes of the USD 500 limitation. Alternatively, the court could reach the same result by finding that the cargo has been shipped unpackaged, and that the USD 500 limitation therefore applies per customary freight unit. Since freight is generally calculated on a "per container" or "lump sum" basis, the limitation could be USD 500.

It should be noted, however, that there is a general reluctance to find that a container is a "package". The courts will closely scrutinise the bill of lading for the intention of the parties and if they find any ambiguity in the bill of lading, the ambiguity will be construed against the carrier.

Based on the current law in the United States, the carrier can place itself in the best position to achieve the lowest limitation available under COGSA by doing the following:

1. Where the carrier does not know from the cargo description provided by the shipper whether the cargo is packaged, it should list the number of containers under the "Number of Packages" column of the bill of lading. The quantity of the cargo can be listed in the "Description of Cargo" column.

2. Where the cargo description provided by the shipper includes both the number of pallets or skids and the number of cartons on the pallets or skids within the container, the carrier should insert the number of pallets or skids (i.e., the larger external packaging unit) in the "Number of Packages" column. Where the bill of lading lists both the number of pallets in the "Number of Packages" column and the number of cartons in the "description of cargo" column of the bill, the carrier may argue that the larger parcels (i.e., the pallets) are the relevant COGSA "package".[5]

3. Where the cargo description provided by the shipper includes the number of cartons within the container, the carrier should still list the number of containers in the "number of packages" column. It is likely, however, that the courts will find that the cartons are the

1 See 46 U.S.C. Section 1300.
2 See All Pacific Trading v. M/V HANJIN YOSU, 7 F.3d 1427, 1433 (9th Cir. 1993); Monica Textile Corporation v. S.S. TANA, 952 F. 2d 636, 640 (2d Cir. 1991); Universal Lea Tobacco Company, Incorporated v. Companhia De Navegacao Maritima Netumar, 993 F. 2d. 414 (4th Cir. 1993); Groupe Chegaray/V. De Chalus v. P&O Containers, et al., 2001 AMC 1858, 1867 (11th Cir. 2001).
3 See Binladen Landscaping v. M.V. NEDLLOYD ROTTERDAM, 759 F. 2d 1006, 1015 (2d. Cir. 1985) (container deemed the relevant "package" where the bill of lading listed the number of containers in the "number of packages" column and described the number of plants in the "description of cargo" column); Orient Overseas Container Line, (UK) Ltd. v. Sea-Land Service, Inc., 122 F. Supp. 2d 481 (S.D.N.Y. 2000) (the bill of lading listed the number of unpackaged engines in the number of packages column; held: container was the relevant "package"); Fishman & Tobin, Inc. v. Topical Shipping & Construction Co., Ltd., 2001 AMC 1663 (11th Cir. 2001) (container deemed the relevant "package" where the number of containers was listed in the "number of packages" column and the number of jackets were listed in "description of cargo" column).
4 See Seguros "Illimani" S.A. v. M/V POPI P, 929 F. 2d 89, 94 (2d Cir. 1991); Tokio Marine and Fire Insurance v. Nippon Express, 155 F. Supp. 2d 1167, 1171 (C.D. Cal. 2000).

relevant "package" if the number of cartons is listed in the "Description of Cargo" column.

Given the foregoing, carriers can take advantage of the limitation of liability that is provided by law by carefully drafting their bills of lading. We appreciate that commercially, this is not always possible. Frequently, the shipper will dictate how the cargo is described in the bill of lading by providing instructions to the carrier. Further, federal regulations require that the carrier's inward cargo manifest lists all inward cargo on board the vessel and that the carrier discloses on the cargo manifest the numbers and quantities from the carrier's bills of lading using the lowest external packaging unit.[6] While these regulations do not appear to require that the carrier inserts in the bill of lading the lowest external packaging unit, it is common practice for a carrier to prepare the inward cargo manifest from information provided in the bill of lading or to merely attach the bills of lading to the customs form. Accordingly, the smallest external packaging unit does commonly appear in the bill of lading.

Footnote
6 See 19 CFR 4.7a(c)(4)(v).

Recent container losses from vessels using automatic locks

Loss Prevention Circular No. 05-06

Background

A large container vessel insured with Gard has recently experienced a serious loss of containers. Whilst investigating the incident we learned of similar events with several other new, large vessels covered by other P&I clubs. One of the common factors of all these incidents seems to be that the vessels have all been using fully automatic container locks between the container corner castings. Such locks appear to have been introduced in 2004, mainly onboard new, modern vessels.

Investigations are still ongoing, but it seems clear that this type of lock, having holding power only by its geometrical shape, may under certain circumstances jump out of the corner castings. The best evidence is that this is happening during heavy pitching movements of the ship and that the containers may thereafter be lost when the vessel is rolling. In most cases the containers have been lost from the aft deck.

Recommendation

We expect that the class societies involved will investigate these events, but until a solution has been found, we recommend our Members and clients to take note of the problem and learn from the unfortunate experiences already made.

Members and clients with vessels using fully automatic container locks are recommended to contact their class societies as well as the manufacturer of the container locks to obtain their recommendations as to further actions.

Gard has been informed of owners who have already taken substantial measures to rectify this situation, including replacing locks, applying limitations where heavy weather is expected and even reducing the height of the container stacks.

Owners may contact Gard with any queries related to the issue and any information the owners are able to provide will be of considerable interest. Responses by e-mail should be directed to our loss prevention manager Trygve.nokleby@gard.no

Update: Container losses from vessels using fully automatic container locks

Loss Prevention Circular No. 08-06

Background

As a result of several container losses from large container ships in the past six months, the shipping industry has taken the issue of fully automatic container locks (FATs) very seriously. Various investigations of the potential problems with lashing arrangements involving FATs have been initiated to clarify what measures may be necessary to avoid future losses. This circular highlights some of the current activities in this respect in the industry.

Gard's Member survey

As a part of our investigation of the container losses, Gard conducted a survey amongst some of its members. The survey has revealed that the losses experienced by the members of Gard seem to be limited to one type of FATs available in the market. Our recommendation in Loss Prevention Circular No. 05-06 to contact the respective supplier of such locks to seek clarification of any limitations is therefore still valid. It has been suggested to hold a meeting of International Group's "Ship Technical Committee" on this issue. It is expected that this meeting will take place this autumn, when more evidence is available from the parties mentioned below. The intention is to also invite the classification societies to attend this meeting.

Actions by Classification societies

In a letter from Germanischer Lloyd dated 16 March 2006, the potential problem was highlighted and future limitations in the use of FATs were discussed. However, in their letter of 27 April 2006, Germanischer Lloyd clarified their current position: The letter states that the approved container stowage plans, with their respective stowage systems, continue to be valid unconditionally and that a general and type independent recommendation for the substitution of FATs should not be issued. GL's tests also confirmed that FATs with a flange and sufficiently dimensioned locking nose obtained good results. According to the press, GL has at a recent seminar also pointed to other factors such as the placement of heavy containers, inadequate container lashings and the age of the containers as potential causes for the recent losses. None of the other classification societies have so far concluded in this issue.

Actions by the industry

Owners, suppliers, authorities and researchers are joining forces in a two year project investigating lashing loads to improve safety and efficiency of container, Ro-Ro and heavy lift transportation. The Joint Industry Project, named Lashing@Sea, was initiated by the Maritime Research Institute Netherlands (MARIN). The project is aiming to improve the safety and efficiency of lashings. This will be achieved by investigating the mechanisms of lashing loads and identifying the key parameters. FATs will be one of many technologies investigated by this project group.

Actions by the manufacturers

One of the major manufacturers of lashing equipment has chosen to recall their FATs from the market. In its press release, this manufacturer stated that they did this as a precaution despite the fact that they had not received reports of equipment failure.

We have been informed that at least one major manufacturer continues to sell FATs subsequent to additional testing and approval by Germanischer Lloyd. According to the manufacturer, no container losses have been reported due to using their type of FAT.

No implication on the P&I cover

The use of fully automatic container locks does not have any implication on the scope of P&I cover, as long as the locks used are class approved and the container stowage complies with applicable regulations.

Recommendation

Gard is still of the opinion that it is prudent for shipowners to seek further information from the approving classification society and container lock manufacturer/supplier concerning the suitability and conditions for use of the specific type(s) of fully automatic container lock(s) that are being used or are intended to be used on board their ships, in order to minimise the risk of future losses.

Inspection and certification of cargo containers

Gard News 151, September/November 1998

The various types of containers for dry, refrigerated and liquid cargoes have to comply with international requirements for road, rail and sea transportation. In this article we discuss the most common regulations applicable, and explain how containers are inspected.

ISO[1] standards

ISO standards applicable to new containers involve technical recommendations concerning dimensions and tolerances, dealing specifically with the interchangeability of containers on a global scale. These standards are not mandatory, but are almost universally complied with. The ISO standard 1496 deals with freight containers in general but also covers the different types of containers, such as dry-freight containers, thermal containers and tank containers.

International Convention for Safe Containers (CSC), 1972[2]

Due to the rapid increase in the use of freight containers and the development of specialised container ships, in 1967 the International Maritime Organization (IMO) started a study of the safety of containerisation in sea transport. In December 1972 the International Convention for Safe Containers (CSC) was signed in Geneva. The aim of the convention was to ensure a high standard of safety for workers during handling and transportation of containers, and also to facilitate international trade by providing uniform international safety regulations. The CSC made the approval of new containers mandatory and was a welcome means of regulating the construction and safety of containers.

The convention set out procedures for the safety approval of new containers, to be enforced by the States party or organisations authorised by them. The evidence of approval, a Safety Approval Plate, was to be recognised by all when granted by a State party, a system which would allow the containers to move with a minimum of safety control formalities.

It is of interest to note that the CSC was not introduced for the safety of the cargo carried in containers, but for the safety of the persons working around them.

The role of the Classification Societies

The Classification Societies were already engaged in container certification when the CSC was introduced. Most contracting governments chose to authorise these Societies to approve the design, inspection and testing of new containers.[3]

CSC Safety Approval Plate

The CSC Safety Approval Plate is a permanent, non-corrosive, fireproof plate, required to measure no less than 200mm x 100mm. It contains information about the country of approval, approval reference, date of manufacture, manufacturer's container identification number, maximum operating gross weight, allowable stacking weight for 1.8g[4], transverse racking test load value, and may also indicate the end and side walls strength if required. The plate also has room for the month and year of the first examination of new containers and for subsequent examination dates.

The CSC requires the container to have an approval reference on the Safety Approval Plate. For instance, the approval reference "GBLR 8653 975", means that the container is certified by Lloyd's Register under authority of Great Britain, 8653 is the approval number and 975 is the date of the approval, i.e., September 1975. The reference "F/BV/6028/97" means that the approval (number 6028) was provided by Bureau Veritas under authority of the French government in 1997.

Certification of new containers

Certification, carried out by the Class Societies to satisfy requirements of the CSC, will normally include:
– Factory approval (approval of production facilities for mass production to needed quality)
– Design type approval (review of drawings and specifications and testing of prototype)
– Survey of production units (verification of compliance with approved type during production)
– On line and final inspection (random verification of workmanship, production tests, and final inspection of each individual unit or of units selected at random)

Class Societies will usually place a sticker with their logo on the container door, confirming that they carried out the initial certification of the container at the factory. The sticker is only a marketing element; it has no function in the approval or maintenance of the container. The all-important proof of compliance with the CSC is the Safety Approval Plate.

In-service examinations

While the CSC requires new containers to be approved by a competent authority under governmental agreement, the subsequent maintenance of an approved container in safe condition is the responsibility of the container owner, who may choose between two inspection systems:
(1) The Periodic Examination Scheme (PES) is a system of regular inspections organised by the container owner every 30 months, starting no later than 5 years after the date of manufacture. Following each inspection the month/year of the next inspection is stamped on the Safety Approval Plate. The CSC also allows for the use of stickers coloured in accordance with the year of examination: brown for 1998, blue for 1999, yellow for 2000, red for 2001, black for 2002, green for 2003, brown again for 2004 and so on. Therefore, for containers certified under the PES it is possible to see from the container itself whether it is "within dates".
(2) The Approved Continuous Examination Program (ACEP). Under this system containers bear a sticker showing the letters ACEP and the identification of the Administration which has granted the approval. The sticker is placed on, or as close as practicable to the Safety Approval Plate. Containers under ACEP

1 International Standards Organization.
2 Entered into force on 6 September 1977. As of 1 June 1998 it had 64 contracting States, representing 62.16 per cent of world tonnage.
3 A pioneer some thirty years ago, Bureau Veritas is still a world leader in certification of containers, with a market share of 60 per cent of all types of new container approvals, and a similar share for re-certification of tank containers. The rest is largely divided between Lloyd's Register and American Bureau of Shipping. Both Bureau Veritas and Lloyd's Register play an important role in the inspection of tank containers, and each of them inspected close to 50 per cent of last year's production. Other Class Societies may have been delegated authority by the various governments, but have only minor world market shares.
4 Standard acceleration of gravity, equal to 9.8 metres per square second.

are subject to thorough examinations organised by the owner in connection with major repairs, refurbishments or on/off-hire interchanges. Such containers are inspected practically every time they are used, but under no circumstance may inspections take place more than 30 months apart. However, the next date of examination cannot be seen from the container itself. A container that has gone astray or missing for some time will therefore not be easily detected as "out of date" and eventually stopped.

The CSC allows governments to control whether containers have a valid Safety Approval Plate and are "in date". "Out of date" containers and containers which are clearly unsafe may be stopped. They may eventually be allowed to proceed to the place of unloading, but not to be loaded again until examination, repairs and updating have taken place. Some governments are very lax in enforcing such authority, others may have a system where port officials, stevedores, trade unions, etc., play an active role in reporting badly maintained containers.

Class Societies, other inspection bodies and repair yards can carry out the in-service examination of containers and may be very interested in doing so, but that is not required by the convention. The examination of an in-service container is only required to be carried out by a person "having such knowledge and experience of containers as will enable him to determine whether it has any defect which could place a person in danger". There is no definition given by the CSC of such person's competence, so owners are largely allowed to carry out their own inspections without very much involvement by the authorities. This may be said to be the weak point of the CSC, an arrangement that would not be found very fitting under the quality assurance schemes of today. However, considering the large number of containers in circulation world-wide (an estimated 10 million units), there are relatively few accidents caused by badly maintained containers. It may therefore be concluded that the "self-regulating" system container owners are subject to in respect of in-service inspections has so far adequately ensured a satisfactory standard of maintenance.

Special approval requirements

Containers may have to comply with requirements for railway transportation, such as those from the International Union of Railways (UIC),[5] the Association of American Railroads (AAR), the U.S. Federal Railroad Association (FRA) and the European Regulations concerning the Carriage of Dangerous Goods by Rail (RID).[6] For road transportation, there are for instance the European Agreement concerning the Carriage of Goods by Road (ADR)[7] and the US Department of Transport Regulations CFR 49 for the Transportation of Intermodal and Portable Tanks.

Customs authorities have special requirements for the sealing of containers, the affixing of customs seals, accessibility to custom officers, etc. The United Nations Customs Convention on the International Transport of Goods under Cover of TIR Carnets, 1975, may be applicable.

Dangerous Cargoes

When the container's contents may be classed as dangerous cargo, the IMO International Maritime Dangerous Goods Code (IMDG) is applicable, as well as various other international and national regulations.

Foodstuffs

When food is transported in containers, the United Nations Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP),[8] 1970, may also be applicable.

Tank containers

For tank containers there are additional national and international regulations related to the transportation of dangerous goods (IMDG Code, RID/ADR, CFR 49, etc.), as well as industrial codes applicable for pressure vessels. Such regulations set forth conditions tank containers must meet to be initially certified and periodically re-certified. It is worth noting that the requirements for tank containers in service resulting from the above regulations clearly exceed those of the CSC. In order to meet the requirements of the IMDG Code and CSC tank containers are subject to periodical inspections by a competent, approved authority every 30 months and regularly tested.

Thermal and reefer containers

In addition to the CSC and ISO standards, the ATP may be applicable to thermal and reefer containers. The ATP has standards to ensure that the equipment is capable of maintaining the required temperature to preserve the quality of foodstuff in transit. For containers with refrigerating equipment, electrical regulations which ensure uniform electric current characteristics, etc., may be applicable. Insulation capability and refrigerating capacity are normally specified in accordance with chosen "statement of values", purchasers' specifications which are commonly used.

Swap-bodies

As the standard 20 foot and 40 foot containers do not take maximum advantage of European road regulations, a new type of container, the swap-body, has gained popularity. Swap-body containers are 2.5 metres wide, while the ISO standard series 1 containers are only 8 feet (2.438 metres). For instance, swap-bodies have space for two "Europallets" sideways, but these would not fit in a standard container. The swap-body is an efficient transport unit on roads and on short sea passages when carried on the back of a road trailer. In deep-sea crossings, however, it is not suitable for vessels with cell guides for standard 8 foot-wide containers. The swap-body was designed in Europe and 95 per cent of its use is in European trades.

Earlier on swap-bodies were not fully regulated, but separate ISO and CEN[9] standards for swap-bodies and swap-tanks are now being developed.

The CSC does not apply to swap-bodies designed for road and rail transportation, if they are without stacking capability and top lift facilities. Equally, the CSC is not mandatory for swap-bodies transported by sea if carried on a road vehicle or rail wagon. However, the swap-body is subject to the CSC if used in transoceanic services.[10]

Offshore containers

The CSC does not apply to offshore containers (containers that are handled in open sea), as such containers have to withstand the most severe conditions and may be subject to different design and testing parameters from those prescribed by the convention.

The IMO has published guidelines for the certification of containers and portable tanks that are transported and handled offshore (Guidelines for the Approval of Containers handled in Open Seas, MSC/Circular 613).[11] ■

5 Union Internationale des Chemins de Fer.
6 Règlement concernant le Transport International Ferroviaire des Marchandises Dangereuses.
7 Accord Européen relatif au Transport des Marchandises Dangereuses par Route.
8 Accord relatif aux Transports Internationaux des Denrées Périssables et aux Engins Spéciaux à Utiliser pour ces Transports.
9 Comité Européen de Normalisation.
10 Bureau Veritas has established rules for the classification and survey of swap-bodies.
11 Det norske Veritas (DnV) is the only Class Society to have issued rules for offshore containers that fully comply with the IMO guidelines, and the DnV Certification Note No. 2.7-1 is therefore the only established standard available. The rules are applicable to all types of transport units handled offshore, such as boxes, tanks, baskets and skids. Due to heavy wear and frequent repairs, offshore containers are generally required by national authorities to be inspected every year. The majority of offshore containers used in the North Sea are built to DnV's rules and certified by DnV or other Class Society. The DnV Certification Note has gained such universal acceptance in Norway that it is practically impossible to use an offshore container which is not a "2.7-1 container". More than 300 different types of offshore containers have been certified.

Stability of multi-purpose general cargo and container ships

Gard News 145,
March 1997

By John Third of Brookes Bell & Co., London

INTRODUCTION

A minimum criterion for stability is set out by Statutory Requirement and has been established to ensure that, when subjected to a heeling movement, a ship will not capsize and, when the initiating force diminishes, it will return to the upright. The objectives of rules and regulations are very much related to ship safety and it is important that ship's staff should have a thorough knowledge of both their application in theory and their effect in reality.

This article addresses the importance of stability when working with multi-purpose general cargo ships which are often heavily loaded and, in addition, can be required to carry large numbers of containers on deck.

THINK AHEAD!

With regard to statutory requirements, Regulation 44 of the International Conference on Load Lines, 1966, states that all ships should have a safe margin of stability at all stages of the voyage. Minimum stability criteria for various ship types are now included in Resolution A.749(18) "Code on Intact Stability for All Types of Ships Covered by IMO Instruments".

When planning a voyage, consideration must be given to the ship's stability in advance of loading. The departure condition is important but it is imperative that the assessment includes arrival conditions at discharge ports and an effort should be made to identify the point in the voyage where stability is least. The analysis should not just amount to a determination of the vessel's GM but must also consider the curve of righting levers (GZ). Both are to be checked for compliance with the criteria.

UNDERSTANDING THE CALCULATION

The curve of righting levers provides a graphical presentation of the ship's stability. It allows a visual assessment of stability, including GM, which dimension broadly can be described as an index both to the inertia of the hull against rolling and the accelerations and forces which might arise if rolling occurs. However, it is important to appreciate that a relatively high GM can be obtained with a GZ curve which affords only a minimal range of stability and does not comply with the set criteria. The range of stability is indicated by the shape of the curve and the area contained between the curve and the base. United Kingdom regulations require the curve to produce a peak value at an angle of heel of 30° or greater and must enclose a prescribed area between 30° and 40°.

An example where an acceptable GM might be combined with insufficient range of stability can occur on a ship with a low freeboard at deep laden condition where the deck edge becomes immersed at low angles of heel. Once the deck edge is underwater there is a significant reduction in the righting lever and poor resistance to large heeling moments. Vessels having shallow draught capability, combining low freeboards with large hatch coamings typically fall into a category which requires special attention.

ESTABLISHING THE SHIP'S CONDITION

A condition should be established as accurately as possible, by careful consideration of the weight and centres of all deadweight on board. Mistakes often result when calculations are based on an assumed tank status which subsequently proves incorrect. This is but one very good reason to establish working practices in which tank soundings are checked regularly. The contents of tanks should be determined from soundings and the calculated condition is only valid if the tank status remains unchanged.

Centres of gravity and free surface corrections used in the calculations should be those derived from the Trim and Stability Book. Other than in exceptional circumstances, the use of reduced or altered values for free surface corrections and centres of gravity should not be tolerated or encouraged.

Establishing the centres of gravity for cargo can be difficult, especially where break bulk shipments are concerned. However, every attempt should be made to estimate accurately erring on the side of safety. Container cargo, by virtue of its uniformity, presents a deceptively easy proposition for solution, but beware, it is easy to make a big mistake!

The Trim and Stability Book may contain details of centres of gravity for all containers, or individual stacks or bays. However, if an assumed mean value for the centre of gravity of a bay, or stack, is used, it is important to know how the average has been arrived at. The calculation may, for example in an older vessel, be based upon units of 8ft height, which would provide invalid results if 8ft 6ins units were used. Use of the 8ft figure will lead to an underestimate of the KG and overestimate the ship's stability. The same would apply if 9ft or 9ft 6ins units were stowed in bays where tabulated data were for 8ft 6 ins units.

If the final loaded condition were marginal an incorrect assumption of centres of gravity might show the vessel complying with statutory requirements with a safe margin of stability when in fact it did not.

DECK CARGO AND WIND

The weight of deck cargo acts above the vessel's centre of gravity. Deck cargo will therefore reduce stability and, accordingly, there are limits on the amount which can be carried. In passing, it is relevant to make the obvious comment that containers cannot under any circumstances be considered as providing buoyancy in the same manner as certain types of timber.

If a large container is to be carried on deck the effect of wind must be considered. This is relatively straightforward and an assessment can be made by referring to the formulae presented in the Code on Intact Stability. Obviously, when considering windage it is necessary to ensure that container heights are correct, particularly if referring to tabulated values for lateral windage area.

A CAUTIONARY NOTE ON CALCULATION

It is not sufficient to rely on mean figures for centres of gravity of containers in a Trim and Stability Book without checking their validity for the particular loading condition being investigated.

Certain ships have Trim and Stability Books which contain maximum permissible KG, or minimum GM, curves. Before using these to establish compliance with the appropriate stability criteria, check the basis of derivation. For example, if the curves do not include wind heeling, they are not appropriate for a vessel carrying containers on deck. In such circumstances, compliance will need to be checked by plotting both the GZ curve and wind heeling arm and checking the appropriate characteristics.

A simple check of accuracy for a condition is obtained by a comparison between the actual draughts with those calculated.

STABILITY AND SHIP BEHAVIOUR

A ship's officer should appreciate how stability influences a ship's behaviour. While a vessel is at sea a heeling moment can be brought about by a variety of environmental or operational circumstances and, in particular, the action of wind and/or waves. In port, a heeling moment can arise when cargo is being loaded or discharged.

The stability of a vessel determines its dynamic response in a seaway and the resultant motions and accelerations induce forces in the cargo lashing system and stowage generally. The behaviour of the ship is partly dictated by the state of the seaway but also by the input of the navigator who determines the course steered, the auto-pilot settings and speed.

A good example of the importance of understanding the dynamics of the relationship occurs on board a ship carrying containers on deck which, in heavy weather, must make a broad alteration of course from a heading into the wind to a heading across the wind. This is the type of situation which routinely occurs in traffic separation schemes and off headlands: the Terschelling Bank scheme in the vicinity of the VL-Centre is a prime example.

A broad alteration brings about a major change in the angle and period of encounter of the ship with waves and exposes, progressively as the ship turns, more lateral projected wind area. Rolling motion is stimulated by waves translating beneath the hull athwartships and the vessel moves from leading slope over the wave crest to the reverse slope generating and sustaining the rolling motion in the process. In addition, the alteration of course generates the angle of heel, outwards from the direction of the turn. The combined effect of all these factors can be a sudden change in the ship's behaviour. If the course alteration is badly managed, which criticism might be directed at the amount of helm applied, or is made coincidental with the passage of a train of steep waves, or is influenced by a strong gust of wind, then a large angle of heel (by which we mean a roll significantly greater than any previously experienced) is often the result. Vessel have been known to roll to 30° and more while making such alterations even in moderate to fresh gale conditions.

Deck stowed containers are restrained by lashings, in the majority of instances utilising twistlocks and incorporating rods and turnbuckles, the integrity of the system is dependant upon condition and proper application. A sudden acceleration and large angle of roll is precisely what is needed to test the capability of components and a very heavy motion is likely, without warning, to reveal any hitherto unnoticed shortcoming in a dramatic manner. There have been numerous casualties where defects in twistlocks, either of mechanical nature or simply resulting from equipment being disengaged, have caused the collapse of container stacks suddenly. Witnesses to such events usually describe a collapse occurring within two or three rolls cycles; i.e. less than one minute, within which period the devastation can be phenomenal.

Sudden motion can break friction forces applying between general cargo and dunnage timber. Cargo lashings are subjected to much higher forces if called upon to restrain a moving load.

Master and Mates on multi-purpose vessel with deck loads should alter course carefully in heavy weather and exercise skill and judgment on speed, timing and the amount of helm applied. In most circumstances an alteration is best carried out by a helmsman who can see waves approaching and can therefore predict the consequences of a helm application rather than by an autopilot which makes no allowance in advance.

...AND IN PORT

On a multi-purpose vessel the stability characteristics can affect port working when loading containers with deck cranes into a portable or permanent cell guides. If a ship is "tender" there will be a tendency to roll towards the quay whenever a moderate or heavy container is lifted. This motion can seriously interfere with concurrent working in which containers are being positioned for lowering into cell guides. Ballast may have to be taken in order to improve the stability and reduce the need for synchronism between stevedoring gangs working at different hatches.

Containers – latent defects

Gard News 153,
March/May 1999

By Per M. Ristvedt, Wikborg, Rein & Co., Kobe

Introduction

When a container breaks down or otherwise fails to function as it should with the consequence that the cargo inside is damaged while in the custody of the carrier, it is sometimes assumed that no defence is available to the carrier. However, in cases of failure or breakdown of a container the exculpatory exception referred to as "latent defect" under the Hague and Hague-Visby Rules may be a possible defence.

Latent defect and containers

It is clear that the exculpatory exception of latent defect, as defined in Article 4(2)(p) in the Hague and Hague-Visby Rules, only applies to a defect in the ship, and not in the cargo.[1] Therefore, in order for the latent defect defence to become a possibility the container must be considered to be a part of the ship.

In the maritime container traffic today the most common scenario is that the containers are provided by the carrier. In such a case it may be argued that the container should be considered to be a part of the ship.[2] Consequently, where the container is provided by the carrier, the exculpatory exception of latent defect should in principle be available to the carrier as a valid defence provided that certain issues are complied with.[3]
Where the carrier provides the container, the container may be considered as a part of the vessel and due diligence must be exercised to make it seaworthy.[4] In this regard the general seaworthiness obligation in Article 3(1) of the Hague and Hague-Visby Rules should be borne in mind, and it should be noted that a cursory visual inspection of the container only is unlikely be sufficient, by itself, to demonstrate the exercise of due diligence.[5]

Once the seaworthiness/due diligence hurdle in Article 3(1) of the Hague and Hague-Visby Rules has been overcome, a crucial question when invoking the latent defect defence under Article 4(2)(p) is whether the defect could have been discovered.

What kind of definition or test should be relied upon when considering whether the failure or the breakdown of the container can be considered a latent defect? The courts have used various definitions. Perhaps the most famous definition is the one relied upon in the Falls City decision[6] where latent defect was stated to be "a defect which could not be discovered by a person of competent skill and using ordinary care". A more practical definition and approach is perhaps to ask whether the cause of the container failure/breakdown could have been discovered by any known and customary test.[7]

As can be understood from the above definitions it will probably be difficult to succeed with a latent defect defence if the failure or breakdown of the container was caused by an incident/defect which has developed over a long period of time and thus could have been discovered by due diligence, typically corrosion and ordinary wear and tear. On the other hand, if the container failure or breakdown is caused by a more sudden type of incident/defect, for instance a gas leakage in a refrigerated container that first materialised days after the ship commenced her voyage, the chances of defending a claim on the basis of latent defect may be good, depending on the cause of the leak. Another example of a defect that may well be considered latent is a basic fault in the construction or metal of the container which causes it to break down or collapse. There are court decisions from France and the US that could be relied upon as support for this position.[8]

Therefore where cargo is damaged due to container failure or breakdown, it is important that all relevant evidence be provided to the P&I Club and the lawyers who will defend the claim. All inspection and maintenance records of the container's condition prior to the commencement of the voyage will clearly be relevant. For instance, the Convention for Safe Containers, 1972, requires that the owner of the container conduct inspections of the container according to certain procedures within certain time intervals. Reports from these controls could often be useful. Also, the terminal operators regularly control and check the condition of the containers. Records or notes from such recent controls could also be of interest. Furthermore, today many of the professional container carriers check the containers on a daily basis (particularly reefer containers). In this regard it is important that proper entries are made in the log books which reflect the inspections carried out while at sea. Partlow charts for refrigerated containers should also be collected for defence purposes. In short: all notes, reports, records or other information

[1] A defect in the cargo would customarily be characterised as "inherent vice" or "hidden defect"; see Article 4(2)(m) of the Hague and Hague-Visby Rules.
[2] This position is supported by Tetley in his book "Marine Cargo Claims", Third Edition (1988), pages 489 and 499. This is further supported by the Red Jacket decision (Houlden v. S.S. Red Jacket, 1977 AMC page 1382), which decides that the standard of seaworthiness applies to "all of the ship's equipment, including containers supplied to the shippers" (at page 1401). As to European legal theory on this subject, see respectively Lebuhn and Auren in the Norwegian maritime publications "Arkiv for Sjørett" No. 8 (1966), page 520 and "Marlus" No. 212 (1995), page 61. Reference is also made to the French decision in DMF 1983 page 531 (at page 539) which concluded that latent defects in the "ship" should be interpreted to include latent defects in containers supplied by the carrier. The decision was later upheld: DMF 1986, page 208.
[3] If the shipper provides the container, defects in the container may be considered as insufficient packing, see Tetley, page 508.
[4] Red Jacket decision, referred to in footnote 2. If the carrier also stuffs the container, he will further be responsible for ensuring that the stowage of the goods inside the container is proper.
[5] Pages 1401-1402 of the Red Jacket decision, referred to in footnote 2. See also the Walter Raleigh decision referred in 1952 AMC page 618 (at page 637).
[6] (1932) 44 Ll. L. Rep., page 17 (at page 18).
[7] Brazil Oiticia Inc. v. S.S. Bill, referred to in (1942) AMC page 1607 (at page 1621).

as to the condition of the container would be of interest since this evidence may support the carrier in proving that the latent defect could not have been discovered by reasonable diligence.[9]

It is important to remember, however, that in spite of the latent defect defence, the carrier has a duty to properly and duly care for the cargo from the time when the latent defect is discovered. In case of a container breakdown which amounts to a latent defect, the carrier should always do his best to avoid (further) cargo damage if possible. For instance, if a reefer container breaks down and an empty reefer container is on board, it may be required that the cargo is transferred to the empty reefer container. Transhipment or a deviation could perhaps also be appropriate if this is considered practicable and reasonable under the circumstances.

Concluding comments

The Hague and Hague-Visby Rules latent defect defence may be available to the carrier where a container breaks down or otherwise fails to function while the cargo is in his custody. Whether the defence can actually be invoked will firstly depend on whether the carrier provided the container, so that the container is considered to be a part of the ship. Secondly, the carrier must prove that due diligence was exercised to make the container seaworthy before and at the beginning of the voyage. Thirdly, the carrier must then prove that the breakdown or failure of the container was caused by a defect which could not have been discovered by a person of competent skill and using ordinary care (by utilising any known and customary tests). Provided that these requirements are complied with, the carrier should be able to exculpate himself from liability for cargo damage caused by breakdown or failure of a container under the latent defect exception in the Hague and Hague-Visby Rules.

Should the claimant successfully argue that the carrier ought to have discovered the latent defect earlier, or that there was lack of proper care of the cargo after the latent defect was discovered, the carrier can still initially rely on the latent defect exception. In such a case the carrier would only be liable for the cargo damage that was caused by lack of care for the cargo after the latent defect was discovered, or from the time when it is proven by the claimant that the latent defect should have been discovered. ■

[8] DMF 1959 page 534 and (1970) AMC page 2109.
[9] DMF 1979, page 103, where a defect in the refrigerating system of a vessel was deemed latent since reports showed that it was not discovered by the inspection of Bureau Veritas.

Container types and problems

Gard News 151,
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This article attempts to describe some of the types of containers in use today, and highlight some of the problems associated with each and all, in terms of cargo carriage.

International Standards and Classification

There are many types of containers in use today, but the purpose of each of them is essentially the same - quick and efficient handling and stowage, and compatible carriage between transport modes. With this in mind, it is somewhat of an irony that there is no complete world-wide standardisation with regard to design, construction, materials, dimensions, etc.[1] The most common standards are set by the International Standards Organization (ISO) and the most common containers have lengths of twenty feet (6.1 m) and forty feet (12.2m). These containers are often referred to as TEU's (twenty foot equivalent units) and FEU's (forty foot equivalent units) and have an ISO width of 8 feet (2.4 m) and height of 8 feet 6 inches (2.6 m). ISO standards with regard to construction and strength are to a large extent duplicated by the well known Classification Societies, which certify containers just as they do the vessels that carry them. In this role the Classification Societies may also act on behalf of a State party to the International Convention for Safe Containers (CSC) 1972, which requires implementation and enforcement of a regime for approval of the safety of containers.[2]

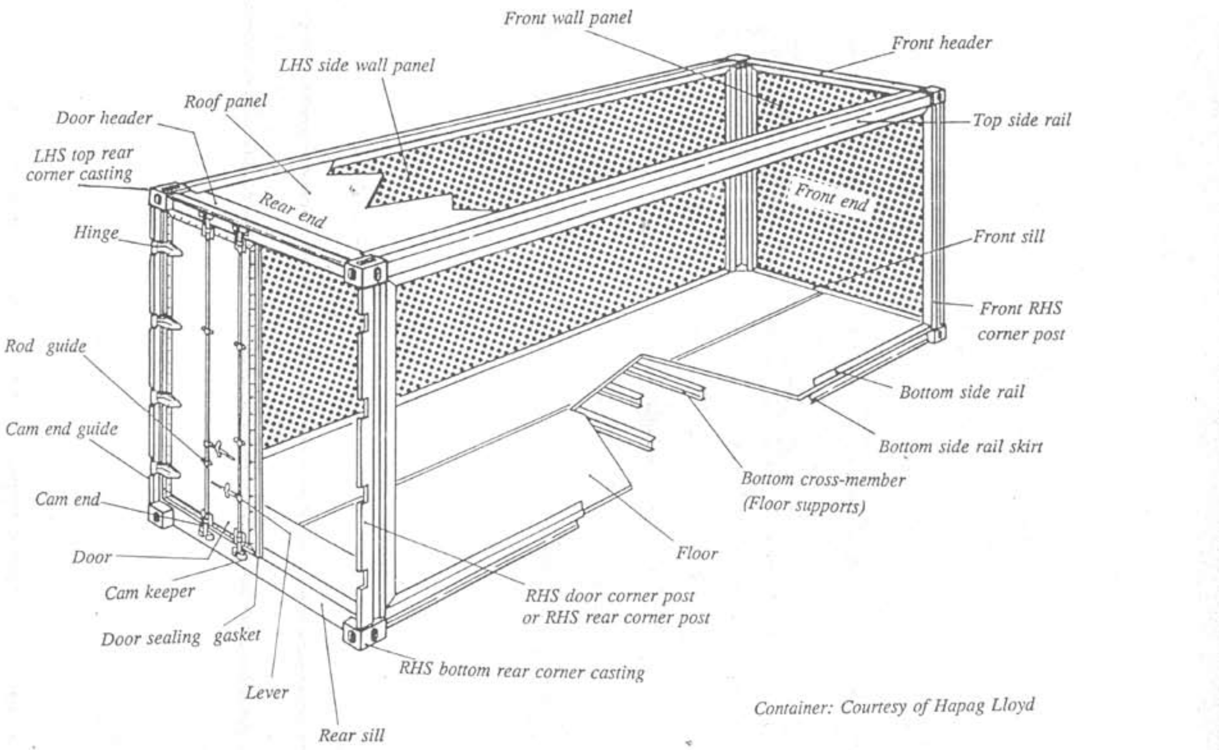
Containers weight

Given that there are numerous types and sizes of containers in use, the weight relevant to their carriage varies enormously. With this in mind, and rather than taking each container type in turn, it is perhaps more fitting to outline the factors involved and the most common weight ranges.

The tare weight of a container is the weight of the container without cargo, and this will vary depending on the fittings, weight of construction materials and size of the container. It will typically range between 2-2.5 MT for a TEU and 3.5-4 MT for a FEU. The payload weight is the weight of the cargo itself, and apart from the type of cargo this will be constrained by the container's cubic capacity and the maximum gross weight (the tare weight plus the payload weight) not just for the container itself in terms of structural constraints, but also any weight restrictions imposed by State transport systems. Payload weight varies between 17.5-18.5 MT for a TEU and 26-27 MT for a FEU, and this gives maximum gross weight of 22 MT and 30-31 MT respectively.

The variation in standards can be a problem in itself, particularly for the liner operator offering a door to door service, since the various modes of

1 Variations from the most common standards, which probably only account for a relatively small portion of the total number of containers in use today, have tended to originate from large container transport operators who have sought to satisfy different requirements from shippers, particularly in terms of payload and cubic capacity.
2 See article "Inspection and Certification of Cargo Containers" in this edition of Gard News.



transport must be capable of carrying the container. For the ship itself, container handling gear may need changing and stowage problems can arise.

General Purpose Containers

As the name suggests, these closed containers are suitable for most types of general cargo, and temporary modification can allow carriage of solid and liquid bulk cargoes. Design and construction are basic - a metal box, with full width doors at one end and a wooden flooring. The diagram on the following page shows a typical construction of a general purpose container and the terms commonly used to identify the parts making up the unit. Lashing points are provided, usually with a Safe Working Load[3] of 2 MT each. Cubic capacity for a TEU is 33.3 cbm[4] and for a FEU is 66.9 cbm.

The main problem peculiar to this type of container is ventilation when vents/fans are not fitted. Such containers are not entirely suitable for moisture sensitive cargoes, particularly on voyages from warm to colder climates. On such voyages, sweat can develop on the inner container surfaces and to prevent contact with the cargo, sheathing on such surfaces and waterproof coverings on the cargo are essential. Other problems are similar to those for general cargo carried in a vessel's holds, and if the carrier is responsible for stuffing[5] due regard must be given to dangers such as tainting, crushing and shifting.

Open Top Containers

This general purpose container without a roof is commonly used for over-height goods and machinery and timber requiring top loading. The door end may also be removable to allow end loading. Removable roof bows can be used to support tarpaulins to the extent this is possible with over-height cargo. Other details are similar to those for general purpose containers.

These containers can be more prone to structural failure than other containers, because they are commonly used for heavier cargoes and are often subject to point loading stresses when weights have not been properly distributed. These units also create stowage problems, as stowage on top must be avoided for over-height cargoes. Shippers may request protective stows and this usually means protection from sea sprays and waves over the deck, but in any case, specific instructions should be requested and conformed with.

Carriers should be particularly cautious if they are responsible for stuffing. The carrier is always expected to have a reasonable knowledge of the cargo, and accordingly, particular attention needs to be given to securing and proper weight distribution of abnormal loads. If the cargo is suspected to be moisture sensitive, and the unit has to be carried on deck, the cargo itself will need to be made suitably waterproof. Tarpaulins will inevitably allow some moisture ingress and the common problem of chafing also needs to be adequately guarded against. Again, instructions should be obtained from the shippers, and their pre-shipment approval of the stow is recommended, particularly for valuable cargoes. If tarpaulins are found to be damaged prior to shipment the shippers should be asked to make appropriate repairs, and if these are not effected the bills of lading should be suitably claused. Regular voyage inspections should pay particular attention to these units, especially the tarpaulins which may require repair and/or tightening.

Fantainers

These are essentially general purpose containers fitted with a hatch in the door, allowing for the fixing of an electric extraction fan (needing an external power source). Air at ambient temperature is drawn into the floor by the fan via a especially designed perforated lower front sill and replaced air is removed through the fan itself. The aim is to balance the temperature of the air within the container with that on the outside, to prevent condensation.

Problems peculiar to this type of container are the inadvertent closing of the fan, units not being connected to a power source and electrical failure either through fault or loss of supply. These units are unsuitable for moisture sensitive cargoes on voyages from cold to warmer climates. If moist warm air is drawn into the container it may be cooled by the cargo at its surface leading to the development of cargo sweat.

Flat-Rack Containers

Commonly these containers consist only of a base and two ends, there are no sides or a roof. Despite this, tare weights are generally greater than those for general purpose containers, materials being of greater scantling for improved strength and wear. They are commonly used for over-width and over-length cargoes and problems similar to those for open top containers are experienced. Additionally, tarpaulins are not normally used so fitting these can be difficult. Stability when handling can also be a problem if the cargo weight has not been evenly distributed. As a rule of thumb, no more than 60 per cent of the weight should be in any one half of a container. The ends of some flat-racks are foldable to allow carriage of over-length cargoes, and to reduce stowage capacity of units not in use. It can be appreciated that the hinges on these end pieces come in for some fairly rough treatment and accordingly structural failure on such parts is common.

Reefer containers

There are two main reefer container types, the integral reefer and the porthole reefer. As their names imply, the former has a refrigeration unit forming an integral part of the container body and the latter has a porthole to which a refrigeration supply is connected. The integral container's cooling unit needs an external power source and the porthole container is connected up to a system of air ducts in the vessel's hold through which cold air is supplied from a central battery of air coolers. Both types of containers are constructed in a similar way to a dry freight container, except that the cargo compartment is isolated from the outer walls by a thick layer of insulating material such as fibreglass matting or synthetic foam. The units also have an aluminium t-section floor, which forms ducts for the passage of cold air into the container stow. Payload capacity for these units is slightly less than for general purpose containers. Normally reefer containers are designed to carry cargoes in either a frozen or chilled state within the temperature range of -25°C to +20°C.

There are numerous problems associated with reefer containers, but a less obvious one can arise when they are not being used for refrigerated cargo and are inadvertently connected up as refrigerated units. Depending on the cargo, extensive damage can result, and to guard against this there need to be clear instructions on transport documents and labelling on the container to the effect that it is "not to be refrigerated". Other common problems arise because the principles and limitations of container refrigeration are ignored or not fully understood. For example, reefer containers are only capable of ensuring that the cargo is maintained at the temperature prevailing at the time of stuffing, and accordingly, they are incapable of freezing a cargo which is not already in a frozen state. Pre-cooling of the container, and indeed the cargo, to the required temperature is usually critical, but it is often thought that setting the container temperature at a lower temperature than that required for carriage will give speedier cooling. This is not the case, the rate of cooling will not be significantly different and there is the risk that the lower temperature will result in frosting damage to cargo. The ventilation openings on reefer containers can also be a source of problems, and it is often the case that these are not in the correct position for the cargo being carried. Most refrigerated loads (especially fruit), with the exception of frozen goods, fresh meat, and non-organic goods such as photographic film, require air exchange to reduce carbon dioxide (CO_2) build up and remove enzymes which speed up ripening. For frozen cargoes the ventilation openings should always be closed.

The actual functioning of the reefer equipment is also a source of many problems. There are numerous accounts of units not being plugged into their power/cooling source correctly, or at all, or being inadvertently unplugged. This is as much a problem off the ship as it is on, and carriers should be aware of their period of responsibility for the goods and in any case ensure that a supervised regime of manual inspections is rigidly enforced.[6] Reefer system failure is also a problem and pre-trip inspections (PTI) should be thorough.[7] Appropriate spares and knowledge should be available on board to effect repairs.[8] The interior fitness of reefer containers is essential, and there are numerous instances where cargo has been contaminated or otherwise damaged due to improper or insufficient cleaning and/or removal of previous cargo remnants including odours.

Other common sources of problem lie with temperature setting, recording devices and stowage arrangements. Incorrect temperature setting is a common occurrence and even when this has been done by the shipper, the carrier's responsibility may become involved if the set temperature is not checked against bill of lading and shipping/booking instructions. Temperature records are invariably of great importance and enormous difficulties can arise when recording devices are not working. Partlow charts are in common use, and each individual chart can record for up to 31 days. It is often the case that the charts are not replaced or filled in correctly, i.e., with start time, container number, set temperature, etc., or that the clockwork mechanism is not activated. Temperature monitoring is not so much a problem but a burden and a necessary one. The problem arises when monitoring has not been done and/or records are not kept. As to stowage, it is often found that arrangements within the container are not suitable for the type of refrigerated cargo concerned.[9]

Bulk Containers

These general purpose type containers can carry dry powders and granular cargoes in bulk. Top loading is via hatches fitted in the roof and discharge (which requires a tipping trailer) is via a hatch fitted in the door. Mild steel floors are commonly fitted to enable easy cleaning. Tank containers for dry bulk cargoes are also in use, but give lower payload capacities than the box design (for a TEU, around 33.1 cbm for the former and 19.3 cbm for the latter).

The main problems these units encounter are water ingress and condensation. Care must be taken particularly with fine powders, where the inadvertent opening of hatches has been known to cause product loss, especially in windy conditions.

Tank Containers

The tank container is a pressure vessel mounted in a frame, the latter of which determines compatibility with standard dimensions. Tanks are cylindrical, but materials, linings and fittings vary. The specifications of the shell and fittings determine the class of the tank and

3 The Safe Working Load is the maximum weight which the item in question can safely be loaded to. It is usually expressed in tonnes and is derived by applying an appropriate fraction to the item's breaking strain, that is the weight at which it has been tested to break.

4 Cubic metres.

5 The operations of packing and unpacking cargo inside containers are usually referred to as stuffing (or vanning) and stripping (or devanning).

thus the type of product it can carry. The frame is designed to support the tank when fully loaded, and there are two different designs. The Frame Tank is a full frame with side rails connecting between end frames, and the Beam Tank has only end frames. The latter has a lower tare weight and thus higher payload capacity. Capacities generally range from 15,000 to 27,000 litres. A filling port/manhole is positioned on the top of the tank, and a dip rod with calibration scale is provided. Other fittings include a pressure/relief valve to protect the tank against over pressure or a pressure valve to protect against excess external pressure, airline connections for pressuring the tank during discharge/testing or vapour recovery, and a discharge pipe, valve and cap at the bottom rear end. Loading and discharge may be via a top outlet valve connected to a vertical siphon pipe.

Heating systems, either steam or electric, can be fitted, and are commonly capable of maintaining temperatures up to 110°C. Insulation is usually in the form of expanded polyurethane. Tanks capable of carrying dangerous cargoes conform to IMO requirements and are classed according to how hazardous the cargo is and whether it is a liquid or gas. Food grade tanks are commonly referred to as "Type O" tanks, which are suitable for the carriage of food stuffs intended for human consumption (some alcohols/spirits may fall within IMO dangerous goods requirements). These tanks and their fittings are usually constructed with stainless steel, and have highly polished smooth interiors to avoid crevasse collection of contaminants.

Problems peculiar to this type of container include cargo contamination. Most tanks, particularly food grade ones, are used for a single product, and some shippers even have their own dedicated tanks for certain grades. Where this is not the case, there are particular risks of contamination from previous cargoes and this usually arises where tanks are not cleaned properly or their interior surfaces have deteriorated. Contamination can also result where incorrect cleaning agents are used. Particularly with regard to food, it is important that the tank is certified by a qualified surveyor as fit with regard to bacteria levels, odour, cleanliness and sterilisation, etc. Fittings are another source of contamination, like for instance hoses and connections, as is the air used in loading, discharging or blanketing operations. Whilst spillage is not very common, it can and does occur, mostly via leaky valves and fittings. In order to guard against this, valid pressure test certificates should be sighted. Leakage may also come about by inadvertent valve operation and in order to guard against this seals should be fitted and the tank clearly marked "loaded".[10] Improper carriage on forklift trucks can result in accidents, the surge of the cargo within the tank leading to toppling, most commonly when the tank is being transported too fast and/or too far above the ground. Stability problems can also be encountered on other vehicles, particularly when excessive cargo surge results from large ullages.

Open-sided containers

Another variation on the standard general purpose container design is the open-sided container, which as the name implies has no sides, only a base, roof and ends. The sides can be closed by full height gates and/or curtains (usually nylon-reinforced PVC).

A common problem with this type of containers is the loss of cargo through shifting. The gates are not usually designed to IMO transverse strength requirements, and accordingly, care must be taken with regard to stowage and securing. Otherwise similar problems to the open top container may be experienced.

Other container types

One could go on to talk about ventilated containers, controlled atmosphere containers, half height containers, high cube containers, hanger containers (for the carriage of garments), and many more types, but it is felt that, for the time being, the units discussed so far are those most widely used.

General container problems

It can no doubt be appreciated that most containers come in for some fairly rough treatment and this can lead to metal fatigue. This is exacerbated if maximum gross weights are exceeded or loads inadequately distributed. Further structural weakening results from damage, such as dents, scrapes and even punctures. With extensive exposure to the elements in a salty environment such weakening can be accelerated by corrosion.

Most damage is caused during handling. Using cranes in excessive wind conditions or with too great a speed of operation often leads to contact with other objects. Many containers are fitted with forklift truck pockets, and such forks have a nasty habit of causing damage. Improper stowage and securing (of the container and its contents) can also cause damage, as can wave impact and the leakage of corrosive contents.[11]

The integrity of the space within the container may be compromised by structural weakening, and this may be particularly critical for tank and reefer containers. As with a ship's holds, weather-tightness is a common problem, and doors, hatches and other openings have been known to permit ingress because seals/gaskets are in

6 With porthole reefers it is clear that when not on the vessel, the cargo requires another source of cooling, and this is often provided by a clip-on generator unit. It is essential that these units are available and are in working order. When on the ship care must be taken to make sure that the port holes are facing the right way and that the container size matches the connections. Some systems may be arranged so as to have a certain temperature or temperature range for a certain stack, and in such cases it is also important to check that the unit is stowed in the correct stack. With integral reefers it is important to make sure that the power plugs and leads are the correct type, in terms of proper connection and electrical compatibility.

7 These inspections, to confirm the proper operation of the container before each voyage, can be done either manually or automatically by micro-processor control. It should however be remembered that some checks, e.g. for signs of damage, require manual inspection.

8 Many charterparties expressly provide that owners are to notify charterers of reefer unit malfunction/failure and thereafter take reasonable steps to effect repair. Indeed, should the reefer system fail on voyage or the unit's insulation integrity become compromised, even if by wave damage, the carrier still has responsibility to take care of the goods, and accordingly has a duty to take reasonable measures to preserve the cargo, for instance by using an empty reefer container, or other available and appropriate reefer space on the vessel. In order to facilitate such measures reefer containers should have accessible stows.

9 For comments and advice on this and other reefer cargo problems see the articles "Reefer Cargoes - the Claims Handler's Point of View", in Gard News 135, October 1994, pages 12-14 and "Reefer Containers - a Brief Outline with Guidelines for their Use", in Gard News 140, January 1996, pages 8-9.

10 The problems described in the article "Problems Created by a Leaking Tank Container", which appeared in Gard News 136, December 1994, page 9, are a good illustration.

11 See the article "Shifting Containers" in this edition of Gard News.

12 Most container lines and/or terminals issue Equipment Interchange Receipts (EIR) at the time the container arrives and leaves the terminal. These receipts should document any container damage found by inspection at these times.

poor condition, or are not giving a good seal because of the presence of dirt or distortion of the door/hatch. Securing levers, which act to keep the door/hatch pressed against the seals, are also frequently found to be defective.

It is clear from the above that a sound system of container inspection and maintenance is essential. Hand in hand with such a system is proper documentation. An all too familiar problem is not being able to evidence when containers were damaged.[12]

Integrity may also be compromised by pilferage and stowaways and this is where the importance of proper sealing comes to the fore.[13] Seals should be checked when a container is received into and delivered from the carrier's care and at intervals in between (for those units that are accessible).[14] If seals are found to be broken, an interior inspection should be conducted, and if all appears in order, re-sealing will be necessary (making an appropriate record of the seal numbers). If the contents appear to be damaged, or have parts missing, this should be reported, as it may be necessary to appoint a surveyor. Sealing is also important in terms of fraud, which is becoming an increasing problem for containers. It goes without saying that carriers should be particularly careful when dealing with shipping requests. Spot inspections should be carried out and potential customers should be aware of this in order for it to be an effective deterrent.

Containers are often associated with specific carriage instructions, for instance as to stow, temperatures, etc., and great care must be taken in order to make sure that such instructions are correct, properly documented and conformed with.

A final problem worth mentioning is the shippers' declaration of contents and weight. With regard to contents, there are some jurisdictions, such as the United Arab Emirates, which still do not allow a carrier to rely on bill of lading clauses such as "contents unknown" or "shippers' load, stow and count", even when it is clear that the container was stuffed and sealed by the shippers.[15] The description of contents can also cause problems, particularly if the cargo is dangerous or a threat to the environment. In cases of fire, loss overboard or salvage, the timely availability of correct and sufficiently detailed information is essential and this should be impressed on shippers.[16] As to weight, it has been noted that shippers may occasionally declare lower figures, presumably as a means of minimising or avoiding taxes and/ or dues. This may create problems in terms of vessel stability and container stowage and securing,[17] and may result in contravention of transport weight restrictions.

To sum up, it can be seen that, whilst containers have revolutionised shipping and brought several benefits, they have also created a fair share of problems. Appreciating these problems and how to avoid or otherwise address them is an important part of the successful carriage of containers.

13 The stowage of containers is also important and to avoid pilferage, containers with valuable cargoes should be stowed (all other factors permitting) within stacks, or so their doors can not be easily accessed.
14 The seal status is also usually recorded on the EIR.
15 However, most jurisdictions do give effect to such words, and accordingly it is important that they are clearly stated (preferably in typed words) on the face of the bill of lading. The following statement should be sufficient : "Container stuffed and sealed by the shippers, said to contain (details of cargo); weight, number, quantity, condition, quality and contents unknown". See also article "When is a Package not a Package?" in Gard News 149, March 1998, pages 12-14.
16 Proper container labelling and documentation, including packing lists and dangerous goods papers, are essential elements of information availability.
17 See the article "Shifting Containers" in this edition of Gard News.

Porthole reefer containers

Gard News 140,
January 1996

This article focuses on cooling systems for containers on board ship which offer maximum flexibility with regard to cargo handling. Stalicon and Conair are commercial names for such systems which use porthole containers.

Cargoes which are not normally mixed can be stored not only in the same bay but in the same stack, and will receive individual treatment without the risk of tainting. The physical dimensions of refrigeration plants such as Stalicon and Conair are so small that the space saved can be utilised for other purposes. The absence of airducts also reduces the fan power and hence, the total consumption of air.

In this system each container may be cooled individually, but the benefits of centralised refrigeration machinery are retained. Other benefits are small space requirements and low power consumption, since common air distribution ducts are not required. Last but not least, there is the additional benefit that the cargo in each container may receive individual treatment.

In addition to preserving the exact condition of each cargo at loading, this facility allows for unique flexibility and rapid cargo handling. Containers may be stowed and unloaded irrespective of the type of cargo and conditions at the ports of loading and discharge. Each container is connected to its own cooling unit or Stalicon module. The primary refrigerant is R-22 and the secondary agent is brine. The module comprises an insulated unit incorporating an air cooler, control valves, fan and motor, defrosting equipment, container couplings, temperature sensors and a fresh air valve for controlling the carbon dioxide (CO_2) content. Together with the container, the module forms a closed air system, whose atmosphere can be controlled irrespective of that of the other containers. Each module consequently has a number of functions requiring control and monitoring. This is accomplished with the aid of a computer-based control and monitoring system, which has been developed specially for use on board reefers (refrigerated cargo vessels) and container ships.

In total five screw-type freon compressors are installed, of which one is a standby set and a supplementary cooling-down compressor. Each compressor has its own independent circuit with evaporator and condenser, thus in total five brine cooler (evaporators) are present. These five systems are interconnected to one standby receiver, with sufficient capacity to take the refrigerant of any system. The brine or refrigerant is circulated from the ship's engine room to the air coolers in the units and back again. The temperature of each stow is controlled by a three-way brine recirculation valve, which receives its signal from a computerised control unit (PID control – PID stands for Proportional Integration Differentiation).

The desired delivery air temperature is also adjusted via this computer, of which part is located in the engine control room with measuring devices in each reefer bay. If the valve is closed, the same is automatically put in the recirculation position, which means that the brine by-passes the brine cooler and returns to the brine room, where normally five brine pumps are located.

In the brine room delivery and return valves are fitted. Each group of stacks in the holds has its own delivery and return brine main, which is connected to three cooling mains in the valve manifolds in the brine room. The refrigeration system is fitted with a flash-gas equipment for the purpose of increasing the capacity of the plant.

The system is designed to keep frozen cargo frozen but is not capable of freezing cargo from a previously unfrozen state. During recent years a lot of claims related to damage to frozen or chilled meat loaded on board vessels equipped with such systems have been received. The cause of the damage to the frozen or chilled meat is mainly due to preshipment problems, i.e too high temperatures of the meat at the time of shipment on board. The master is not in a position to clause the Bill of Lading for the porthole containers in the port of loading.

The porthole containers are delivered for shipment without having been connected to the clip-on units to maintain a stable temperature or without nitrogen injection at the ports of loading. The vessel's staff have to rely on the information received from the shippers that the cargo has been stuffed at a temperature of minus 18°C or minus 1°C, for reefer and chilled cargo, respectively. The master has no control whatsoever over the temperature of the cargo inside the containers. By the time the containers are connected to the coupling device on board the vessel and before obtaining the first temperature printout the vessel is already underway and therefore it is not possible to clause the bill of lading.

Recently a claim was received in respect of frozen meat stuffed into a porthole container and legal proceedings were started by the claimants against our member in France. The facts are the following: The vessel loaded five FCL/FCL porthole containers stuffed with frozen hake fillets in Buenos Aires destined for Le Havre. Shipper's instructions were to maintain minus 18°C during ocean carriage. After three weeks the vessel arrived at Le Havre. The day after the vessel's arrival at Le Havre the containers were unloaded. Due to the fact that no clip on units were available at Le Havre, the containers were only connected to the plant in the container yard two days after the containers' discharge from the vessel. The next day a sanitary survey was carried out and the containers showed temperatures ranging between minus 12.0°C and minus 13.3°C.

The five containers were provided with nitrogen clip on units for subsequent transport to the consignees' premises. A joint survey was carried out at the consignees' premises and a general depreciation of seven per cent was agreed between the parties. The surveyor acting on behalf of the cargo interests attributed the damage to the cargo to the fact that the containers had been left without refrigeration or ventilation at the container yard between discharge and delivery to the receivers. The surveyor representing Gard's Members' interest diagnosed pre-loading damage as the container's temperature logbooks on board the vessel revealed that the return temperatures had always been incorrect i.e. from the time of loading on board to the time of the discharge, which made him draw the conclusion that the cargo was not properly frozen at the time of handover from the shippers to the vessel in Buenos Aires.

The discharge port stevedores contended that they had supplied cold air at minus 18°C while the containers were in their custody. The vessel's captain alleged that the containers had not been connected in the yard over the weekend due to lack of available equipment. Cargo underwriters commenced legal proceedings and our lawyer was instructed to issue third party proceedings against the stevedores.

The plaintiffs contended that the delivery temperatures were not minus 18°C during the first six days, i.e. as from the time of loading in Buenos Aires. According to the first print outs of the vessel's logbook the return temperatures varied from minus 4°C to minus 12°C. During the whole voyage the return temperatures were approximately 4 to 5°C below the delivery temperature, i.e. 10 to 13°C and during the last part of the voyage 14 to 16°C.

The question was whether the carrier should have claused the Bills of Lading and whether the master had been in a position to clause the Bill of Lading. The Court ruled in favour of our Member and held that:
(1) The porthole system is not capable of freezing cargo, which has been loaded with too low temperatures before loading on board the vessel.
(2) The carrier has no reasonable means of checking the temperatures and stowing of FCL/FCL porthole containers before loading on board the vessel.
(3) The carrier was not in a position to clause the Bill of Lading for this kind of FCL/FCL porthole containers.
(4) The carrier had exercised due diligence and was not estopped from referring to pre-shipment damage as being the origin of the damage claimed.
(5) Since the case against our Member was dismissed, the third party proceedings against the stevedores was found to be groundless.

The claimants did not appeal the case. According to our Le Havre correspondents, the comments made by the judges as far as transport in porthole containers is concerned are in line with current jurisprudence of the local tribunal.

Containers overboard close to port limits

Gard News 151,
September/November 1998

Over the years the Association has experienced several cases of containers going overboard, also within or close to port limits, and there are reasons to suspect that in some of the cases the securing devices have not been fully in place.

We are aware that ship operators sometimes have the cargo unsecured after leaving port and before arrival. The reasons for doing so are generally time and money. In port stevedores may not allow the crew to do this type of work and may charge high fees for doing it. That problem was recently encountered by one of our Members, who wanted the crew to secure the containers on the way out from the loading port. The Association was consulted and recommended strongly against the procedure. However, a number of operators may choose such solutions, so stevedore policies may have an influence on cargo safety. Arriving in port, the situation may be the same, or an operator may simply want to have his vessel ready for discharge upon arrival and thereby save time in port.

An example

Scenario: a feeder container vessel was on the approaches to Mumbai outer harbour, travelling at 8 knots when the vessel made a sharp turn to starboard, which caused her to heel heavily to the same side. The weather was described as "prevalent turbulent monsoonal swell and seas".
Loss: containers carried on the hatch covers were stacked in three tiers. Six 40 foot containers went straight overboard from hatch No. 1, one 40 foot and two 20 foot containers fell down on deck.

Cause: an inspection following the incident revealed sheared and broken twistlock fittings. Metal fatigue and improper locking of the twistlock fittings could be a part of the picture, but the main cause was put down as "improper/inadequate form of securing/lashing of containers with failure to use cross bar lashings, as the vessel is on feeder trade conducting short, quick voyages".

The Association's previous experience would indicate that the only proper way to operate with containers is to strictly follow the vessel's approved stowage and lashing plan. The safest method is the recommended combination of twistlocks, turnbuckles, rods and cones with appropriate stress loadings as recommended by the manufacturers.[1] It can be seen from the example given that proximity to the berth is no guarantee of safety as far as lashing arrangements are concerned.

1 See the articles "Will your Containers Shift? – Some Points to Check" and "Shifting Containers" in this edition of Gard News.

Will your containers shift - Some points to check

Gard News 151,
September/November 1998

Several articles in this edition of Gard News highlight the problem of containers shifting.[1] In order to assist Members to prevent this type of incident we outline below some points to be borne in mind when carrying containers on deck, as this is when shifting most often occurs and when the consequences of shifting are most costly and wide ranging.[2]

Stowage and Securing

(1) Shippers' instructions should be checked and conformed with.[3]
(2) Containers should be stowed so that the weight of the units is borne by the corner posts only, and maximum deck/hatch weights (for purpose-built containerships read tier and stack weights) are not to be exceeded. Containers sides are not to be used as restraining walls. If containers are stuffed by the carrier, proper care should be exercised with regard to securing contents, particularly heavy items. For containers not stuffed by the carrier, spot checks are recommended.[4]
(3) Spot checks of container weights should be conducted. Where a container weight can not be checked, and is suspected to be incorrect (for instance given its reported contents), the maximum gross weight should be applied for the purposes of securing. Centres of gravity should also be assumed to lie at the geometrical centres of the container, and the number, disposition and breaking strain of the lashings should be calculated accordingly. The general rules of seamanship are always worth bearing in mind:
(a) the total holding power (in tonnes) of all lashings holding the cargo item vertically down to the deck should be no less than three times the gross weight of the cargo item;
(b) the holding power (in tonnes) of all lashings preventing sideways movement (port to starboard) and of lashings preventing forward to aft movement should be no less than seven-tenths and three-tenths respectively of the figure in (a), above.

1 See the articles "Shifting Containers", "Container Types and Problems", "Containers Overboard Close to Port Limits" and "When Boxes Box with Each Other" in this edition of Gard News.
2 For a more detailed discussion on this problem see the article "Shifting Containers" in this edition of Gard News.
3 The carrier is still obliged (e.g., under the Hague/Hague-Visby Rules) to properly and carefully load, stow and carry the cargo. Accordingly, the carrier may be obliged to arrange a protective stow if it is readily apparent that one is necessary, even though it has not been requested.
4 With units such as flat-racks, poor securing of contents may be readily apparent, and if this is not detected or is ignored, the carrier may face difficulties in avoiding liability for damage/loss resulting from such poor securing.
5 The Cargo Securing Manual is required to provide information with regard to the specifications of fixed and portable securing devices, inspection and maintenance schemes, handling and safety instructions, stowage and securing instructions, other allowable stowage patterns, and the forces acting on cargo units. For more details see the article "Cargo Securing Manuals" in this edition of Gard News.

(4) The Cargo Securing Manual[5]/ Classification Society approved securing manual/lashing plans should always be consulted and adhered to, unless there are good grounds for questioning them. In such cases, the relevant authority/Society should be consulted before any decision is made.
(5) Periodic checks of stevedore/crew securing work is recommended, and all securing must be in place and checked (for tightness, proper application and arrangement) before sailing. Further inspections should be conducted at regular intervals during the voyage, weather permitting, and securing is not to be removed before berthing. Appropriate adjustments should be made if required and all of this should be properly recorded in the deck log book.
(6) Stacking on non-purpose-built containerships should be avoided, but if this is not possible, the stack should be no more than two units high. Each base corner on the lower container should be restrained by a welded securing device such as I beam, deck socket with shoe twistlock or locator cone, and interlayer stacking cones or turnfoot twistlocks should be fitted at each corner between the containers. Additional securing will be necessary depending on the exact arrangement.
(7) For containers stowed adjacently on non-purpose-built containerships, loop lashing is not to be practised. Double inter-layer stacking cones or screw bridge fittings should be used to give a more rigid stow.
(8) For the proper application of bulldog grips, manufacturers' or rigging suppliers' instructions and seamanship books should be consulted. Grips should be the correct size for the wire used and the u-bolt should be fitted against the loose, tail or dead end of the wire (dead ends to be whipped/ taped before cutting to prevent unravelling). The other part of the grip – the saddle or bridge – should be fitted against the working part of the wire. The first grip should be positioned close to the neck of the eye (or thimble) with the others facing the same direction, spaced apart at six times the diameter of the wire rope. The number of grips will depend on the type and diameter of the wire. PVC-coated wires should have the coats removed and the grips applied to the wire, not the coat, as slipping is found to occur.
(9) Welded devices should be used in preference to timber chocking. All welding to be inspected prior to the device being used. Where timber chocking is the only alternative, it should be properly secured within itself using nails, wedges, bolts, etc.
(10) Deck securing points must provide effective leads in terms of the axes of the forces being resisted, and be so arranged to avoid chafing. The securing points must not be overloaded by holding more lashings than they can safely take, and if necessary additional points are to be welded.
(11) A proper assessment of the forecasted and possible weather conditions should be made before the vessel sails and the securing arrangement should reflect the worst expected weather. Similar assessments should be conducted at appropriate intervals during the voyage. The vessel should be routed,[6] if possible, to avoid rough weather, and courses and speeds should be adjusted to avoid excessive rolling and water on deck. Stabilisers should be used if fitted. Extra securing may be necessary during the voyage, weather permitting, in cases where the worst expected forces are likely to be/ have been exceeded.
(12) Stability must be adequate for the whole voyage and must conform with Classification Society lashing plan conditions. Excessive stability should be avoided as this often subjects deck cargoes and their securing to greater forces than is necessary.

Maintenance and repair

(1) The cheapest securing device is not usually the best in terms of wear and reliability.
(2) Securing devices must be handled with reasonable care, and not thrown, dropped or left lying about the ship. When not in use devices should be placed in protective stows.
(3) Check all devices before use for signs of wear and damage. This goes for both fixed devices, such as securing points on decks/hatches and the containers themselves (particularly the corner castings),[7] as well as portable devices such as wires, stacking cones, lashing rods and turnbuckles. Suspect devices should never be used, and always stored separately (for repair/ replacement) from usable devices.
(4) Follow the inspection, maintenance and repair instructions of the manufacturer and replace gear in accordance with the manufacturers' recommendations or whenever it is considered suspect. Sufficient spare devices should be carried on board the vessel. The upkeep of appropriate records of all inspections, repairs, and maintenance work is essential.
(5) A log of all securing devices should be maintained, with photographs, using correct trade names and part numbers as per the manufacturers' handbook. Duplicate replacements can then be ordered easily. All replacement devices should be checked for compatibility with other devices.
(6) All fixed and portable devices should be clearly marked with safe working loads (or similar load rating) and be of sufficient strength for the task.

6 There are organisations which offer weather routing services.
7 Container condition may be checked by the port/terminal at the point of entry and copies of relevant documentation can be requested. Spot checks on container weights, security, and contents also provide opportunities to check container condition. When containers are being secured, corner castings can be closely checked.

Shifting containers

Gard News 151,
September/November 1998

Over the years the Association has had experience of several serious incidents involving containers shifting. Most problems arise with containers loaded on deck, and this is not surprising as under-deck stowage is often in cell guides.[1] Deck cargoes are exposed to the elements and greater transverse forces,[2] and there are numerous things required of the carrier if deck carriage is to be successful (which also means there are numerous things that can go wrong).[3]

Apart from deck stowage being the most common factor involved with shifting containers, the consequences of shifting on deck can be particularly wide ranging and costly. Damage may be caused to the shifted container or other units contacted, and where this involves toppling from a stack, damage may be extreme. This may be particularly critical if a reefer or tank container is involved. Where adjacent units are affected, a domino effect can result in a number of containers shifting and even being lost overboard. If numerous containers are lost the vessel may be caused to list and this could lead to further shifting as well as stability problems. Invariably the contents of lost containers will be a total loss, and added to the cost of this is the likelihood that the shipowner may be required by the State, whose waters may be affected, to carry out search and recovery (or at least pay for it).[4] The contents of containers may also cause harm to the environment and this may lead to claims for damage to property and/or resources. State penalties and fines may be imposed.

There are numerous factors involved with the shifting of containers carried on deck and this article attempts to identify and discuss these.[5]

Defective securing devices

Very often the proximate cause of containers shifting is a defect in the securing devices themselves. Securing devices invariably receive some fairly rough treatment, and this can result in metal fatigue, fractures, breakage, excessive wearing, distortion or other damage. Rust will readily form under the conditions experienced at sea and this process of corrosion will accelerate the weakening process. Simple wearing can affect devices such as shoe twistlocks and base sockets to which the former fit. With such devices the edges/lips can become so worn that the twistlock can easily slip out or leave such a small degree of metal to metal contact that the excess clearance allows the containers to move. Once this momentum is started and excessive loading results, all other securing devices can quickly fail. Mechanical failure sometimes results from a manufacturing defect and more often than not this is associated with cheaply made devices.

Incompatible securing devices

With the multiplicity of device manufacturers and the lack of standardisation, many devices are designed to be used only in conjunction with other devices of the same make. An example of this is shoe twistlocks which are incompatible with deck sockets. Another example is the joint use of twistlocks having either right or left handed closing levers. In such circumstances it is very difficult to tell if the twistlock is closed or open, since in the same lever position one device would appear to be closed and the other would appear to be open. One can imagine how dangerous such a practice is.

Incorrect securing device application

Non-purpose-built containerships are frequently involved with many securing device application problems. On such vessels steel wires are the common lashing medium, and where bulldog grips are used to either join two ends or form a loop, numerous failures have been found to occur. Incorrect grip sizes, numbers of grips and improper grip to wire application have all contributed to these failures. Timber chocking is popular practice on non-purpose-built containerships, principally because it is cheaper and quicker than welding restraints, e.g., I beams or base sockets (for twistlocks). Sometimes, however, the chocking is not secure within itself, and shipped seas in particular have a habit of breaking up the chocking arrangement.

Poor lashing angles and leads are yet another example of incorrect securing device application. This is not usually a problem on vessels designed or properly adapted for the carriage of containers on deck, since the deck/hatch lashing points are positioned to avoid chafing and to be most effective in terms of resisting forces. A common example of the chafing problem arising on non-purpose-built containerships is loop lashing. This is the bad practice of lashing two adjacent containers with one wire, which passes through the adjacent corner castings of each container. Such a practice may lead to the wire becoming overloaded. Overloading can also occur where fixed securing devices, like deck eye pads, are made to hold more lashings than they can safely take. Such an arrangement is often associated with poor lashing leads, and accordingly the problem becomes compounded.

The looseness of lashings could be said to be another area of incorrect securing device application. This can lead to a container or containers gaining momentum as mentioned above. Slack securing usually arises from stevedore/crew laziness, poor workmanship and/or perceived/actual time constraints, and such shortfalls are exacerbated when, through poor maintenance, devices are too stiff to operate. Common examples of this are twistlocks left in the not fully closed position and slack turnbuckles. Of course, securing devices may also work themselves loose during a voyage, particularly in heavy weather.

Bad stowage

Another cause of shifting is the stow arrangement, an example of which is when two twenty foot containers are stowed on one forty foot container. Most containers are constructed and designed to stand on the four bottom corner castings alone, and it can be appreciated that there are

1 There are a number of container vessels operating today with cell guides fitted on deck.
2 For further information and explanation see the article "A Basic Guide to the Principles of Transverse Stability" in Gard News 145, March 1998, Pages 14-18.
3 The reader may also wish to refer to the article "Carriage of Containers in Bulk Carriers" in Gard News 118, July 1990, Pages 24-25.
4 This will be particularly likely if shipping lanes are affected or there is a threat to the environment caused by the container or its contents.
5 The article "Will your Containers Shift? – Some Points to Check", in this edition of Gard News, outlines a number of points to be borne in mind in terms of preventing such occurrences.

no such supports located at mid length on a forty foot container. The roof and top rails are not designed to bear such weights, and buckling will likely occur. This may lead to a collapse of the stow, and thus shifting. A similar problem arises where the bottom side and end rails rest on dunnage boards (which are required to give better resistance against slipping than metal (the container) to metal (the deck/hatch) contact). A collapse may also occur because tier and stack weights (for non-purpose vessels read maximum deck weights or hatch weights) are not adhered to. Where containers are stowed adjacent to break-bulk cargoes a number of failures were also found to result because containers have been thought able to act as restraining walls. The stow within the container is just as important, and if contents do shift this will likely affect securing devices, possibly to the extent of overloading.

Stability

As previously mentioned, deck cargo, as opposed to under-deck cargo, is usually exposed to greater transverse forces. Stability can therefore be of great significance and associated with this is the problem of containers weight. It is often the case that the weight of containers is actually in excess of that declared or estimated, and the total difference may mean that a vessel's initial metacentric height (GM) is much lower than calculated. With a likely further reduction in the GM during the voyage a capsizing moment can be formed, and this may be severe enough to overload securing arrangements. On the opposite end of the scale, a large GM can result in heavy rolling subjecting lashings to excessive and often sudden forces.[6]

Operator's error

Whilst operator's errors could be said to play a part in all of the causes of container shifting discussed so far, it is most obvious, and perhaps the sole cause, in cases where containers have shifted as a result of having been secured shortly after, or unsecured shortly before, berthing. This essentially time and cost-saving measure is more than outweighed by the huge risks involved, not just in terms of losing the odd container, but to the safety of life and the ship itself. If containers are not properly secured, it may only take a relatively small force to cause movement, and once this starts, the domino effect can take over. Such a force may come from the vessel heeling over on a large turn or suddenly heeling on an emergency turn, or by a sudden squall bringing strong gusts of wind and choppy seas.[7]

Securing devices/arrangements with insufficient strength/restraining power

Whilst all other aspects involved in securing of containers on deck may be satisfactory, the arrangement may be of insufficient strength to withstand the forces being exerted. This is a common source of securing failure and thus container shifting, and it is more than often associated with forces having been underestimated, wrong devices (or combinations of the same) having been used, or simply insufficient devices having been used. Non-purpose-built containerships are notably involved with such problems, particularly where timber chocking is used. Such restraints are far less effective than welded devices, and if additional securing is not provided, shifting can occur.

For many purpose-built containerships the securing arrangement is calculated and approved by a Classification Society, and failures commonly result because the Society's approved lashing plans, or their attached conditions, are not adhered to.[8]

It can be seen that there are numerous causes contributing to the shifting of containers on deck, and in many cases a combination of these actually occurs. In terms of liability for damage/loss to the cargo, the difficult defences of "latent defect"[9] (of the securing devices) and "perils of the sea"[10] are often thought to be more protective than they actually are. Whilst in many cases the weather has been very poor, it is often found that the proximate cause of the loss is lack of maintenance and/or other human error.

6 See footnote 2.
7 See the article "Containers Overboard Close to Port Limits" in this edition of Gard News.
8 The plans are usually based on maximum stack and tier weights (which in turn depend on such things as maximum deck/hatch weights, stability considerations and bridge visibility), weather criteria (force 10, ship roll +/- 30 degrees, ship pitch +/- 8 degrees is commonly used) and stability conditions. A condition of many plans is a maximum GM (see footnote 2).
9 Hague and Hague-Visby Rules Article IV, Rule 2 (p).
10 Hague and Hague-Visby Rules Article IV, Rule 2 (c).

Containers

2.11.6.4 IMDG labels
During loading, attention should be given to IMDG labels identifying dangerous goods. The labels on these containers should correspond to the descriptions in the dangerous goods manifest and dangerous cargo stowage or bay plan. Storage of these containers should always be in accordance with the dangerous goods stowage plan. If discrepancies are noted, the Master should ensure that the container is re-loaded in the correct stowage position as planned.

2.11.6.3 Seals and doors
Loss of containerised cargo often arises prior to loading. The methods of theft are becoming more and more sophisticated and traces of unlawful opening of containers are very difficult to discover.

The speed with which containers are loaded onto a ship makes it difficult to check whether:
– the seals are intact
– the seal numbers concur with the numbers in the cargo documents.

Wherever possible the Master should establish a procedure for checking the container seals. Any irregularities should be immediately notified to the stevedores or terminal operators responsible for the loading, as well as the ship's agent and the Company.

When broken seals are discovered and replaced by the crew, a record should be made in the log book and the bill of lading together with the relevant seal numbers.

On checking individual containers, whether ashore or on board, the crew should be instructed to look for defective or loose bolts on hinges and seal brackets and to identify any signs of interference. Any such observations must be reported immediately to the responsible officer so that appropriate action, such as closer inspection or rejection of the container can be taken

2.11.6.7 Lashing and securing of deck containers
After loading containers on deck, particular attention should be paid to proper lashing. Only approved lashing material of suitable strength and quality should be used in accordance with the ship's approved container lashing plan and the Cargo Securing Manual as approved by the flag State administration.

Mixing of different securing devices should be avoided, such as left- and right-handed twist locks and sockets.

During the voyage, the container securing arrangements should be regularly checked and tightened where necessary and such checks should be entered in the log book or the relevant ship's forms.

2.11.6.2 Condition of containers
If containers are not properly maintained, they are likely to cause damage to their contents. Whilst

it is difficult, if not impossible, for the Master or his officers to check whether the doors of the container are watertight or if holes in the roof allow water to penetrate, close observation of cargo operations during loading of containers may give some useful indications.

Containers with apparently neglected exteriors should be closely inspected. This is particularly relevant to tank containers, as even tiny holes, defective valves or gaskets allow the liquid contents, often of a hazardous nature, to escape and create a dangerous air mixture. This can cause personal injury by contact, inhalation or cause an explosive air mixture. If an inspection raises doubts as to the safety of the container, it should be off-loaded.

2.3.2. Broken container seals

Broken container seals should be dealt with similarly to damaged cargo, and a replacement seal should be requested from the shipper unless the container has been sealed by the Company. If the shipper refuses, the ship should protest in writing, provide its own replacement seal and clause the mate's receipt. It is also advisable to open the container and inspect the goods (see section 2.2.5.1. The apparent order and condition of the goods). If the goods are found in a damaged condition, the steps should be followed as set out in section 2.3.1. General steps to take should be followed.

2.11.8.4 Reefer containers

When containers with refrigeration units are to be loaded, the Master should, together with the engineer responsible, ensure that the ship's electricity output is sufficient for the supply of power during the entire voyage. To prevent a power failure or insufficient power supply, special attention should be paid when additional power is required:

– on entering and leaving port using the bow-thruster
– during cargo operations in port using the vessel's cargo gear.

The Master should ensure that:

– all reefer containers are properly connected to the ship's power sockets
– a daily check on the temperature of reefer containers is carried out if required by the Company or the charterer to prevent damage to the cargo by insufficient cooling
– a daily written record is kept and retained for at least two years.

2.11.6.6 Container weights and stability

Weights of containers are sometimes not properly checked ashore or the tare weight has been disregarded so that the ship's stability is affected. If in any doubt the Master is advised to:

– carry out his own stability tests
– re-check the ship's stability calculations
– demand clarification from ashore
– unload and re-weigh suspect containers.

Container stack collapse – Overweight and unfit containers

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The collapse of a container stack on board a vessel is a significant and far too prevalent problem. According to Gard Services' statistics for major claims for the five policy years from 1996 to 2000[1] the problem has accounted for the loss of 212 containers overboard. However, statistics do not tell of the grave consequences that can result from container stack collapse – loss of life or injury, damage to the ship, equipment, cargo and the environment. The consequences are likely to be graver where containers stuffed with dangerous goods are involved. Even where the consequences are fortunately minimal, the disruption to vessel operations alone can be very costly.

Overweight and unfit containers

Whilst the causes of container stack collapse can be numerous and often difficult to determine, more recent cases suggest that overweight (actual weight, i.e., container and cargo, exceeds manifested/stowage plan weight) and unfit containers (not structurally sound) are causes that may not be fully appreciated or understood. It is also fair to say that the situation is likely to worsen in the absence of carriers taking preventative measures.[2]

Recent cases

Two recent cases which Gard Services has been involved with have certain similarities. Both cases involved heavy weather and the collapse of an on-deck container stack in way of the bottom container. In each case, the bottom container was of questionable fitness in terms of structural integrity. However, that was not the only factor. In each case the weight of certain containers within the stack was found to be in excess of the manifested weight. In one case, four containers (forty foot units) in the collapsed stack were found to have 18 MT or more undeclared cargo, which even resulted in the maximum operating gross weight for each container being exceeded.[3] It is worth noting that an African load port was involved in all these cases, and although the problem of overweight and unfit containers is a world-wide one, it may well be greater in places where container fleets are generally older and where the enforcement of container related regulations is lacking.

The more obvious risks of stack collapse

Overweight and unfit containers give rise to some fairly obvious risks as far as stack collapse is concerned. For example, overweight containers may result in the overloading of securing systems, fittings or even decks on which they are loaded and an unfit container at the base of the stack may be unable to withstand the compression load

[1] Claims on the Association in excess of USD 75,000.
[2] The IMO Sub-committee on Dangerous Goods, Solid Cargoes and Containers reported at their 7th session in September 2002 that, out of a total 19,704 containers inspected by governments in the period 1996-2000, some 1,737 containers were found with Container Safety Convention (CSC) plate and structural deficiencies.
[3] The maximum operating gross weight for standard ISO TEUs/FEUs is 24/32 MT.

from containers on top. A standard ISO container should be design-tested to withstand 192 MT of weight stacked on its corner posts when subject to 1.8 times the force of gravity. An unfit container may only be able to withstand a weight much less than that. In circumstances where containers on top exceed their maximum operating gross weights, as in the case mentioned above, even a sound container may become subject to a weight on top in excess of 192 MT.

Racking and transverse forces – the less obvious risk of container collapse

A standard ISO container is designed to withstand limited forces. One of the most important, but less obvious limitations to be aware of is that of transverse racking force. This is a force applied to the top container fittings (whilst the bottom fittings are assumed to be anchored) and which racks the end structures of the container sideways. For standard ISO containers this is typically 15,000 kilos, which means that the container is design-tested to withstand a racking force of 150 kN.[4]

It can be appreciated that the bottom fittings of a container properly secured to the deck of a vessel will generally have good resistance to the transverse forces acting on those fittings as a result of the vessel's motion. However, the top fittings will be subject to greater transverse forces, particularly where the container is the bottom one in a stack. According to most classification society rules, it can be assumed that the top fittings of a base container in a stack will be subject to a proportion of the transverse forces acting on each container in the stack. The largest factor in determining the transverse force acting on a given container will be the container weight (with cargo). The vessel's Cargo Securing Manual (CSM)[5] will often include guidance to assist in determining transverse forces.

Racking forces will usually be greatest on containers stowed at the bottom of stacks and will be of greatest concern where the resistance to such forces is lowest, for example in stacks where there is no or little resistance to transverse forces from cell guides, lashings and shoring arrangements.

Container stowage plans

A vessel's container stowage plan will often state limiting weights (container plus cargo) for each stack and sometimes each container position within a stack. These limits should take account of loading constraints on securing systems, fittings, decks and on the containers themselves.

Observation of the limiting stack weight alone will be insufficient to avoid the risks of stack collapse. One must also consider the distribution of weight within a given stack, primarily to ensure that the safe working load of any item of securing equipment is not exceeded. There is often a problem for example where heavy containers are stowed in the top tiers of an on-deck stack, and where transverse forces are at their greatest. Where overweight containers are unknowingly shipped, the risk of limiting stack weights being exceeded or individual securing items being overloaded is obviously much greater.

Limiting weights should take account of the 150 kN transverse racking force limit on any given container. However, these limiting weights may allow little or no margin for error in some cases. In other words, where the container weights are close to the limiting weights as per the stowage plan, the transverse racking force may be close to the 150 kN limit. Whilst lashings providing resistance to transverse forces will afford some margin of safety, this margin may well be lost if the container is not structurally sound or if the actual weight (container plus cargo) is in excess of the limiting weight.

The investigation of the UK's Marine Accident and Investigation Branch into a container collapse incident on board the vessel DUTCH NAVIGATOR is worthy of mention. The limiting weights, as per the stowage plan, for containers within the stack were found to produce a transverse racking force on the base container (which contained dangerous goods) slightly in excess of the 150 kN limit. However, because the actual weights (container plus cargo) were in excess of the limiting weights, the actual racking force on the base container was calculated to be 278 kN. The problem was compounded by a lack of transverse securing and some questionable repairs to the frame of the base container.[6]

Recommendations

1. A careful watch should be kept for containers which may be unfit for carriage. Any container with suspect fitness should not be loaded, but put to one side for closer inspection ashore. If still considered unfit[7] the container should be rejected for carriage until it has been certified fit by an approved surveyor.

2. The container inspection should include the Container Safety Convention (CSC) plate, which should evidence whether certified inspections are in or out of date.[8] A classification society sticker does not mean that the container is in fact fit.

3. Container terminals often inspect containers at points of terminal exit/entry to avoid being held responsible for pre-existing container damage. Container lines may be able to make arrangements with terminals they use such that concerns as to container fitness are reported to the line.

4. Vessel staff should pay particular attention to the fitness of containers intended to be stowed at the base of stacks and follow similar steps to those suggested in 1 above, before other containers are loaded on top.

5. Spot checks on container weights are also advisable. Again, arrangements between lines and terminals might be possible. Some terminals will have their own policies. An alternative would be to request the shipper to provide evidence supporting the actual weight, like a weighbridge certificate. It is of course preferable to target checks, especially to containers with high density contents.

6. It would be a worthwhile exercise for owners to check what margin exists between the theoretical forces, based on the limiting weights in the stowage plan/CSM,[9] and the maximum forces designed to prevent the overloading of containers (particularly the transverse racking force limit of

[4] A kilo-Newton is roughly equivalent to one MT of force. A standard ISO container is also design-tested to withstand a racking force in the longitudinal direction of 125 kN.
[5] A CSM, in an approved form, is a requirement of the International Convention for the Safety of Life at Sea (SOLAS).
[6] The MAIB's report of November 2002 can be found at www.maib.dft.gov.uk.
[7] One could also include here containers with contents that are not properly secure, and which through damage to the container could lead to stack collapse. Particular attention should be paid to containers with bulging sides. Certain formalities will need to be observed if containers are opened.
[8] This information may also appear on stickers. See the article "Inspection and certification of cargo containers" in Gard News issue No. 151.
[9] It is important to note that limiting weights may be based on a maximum GM and in circumstances where the actual GM is greater, transverse forces will also be greater.

150kN), securing systems, fittings, decks and containers. If the margin is low, the vessel will be more at risk of stack collapse associated with overweight and unfit containers – unknowingly shipped, despite checks. In these circumstances it would also be worthwhile for owners to discuss with those designing/approving the stowage plan/CSM whether there is a case for reducing limiting weights. A more temporary solution may be to increase securing (to resist transverse forces) or to re-stow containers in less sensitive stacks.

7. A record of offending shippers (providing overweight/unfit containers) could be kept and information could be shared with other container lines calling at the same port.

8. Owners should seek the incorporation of appropriate charterparty provisions which, amongst other things, require charterers to:
   a. Have in place procedures for preventing the shipment of overweight and unfit containers.
   b. Provide full and accurate details (including gross weights) of goods and containers and a full and accurate stowage plan preferably before the ship's arrival at the load port.
   c. Warrant that all containers carried are constructed to an approved design, are properly maintained and are not loaded beyond their maximum operating gross weight.
   d. Ensure that stowage is effected such that limiting weights are not exceeded.

   However, it should be borne in mind that, if a stack collapse does occur, it will often be very difficult to determine the cause(s), particularly if evidence, such as an overweight container, is lost overboard. Therefore, far better than relying on charterparty provisions[10] is to avoid the problem in the first place.

9. In the event of a container collapse incident Gard Services should be contacted to discuss the appointment of a surveyor to investigate.

This article has been produced with the kind assistance of John J Banister Ltd, Marine Surveyors and Consultants.

[10] The Boxtime charterparty form goes some way towards providing for the above requirements.

Recommendations on carriage of Calcium Hypochlorite UN Nos. 1479, 1748, 2208, 2880 by the International Group of P&I Clubs

Member Circular No. 16/99, November 1999

There have been several large fires in cargo ships over the past two years, which have been attributed to the carriage of calcium hypochlorite. In response to these casualties the International Group of P&I clubs established a calcium hypochlorite working group which has met to share information and listen to the views of scientific experts.

The results from full-scale tests on package sizes routinely used when shipping calcium hypochlorite in freight containers indicates that the transport requirements in the IMDG Code are inadequate.

Calcium hypochlorite is classed as an oxidising substance (IMDG Class 5.1). It is manufactured in various forms, both high strength ("HCH") and low strength known as bleaching powder. Hence the various UN classifications. All forms of calcium hypochlorite will react violently when contaminated by an organic material. The reaction will generate heat and oxygen, which will feed any resulting fire. Impurities can be introduced either via insufficient or damaged packing material alternatively due to poor manufacturing standards. The product is also spontaneously combustible and sensitive to high temperatures; sensitivity increases as the package size increases. Recent research on hydrated HCH (UN 2880) indicates that a violent reaction can occur at temperatures that are encountered by vessels transiting tropical areas. The Critical Ambient Temperature (the temperature at which a violent decomposition of the material occurs) for a 20ft freight container packed with 432 drums of 40 kg (net) of UN 2880 is calculated by the scientists to be about 37°C. The Critical Ambient Temperature for a 20ft freight container packed with 80 drums of UN 200 kg (net) is calculated to be about 30°C. For a violent reaction to occur, these temperatures would have to be maintained for up to 3 weeks, although at higher temperatures (or if the product is impure) this period is reduced considerably.

The IMDG code today allows UN 2880 to be shipped below deck but "Away from sources of heat where temperatures in excess of 55°C for a period of 24 hours or more will be encountered".

In light of the results from the investigation into the thermal properties of hydrated HCH UN 2880, the International Group believes that this provision is inadequate and has requested IMO to review all entries in the IMDG Code concerning the requirements for transportation of all forms of calcium hypochlorite.

Realising the product's importance in providing clean water to disaster struck areas and taking into account an envisaged delay before any changes to the IMDG Code will take effect, the International Group of P&I clubs has decided to issue interim recommendations for the carriage of calcium hypochlorite cargoes. The purpose of these guidelines is to enable the continued shipping of calcium hypochlorite in a way that will lessen the risk of exposing the carrying vessel and shipboard personnel to danger, until such time as the IMDG Code has been reviewed by IMO.

Recommendations:

Cargoes of calcium hypochlorite classified as UN1748, 2208 and 2880 should be carried on deck only, out of direct sunlight and clear of living quarters.

Cargoes of calcium hypochlorite classified as UN1748, 2208 and 2880 should be packed in clean drums not exceeding 45 kg net weight. Calcium hypochlorite should never be packed for marine transportation in sacks or in bags.

On those voyages for which prolonged mean air temperatures can be anticipated to reach 35°C, additional measures for limiting temperatures within freight containers carrying calcium hypochlorite, classified as UN1748 and UN2880, should be adopted, for example by ventilation or mechanical cooling, alternatively the total weight of calcium hypochlorite should be limited to 14 tonnes per freight container.

Cargoes of calcium hypochlorite classified as UN1748, 2208 and 2880 should not be carried in freight containers larger that 20ft.

It has been reported that some manufactured hydrated HCH contains water in excess of 10%, which takes the product out of the specification for calcium hypochlorite hydrated UN 2880. This has resulted in the product being declared as UN 1479 (oxidising solid N.O.S), which has less onerous provisions for carriage. Research has shown that increased water content lowers the thermal stability of the product. It is recommended that calcium hypochlorite declared as UN 1479 should be subject to the same transport requirements as UN 2880.

Yours faithfully,
ASSURANCEFORENINGEN GARD
-gjensidig-

Sven-Henrik Svensen
Deputy Managing Director

Recommendations on the carriage of calcium hypchlorite

Member Circular No. 7/2000, October 2000

We refer to our Circular No 16/99 and to the Working Group's previous Recommendations on Carriage of Calcium Hypochlorite UN Nos. 1479, 1748, 2208, 2880 and to The International Maritime Organisation's (IMO) Marine Safety Circular No. 963 dated 1 June 2000.

After several large fires in cargo ships in the 1990s involving Calcium Hypochlorite, The International Group of P&I Clubs Commissioned full-scale tests on the package sizes of this cargo, which are routinely shipped. The results were such that experts advising the International Group viewed the prevailing transport requirements for this product group as inadequate and recommended that they be amended.

The International Group therefore delivered a submission to the February 2000 meeting of the IMO Sub-committee on Dangerous Goods, Solid Cargoes and Containers (DSC5), recommending amendments to the IMDG Code transport requirements for calcium hypochlorite. The changes recommended to the IMO were based on the scientific results reflected in the Group circular referred to above. After much debate in plenary session at DSC5 the Sub-committee decided to recommend the Maritime Safety Committee to partially amend the rules in the updated version of the IMDG Code (Amendment 30) coming into force 1 January 2001. However, the amendments will not introduce any changes to package sizes for this product. Nor will the amendments to it expressly require stowage of the cargo "Clear of Living Quarters". The Marine Safety Committee (MSC 72) adopted the recommendations of DSC5 and the entries for calcium hypochlorite (UN Nos. 1748, 2208 and 2880) will be amended in the new version of the code. In addition an MSC Circular (as attached) was issued urging all parties to implement the amended requirements as soon as possible.

The International Group supports the actions undertaken by the IMO and agrees with the amendments introduced in the new IMDG Code. However, the failure to introduce package size limitation and the failure to require stowage "Clear of Living Quarters" contradicts scientific advice received from the experts advising the International Group. All of the full-scale tests performed by the International Group on calcium hypochlorite "UN No. 2880" indicates that larger packages can develop a critical condition at temperatures which can be encountered in cargo holds of modern container vessels. Furthermore, if calcium hypochlorite develops a critical condition (for any reason) it will emit chlorine gas, which is toxic and the runaway reaction will develop extreme heat that will ignite surrounding cargoes, which demonstrates the need to consider the proximity to living quarters in stowage of such cargoes.

Consequently, it is the recommendation of the International Group that Members involved in shipments of calcium hypochlorite products should, in addition to the new requirements of the IMGD Code, ensure that cargo transport units are stowed "Clear of Living Quarters" and that the size of the individual packages stowed in the cargo transport unit should not exceed 45 kg net weight per package.

We have learned that shipments of calcium hypochlorite have been loaded on board vessels under different names, which has lead to some of the shipments not being declared as dangerous cargo. Below is a list of synonyms for products that are calcium hypochlorites or products related to calcium hypochlorite. Depending on the exact chemical composition of the product it may or may not become unstable at temperatures encountered in the ship's hold.

B-K POWDER
BLEACHING POWDER
BLEACHING POWDER, containing 39% or less chlorine
CALCIUM CHLOROHYDROCHLORITE
CALCIUM HYPOCHLORIDE
CALCIUM HYPOCHLORITE
CALCIUM OXYCHLORIDE
CAPORIT
CCH
CHLORIDE of LIME
CHLORINATED LIME
HTH
HY-CHLOR
LIME CHLORIDE

Yours faithfully

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