IUMI

Statement on Fit-for-Purpose Packaging for the Transport of Goods

Why shippers should consider “Fit-For-Purpose Packaging”

Loss-free delivery of cargo whether it's grapes from South Africa to Northern Europe, high-tech machinery from Europe to Australia or even clothing from China to Brazil, all cargoes need adequate protection.

Today, concern for the environment drives many commercial business decisions; one example is packaging. Some goods are at risk of being insufficiently packed due to the use of “green” materials that may lack the robustness to withstand the rigors encountered in the supply chain. Insufficient packaging is not only responsible for a high frequency of smaller losses due to the collapse of packaging but also for larger casualties when, for example, critical components or sophisticated CNC equipment suffer damage while being handled, loaded or stowed during the transport process.

> All shippers need their goods to arrive at destination intact and in good condition and should therefore ensure they are packed fit for purpose. They should fully understand both the static and dynamic stresses inherent in the different modes of transport as defined in the CTU-Code.[1] The Code represents state-of-the-art thinking; however, if national guidelines or directives of even higher standards are available, they take precedence. The application of such guidelines and directives also achieves the end goal of this statement, namely “fit-for-purpose packaging”.

Transport of goods

By definition, the transport of goods involves deliberately changing their location by the organized interaction of labor and a means of transport by road, rail, sea or air or likely a combination of two or more. It can be a distance of just a few meters using a forklift or pallet jack or over several thousand kilometers involving several modes and multiple handlings including periods of interim, temporary storage.

The wide variety of operations generates differing stresses which need to be taken into account in planning packaging. Consideration must be given to the risks of loss and damage involved in the handling, transport and storage operations envisaged in order to ensure that packaging is appropriate to the goods it is designed to contain, support and protect?

[1] IMO/ILO/UNECE “Code of Practice for Packing of Cargo Transport Units

Stress assumptions

There are three fundamentally different types of stresses:

- mechanical stresses , which can be further subdivided into static and dynamic stresses
- climatic stresses and
- biotic stresses deriving from living organisms.

Mechanical Stress

Mechanical stresses can vary massively depending on circumstances. If, for example, a crate is carried as general cargo in the hold of a ship with other cargo stowed on top and alongside, the top, end and side panels must be capable of bearing static superimposed load as well as the dynamic loads created by the ship's motion at sea on itself and the adjacent cargo. If this crate is transported in a general purpose ocean- or flat-rack container, the same stresses will be limited by the maximum stacking height and width inside the fully enclosed container. (Note: If a container is shipped door-to-door, this will, or should, eliminate in-transit handling of the cargo.)

The same principle applies to corrugated cartons. If cartons are to be stacked in a container, all of them, especially those at/near the bottom tier, must be constructed to enable them to absorb the pressure exerted from superimposed weight. If the same cartons are palletized and stacked several units high, this pressure increases significantly and the carton construction must be adjusted accordingly.

Dynamic mechanical stresses result from the movements of the means of transport along with intermediate handling, and these are added to the aforementioned static loads. These stresses are often expressed as a multiple of the acceleration due to gravity "g" (9.81m/s²) relative to the weight of the cargo. For example, a dynamic load of 0.5g laterally (side-side) means that the dynamic load is equivalent to half its static weight in that direction. If not properly restrained, dynamic stress can cause cargo to slide or shift laterally, longitudinally and even vertically. It can also result in goods breaking free within the package itself, items tipping over and distorting the packaging.

Transport, Handling and Storage Stresses

The individual forces that act on the goods from transport, handling and storage loads will depend on a wide range of factors, such as:

- Are the goods palletized?
- What is the intended stacking height?
- Will forklift trucks or cranes be used for handling?
- Are spreaders available for handling?
- Is there suitable cargo handling equipment at destination?
- Are the goods to be stored in the open at the port of loading, transshipment port or destination?
- Are temperature extremes and/or precipitation or environmental factors to be experienced during transport??
- Is it to be expected that the goods will be stored in an extremely humid or arid climate at their destination?

- What is the size of any transportation ship to be used, the stowage position and the sea climate on the route?

Sensitivity of the goods

Packaging can only optimize its protective function if there is a clear understanding of the requirements needed to safeguard the goods. These can include protection from:
- shock/impact
- vibration,
- water and humidity (or lack thereof) including condensation
- temperature extremes
- ultraviolet rays
- Electro-static discharge
- atmospheric pressure
- pilferage

Cargo securing

Cargo securing measures are required to counteract the potential dynamic loads arising during transportation. Packaging, therefore, must additionally be constructed to facilitate attaching of the securement devices (wire rope, banding straps and even dunnage) and to withstand the localized pressure or forces exerted by them. In addition, there must also be measures used to secure the goods in the packaging itself. Needless to say, if unusual stresses are to be expected, these must be explicitly identified and taken into account.

Markings

If goods are to be handled and transported safely, the packaging must be marked correctly and uniformly as this is really the only way a shipper can communicate their desires to cargo handlers and transport personnel. It is vital that the position of the center of gravity is marked on crates with a gross weight in excess of 1,000 kilograms. Optimal sling and forklift entry points should also be clearly identified, as should any instruction or caution. In order to allow for clear understanding of the requirements, internationally recognized pictorials (symbols) are recommended. Commonly used symbols can be found in the International Organization for Standardization document, ISO 780, entitled: “Graphical Symbols for Handling and Storage of Packages.”

Climatic stresses

Climatic “stresses” act on the goods and packaging throughout the entire duration of the transit period. If the packaging is hygroscopic such as corrugate, paper or wood), its strength can be significantly weakened. In the open air as it can be subjected to rain, snow, ice and humidity, as well as arid conditions along with dust and industrial fallout.

Biotic stresses

The integrity of goods and their packaging may additionally be threatened by pest damage, insects, animals and mold. As many types of packaging, and indeed the goods

themselves, are of organic origin, they provide a source of food for some pests, or are simply good places to hide.

Generally wood packaging materials to also encompass pallets and dunnage must be either chemically or heat-treated prior to transport. The relevant regulation is ISPM 15 (International Standards for Phytosanitary Measures) "Guidelines for Regulating Wood Packaging Material in International Trade".

Mold and its waste products can be highly toxic and cause damage to the goods. Pre-shipment quality inspection of the packaging materials, treatment of the packaging, and storage and stowage in clean, dry conditions are all fundamental prerequisites.

Configuration of fit-for-purpose packaging

Packaging personnel need to have ready access to a wide range of information to allow them to properly design and complete the packaging. This includes:
- weight of the goods
- dimensions
- center of gravity
- transport routing
- shipment duration
- modes of transport (land and sea)
- handling method(s)
- whether containerized or break-bulk
- stowage location
- time of year
- sensitivity of the goods
- storage required during or after the journey

It is only if this information is obtained, coupled with the best practices within the CTU Code that shippers will, with respect to the acceleration forces to be expected, be able to construct fit-for-purpose packaging. This proper design prevents not only uneconomical, over-dimensioned packaging, but also inadequate packaging that puts the goods at risk.

Recommendation from the IUMI

Packaging should be able to withstand the anticipated transport conditions within the entire supply chain as defined in the CTU Code. These stresses determine the appropriate design and completion of packaging.

We are not advocating over-dimensioned packaging capable of withstanding *any* load. Rather, our intention is to ensure that the packaging is well suited, fit-for-purpose.

We also must mention that in some instances, packaging and goods will be subjected to stresses that far exceed the expected normative state and failure (damage) will ensue. However, if the packaging is damaged but the goods it was meant to protect is unharmed, then it has done its job.

Finally, certain terms such as "seaworthy packaging" or " commercial packaging" have sometimes been used; however, designations such as these are imprecise, open to interpretation and subsequently can leave the design and fabrication of the packaging to chance.

Loss Prevention Committee of the IUMI

About IUMI The International Union of Marine Insurance e.V. (IUMI) is a non-profit association established for the purpose of protecting, safeguarding and advancing insurers‘ interests in marine and all types of transport insurance. It also provides an essential forum to discuss and exchange ideas, information and statistics of common interest for marine underwriters and in exchange with other marine professionals. IUMI currently represents 46 national and marine market insurance and reinsurance associations.

The roles of IUMI are to
act as a focal point and representative voice on behalf of the marine and transport insurance industries in dialogue with all interested parties,
share information and research that are non-commercially sensitive with regard to marine and transport insurance,
bring together marine insurance practitioners to facilitate the exchange of technical information and best practice, and
provide information on positions taken by IUMI.

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