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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the
Transport of Dangerous Goods

Twenty-seventh session, 4-8 July 2005
Item 4(c) of the provisional agenda

PACKAGINGS (INCLUDING IBCS AND LARGE PACKAGINGS)

Approval of Intermediate Bulk Containers

Strength of "Single Trip" or "Lightweight" Composite Intermediate Bulk Containers (IBCs) with metal outer framework and plastic inner receptacle

Transmitted by the expert from Australia

SCOPE

This proposal aims at recommending possible amendments to Chapter 6.5 with the respect to testing of Composite Intermediate Bulk Containers:

RELATED DOCUMENTS

UN/SCETDG/23/INF.4 - (Spain) New requirements for rigid plastic (H) and Composite (HZ) IBCs
UN/SCETDG/26/INF.22 - (ICCR, ICCA, ICPP) Comments on INF.4
ST/SG/AC.10/C.3/2003/56 - (Australia) Approval of Intermediate Bulk Containers.
UN/SCETDG/26/INF.41 - (Australia) Approval of Intermediate Bulk Containers.
ST/SG/AC.10/C.3/52 - Report of the Sub-Committee of Experts on its twenty-sixth session
ST/SG/AC.10/32/Add.1 - Report of the Committee of Experts on its second session

Introduction

1. During the twenty-sixth session the expert from Australian presented informal document INF.41 relating to the strength of "single trip" composite IBCs (also referred to as lightweight IBCs). It is noted that the term "single trip IBC" is not used in the UN Model Regulations. This issue was

discussed and there was general support for the paper, however, as indicated in ST/SG/AC.10/C.3/52, para. 108, there was insufficient time to fully consider this proposal and it was agreed to examine this issue in the next biennium.

2. As indicated by the related documents referred to above the issue of the whether or not lightweight IBCs are strong enough to withstand the rigours of transport has been raised at meetings of the Sub-Committee on a number of occasions since the twenty-third session. From comments noted there appears to be a reasonable level of agreement that a problem exists with lightweight ("single trip") composite IBCs. The relevant parts of informal document UN/SCETDG/26/INF.41, presented by the expert from Australia at the twenty-sixth session, have been incorporated into this paper.

Lightweight IBC: designed with minimum outer packaging, particularly on the upper surface, and specially designed pallet base. The inner plastic receptacle of this unit has bulged out under load and has deformed the outer metal receptacle.

Issues

3. The current trend in the manufacture of Intermediate Bulk Containers (IBCs) has seen a progressive move to "lightweight" composite intermediate bulk containers (rigid plastic inner receptacle and metal outer framework of types 11HZ1, 21HZ1 and 31HZ1) for the transport of liquid, and some dry, dangerous goods, which are then carried in Cargo Transport Units (CTUs). In an effort to minimise bulk, weight and cost, the metal outer frame structure is often limited to the minimum required to surround the inner receptacle and support another IBC stacked above it. Further, the side protection is such that even contact occurring as a result of loading in a CTU can result in failure (see example below). Australia is of the opinion that loading of an IBC in a CTU is "normal handling" for the purposes of section 6.5.1.5.6 and an IBC should be able to withstand such stresses.

4. As noted by the expert from Spain in UN/SCETDG/23/INF.4 and by the expert from Australia in UN/SCETDG/26/INF.41 it appears that some "lightweight IBCs" are manufactured and marketed as single trip IBCs. This trend has been recognised by industry as is evidenced by reports in the Hazardous Cargo Bulletin in the November 2003 and August 2004 editions. The later lists the output from major composite IBC producers giving details of whether the product range included "Multi trip" or "Single trip" IBCs and whether a removable liner was available. A supplier of composite IBCs in Australia has provided further evidence of a dual standard stating that:

"…, regarding Multi trip and Single trip (limited trip):- These are terms we use to differentiate the two products we offer. The Multi trip version is built in a more robust design and customers experience over 70 trips in five years. The single trip (limited trip) models are built with different fittings i.e. different valve, pallet, cage and no top protector and therefore although UN approved for 5 years (subject to 2.5 yr. test) rarely last longer than 4-8 trips (less than one year in heavy usage) …".

5. During the twenty-third session ICCR, ICCA and ICPP submitted informal document UN/SCETDG/26/INF.22 in response to the Spanish paper. This paper contended that all rigid plastic (H) IBCs and composite (HZ) IBCs that were marketed as "single trip" IBCs had been tested in accordance with Chapter 6.5 of the Model Regulations and as such were safe for multi trip use regardless of the marketing appellations applied to them. Australia has difficulty accepting this view as experience indicates that lightweight IBCs lack the strength for multi trip applications and are only really designed for short-term use. In addition, and as noted above, these units appear prone to damage during normal handling. To give an example; the pictures below show the failure of two **new** lightweight IBCs that occurred some time after they had been loaded in a CTU. The combination of weak side protection, possible contact between IBCs during loading, and pressure from the IBCs loaded on top, caused the spill.

The two damaged composite IBCs after undamaged units have been removed. Note there is no damage to the leading corner of either IBC that would indicate a significant impact during loading operations. It is possible part of the side frame may have been tripped as the IBCs were set down next to each other. The side cage on the IBC on the left of the picture has failed and the inner receptacle has been forced out into the side to the IBC on the right.

The damaged IBCs after being removed. The IBC on the left has suffered a complete structural failure of the outer casing and the "rigid" inner receptacle has been forced out. The IBC on the right has failed due to the pressure applied to the outer casing by the bulging inner receptacle of the other IBC. Again there is no damage to the leading corners of either IBC that would indicate a significant impact during loading operations.

6. As noted above it is assumed that these IBCs have passed the relevant tests detailed in section 6.5.4 and as indicated by ICCR, ICCA and ICPP in UN/SCETDG/26/INF.22 but in spite of this, it appears the IBCs have failed as a result of routine handling. Such failures and deformation of composite IBCs, as noted in the picture on page 2 of this paper, call into question the adequacy and design of "single trip"/"lightweight" composite IBCs. It is noted that there are no tests that would simulate the effect of normal handling on the sides of an IBC. However, in respect of existing tests it has been reported that permanent deformation of the outer casing of lightweight IBCs is occurring during tests but is not always considered as making the unit unsafe for transport.

Proposals

7. The expert from Australia is of the opinion that the determination of what level of deformation renders the unit unsafe for transport is a subjective judgement and could be subject to inconsistent application. As such it is recommended that the words *"which renders* [the IBC] … *unsafe for transport"* be deleted and section 6.5.4.6.5.(a) of the Model Regulations be amended to read:

"All types of IBCs other than flexible IBCs: no permanent deformation of the IBC and pallet base, if any, and no loss of contents"

8. The expert from Australia is of the opinion that normal handling, as described in section 6.5.1.5.6 includes handling in and out of a CTU, noting IBC packing instruction special provisions B1 and B2 specify that particular goods carried in an IBC will be loaded into a CTU. As such the expert from Australia recommends the Sub-Committee examine the possibility of developing tests that would adequately test the ability of the IBC to withstand the contact and friction events associated with such normal handling particularly on the side structure of the outer casing of composite IBCs. In the interim it is recommended that a note be added to section 6.5.1.5.6 that states:

"Where an IBC is to be loaded in a (Cargo) Transport Unit the term "normal handling" includes the stresses on the IBC associated with loading and unloading of the (Cargo) Transport Unit."
