



WORKSHOP ON TRANSPORT REGULATION FOR USED LITHIUM BATTERIES

Brussels, 1 September 2010

**Presentation of the German Proposals to the
37th session of the
Sub-Committee of Experts on the Transport of Dangerous Goods**



Need to transport used batteries

Larger lithium batteries such as battery systems used for electric vehicles are elaborate and cost-intensive technology: increasing necessity to cover long distances by all means of transport, at least sea transport.

Used or spent batteries have to be carried to special test laboratories or test houses or to the manufacturer for examination within the framework of quality assurance programmes as well as for maintenance and repair.

Specialized facilities for disposal and for an environmentally rational recycling have to be used.



Introduction

Existing provisions

UN Model Regulation do not differentiate between new and used lithium batteries, Used batteries have to comply with the provisions assigned to UN 3090, UN 3091, UN 3480 and UN 3481.

P 903 a and P 903 b ADR/RID concern transport of smaller used batteries and the collection together with other type of batteries, but not transport of larger batteries. No special transport provisions for used batteries in other modes of transport. ICAO-TI prohibits damaged/defective batteries.

Germany submitted Document ST/SG/AC.10/C.3/2010/7 and UN/SCETDG/37/INF.56 to the UN Sub-Committee of Experts on Transport of Dangerous Goods to question which transport conditions should apply to used batteries.

Introduction

Problems

The condition of used batteries may differ widely:

- A used battery may be of same quality as a new battery, well-functioning and as safe as new;
- There are spent batteries at the end of their life cycle, aged but without any further defects;
- There are batteries with defects due to mechanical impact (e.g. crash); due to electrical impact (overcharge, depth discharge, short circuit, inversion of polarity) or due to thermal impact as overheating.

Introduction

Problems

The condition of used batteries is often not known:
The question if a battery is still safe for transport premise an evaluation of the condition of a battery prior to transport.

Aspects to consider

- Known impacts on the battery
- Possible risks resulting from that impact
- External indication of defects: damages (cracks, deformation) of the outer case, leakage, development of fumes,
- Internal electric condition - indications of defects: Does the battery management system still work and how are the parameters - like those of a new battery or are there differences?
- The behaviour of the battery during storage for a certain period of time prior to transport.



Introduction Issues

Possible Approach: Identification of typical transport operations

Three main issues have been identified:

- **Transport of damaged lithium batteries while developing process**
- **Transport of used lithium batteries at the end of their life time**
- **Transport of lithium batteries with indication of damage**



Introduction

Issues

Transport of damaged lithium batteries while developing process

- When prototypes of lithium cells or batteries are transported for testing they are exempted from the testing requirements in Chapter 38.3 of the Manual of Test and Criteria if packed as specified in SP 310.
- At this stage, it is very likely that the batteries are damaged by the performed tests: prototypes may fail the tests according to Chapter 38.3 of the Manual of Test and Criteria or other tests, e.g. crash tests, cause necessarily the damage of a battery.
- Dependent on the character of the extent of the damage, further measures may be necessary to ensure the safety of transport. Possible measures may be e.g. additional absorbing material in the inner packaging, securing in such a way that they cannot slip or leak, cooling or a period of storage before transport.
- The determination of the concrete measures can be left to the responsibility of the industry as the measures may be influenced by the knowledge which kind of tests have been carried out and how the battery reacted.
- A requirement could be added to SP 310, saying that additional measures have to be taken, if the batteries have been damaged by the tests and the requirements described under (a) and (b) are not sufficient to ensure their safe transport.



Transport of used lithium batteries at the end of their life time

- Used lithium batteries at the end of their life time can be treated in the same way as new batteries if there are no indications that they are damaged. They still comply with SP 230.



Introduction

Issues

Transport of lithium batteries with indication of damage

- It has to be decided to which extent batteries with defects should be allowed for transport, whether an approval of the competent authority should be required or which transport conditions are necessary to ensure a safe transport.
- Air transport: Special provision A 154 of ICAO TI reads as follows “Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).”
- German Point of view: Such batteries can not be prohibited for all modes of transport. On the spot disposal is usually not possible.
- Possible amendments: Inclusion of a new packing instruction for damaged lithium batteries in the UN Model Regulations.



Transport of lithium batteries with indication of damage – Possible new Packing Instruction

- Only approved packagings should be allowed, also for larger batteries of a gross mass of 12 kg or more. If the batteries are too large for approved packagings which have to comply with the limits of 6.1.1.1 (net mass not more than 400 kg and capacity not more than 450l) only packagings which are approved by the competent authority for these batteries may be used.
- The packagings shall conform to the packing group [I] performance level.
- The cells or batteries are packed in a tight closable inner packaging made from nonflammable material, the inner packaging has to be resistant against possible leaking liquids.
- Free spaces in the inner packaging are filled completely with non-combustible, nonconductive, absorbing material.
- The cells or batteries are packed and fixed to prevent short-circuits.
- [Used] cells or batteries have to be stored at least for [5] days prior to transport.
- Alternative measures should be allowed only if they provide same level of safety.



Transport of lithium batteries with indication of damage – Scope of a new Packing Instruction

- Scope: The new packing instruction should apply to new damaged batteries (e.g. lithium batteries that are subject to recall campaigns) as well as to used damaged batteries.
- A **special provision**, assigned to UN 3090, UN 3091, UN 3480 and UN 3481, should be included in the Model Regulations to define the scope of the new packing instruction.
- The content of this special provision should be as follows:
 - Used lithium batteries at the end of their life time may be packed according to P 903.
 - Used lithium batteries with indication of damage that may have impact on the safety during transport have to comply with the new packing instruction.
 - Define lithium batteries with indication of damage



Transport of lithium batteries with indication of damage

Lithium batteries with indication of damage are in particular:

- Batteries identified by the manufacturer as being defective for safety reasons,
- Batteries with damaged or considerably deformed cases,
- Batteries with leakage or venting or
- Batteries that are not diagnostic-capable.



Introduction

Conclusion

The UN Sub-Committee of Experts on Transport of Dangerous Goods recognized need for further work on the issue, no text was adopted at the 37th session

Proposal: The Sub-Committee should take stock of the situation. All delegations are invited to submit documents indicating:

- A list of practical problems encountered at the national level, or for industry, encountered in disposal and recycling;
- Local or regional measures already taken in the context of transport regulations;
- Possible interference with other legal frameworks, for example environmental protection regulations governing waste disposal and recycling.