

# Developments and Initiatives

## Creating modern regulations for the transport of dangerous goods

by Dr. Chris Jubb, Chair of ISO/TC 58, Gas cylinders, and Randy Dey, Chair of ISO/TC 197, Hydrogen technologies

The world of international transport has seen the need to guarantee safety when carrying dangerous goods, such as gases in cylinders. Each mode of

transport has developed its own rules such as the *International Maritime Dangerous Goods Code* developed by the International Maritime Organization (IMO) and the *Technical Instructions* published by the International Civil Aviation Organization (ICAO). Since goods often travel by more than one mode, there is a clear need to harmonize requirements, and this work has been achieved by the United Nations Economic and Social Council's Sub-Committee of Experts on the Transport of Dangerous Goods (UN/SCETDG).

The Sub-Committee has become the paramount instrument of global harmonization in the transport of dangerous goods. Its recommendations, commonly known as the "Orange Book", were first published in 1956, and are now in their 16<sup>th</sup> edition. The recommendations, presented these days under the heading, "*Recommendations on the Transport of Dangerous Goods, Model Regulations*", (or *UN Model Regulations*), provide a basic scheme of provisions for the uniform development of national and international regulations.

Thus, the *UN Model Regulations* are an excellent tool for writing rules for the transport of dangerous goods, which apply to all international journeys, and can also be applied to national journeys.

### Taking the lead

ISO technical committee ISO/TC 58, *Gas cylinders*, consists of manufacturers and users of gas cylinders committed to global harmonization. When the UN/SCETDG decided to create requirements for gas cylinders in the late 1990s, ISO/TC 58 naturally became closely involved. Its involvement served a two-pronged approach. On the one hand, the committee was able to influence national and international regulations and, on the other hand, encourage the use international standards instead of national standards, thereby reducing barriers to trade.

When the first recommendations on gas cylinders were published in 2001 (12<sup>th</sup> edition of the *UN Model Regulations*),

it was a classic combination of essential safety requirements and a listing of ISO standards which detailed how these essential requirements were to be met. In all, there were 17 standards from ISO/TC 58.

With the recent publication of the 16<sup>th</sup> edition, the list of standards has increased to 27 to accommodate evolving technology of gas cylinders such as composite construction (reinforcement by fibre wrapping), welded cylinders of steel, stainless steel and aluminium alloy and testing by means of acoustic emission.

### Highest possible quality

Each new proposal to accept an ISO standard into the regulations is not taken lightly. The UN/SCETDG experts (using their own specialists) examine the standards to ensure their clarity, enforceability and compatibility with the safety principles of the dangerous goods regulations. It is therefore essential that ISO standards are clear and constructed to fit the structure of the regulations. This care pays dividends and ISO/TC 58 has a good record of having its standards accepted.

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There will be more proposals emerging from ISO/TC 58 as the committee seeks to reflect the evolution of manufacturing and testing techniques in the development of its standards. For example, there are two proposals pending for the committee's next meeting.

Having been part of establishing ISO as a valued participant in creating modern regulations for the transport of dangerous goods, ISO/TC 58 is pleased that new standards associated with the emerging use of hydrogen, namely ISO 16111:2008, are able to find a place in the regulations.



## Hydrogen technologies

ISO technical committee ISO/TC 197 was created in 1990 to develop standards in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen.

The secretariat of ISO/TC 197 resides with the Bureau de normalisation du Québec (BNQ), which acts on behalf of the Standards Council of Canada (SCC) with Sylvie Gingras as Secretary.

## A success for hydrogen storage

Developed by ISO/TC 197, *Hydrogen technologies*, ISO 16111:2008 will help pave the way for larger, widespread applications of hydrogen. The International Standard describes the service conditions, design criteria, type tests and routine tests for ensuring the safety of metal hydride assemblies used for the storage of hydrogen.

Until now, hydrogen stored in metal hydride assemblies could not be shipped or transported without special permit allocated on case-by-case basis. This costly and lengthy process did not ensure consistency across international borders. It was also seen as a barrier to the large-scale commercialization of this convenient method of hydrogen storage.

## Gas cylinders

ISO technical committee ISO/TC 58 is responsible for the standardization of gas cylinders, their fittings and characteristics relating to their manufacture and use.

The secretariat of ISO/TC 58 resides with the British Compressed Gases Association, which acts on behalf of the British Standards Institution (BSI) with Stephen Elliott as Secretary.

With the publication of ISO 16111:2008 and its subsequent uptake by the UN/SCETDG, these redundancies are no longer a concern. This success story, which seems simple on paper, required a lot of work and coordination.

## A cooperative spirit

ISO 16111:2008 first appeared as ISO technical specification ISO/TS 16111:2005. A joint working group of ISO/TC 197/WG 10 and ISO/TC 58/SC 3, *Gas cylinder design*, had only 24 months to upgrade the document to the status of International Standard. All interested stakeholders, namely ISO/TC 197 and ISO/TC 58 experts, the regulatory authorities, the industry association represented by the USA Fuel Cell Council (USFCC), as well as the ISO Central Secretariat, had to work in a cooperative spirit to make this happen.

Throughout the development process, ISO/TC 197 ensured UN/SCETDG was informed of the progress of ISO 16111. This information exchange, which was supplemented with USFCC support, was pivotal in ensuring the standard's place in the *UN Model Regulations* shortly after its publication.

ISO/TC 197 had to invest many resources to publish ISO 16111:2008 in the short timeframe that would allow its reference in the 16<sup>th</sup> edition of the Orange Book. In the end, the fruitful collaboration proved well worth the effort.



## About the authors



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## Industry benefits

The provisions of the *UN Model regulations* applicable to hydrogen stored in metal hydride assemblies will allow shipment of hydrogen storage assemblies certified as conforming to ISO 16111 to become routine. The industry will no longer need special permits allocated on a case-by-case basis and the hydrogen stored in metal hydride assemblies will be able to travel across international borders.

The removal of this technical barrier to trade, which is the result of a close cooperation between ISO and the UN/SCETDG, represents a major benefit for industry. It should certainly be considered as a model for the future. ■