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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

Thirty-fifth session  
Geneva, 22–26 June 2009  
Item 5 of the provisional agenda

**MISCELLANEOUS PROPOSALS OF AMENDMENTS TO THE MODEL REGULATIONS  
ON THE TRANSPORT OF DANGEROUS GOODS**

The life of gas cylinders of composite construction bearing the UN mark

Transmitted by the International Organization for Standardization (ISO)<sup>1</sup>

**Introduction**

1. The construction of UN composite gas cylinders is in accordance with standards ISO 11119-1:2002, ISO 11119-2:2002 or ISO 11119-3:2002 listed in 6.2.2.1.1. The application of these standards is restricted by two notes which;

- (a) Require the cylinders to be designed for unlimited life; and
- (b) Limit the life to 15 years which may be extended by the competent authority based upon test evidence.

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<sup>1</sup> In accordance with the programme of work of the Sub-Committee for 2009-2010 approved by the Committee at its fourth session (refer to ST/SG/AC.10/C.3/68, para. 118(d) and ST/SG/AC.10/36, para. 14)

2. ISO proposes that the first of these notes be modified so that so that composite cylinders may be designed for a limited life. Additionally, when the life of such gas cylinders is limited the date of the end of its life shall be shown by marking.

### **Background**

3. ISO 11119 consists of the following parts, under the general title Gas Cylinders of Composite Construction – Specification and test methods:

- Part 1: Hoop wrapped composite gas cylinders
- Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners
- Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners

4. The three part standard was approved and published in September 2002. All three parts allow the manufacture of cylinders with a design life from 10 years to non-limited life based on an extensive series of performance tests which are supported by periodic inspection in the field.

5. In July 2002 the Working Group on Additional Provisions for the Transport of Gases in Geneva, 1-10 July 2002 agreed to refer to the standards ISO 11119-1, -2 and -3. At this meeting the expert from the United States of America requested that the life of ISO cylinders be limited to no more than 15 years. After lengthy discussion on the life expectancy of these composite cylinders, it was agreed to add a provisional limitation to the life of these cylinders of 15 years.

6. In December 2002, the Sub-Committee and Committee received two requests related to the life of composite cylinders. One was from the European Industrial Gases Association (EIGA) concluding that there is no need for any limitation on the life of any type of composite cylinder. The second was from the expert from the United Kingdom proposing the acceptance of a lifespan of up to 30 years for composite cylinders.

7. The UN Working Group agreed to adopt ISO 11119-1:2002 and ISO 11119-2:2002 to specify the requirements for the manufacture of UN composite cylinders in 6.2.2.1.1 of the Model Regulations, 13<sup>th</sup> revised edition but with the following notes:

**NOTE 1:** *In the above referenced standards composite cylinders shall be designed for unlimited service life.*

**NOTE 2:** *After the first 15 years of service, composite cylinders manufactured according to these standards, may be approved for extended service by the competent authority which was responsible for the original approval of the cylinders and which will base its decision on the test information supplied by the manufacturer or owner or user.*

8. In July 2004 the expert from the United States of America proposed to allow the use of refillable composite cylinders designed, manufactured and tested in accordance with ISO 11119-3. In addition he proposed that it should also be subject to the same restrictions shown above for parts 1 and 2 of the standard.

#### **Rationale for modification of note 1**

9. ISO 11119 allows composite cylinders to be manufactured with a design life from 10 years to non-limited life. The intent of this standard is outlined in the introduction of as follows:

“The purpose of ISO 11119 is to provide a specification for the design, manufacture, inspection and testing of cylinders for world-wide usage. The objective is to balance design and economic efficiency against international acceptance and universal utility.”.

10. By requiring that all cylinders eligible for UN marking be designed for unlimited life, the original intent of the ISO standard has been undermined in two ways:

- (a) It will effectively prevent UN composite cylinders from being technically or economically competitive with cylinders currently being constructed and used under other existing standards, regulations, or directives.
- (b) If all ISO composite cylinders are manufactured to have a non-limited life whether there is a need for a non-limited life design or not leads to the unnecessary over design of cylinders and consequent waste of resource materials.

11. The key benefit of using composite cylinders is the light weight. The technology and associated standards have been developed over the past 30 years to enable the safe use of composite cylinders in a variety of applications.

12. When composite cylinders were first approved, the design-life concept was introduced to ensure that a safe working life could be established for each design. The design-life concept also enabled the cylinders to be designed with a balance of optimum efficiency (i.e. lightest weight) and useful service life.

13. The typical design life for composite cylinders today is 15 years. It is estimated that well over 3 million fully-wrapped cylinders with a 15-year design life have been produced since they were first approved in the 1970s.

14. All current national standards permit the design, manufacture and sale of composite cylinders with a specified, limited design life. For example, the European standards EN12245 and EN12257 allow the design, manufacture and sale of composite cylinders with varied design lifetimes from 10 years.

15. It is possible to design composite cylinders so that they have a longer design life. However, in order to accomplish this, additional material thickness is necessary in the design, and, as a consequence, the weight as well as the cost will increase. Some users require a cylinder design life longer than 15 years, and standards now allow a variable or even non-limited design life.

16. The current requirements of 6.2.2.1.1 of the Model Regulations eliminate options for design life and will place undue restrictions on design. It is not necessary for all composite cylinders to be designed for “unlimited life” only.

### **Proposal**

17. In 6.2.2.1.1 replace Note 1 by the following:

***NOTE:** Composite cylinders shall be designed for their required life in accordance with the relevant part of ISO 11119. Cylinders designed for a limited life shall be marked with the date of expiry of that life in accordance with 6.2.2.7.8.*

Insert the following new paragraph at the end of sub-section 6.2.2.7.

6.2.2.7.8 Pressure receptacles of composite construction having a limited life shall be marked with the letters “FINAL” followed by the expiry date year (four figures) and month (two figures). This mark shall be situated adjacent to the area intended for periodic inspection marks.

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