



METHOD FOR CHARACTERIZING ACCEPTANCE CRITERIA DUE TO MECHANICAL IMPACTS ON COMPOSITE CYLINDERS

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Prepared by WG-2 Gas Cylinders and Pressure Vessels

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1 Introduction

Cylinders of composite construction are sensitive to mechanical impact damage, especially when carbon fibre is used. Damage due to mechanical impact(s) require further investigations to quantify damage severity.

The design standards for fully wrapped composite cylinders EN 12245, ISO 11119-2, -3 and -4, and ISO 11515¹ set the minimum requirements for the materials, design, construction, prototype testing and routine manufacturing inspections of composite gas cylinders for compressed and liquefied gases, [1,2,3,4,5].

In particular, these standards require mechanical impact tests such as a drop test and/or blunt impact test for the approval of composite cylinders.

Consequently, the impact traces left on the cylinders resulting from these tests are acceptable.

However, when a cylinder is subjected to more critical impacts, the visual damage of these impacts is unknown.

EN ISO 11623, *Gas cylinders – Composite construction – Periodic inspection and testing*, sets the reference to define damage severity classes to give acceptance/ rejection criteria for composite cylinders, both for the periodic and for the pre-fill inspection procedures [6].

Traces of mechanical impacts observed on the external surface of a cylinder or tube vary, depending on cylinder type, design, size. The requirements of EN ISO 11623 [6] to be applied to qualify/quantify mechanical impact damage severity are in some cases not clear enough and need to be clarified.

Appendix 1 gives an example of a photograph where the decision to discard a cylinder is not clear for the inspector.

2 Scope and purpose

2.1 Scope

This publication gives a method to establish the acceptance criteria for impact damage on Type 3 and Type 4 cylinders and tubes.

This publication specifies the tests to be performed for producing pictures of acceptable and non-acceptable defects.

2.2 Purpose

To provide a method for visual inspection of refillable, transportable fully wrapped composite cylinders with acceptable and non-acceptable examples of impact defects.

3 Definitions

3.1 Publications terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.