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Gaseous hydrogen — Pressure vessels for stationary storage —

Part 3: Pressure cycle test data to demonstrate partial pressure cycle estimation methods

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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Introduction

A much higher level of long-term reliability is required for a pressure vessel in stationary use compared to on-board use, as the risk of a serious incident in the event of a vessel rupture is significantly higher. Reliability is ensured through full-pressure cycle testing in accordance with the performance-based standard, ISO 19884-1 [1] . One of the primary objectives of utilizing stationary vessels is to accumulate hydrogen pressure quickly prior to refuelling vehicles. That is why the pressure of a stationary vessel never decreases to zero in actual use. The expected pressurizing time-history is between the design pressure and 70% of the design pressure, that is, a partial pressure cycle, for which a longer cycle life is expected than the full pressure cycle life. The cycle life extension by the partial pressure cycle seems applicable to other high-pressure hydrogen equipment, such as tubes. Cycle life extension is rather a matter of maintenance for reliable performance. The authority with jurisdiction needs to be convinced that the vessel can be relied upon for a period longer than the nameplate life. This document presents candidate methods for estimating cycle life extension through partial pressure cycling for authorities and users, enabling hydrogen stations to be operated and managed efficiently and safely. This document presents the currently available methods and the test data to support them. However, this document is not intended to inhibit the advancement of new technologies that are presently being developed or used in the market, or those yet to emerge. As these new technologies mature, they will be added in future revisions of this document.