ISO 9809-3:2019 (E)

Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes

Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

4 Symbols

5 Inspection and testing

6 Materials

- 6.1 General requirements
- 6.2 Controls on chemical composition
- 6.3 Heat treatment
- 6.4 Failure to meet test requirements

7 Design

- 7.1 General requirements
- 7.2 Design of cylindrical shell thickness
- 7.3 Design of convex ends (heads and bases)
- 7.4 Design of concave base ends
- 7.5 Neck design
- 7.6 Foot rings
- 7.7 Neck rings
- 7.8 Design drawing

8 Construction and workmanship

- 8.1 General
- 8.2 Wall thickness
- 8.3 Surface imperfections
- 8.4 Ultrasonic examination
- 8.5 Out-of-roundness
- 8.6 Mean diameter
- 8.7 Straightness
- 8.8 Verticality and stability
- 8.9 Neck threads

9 Type approval procedure

- 9.1 General requirements
- 9.2 Prototype tests
- 9.2.1 General requirements
- 9.2.2 Hydraulic burst test
- 9.2.2.1 Test installation
- 9.2.2.2 Test conditions
- 9.2.2.3 Interpretation of test results
- 9.2.2.4 Acceptance criteria
- 9.2.3 Pressure cycling test
- 9.2.4 Base check
- 9.2.5 Bend test and flattening test

9.2.5.1 Bend test
9.2.5.2 Flattening test
9.2.5.3 Ring flattening test
9.2.6 Torque test for taper thread only
9.2.6.1 Procedure
9.2.6.2 Acceptance criteria
9.2.7 Shear stress calculation for parallel threads
9.2.7.1 Procedure
9.2.7.2 Acceptance criteria
9.3 Type approval certificate

10 Batch tests

10.1 General requirements
10.2 Tensile test
10.3 Impact test

11 Tests/examinations on every cylinder

11.1 General
11.2 Hydraulic test
11.2.1 Proof pressure test
11.2.2 Volumetric expansion test
11.3 Hardness test
11.4 Leak test
11.5 Capacity check

12 Certification

13 Marking

Annex A (normative) Description and evaluation of manufacturing imperfections in seamless gas cylinders

A.1 Overview
A.2 General
A.3 Manufacturing imperfections and the procedure for their evaluation
A.4 Acceptance and rejection conditions

Annex B (normative) Ultrasonic examination

B.1 General
B.2 General requirements
B.3 Flaw detection of the cylindrical parts
B.3.1 Procedure
B.3.2 Reference standard
B.3.3 Calibration of equipment
B.4 Wall thickness measurement
B.5 Interpretation of results
B.6 Certification

Annex C (informative) Example of type approval certificate

Annex D (informative) Example of acceptance certificate

Annex E (informative) Bend stress calculation

Annex F (informative) An example of shear strength calculation for parallel threads

Page count: 54