DIN EN ISO 9809-4:2026-11 (E)

Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes - Part 4: Stainless steel cylinders with an R<(Index)m> value of less than 1 100 MPa (ISO 9809-4:2026)

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **2**

4 Symbols **3**

5 Inspection and testing **4**

6 Materials **4**
6.1 General requirements 4
6.2 Controls on chemical composition 5
6.3 Heat treatment 5
6.4 Cold working or cryoforming 5
6.5 Failure to meet test requirements 6

7 Design **6**
7.1 General requirements 6
7.2 Design of cylindrical shell thickness 6
7.3 Design of convex ends (heads and bases) 7
7.4 Design of the concave base ends 9
7.5 Neck design 10
7.6 Foot rings 10
7.7 Neck rings 10
7.8 Design drawing 11

8 Construction and workmanship **11**
8.1 General 11
8.2 Wall thickness 11
8.3 Surface imperfections 11
8.4 Ultrasonic examination 11
8.5 Out-of-roundness 12
8.6 Mean diameter 12
8.7 Straightness 12
8.8 Verticality and stability 12
8.9 Neck threads 13

9 Type approval procedure **13**
9.1 General requirements 13
9.2 Prototype test 14
9.2.1 General requirements 14
9.2.2 Pressure cycling test 14
9.2.3 Base check 15
9.2.4 Bend test and flattening test 15
9.2.5 Torque test for taper thread only 16
9.2.6 Shear stress calculation for parallel threads 17
9.3 Type approval certificate 17
9.4 Specific type approval/production tests for cylinders ordered in quantities below 200 17

10 Batch tests **18**
10.1 General requirements 18
10.2 Tensile test 19

10.3 Impact test 20
10.4 Hydraulic burst test 22
10.4.1 Test installation 22
10.4.2 Test conditions 23
10.4.3 Interpretation of test results 24
10.5 Intergranular corrosion test 25
11 Tests/examinations on every cylinder 25
11.1 General 25
11.2 Hydraulic test 26
11.2.1 Proof pressure test 26
11.2.2 Volumetric expansion test 26
11.3 Hardness test 26
11.4 Leak test 26
11.5 Water -capacity check 27
12 Certification 27
13 Marking 27
Annex A (normative) **Description and evaluation of manufacturing imperfections and conditions for rejection of seamless steel gas cylinders at the time of final inspection by the manufacturer 28**
Annex B (normative) **Ultrasonic examination 42**
Annex C (informative) **Example of type approval certificate 48**
Annex D (informative) **Example of acceptance certificate 49**
Annex E (informative) **Example of shear strength calculation for parallel threads 51**
Bibliography 53