

ISO 9809-4:2026-02 (E)

Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes - Part 4: Stainless steel cylinders with an R_m value of less than 1 100 MPa

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