

ISO 19881:2025-06 (E)

Gaseous hydrogen - Land vehicle fuel containers

Contents

Page

Foreword	vi	
Introduction	vii	
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Service conditions	6
4.1	General.....	6
4.1.1	Standard service conditions.....	6
4.1.2	Container category.....	6
4.1.3	Service life.....	6
4.1.4	Periodic in-service inspections.....	6
4.2	Pressures.....	6
4.2.1	Nominal working pressures.....	6
4.2.2	Maximum pressures.....	6
4.3	Maximum number of filling cycles.....	7
4.4	Temperature range.....	7
4.4.1	Settled gas temperatures.....	7
4.4.2	Container temperatures.....	7
4.4.3	Extreme gas temperatures.....	7
4.4.4	Test temperatures.....	7
4.5	Gas composition.....	7
4.6	External surfaces.....	8
4.7	Installation requirements.....	8
5	Conformance	8
6	Material qualification tests and requirements	8
6.1	General.....	8
6.2	Material requirements.....	9
6.3	Metal containers and metal liners.....	9
6.3.1	Material properties.....	9
6.3.2	Impact test for steel.....	9
6.3.3	Tensile tests for metals.....	10
6.3.4	Sustained load cracking (SLC) test for aluminium alloys.....	10
6.3.5	Corrosion tests for aluminium alloys.....	10
6.4	Ultraviolet resistance of external coatings.....	10
6.5	Fibres.....	10
6.6	Resins.....	10
6.7	Nonmetallic liners (Type 4).....	10
6.8	Bosses for Type 4 containers.....	11
7	Wall thickness	11
7.1	Type 1 containers.....	11
7.2	Liners for Type 2, Type 3, and Type 4 containers.....	11
7.3	Composite reinforcement for Type 2, Type 3, and Type 4 containers.....	11
7.3.1	Stress analysis.....	11
7.3.2	Composite reinforcement stress ratios.....	11
7.3.3	Modified stress ratio test.....	12
7.3.4	Hybrid designs.....	12
7.4	External loads on containers.....	12

8	Threaded openings	12
9	Manufacture	12
9.1	General	12
9.2	Metal containers and metal liners	12
9.3	Nonmetallic liners	13
9.4	Composite containers with metallic liners	13
9.5	Composite containers with nonmetallic liners	13
9.6	Brazing	13
9.7	Welding	13
9.8	End closing by forming	14
9.9	Mounting and protection	14
9.10	Batch definitions	14
9.11	Design qualification tests	14
10	Production tests and examinations	14
10.1	General	14
10.2	Hydrostatic proof and volumetric expansion test	15
10.3	Leak test	16
11	Batch tests	16
11.1	General	16
11.2	Batch material tests	16
11.3	Coated containers	16
11.4	Burst test	17
11.4.1	Batch burst test	17
11.4.2	Periodic burst test	17
11.5	Ambient cycle test	17
11.5.1	Batch cycle test	17
11.5.2	Periodic pressure cycling test	18
12	Rejected containers and liners	18
12.1	Physical test	18
12.2	Leak test	19
12.3	Hydrostatic proof and volumetric expansion test	19
12.4	Ambient cycle test	19
12.5	Burst test	19
13	Thermally-activated pressure relief devices	19
14	Records of manufacture	19
15	Marking and dispatch	19
15.1	Markings	19
15.1.1	General	19
15.1.2	Marking information	20
15.2	Dispatch inspection	20
16	Quality assurance	20
17	Design qualification tests	20
17.1	General	20
17.2	Test requirements	21
17.3	Category A, B and C: design qualification tests	22
17.3.1	Test requirements	22
17.3.2	Ambient cycling test	22
17.3.3	Environmental test	23
17.3.4	Extreme temperature cycling test	24
17.3.5	Hydrostatic burst test	25
17.3.6	Flaw tolerance test	25
17.3.7	Drop test	27
17.3.8	Fire test	28
17.3.9	High temperature pressure static test	35
17.3.10	High strain rate impact test	35
17.3.11	Permeation test	35
17.3.12	Boss torque test	36
17.3.13	Hydrogen gas cycling test	36
17.3.14	Leak before break test	37

17.4	Change of design	38
17.5	Category B: design qualification tests	41
17.5.1	General test requirements	41
17.5.2	Ambient cycling test	41
17.5.3	Hydrostatic burst test	41
17.5.4	Container test for performance durability	41
17.5.5	Container test for expected on-road performance	43
17.6	Category C: design qualification conditions and limitations	43
17.6.1	Marking information	43
17.6.2	Material tests for steel containers and liners	43
17.6.3	Material tests for aluminium alloy containers and liners	43
17.7	Qualification test results	44
Annex A (normative) Visual inspection		45
Annex B (normative) Non-destructive examination		46
Annex C (normative) Records of manufacture		48
Annex D (normative) Pre-test checkout of burner		54
Annex E (informative) Design qualification test rationale		60
Bibliography		84