

# ISO 19881:2025-06 (E)

## Gaseous hydrogen - Land vehicle fuel containers

---

### Contents

Page

Foreword	vi
Introduction	vii
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>2</b>
<b>4 Service conditions</b>	<b>6</b>
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
<b>5 Conformance</b>	<b>8</b>
<b>6 Material qualification tests and requirements</b>	<b>8</b>
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
<b>7 Wall thickness</b>	<b>11</b>
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

<b>8</b>	<b>Threaded openings</b>	<b>12</b>
<b>9</b>	<b>Manufacture</b>	<b>12</b>
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
<b>10</b>	<b>Production tests and examinations</b>	<b>14</b>
10.1	General	14
10.2	Hydrostatic proof and volumetric expansion test	15
10.3	Leak test	16
<b>11</b>	<b>Batch tests</b>	<b>16</b>
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
<b>12</b>	<b>Rejected containers and liners</b>	<b>18</b>
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
<b>13</b>	<b>Thermally-activated pressure relief devices</b>	<b>19</b>
<b>14</b>	<b>Records of manufacture</b>	<b>19</b>
<b>15</b>	<b>Marking and dispatch</b>	<b>19</b>
15.1	Markings	19
15.1.1	General	19
15.1.2	Marking information	20
15.2	Dispatch inspection	20
<b>16</b>	<b>Quality assurance</b>	<b>20</b>
<b>17</b>	<b>Design qualification tests</b>	<b>20</b>
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
<b>Annex A (normative) Visual inspection .....</b>		<b>45</b>
<b>Annex B (normative) Non-destructive examination .....</b>		<b>46</b>
<b>Annex C (normative) Records of manufacture .....</b>		<b>48</b>
<b>Annex D (normative) Pre-test checkout of burner .....</b>		<b>54</b>
<b>Annex E (informative) Design qualification test rationale .....</b>		<b>60</b>
<b>Bibliography .....</b>		<b>84</b>