



BSI Standards Publication

Design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -196 °C

Part 5: Testing, drying, purging and cool-down

National foreword

This British Standard is the UK implementation of EN 14620-5:2025. It supersedes BS EN 14620-5:2006, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PVE/15, Storage Tanks for the Petroleum Industry.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Design and manufacture of site built, vertical, cylindrical,
flat-bottomed tank systems for the storage of refrigerated,
liquefied gases with operating temperatures between 0 °C
and -196 °C - Part 5: Testing, drying, purging and cool-
down

Conception et fabrication de réservoirs cylindriques
fond plat, verticaux, construits sur site, destinés au
stockage des gaz réfrigérés, liquéfiés, dont les
températures de service sont comprises entre 0 °C et -
196 °C - Partie 5 : Essais, séchage, inertage et mise en
froid

Auslegung und Herstellung standortgefertigter,
stehender, zylindrischer Flachboden-Tanksysteme für
die Lagerung von tiefkalt verflüssigten Gasen bei
Betriebstemperaturen zwischen 0 °C und -196 °C - Teil
5: Prüfen, Trocknen, Inertisieren und Kaltfahren

This European Standard was approved by CEN on 27 July 2025.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword	4
1 Scope.....	5
2 Normative references.....	6
3 Terms and definitions.....	6
4 Hydrostatic and pneumatic testing.....	6
4.1 Hydrostatic test	6
4.1.1 General.....	6
4.1.2 Test requirements for each type of tank.....	6
4.1.3 Additional requirements.....	7
4.1.4 Quality of the water.....	8
4.1.5 Conditions of implementation	10
4.1.6 Examination related to hydrostatic testing.....	10
4.1.7 Filling and emptying	11
4.1.8 Post emptying cleaning.....	11
4.2 Pneumatic test	11
4.2.1 General.....	11
4.2.2 Positive pressure test.....	11
4.2.3 Negative pressure test.....	12
4.2.4 Empty checks.....	13
4.2.5 Double-wall double-roof tank systems.....	13
4.3 Specific requirements for membrane tank testing.....	14
4.3.1 Hydrostatic test	14
4.3.2 Positive and negative pneumatic pressure tests.....	15
4.3.3 Global Test.....	16
5 Commissioning	16
5.1 General.....	16
5.2 Procedures	17
5.3 Drying.....	17
5.4 Purging	18
5.4.1 Purging with inert gas	18
5.4.2 Purging with product gas	18
5.5 Cool-down.....	18
5.6 Completion of commissioning activities.....	19
6 Decommissioning	19
Annex A (informative) Cool-down of the primary liquid container/membrane	21
A.1 General.....	21
A.2 Cool-down rates.....	21
A.2.1 Inner Tank.....	21
A.2.2 Membrane.....	21
Annex B (informative) Global test for membrane tanks.....	22
B.1 General.....	22
B.2 Intermediate monitoring.....	22

B.3	Test Phases	22
B.3.1	Concrete outer tank	22
B.3.2	Steel outer tank	23
	Annex C (informative) Guidance for duties and responsibilities between parties.....	25
	Annex D (normative) Requirements for non-destructive examinations (NDE) of steel containers supplementary to Table 14 EN 14620-2:2006.....	26
D.1	For steel primary containers.....	26
D.2	For steel secondary containers.....	26
D.3	For steel membrane tank outer containers	26
D.3.1	Hydrotested prior to Membrane installation.....	26
D.3.2	Hydrotested after Membrane installation.....	26
	Bibliography	28

European foreword

This document (EN 14620-5:2025) has been prepared by Technical Committee CEN/TC 265 “Metallic tanks for the storage of liquids”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2026, and conflicting national standards shall be withdrawn at the latest by April 2026.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14620-5:2006.

EN 14620-5:2025 includes the following significant technical changes with respect to EN 14620-5:2006:

- Table 1 ‘Hydrostatic test requirements’ updated and adjusted to relate to product temperature;
- product temperature range extended to -196°C to include LIN, LOX and LAR;
- permitted use of small temporary safety opening in primary steel liquid container after hydrostatic test added;
- requirements for inspection of concrete surfaces during pressure test added;
- negative pressure test details clarified;
- negative pressure test requirements for double-wall double-roof tanks clarified;
- purging of bottom insulation space clarified;
- decommissioning guidance improved;
- new informative annex for global test for membrane tanks added;
- new informative annex for guidance for duties and responsibilities between parties added;
- new normative annex for NDE of steel containers supplementary to EN 14620-Part 2:2006.

A list of all parts in the EN 14620 series, “*Design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0°C and -196°C* ”, can be found on the CEN website.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document is applicable to the design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and –196°C. It specifies the requirements for testing, drying, purging, cool-down and decommissioning of refrigerated liquefied gas storage tank systems.

The tank systems covered by this document are used to store large volumes of hydrocarbon products, ammonia and other non-hydrocarbon gases with low temperature boiling points, generally called “Refrigerated Liquefied Gases” (RLGs). Typical products stored in the tank systems are: methane, ethane, propane, butane, ethylene, propylene, butadiene (this range includes Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG), ammonia, nitrogen, oxygen and argon.

NOTE Properties of the gases are given in Annex A EN 14620-1:2024.

This document provides requirements and specifies measures to be taken following completion of major tank construction activities and before the tank is brought in to service. It provides requirements for full-height and partial height hydrostatic testing to check the structural integrity of tanks and the capacity of the foundations. Settlement monitoring of the foundations at this stage form the starting point of an annual settlement monitoring programme for the tank foundation. Recommendations are given for marker systems for such monitoring. Requirements for water quality of both fresh water and seawater used during hydrotest, are provided to avoid the risk of corrosion of tanks and appurtenances.

Guidance and requirements for positive and negative pneumatic tests to further check tank structural integrity, leak tightness of welds and the function of pressure and vacuum relief valve systems are also given. Requirements specific to testing of double-wall and membrane type tanks is included.

Rules and procedures for commissioning activities, including drying and purging with inert and product gas are provided, including required oxygen concentrations for various RLG's. The document also provides guidance for cool-down procedures and suggestions for temperature monitoring, including an informative Annex A.

For major maintenance inspection or at the end of the life of the tank, decommissioning will be required. Guidance on safe decommissioning processes is provided.

Suggested procedures for Global testing for membrane tanks are provided in informative Annex B

This document is applicable to the design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and –196°C.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14620-1:2024, *Design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -196 °C - Part 1: General*

EN 14620-2:2006, *Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -165 °C - Part 2: Metallic components*

3 Terms and definitions

For the purposes of this document, the definitions given in EN 14620-1:2024 and the following terms apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Hydrostatic and pneumatic testing

4.1 Hydrostatic test

4.1.1 General

A hydrostatic test shall be carried out. The hydrostatic test shall demonstrate that:

- the tank system is designed and constructed to contain the product under normal operating conditions;
- the foundation is able to support the tank and its contents.

NOTE A hydrostatic test might also aid the relief of residual stresses for steel tanks.

Details can be found in 4.1.2 to 4.1.7 and 4.3.1.

4.1.2 Test requirements for each type of tank

For the various tank types, the hydrostatic test shall be carried out in accordance with Table 1.

Hydrostatic testing of secondary liquid containers of double and full containment systems (see Table 1) is not required unless explicitly required by the project specification.

A comprehensive specification shall be prepared which includes the requirements of equipment and methodologies for safe execution of all stages of the hydrostatic test. The testing shall be subject to a quality management system in accordance with EN 14620-1:2024. The test results shall be documented.

NOTE See Annex C

For products with specific gravity between 0,8 and 1,0 (e.g. LIN) the overload requirements of 4.1.3 cannot be met. However, load applied during hydrotest exceeds loads applied during operation.

If product specific gravity exceeds 1,0, (e.g. LOX and LAR), it is accepted that the hydrotest would not demonstrate objectives outlined in 4.1.1. In this case special provisions, such as long-term monitoring of foundation settlement during operation may be required.

Table 1 — Hydrostatic test requirements

Product Boiling Point ^c	Single containment	Double containment	Full containment	Membrane tank
≥ −50 °C	Primary liquid container - steel FH	Primary liquid container - steel FH	Primary liquid container – steel FH	Membrane barrier ^a
		Secondary liquid container - steel No test	Secondary liquid container - steel No Test	Outer container - steel FH
		Secondary liquid container - pre-stressed concrete No test	Secondary liquid container – pre-stressed concrete No test	Outer container - pre-stressed concrete PH ^{a,b}
< −50 °C	Primary liquid container - steel PH ^b	Primary liquid container - steel PH ^b	Primary liquid container - steel PH ^b	Membrane barrier ^a
		Secondary liquid container - steel No test	Secondary liquid container – steel No test	Outer container - steel PH ^b
		Secondary liquid container – pre-stressed concrete No test	Secondary liquid container – pre-stressed concrete No test	Outer container – pre-stressed concrete PH ^{a,b}
NOTE FH means Full height hydrostatic test, PH means Partial height hydrostatic test.				
^a In the case of a membrane tank, there is no general requirement for the membrane barrier to be hydrostatically tested but refer also to 4.3.1.3. Refer to 4.3 for hydrotesting of membrane tank outer container.				
^b For products where the specific gravity exceeds 0,8, the equivalent full height hydrotest will apply.				
^c Product Boiling Point as defined in Table A.1, Annex A in EN 14620-1:2024.				

4.1.3 Additional requirements

The following additional requirements shall apply:

- Leak testing shall be completed by means of the welding examination and inspection requirements described in Annex D and EN 14620-2:2006.
- For a full height hydrostatic test, the primary liquid container shall be filled to the maximum design liquid level.
- For a partial height hydrostatic test of the primary liquid container, the test pressure applied by hydrotest water to the tank bottom shall be equal to 1,25 times the pressure applied to the tank bottom by the product at the height of the maximum design liquid level.

- In cases where the project specification calls for a secondary liquid container hydrotest, the same quantity of water as for testing of the primary liquid container shall be used. The hydrotest liquid level in the annular space shall never exceed the concurrent liquid level in the primary liquid container. A suitable water barrier shall be provided to prevent test water ingress into the bottom insulation.
- For the container subject to hydrotest the hydrostatic test shall not be carried out until all welded accessories to the shell and the bottom of the container are in place. Welding shall not be allowed after completion of the hydrostatic test. The exception is when approved by the Purchaser, to assist quick emergency evacuation of construction personnel for tank systems without wall penetrations. A single circular temporary opening, not smaller than 600mm and not larger than 1000mm in diameter, may be allowed in the tank after hydrotest. The opening shall be permanently closed by the welding of a closure plate after personnel access into the hydrotested container is no longer necessary. The closure plate shall conform to the shape of the shell and be in accordance with EN 14620-2:2006.
- The circular opening shall be positioned so that it does not cross any shell seams. It should also be at least the greater of 300mm or 10 times the shell thickness from any other weld in the shell. This includes shell to bottom weld, shell seams or welds to attachments.
- The butt weld around the perimeter of the closure plate shall be examined over the entirety of its length. Examination shall comprise liquid penetrant method and radiographic method. The liquid penetrant inspection is needed on the root pass, on the back gouged surface and on the inside and outside surfaces of the finished weld. The whole weld shall also be vacuum box leak tested. The welding and testing procedures shall be in accordance with EN 14620-2:2006.
- For tanks which are to be insulated with expanded perlite, the hydrostatic test shall be carried out before installation of the expanded perlite and resilient layer (if applicable).

4.1.4 Quality of the water

The water shall be of a quality such that no damage to the steel, concrete or coatings can occur. The suitability of the water for hydrostatic testing shall be demonstrated.

NOTE 1 See Annex C

Special attention shall be paid to possible corrosion.

The following types of corrosion shall be considered:

- general corrosion;
- galvanic corrosion; and
- localised corrosion (pitting, under deposit corrosion, bacterial corrosion).

NOTE 2 Galvanic corrosion (fresh and sea water) is an electrochemical form of corrosion. It can occur when a metal or alloy is electrically connected to another metal or alloy with a different electrochemical potential and the metals (alloys) are exposed to a common electrolyte and electrical path. Welding of metals can lead to dissimilar metal compositions between the weld, Heat Affected Zone (HAZ) and the plate material. The most anodic material area will corrode because of the galvanic effect with the cathodic material areas.