



SLOVENSKI STANDARD SIST EN 13575:2005

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Thermoplastic tanks made from blow or rotational moulded polyethylene - Tanks for the above ground storage of chemicals - Requirements and test methods

Tanks aus Thermoplasten, die aus blas- oder rotationsgeformtem Polyethylen hergestellt wurden - Tanks für die oberirdische Lagerung von Chemikalien - Anforderungen und Prüfverfahren

Réservoirs thermoplastiques en polyéthylène moulés par soufflage ou par rotation - Réservoirs destinés au stockage non enterré de produits chimiques - Exigences et méthodes d'essai

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Thermoplastic tanks made from blow or rotational moulded polyethylene - Tanks for the above ground storage of chemicals - Requirements and test methods

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This European Standard was approved by CEN on 16 August 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document (EN 13575:2004) has been prepared by Technical Committee CEN/TC 266 “Thermoplastic static tanks”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

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

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EN 13575:2004 (E)

1 Scope

This document specifies requirements for above ground single static thermoplastic tanks of volume 450 l to 10 000 l, which can be used for the storage of liquids other than water including chemicals classified as dangerous goods.

This document only applies to tanks manufactured by blow moulding or rotational moulding of polyethylene, with or without reinforcements, which are not subjected to pressures exceeding ± 5 kPa ($\pm 0,05$ bar). Except for periodic temperature fluctuation their normal operating temperature does not exceed 25 °C.

This document only applies to tanks with a maximum lifetime of 10 years.

This document specifies permitted materials, performance requirements and test methods and factory production control tests.

This document does not consider wind and snow loads.

NOTE National and/or International regulations above and beyond the requirements of this standard may apply to the storage of liquids and the installation of tanks.

2 Normative references

The following referenced documents are indispensable for the application 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 1778, *Characteristic values for welded thermoplastic constructions — Determination of allowable stresses and moduli for design of thermoplastic equipment* [SIST EN 13575:2005](https://standards.iteh.ai/catalog/standards/sist/05ac3061-7a21-4c82-8c2e-14f7412e72e1/en-13575-2005)

EN 13616; *Overfill protection devices for static tanks for liquid petroleum fuels*

EN ISO 179-1, *Plastics - Determination of Charpy impact properties – Part 1: Non-instrumented impact test (ISO 179-1:2000)*

EN ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets (ISO 527-3:1995)*

EN ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:1997)*

EN ISO 1183, *Plastics — Methods for determining the density of non-cellular plastics*

EN ISO 1872-2, *Plastics — Polyethylene (PE) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties - Amendment A1 (ISO 1872-2:1997/AM 1:2000)*

EN ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance (ISO 4892-1:1999)*

EN ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc sources (ISO 4892-2:1994)*

EN ISO 16101:2004, *Packaging — Transport packaging for dangerous goods — Plastics compatibility testing (ISO 16101:2003)*

CLC/TR 50404, *Electrostatics – Code of practice for the avoidance of hazards due to static electricity*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

tank

container for the storage of liquids at atmospheric pressure and which retains its designed shape without any support when empty

3.2

brimful capacity (of a tank)

volume of water held by the tank filled through the filling orifice to the point of overflowing

3.3

maximum filling capacity (of a tank)

value of 95 % of the brimful capacity

3.4

regrind

material prepared from clean rejected unused tanks, including trimmings from the production of tanks, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer in the production of tanks

4 Requirements for materials

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4.1 Tank

Flammable liquids with a flash point > 55 °C may be stored in these tanks without further requirements.

Flammable liquids with a flash point ≤ 55 °C may be only stored in these tanks if the requirements concerning electrostatic behaviour according to CLC/TR 50404 are considered.

4.2 Material

The proportion of the regrind from the same material shall not exceed 50 % for blow-moulded tanks. Regrind shall not be used for rotational-moulded tanks.

The raw materials and samples taken from the tanks shall be tested according to Table 1. For initial type test and factory production control see 6.1 and 6.2 respectively.

If required, the long-term behaviour of the material should fulfil the creep curves according to Figure A.1 and Figure A.2.

If requested, the impact strength at low temperature shall be determined.

When tested in accordance with Annex C.6, the impact strength of a sample, cut from the tank, measured at -8 °C shall be at least 75 % of the impact strength measured at (23 ± 2) °C.

Note The material may not turn brittle at low temperature.

Table 1 — Material requirements

Material type	Property	Requirement	Test method
Blow-moulded polyethylene	Density ^a	shall not be less than 938 kg/m ³	B.1
	Melt flow rate ^b	shall be less than 12 g/10 min at 190 °C, 21,6 kg maximum increase of the melt flow rate of the moulded tank shall not be greater than 15 % of the value determined on the raw material	B.2
	Tensile ^c	tensile strength at yield shall not be less than 21 MPa elongation at yield shall not be more than 15 %	B.3
Rotational-moulded polyethylene	Density ^a	shall not be less than 934 kg/m ³	B.1
	Melt flow rate ^b	shall be 4,0 g/10 min ± 3,0 g/10 min at 190 °C, 2,16 kg maximum variation of the melt flow rate of the moulded tank shall not be greater than 20 % of the value determined on the raw material	B.2
	Tensile ^c	tensile strength at yield shall not be less than 15 MPa elongation at yield shall not be more than 25 % elongation at break shall not be less than 200 %	B.3
Blow-moulded polyethylene and rotational-moulded polyethylene	Resistance against chemical liquids ^c		
	Absorption behaviour	mass alteration shall be less than 10 %.	B.4.2
	Degradation behaviour	the increase in melt flow rate shall not be more than 30 % reduction in elongation at break shall not exceed 50 % of that measured in B.3.	B.4.4
	Stress crack resistance	either:	B.4.3.2
		After 28 days immersion the tensile strength shall not be less than 85 % of the reference sample without pin impression	
		or:	B.4.3.3
the time to 50 % failure shall not be less than 500 h			
or:	B.4.3.4		
the time to failure at reference stress 9 MPa shall not be less than 20 h			
Weather resistance ^c	For outside installations after exposure to total irradiance of 34 GJ/m ² , equivalent to 10 years exposure in a Northern European climate, the elongation at break shall be greater than 50 % of the initial value For inside installations the elongation at break after exposure to total irradiance of 3,4 GJ/m ² , shall be greater than 50 % of the initial elongation at break The manufacturer shall ensure that changing the additive package does not decrease weather resistance	B.5	
^a Test to be carried out on raw material. ^b Test to be carried out on raw material and on tank. ^c Test to be carried out on tank.			

5 Design requirements

5.1 General

The requirements according to 5.2 to 5.7 are minimum requirements. Further nozzles, e.g. manhole or nozzle for inspection are allowed.

5.2 Filling systems

In the case of direct fill, the aperture for filling shall be a minimum of 38 mm in diameter and shall be covered with a cap or lid.

5.3 Supports

Tanks shall be supported according to tank manufacturer's instructions.

5.4 Venting systems

All tanks shall be equipped with venting facilities. The minimum cross sectional area of the venting tube shall not be less than the sum of the smallest cross sectional area of the filling system with a minimum diameter of 38 mm.

5.5 Suction/outlet system

Tanks shall be equipped with an opening permitting the safe and reliable connection of withdrawal systems. All fittings shall be corrosive resistant.

Class A - outlet installed above the liquid level

Class B - outlet installed below the liquid level

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5.6 Overflow alarm device

All tanks, which are filled by fixed pipework shall have on the top of the tank a provision to fit an overflow prevention system according to EN 13616.

5.7 Contents gauge connection facility

If the level of liquid can be seen through the walls of the tank a contents gauge is not required. In all other cases provision shall be made for a contents gauge to be fitted.

6 Sampling and test methods

6.1 Initial type test

A minimum of three samples is required.

The samples for initial type test shall be randomly selected from the produced batch.

The initial type tests are applicable for a serie of tanks produced by the same mould design. The initial type test shall be carried out on the largest tank of a serie, whereby the tank height may differ by 20 % in a serie. All the other aspects of the design remaining the same. A reduction of mass equal to the mass of the segment of tank is permitted.

Samples for initial type test (see Table 2) shall be selected in the following circumstances:

- 1) when the method of production is altered in such a way as to affect type test performance;

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- 2) when the manufacturer changes either the base polymer grade used, or the producer of that material;
- 3) when wall thickness is decreased or changes are made in the dimensions of height, diameter, length, width or configuration for any one tank capacity.

Table 2 indicates tests given in Annexes A and B that shall be used for the initial type tests of the tanks.

Table 2 —Initial type tests of the tank

Property	Test Method	Circumstance requiring initial type test in 6.1
Density	B.1	2)
Melt flow rate	B.2	
Tensile	B.3	
Resistance against chemicals	B.4	
Weather resistance	B.5	
Capacity	C.1	1); 2); 3)
Visual inspection	C.2	
Mass	C.3	
Wall thickness	C.4	
Impact	C.5	
Elongation or deformation ^a	C.7	
Hydrostatic pressure	C.8	
^a The choice of the test method depends on the minimum wall thickness, see Table 4 and Table 5.		

6.2 Factory production control

The tests listed in Table 3 shall be used to determine that satisfactory quality is maintained during production and records should also be maintained within a quality control system. The documentation regarding the factory production control shall be kept for at least 10 years.

Table 3 — Factory production control

Property	Test method	Test to be carried out on tank and/or raw material	Frequency
Melt flow rate	B.2	Tank	Once every week on a programme that covers all machines
		Raw material ^a	Every new batch
Visual inspection	C.2	Tank	Every tank
Mass	C.3	Blow-moulded tank	Every tank
		Rotational-moulded tank	Every shot and a tank per shift
Wall thickness	C.4	Tank	Every tank at its critical points as identified by the manufacturer and an overall test per shift
Leak tightness	C.9	Tank	Every tank

^a This requirement may be waived if the raw material manufacturer supplies a certificate of conformity with each delivery, i.e. a document which certifies that the material supplied is in compliance with the melt flow rate as specified in an agreed supply specification.

7 Requirements for tanks

Blow-moulded and rotational-moulded tanks shall be tested according to Table 4 and Table 5

Table 4 — Requirements for blow-moulded polyethylene thermoplastic tanks

Property	Requirement	Test method	
Capacity	The maximum filling capacity, declared by the manufacturer, shall be checked.	C.1	
Visual inspection	There shall exist no bubbles, blisters or other defects in the tank wall which could cause a hole or fracture.	C.2	
Mass	Minimum mass shall be the lightest tank.	C.3	
Wall thickness	For tanks tested in accordance with C.7.1 the minimum wall thickness shall not be less than 2,5 mm. For factory production control the minimum wall thickness shall be the wall thickness of the initial type test.	C.4	
	For tanks tested in accordance with C.7.2 the nominal wall thickness shall be:		
	For tank brimful capacity		Nominal wall thickness
	≥ 450 l < 1 000 l		3,0 mm
	≥ 1 000 l < 1 500 l		3,2 mm
	≥ 1 500 l < 2 000 l		3,5 mm
	≥ 2 000 l < 2 500 l		3,7 mm
	≥ 2 500 l < 3 000 l		3,9 mm
	≥ 3 000 l < 3 500 l		4,0 mm
	For tanks with a brimful capacity ≥ 3 500 l the elongation test shall be used for the determination of the wall thickness. A margin of 10 % shall be allowed regarding the nominal wall thickness, whereby the surface of each area shall not exceed 300 mm ² . They shall be located a minimum of 50 mm from the bottom of the tank. The manufacturer shall declare in a document, that the margin has no effects on the physical properties of the tank.		
Impact	The tank shall remain leak tight.	C.5	
Elongation	Elongation at the surface shall not exceed 1,5 % after 1000 h.	C.7.1	
Deformation	The volumetric deformation is stabilized when the rate of volumetric expansion is not greater than 0,015 % volume, per day, for tanks with a maximum filling capacity of up to and including 3 800 l or 0,02 % volume, per day, for tanks with a maximum filling capacity of over 3 800 l. After refilling the deformation shall conform to the following equations. $w_d \leq w_i + 100 \text{ mm}$ $l_d \leq l_i + 200 \text{ mm}$ where: l_d is the length of the tank after deformation in mm l_i is the initial length of the tank in mm w_d is the width of the tank after deformation in mm w_i is the initial width of the tank in mm	C.7.2	
Hydrostatic pressure	The tank shall be leak tight at five time the hydrostatic pressure In the case of reinforced tanks the reinforcement shall retain its reinforcing function up to a hydrostatic pressure corresponding to twice the tank height.	C.8	
Leak tightness	The tank shall be leak tight.	C.9	