SLOVENSKI STANDARD
oSIST prEN 13341:2018

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Plastomerne stabilne posode za nadzemno skladiščenje goriva - Značilnosti izdelka in preskusne metode

Static thermoplastic tanks for above ground storage of fuel - Product characteristics and test methods

Ortsfeste Tanks aus Thermoplasten zur oberirdischen Lagerung von Kraft- und Brennstoffen - Produkteigenschaften und Prüfverfahren

Réservoirs statiques thermoplastiques pour le stockage non enterré de combustibles - Caractéristiques du produit et méthodes d'essai

Ta slovenski standard je istoveten z: **prEN 13341**

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23.020.10	Nepremične posode in rezervoarji	Stationary containers and tanks

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EUROPEAN STANDARD

NORME EUROPÉENNE

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English Version

Static thermoplastic tanks for above ground storage of fuel - Product characteristics and test methods

Réservoirs statiques thermoplastiques pour le stockage non enterré de combustibles - Caractéristiques du produit et méthodes d'essai

Ortsfeste Tanks aus Thermoplasten zur oberirdischen Lagerung von Kraft- und Brennstoffen - Produkteigenschaften und Prüfverfahren

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 266.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Contents

Page

European foreword

This document (prEN 13341:2018) has been prepared by Technical Committee CEN/TC 266 “Thermoplastic static tanks”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13341:2005+A1:2011.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports basic requirements of Regulation (EU) 305/2011.

For relationship with Regulation (EU) 305/2011, see informative Annex ZA, which is an integral part of this document.

In comparison with the previous edition, the following technical modifications have been made:

a) the title has been changed to “Static thermoplastic tank for the above ground storage of fuel”;

b) the Scope has been amended to include bioliquids;

c) the essential characteristics and their respective proxies have been amended;

d) the structure of the document has been amended.

1 Scope

This document specifies the product characteristics and the corresponding test methods for static thermoplastic tanks made of:

— blow moulded polyethylene, or

— rotationally moulded polyethylene, or

— rotationally moulded anionically polymerized polyamide 6,

with or without factory assembled reinforcement.

The products covered by this European Standard:

— are intended to be used for internal or external installations, for above ground storage of fuels limited to kerosene, heating oil, diesel, fatty acid methyl ester (FAME) and bioliquids (containing up to 15 % FAME);

— have a maximum filling capacity from 400 l up to and including 10 000 l, except for those made of anionically polymerized polyamide 6 where the maximum filling capacity will be limited to 3 000 l;

— are subject to atmospheric pressure but not to any external loading (e.g. installation, wind and snow, earthquakes, flooding);

— are not manufactured using recycled thermoplastic material;

— are not manufactured using regrind thermoplastic material for rotationally moulded tanks;

— are not manufactured using more than 50 % of regrind thermoplastic material for blow moulded tanks.

This document does not include tanks for the transport and distribution of fuels or gasses, or tanks for the storage of gas.

Flammable fuels with a flash point > 55 °C as determined by EN ISO 2719:2016 are eligible for storage in the tanks described in this standard without further provisions.

Flammable fuels with a flash point ≤ 55 °C as determined by EN ISO 2719:2016 are also eligible for storage in the tanks described in this standard if the provisions concerning electrostatic behaviour according to CLC/TR 60079-32-1:2015 are fulfilled.

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 13501-1:2007+A1:2009, *Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests*

CLC/TR 60079-32-1:2015, *Explosive atmospheres – Part 32-1: Electrostatic Hazards - Guidance*

EN ISO 175:2010, *Plastics - Methods of test for the determination of the effects of immersion in liquid chemicals (ISO 175:2010)*

EN ISO 293:2005, *Plastics - Compression moulding of test specimens of thermoplastic materials (ISO 293:2004)*

EN ISO 527-2:2012, *Plastics - Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:2012)*

EN ISO 1133-1:2011, *Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics – Part 1: Standard method (ISO 1133-1:2011)*

EN ISO 1183-1:2012, *Plastics - Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2012)*

EN ISO 1183-2:2004, *Plastics - Methods for determining the density of non-cellular plastics – Part 2: Density gradient column method (ISO 1183-2:2004)*

EN ISO 1872-2:2007, *Plastics - Polyethylene (PE) moulding and extrusion materials – Part 2: Preparation of test specimens and determination of properties (ISO 1872-2:2007)*

EN ISO 4892-1:2016, *Plastics - Methods of exposure to laboratory light sources – Part 1: General guidance (ISO 4892-1:2016)*

EN ISO 4892-2:2013, *Plastics - Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps (ISO 4892-2:2013)*

3 Terms and definitions

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

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

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

3.1
brimful capacity
volume of water held by a tank filled through the filling orifice to the point of overflowing

3.2
family
group of products made of the same raw materials and similar shape but different capacities

3.3
fuel
liquid intended to be stored in a tank

3.4
hydrostatic pressure
pressure exerted on a surface by a vertical column of liquid

Note 1 to entry: The pressure exerted on a surface by a vertical column of water with a height of 100 cm is 10 kPa.

3.5
maximum filling capacity
value of 95 % of the brimful capacity of a tank

3.6
raw material
thermoplastic material before processing

3.7
recycled material
raw or processed thermoplastic material that can be recovered from a waste stream for re-use

3.8
regrind material
in house material arising from the same process and prepared from clean unused tanks and/or trimmings

3.9
reinforcement
constitutive element of a tank which contributes to its mechanical stability

Note 1 to entry: For example, one or several strapping (s), a secondary containment.

3.10
tank
container for the storage of liquids at atmospheric pressure

4 Product characteristics

4.1 Static blow moulded polyethylene tank

4.1.1 Reaction to fire

The reaction to fire indicates the degree of contribution of the material to the behaviour of the construction product in the event of fire. When tested in accordance to the test methods given in Clause 5.1.1, relevant for the claimed class, the test results are expressed as a class according to EN 13501-1:2007+A1:2009.

4.1.2 Mechanical resistance and stability

4.1.2.1 Density

The density of the raw material is measured in accordance with 5.1.2.1 and the results are expressed according to Table 1.

4.1.2.2 Melt flow rate

The melt flow rate of both the raw material (before processing) and the material from the tank (after processing) is measured in accordance with 5.1.2.2 and the results are expressed according to Table 1.

4.1.2.3 Tensile strength at yield

The tensile strength at yield of the material from the tank is measured in accordance with 5.1.2.3 and the results are expressed according to Table 1.

4.1.2.4 Mass

The mass of the tank is measured in accordance with 5.1.2.4 and the results are expressed according to Table 1.

4.1.2.5 Wall thickness

The wall thickness of the tank is measured in accordance with 5.1.2.5 and the results are expressed according to Table 1.

4.1.2.6 Brimful capacity

The brimful capacity of the tank is measured in accordance with 5.1.2.6 and the results are expressed according to Table 1.

4.1.2.7 Elongation at yield

The elongation at yield of the material from the tank is measured in accordance with 5.1.2.7 and the results are expressed according to Table1.

4.1.3 Internal pressure

4.1.3.1 Elongation

The elongation of the tank is measured in accordance with 5.1.3.1 and the results are expressed according to Table 1.

4.1.3.2 Deformation

The deformation of the tank is measured in accordance with 5.1.3.2 and the results are expressed according to Table 1.

4.1.4 Impact resistance

The impact resistance of the tank is measured in accordance with 5.1.4 and the results are expressed according to Table 1.

4.1.5 Permeability (resistance to fuels)

4.1.5.1 Change in mass

The change in mass of the material from the tank is measured in accordance with 5.1.5.1 and the results are expressed according to Table 1.

4.1.5.2 Change in tensile strength at yield

The change in tensile strength at yield of the material from the tank is measured in accordance with 5.1.5.2 the results are expressed according to Table 1.

4.1.5.3 Change in elongation at yield

The change in elongation at yield of the material from the tank is measured in accordance with 5.1.5.3 and the results are expressed according to Table 1.

4.1.6 Tightness: gas and liquid

4.1.6.1 Visual appearance

The tank is visually inspected in accordance with 5.1.6.1 and the results are expressed according to Table 1.

4.1.6.2 Water leak tightness

The water leak tightness of the tank is measured in accordance with 5.1.6.2 and the results are expressed according to Table 1.

4.1.6.3 Air leak tightness

The air leak tightness of the tank is measured in accordance with 5.1.6.3 and the results are expressed according to Table 1.

4.1.7 Durability (elongation at break after weathering)

The change of elongation at break after weathering of the material from the tank is carried out in accordance with 5.1.7 and the results are expressed according to Table 1.

Table 1 — Product characteristics and expression of results for static thermoplastic tank made of blow moulded polyethylene

<table>
<tr><th>Product characteristic</th><th>Subclause</th><th>Expression of results</th></tr>
<tr><td colspan="3">Reaction to fire</td></tr>
<tr><td>Reaction to fire</td><td>4.1.1</td><td>Shall be classified according to EN 13501-1:2007+A1:2009.</td></tr>
<tr><td colspan="3">Mechanical resistance and stability</td></tr>
<tr><td>Density</td><td>4.1.2.1</td><td>Shall not be less than 938 kg/m³.</td></tr>
<tr><td>Melt flow rate</td><td>4.1.2.2</td><td>Shall not exceed 12 g/10 min at 190 °C and 21,6 kg for the raw material.
Melt flow rate of the material from the tank shall not exceed 15 % of the raw material melt flow rate.</td></tr>
<tr><td>Tensile strength at yield</td><td>4.1.2.3</td><td>Shall not be less than 21 MPa at yield.</td></tr>
<tr><td>Mass</td><td>4.1.2.4</td><td>The declared mass shall be the mass of the lightest tank of the samples measured.</td></tr>
<tr><td>Wall thickness</td><td>4.1.2.5</td><td>For tanks intended for storage of kerosene, the minimum wall thickness shall be 4,5 mm, or if the wall thickness is less than 4,5 mm, the tank manufacturer shall demonstrate by a test method that the oil permeation is equal or less than the permeation through a rotationally moulded tank sample with a thickness of 4,5 mm and made of a polyethylene with a density of 934 kg/m³.
For tanks tested in accordance with 5.1.3.1, the minimum wall thickness shall not be less than 2,5 mm and, for factory production control the minimum wall thickness shall be the wall thickness as determined by the type test.
For tanks tested in accordance with 5.1.3.2, the minimum wall thickness shall be as follows, except for each area which surface does not exceed 300 mm², where a margin of 10 % shall be allowed regarding the minimum wall thickness. These areas 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.
The minimum wall thickness of the tank shall be as follows:
<table>
<tr><th>Maximum filling capacity</th><th>Minimum wall thickness</th></tr>
<tr><td>l</td><td>mm</td></tr>
<tr><td>≥ 400 and ≤ 1 000</td><td>3,0</td></tr>
<tr><td>> 1 000 and ≤ 1 500</td><td>3,2</td></tr>
<tr><td>> 1 500 and ≤ 2 000</td><td>3,5</td></tr>
<tr><td>> 2 000 and ≤ 2 500</td><td>3,7</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>> 2 500 and ≤ 3 000</td><td>3,9</td></tr>
<tr><td>> 3 000 and ≤ 3 500</td><td>4,0</td></tr>
</table>

Where the tank has a maximum filling capacity > 3 500 l the elongation test according to 5.1.3.1 shall be carried out.
Where the elongation requirement is fulfilled, the wall thickness shall be determined from the same sample and shall be the minimum wall thickness for the tank.</td></tr>
<tr><td>Brimful capacity</td><td>4.1.2.6</td><td>The maximum filling capacity as declared by the manufacturer shall be checked.</td></tr>
<tr><td>Elongation at yield</td><td>4.1.2.7</td><td>Shall not exceed 15 % at yield.</td></tr>
<tr><td colspan="3">Internal pressure</td></tr>
<tr><td>Elongation</td><td>4.1.3.1</td><td>Shall not exceed 1,5 % after 1 000 h</td></tr>
<tr><td>Deformation</td><td>4.1.3.2</td><td>Shall conform to Formula (1) and Formula (2).
$w_d \leq w_i + 100\,\text{mm}$ (1)
where:
w_d width of the tank after deformation (mm);
w_i width of the tank in (mm).
$l_d \leq l_i + 200\,\text{mm}$ (2)
where:
l_d length of the tank after deformation (mm);
l_i initial length of the tank (mm).
In a vertical cylindrical tank where $l_d = w_d$, the diameter of the tank is considered to be its width (w_d).
In the case of tank with reinforcement, the reinforcement shall retain its function up to a hydrostatic pressure corresponding to twice the tank height.</td></tr>
<tr><td colspan="3">Impact resistance</td></tr>
<tr><td>Impact resistance</td><td>4.1.4</td><td>Shall be leak tight.</td></tr>
<tr><td colspan="3">Permeability (resistance to fuels)</td></tr>
<tr><td>Change in mass</td><td>4.1.5.1</td><td>Shall not exceed 10 % of initial mass.</td></tr>
<tr><td>Change in tensile strength at yield</td><td>4.1.5.2</td><td>Shall not exceed 20 % of initial tensile strength at yield.</td></tr>
<tr><td>Change in elongation at yield</td><td>4.1.5.3</td><td>Shall not exceed 150 % of initial elongation at yield.</td></tr>
</table>

Tightness: gas and liquid		
Visual appearance	4.1.6.1	The tank shall be free from all visible defects such as, cracks, pinholes, blisters or malformed sections which could lead to holing or fracture of the tank. The marking shall be in accordance with Clause 7
Water leak tightness	4.1.6.2	Shall be leak tight.
Air leak tightness	4.1.6.3	Shall be leak tight.
Durability (elongation at break after weathering)		
Elongation at break	4.1.7	Shall be greater than 50 % of the initial elongation at break.

4.2 Static rotationally moulded polyethylene tanks

4.2.1 Reaction to fire

The reaction to fire indicates the degree of contribution of the material to the behaviour of the construction product in the event of fire. When tested in accordance to the test methods given in 5.2.1, relevant for the claimed class, the test results are expressed as a class according to EN 13501-1:2007+A1:2009.

4.2.2 Mechanical resistance and stability

4.2.2.1 Density

The density of the raw material is tested in accordance with 5.2.2.1 and the results are expressed according to Table 2.

4.2.2.2 Melt flow rate

The melt flow rate of both the raw material (before processing) and the material from the tank (after processing) are measured in accordance with 5.2.2.2 and the results are expressed according to Table 2.

4.2.2.3 Tensile strength at yield

The tensile strength at yield of the material from the tank is measured in accordance with 5.2.2.3 and the results are expressed according to Table 2.

4.2.2.4 Mass

The mass of the tank is measured in accordance with 5.2.2.4 and the results are expressed according to Table 2.

4.2.2.5 Wall thickness

The wall thickness of the tank is measured in accordance with 5.2.2.5 and the results are expressed according to Table 2.

4.2.2.6 Brimful Capacity

The brimful capacity of the tank is measured in accordance with 5.2.2.6 and the results are expressed according to Table 2.

4.2.2.7 Elongation at yield

The elongation at yield of the material from the tank is measured in accordance with 5.2.2.7 and the results are expressed according to Table 2.

4.2.3 Internal pressure

4.2.3.1 Elongation

The elongation of the tank is measured in accordance with 5.2.3.1 and the results are expressed according to Table 2.

4.2.3.2 Deformation

The deformation of the tank is measured in accordance with 5.2.3.2 and the results are expressed according to Table 2.

4.2.4 Impact resistance

The impact resistance of the tank is measured in accordance with 5.2.4 and the results are expressed according to Table 2.

4.2.5 Permeability (resistance to fuels)

4.2.5.1 Change in mass

The change in mass of the material from the tank is measured in accordance with 5.2.5.1 and the results are expressed according to Table 2.

4.2.5.2 Change in tensile strength at yield

The change in tensile strength at yield of the material from the tank is measured in accordance with 5.2.5.2 the results are expressed according to Table 2.

4.2.5.3 Change in elongation at yield

The change in elongation at yield of the material from the tank is measured in accordance with 5.2.5.3 the results are expressed according to Table 2.

4.2.6 Tightness: gas and liquid

4.2.6.1 Visual appearance

The tank is visually inspected in accordance with 5.2.6.1 and the results are expressed according to Table 2.

4.2.6.2 Water leak tightness

The water leak tightness of the tank is measured in accordance with 5.2.6.2 and the results are expressed according to Table 2.

4.2.6.3 Air leak tightness

The air leak tightness of the tank is measured in accordance with 5.2.6.3 and the results are expressed according to Table 2.

4.2.7 Durability (elongation at break after weathering)

The change of elongation at break after weathering of the material from the tank is measured in accordance with 5.2.7 and the results are expressed according to Table 2.

Table 2 — Product characteristics and expression of results for static thermoplastic tank made of rotationally moulded polyethylene

<table>
<tr><th>Product characteristic</th><th>Subclause</th><th>Expression of results</th></tr>
<tr><td colspan="3">Reaction to fire</td></tr>
<tr><td>Reaction to fire</td><td>4.2.1</td><td>Shall be classified according to EN 13501-1:2007+A1:2009.</td></tr>
<tr><td colspan="3">Mechanical resistance and stability</td></tr>
<tr><td>Density</td><td>4.2.2.1</td><td>Shall not be less than 934 kg/m^3.</td></tr>
<tr><td>Melt flow rate</td><td>4.2.2.2</td><td>Shall be 4,0 ± 3,0 g/10 min at 190 °C and 2,16 kg for the raw material.
Melt flow rate of the material from the tank shall not exceed 20 % of the raw material melt flow rate.</td></tr>
<tr><td>Tensile strength at yield</td><td>4.2.2.3</td><td>Shall not be less than 15 MPa at yield.</td></tr>
<tr><td>Mass</td><td>4.2.2.4</td><td>The declared mass shall be the mass of the lightest tank of the samples measured.</td></tr>
<tr><td>Wall thickness</td><td>4.2.2.5</td><td>For tanks intended for storage of kerosene, the minimum wall thickness shall be 4,5 mm, or if the wall thickness is less than 4,5 mm, the tank manufacturer shall demonstrate by a test method that the oil permeation is equal or less than the permeation through a rotationally moulded tank sample with a thickness of 4,5 mm and made of a polyethylene with a density of 934 kg/m^3.
For tanks tested in accordance with 5.2.3.1, the minimum wall thickness shall not be less than 2,5 mm and, for factory production control the minimum wall thickness shall be the wall thickness as determined by the type test.
For tanks tested in accordance with 5.2.3.2, the minimum wall thickness shall be as follows, except for each area which surface does not exceed 300 mm^2, where a margin of 10 % shall be allowed regarding the minimum wall thickness. These areas 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.
The minimum wall thickness of the tank shall be as follows:
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<tr><th>Maximum filling capacity</th><th>Minimum wall thickness</th></tr>
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<tr><td>> 2 000
and ≤ 2 500</td><td>4,1</td></tr>
<tr><td>> 2 500
and ≤ 3 000</td><td>4,3</td></tr>
<tr><td>> 3 000</td><td>4,4</td></tr>
</table>
</td></tr>
</table>