CEN/TC 266

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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

Réservoir statique thermoplastique pour le stockage non enterré de combustibles — Caractéristiques du produit et méthodes d'essai

ICS:

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/m^3.</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/m^3.
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 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:
<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:
<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>3,3</td></tr>
<tr><td>> 1 000
and ≤ 1 500</td><td>3,5</td></tr>
<tr><td>> 1 500
and ≤ 2 000</td><td>3,9</td></tr>
<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>

		and ≤ 3 500 | > 3 500 and ≤ 5 000 | 4,8 > 5 000 and ≤ 7 500 | 5,1 > 7 500 and ≤ 10 000 | 5,4
Brimful capacity	4.2.2.6	The maximum filling capacity as declared by the manufacturer shall be checked.
Elongation at yield	4.2.2.7	Shall not exceed 25 % at yield and shall not be less than 200 % at break.
Internal pressure		
Elongation	4.2.3.1	Shall not exceed 1,5 %.
Deformation	4.2.3.2	Shall conform to Formula (1) and Formula (2). $w_d \leq w_i + 100\,\text{mm}$ (3) where: w_d width of the tank after deformation (mm); w_i width of the tank in (mm). $l_d \leq l_i + 200\,\text{mm}$ (4) 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.
Impact resistance		
Impact resistance	4.2.4	Shall be leak tight.
Permeability (resistance to fuels)		
Change in mass	4.2.5.1	Shall not exceed 10 % of initial mass.
Change in tensile strength at yield	4.2.5.2	Shall not exceed 20 % of initial tensile strength at yield.
Change in elongation at yield	4.2.5.3	Shall not exceed 150 % of initial elongation at yield.
Tightness: gas and liquid		
Visual	4.2.6.1	The tank shall be free from all visible defects such as, cracks, pinholes, blisters or

appearance		malformed sections which could lead to holing or fracture of the tank. The marking shall be in accordance with Clause 7.
Water leak tightness	4.2.6.2	Shall be leak tight.
Air leak tightness	4.2.6.3	Shall be leak tight.
Durability		
Elongation at break after weathering	4.2.7	Shall be greater than 50 % of the initial elongation at break.

4.3 Static rotationally moulded anionically polymerized polyamide 6 tanks

4.3.1 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 5.3.1, relevant for the claimed class, the test results are expressed as a class according to EN 13501-1:2007+A1:2009.

4.3.2 Mechanical resistance and stability

4.3.2.1 Tensile strength at yield

The tensile strength at yield of the material from the tank is measured in accordance with 5.3.2.1 and the results are expressed according to Table 3.

4.3.2.2 Mass

The mass of the tank is measured in accordance with 5.3.2.2 and the results are expressed according to Table 3.

4.3.2.3 Wall thickness

The wall thickness of the tank is measured in accordance with 5.3.2.3 and the results are expressed according to Table 3.

4.3.2.4 Brimful capacity

The brimful capacity of the tank is measured in accordance with 5.3.2.4 and the results are expressed according to Table 3.

4.3.2.5 Elongation at yield

The elongation at yield of the material from the tank is measured in accordance with 5.3.2.5 and the results are expressed according to Table 3.

4.3.2.6 Colour bleed

The colour bleed of the material from the tank is measured in accordance with 5.3.2.6 and the results are expressed according to Table 3.

4.3.3 Internal pressure

The elongation of the tank is measured in accordance with 5.3.3 and the results are expressed according to Table 3.

4.3.4 Impact resistance

The impact resistance of the tank is measured in accordance with 5.3.4 and the results are expressed according to Table 3.

4.3.5 Permeability (resistance to fuels)

4.3.5.1 Change in mass

The change in mass of the material from the tank is measured in accordance with 5.3.5.1 and the results are expressed according to Table 3.

4.3.5.2 Change in tensile strength at yield

The change in tensile strength at yield of the material from the tank is measured in accordance with 5.3.5.2 the results are expressed according to Table 3.

4.3.5.3 Change in elongation at yield

The change in elongation at yield of the material from the tank is measured in accordance with 5.3.5.3 the results are expressed according to Table 3.

4.3.6 Tightness: gas and liquid

4.3.6.1 Visual appearance

The tank is visually inspected in accordance with 5.3.6.1 and the results are expressed according to Table 3.

4.3.6.2 Liquid leak tightness

The liquid leak tightness of the tank is measured in accordance with 5.3.6.2 and the results are expressed according to Table 3.

4.3.6.3 Air leak tightness

The air leak tightness of the tank is measured in accordance with 5.3.6.3 and the results are expressed according to Table 3.

4.3.7 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 5.3.7 and the results are expressed according to Table 3.

Table 3 — Product characteristics and expression of results for static thermoplastic tank made of rotationally moulded anionically polymerized polyamide 6

<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>4.3.1</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>Tensile strength at yield</td><td>4.3.2.1</td><td>Shall not be less than 30 MPa at yield.</td></tr>
<tr><td>Mass</td><td>4.3.2.2</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>4.3.2.3</td><td>The minimum wall thickness of the tank shall be as follows:
<table>
<tr><th>Maximum filling capacity
l</th><th>Minimum wall thickness
mm</th></tr>
<tr><td>≤ 1 500</td><td>2,0</td></tr>
<tr><td>> 1 500 and ≤ 3 000</td><td>3,5</td></tr>
</table></td></tr>
<tr><td>Brimful capacity</td><td>4.3.2.4</td><td>The maximum filling capacity as declared by the manufacturer shall be checked.</td></tr>
<tr><td>Elongation at yield</td><td>4.3.2.5</td><td>Shall not be less than 200 % at break.</td></tr>
<tr><td>Colour bleed</td><td>4.3.2.6</td><td>Shall not be less than 2,5 h, after the conditioning time (3 h)</td></tr>
<tr><td colspan="3">Internal pressure</td></tr>
<tr><td>Elongation</td><td>4.3.3</td><td>The elongation shall be as follows:
<table>
<tr><th>Water content
%</th><th>Maximum elongation
%</th></tr>
<tr><td>≥ 2,0 and ≤ 2,5</td><td>1,1</td></tr>
<tr><td>> 2,5 and ≤ 3,0</td><td>1,3</td></tr>
<tr><td>> 3,0 and ≤ 3,5</td><td>1,6</td></tr>
</table></td></tr>
<tr><td colspan="3">Impact resistance</td></tr>
<tr><td>Impact resistance</td><td>4.3.4</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>4.3.5.1</td><td>Shall not exceed 0,4 % of initial mass.</td></tr>
<tr><td>Change in tensile strength at yield</td><td>4.3.5.2</td><td>Shall not exceed 5 % of initial tensile strength at yield.</td></tr>
<tr><td>Change in elongation at yield</td><td>4.3.5.3</td><td>Shall not exceed 20 % of initial elongation at break.</td></tr>
</table>

Tightness: gas and liquid		
Visual appearance	4.3.6.1	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.
Liquid leak tightness	4.3.6.2	Shall be leak tight.
Air leak tightness	4.3.6.3	Shall be leak tight.
Durability		
Elongation at break after weathering	4.3.7	Shall be greater than 50 % of the initial elongation at break

5 Testing, assessment and sampling methods

5.1 Static blow moulded polyethylene tank

5.1.1 Reaction to fire

The reaction to fire of the material from the tank shall be carried out using the test methods relevant to the class, according to EN 13501-1:2007+A1:2009, claimed by the manufactured.

5.1.2 Mechanical resistance and stability

5.1.2.1 Density

The density of the raw material shall be measured in accordance with EN ISO 1183-1:2012 or EN ISO 1183-2:2004. The method in accordance with EN ISO 1872-2:2007 shall be used to anneal the specimen.

5.1.2.2 Melt flow rate

The melt flow rate of the raw material and of a specimen taken from the tank wall shall be measured in accordance with EN ISO 1133-1:2011, using Condition G.

5.1.2.3 Tensile strength at yield

The test shall be carried out in accordance with EN ISO 527-2:2012 at a testing speed of 100 mm/min, using Type 1B test pieces, prepared by machining specimens taken from the tank wall in the direction of extrusion.

5.1.2.4 Mass

The mass of the tank shall be measured with all moulded-in inserts, without reinforcements and accessories to an accuracy of ± 0,5 %.

5.1.2.5 Wall thickness

The wall thickness shall be measured, rounded to the nearest 0,1 mm, using ultrasonic wall thickness measurement equipment calibrated in accordance with the manufacturer's instructions.

A reference test piece of similar thickness, manufactured by the same process and from the same raw material as the tank shall be used for calibration.

5.1.2.6 Brimful capacity

The tank shall be conditioned at (20 ± 5)°C for 48 h and then be filled to the point of overflow at a rate of (150 ± 40) l/min with water at (15 ± 5) °C.

After 10 min the tank shall be filled again to overflow and the brimful capacity shall be measured to an accuracy of ± 1 %.

5.1.2.7 Elongation at yield

The test shall be carried out in accordance with EN ISO 527-2:2012 at a testing speed of 100 mm/min, using Type 1B test pieces, prepared by machining specimens taken from the tank wall in the direction of extrusion.

For the determination of elongation at break after artificial weathering (see 5.1.7), the type 1B test pieces shall be prepared by machining specimens taken from the tank wall after the exposure of those specimens to artificial weathering.

5.1.3 Internal pressure

5.1.3.1 Elongation

The elongation test shall be carried out on the lightest tank from the samples at (23 ± 2) °C.

At points on the tank where the greatest deformation is expected, a minimum of five expansion measurement strips shall be fitted (use the results from the pressure resistance test in accordance with 5.1.6.3 to determine the measuring point).

The tank shall be filled with water at a temperature not exceeding 23 °C.

The test pressure shall correspond to 1,3 times the hydrostatic pressure at the deepest part of the tank and shall be kept constant for 1 000 h.

The expansion shall be measured per decade at least three times in logarithmically equal intervals (at least nine measurements in 1 000 h).

5.1.3.2 Deformation

The deformation test shall be carried out on the lightest tank from the samples at (23 ± 2) °C.

The tank shall be placed on flat ground with reference to a measurement grid so as to be able to determine its length and width.

The tank shall be stabilized by filling it with 30 cm of water.

The initial length (l_i), and height (h_i) shall be determined and the width (w_i) of the tank shall be measured in at least three cross-sections where the deformation, due to the hydrostatic pressure, is most critical.

The tank shall be filled to its brimful capacity at a filling rate of (150 ± 40) l/min with water at (15 ± 5) °C and pressured to a test pressure corresponding to 1,3 times the hydrostatic pressure at the deepest part of the tank.

The total amount of water added to the tank at the filling and pressuring stage shall be measured.

The length and width of the tank shall be measured at the same locations after 5, 18 and 27 days. From day 28 the volume variation shall be measured.

The tank is stabilized when the volume variation measured for 2 successive days is not greater than:

— 0,015 % per day for tanks up to and including 3 800 l maximum filling capacity; or

— 0,020 % per day for tanks over 3 800 l maximum filling capacity.

After tank stabilization or a maximum of 42 days, the length (l_d) and width (w_d) shall be measured.

5.1.4 Impact resistance

The tank shall be filled to overflow with water at a temperature of (15 ± 5) °C.

An impact hammer or pendulum shall be used, in the form of an equilateral triangle with rounded tips and edges having radii of 3 mm (see Figure 1). The dimensions given in Figure 1 are in millimetre (mm).

The five most vulnerable surfaces of the tank (normally corners or stiff sections) shall be subjected to an impact of 30 J.

Dimensions in millimetres

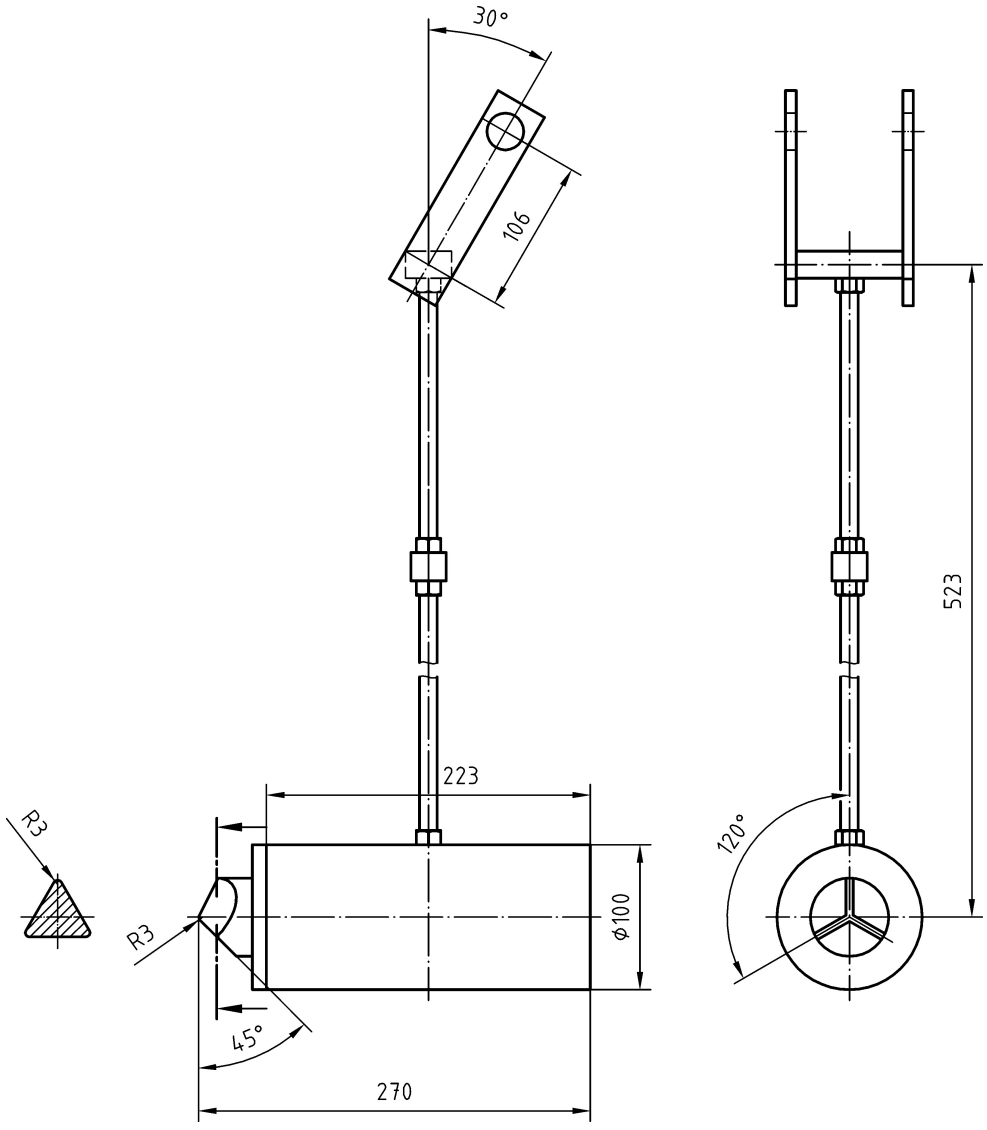

Figure 1 — Impact resistance test equipment

5.1.5 Permeability (resistance to fuels)

5.1.5.1 Change in mass

The change in mass shall be determined by immersing a compression moulded specimen taken from the tank wall of 50 mm × 50 mm × 1 mm thickness in fuel (see 3.3) until it reaches equilibrium at 40 °C, (equilibrium point is reached when the change in mass after a one week interval is less than 0,5 %).

The change in mass shall be determined in accordance with EN ISO 175:2010.

5.1.5.2 Change in tensile strength at yield

The change in tensile strength at yield shall be measured by repeating the test according to 5.1.1.3 on a specimen taken from the tank wall immersed in fuel (see 3.3) at 40 °C until it reach equilibrium, (equilibrium point is reached when the change in mass after a one week interval is less than 0,5 %).

Where the test is carried out with fuel having a flash point below 55 °C, for safety reasons, the test shall be carried out at 30 °C.

5.1.5.3 Change in elongation at yield

The change in elongation at yield shall be measured by repeating the test according to 5.1.1.7 on a specimen taken from the tank wall immersed in fuel (see 3.3) at 40 °C until it reach equilibrium, (equilibrium point is reached when the change in mass after a one week interval is less than 0,5 %).

Where the test is carried out with fuel having a flash point below 55 °C, for safety reasons, the test shall be carried out at 30 °C.

5.1.6 Tightness: gas and liquid

5.1.6.1 Visual appearance

Visual inspection is conducted on the internal and external surfaces of each tank with a light source with a minimum light intensity of 350 lx.

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.

5.1.6.2 Water leak tightness

The water leak tightness test shall be carried out on the second lightest tank from the samples at (23 ± 2) °C.

Reinforced tanks shall be tested with their reinforcements. The opening shall be closed with reinforced or metal caps.

The tank shall be filled with water at (15 ± 5) °C.

After the tank is filled the pressure shall be increased using a filling rate of 10 l/min up to five times the pressure resulting from the hydrostatic pressure based on the height of the tank. The test pressure shall be limited to 100 kPa for tanks with a maximum filling capacity of over 3 500 l.

The test pressure shall be measured at the base of the tank and shall be held for 5 min.

During the pressure increase the condition of the reinforcements shall be observed up to twice the hydrostatic pressure.

For tanks with a maximum filling capacity of over 3 500 l, a support framework which restrains the tank vertically between its base and its top is permitted during testing. The top part of the framework should not support more than 20 % of the surface area of the top of the tank and the framework should not restrain the deformation of the sides of the tank during testing.

5.1.6.3 Air leak tightness

The air leak tightness test shall be carried out at (23 ± 2) °C and the tank shall be subjected to a pneumatic pressure of:

— 30 kPa for at least 15 s; or

— 10 kPa for at least 60 s.

5.1.7 Durability (elongation at break after weathering)

Specimens shall be taken from the moulded tank and the outer surface shall be exposed to UV radiation in accordance with EN ISO 4892-1:2016 and EN ISO 4892-2:2013. The test shall be carried out under the following conditions:

a) xenon arc lamp;

b) black standard temperature: 65 °C;

c) relative humidity: 65 %;

d) spray cycle:

   — duration of spray: 18 min;

   — dry interval between spraying: 102 min;

   — for external installations exposure to global radiant shall be 34 GJ/m2 (corresponding to a radiant exposure of 2,3 GJ/m2 for the band from 300 nm to 400 nm);

   — for internal installations exposure to global radiant shall be 3,4 GJ/m2 (corresponding to a radiant exposure of 0,23 GJ/m2 for the band from 300 nm to 400 nm).

The manufacturer shall ensure that changing the additive package does not decrease weather resistance of the tank.

5.2 Static rotationally moulded polyethylene tank

5.2.1 Reaction to fire

The reaction to fire of the material from the tank shall be carried out using the test methods relevant to the class, according to EN 13501-1:2007+A1:2009, claimed by the manufactured.

5.2.2 Mechanical resistance and stability

5.2.2.1 Density

The density of the raw material shall be measured in accordance with EN ISO 1183-1:2012 or EN ISO 1183-2:2004. The method in accordance with EN ISO 1872-2:2007 shall be used to anneal the specimen.

5.2.2.2 Melt flow rate

The melt flow rate of the raw material and of specimens taken from the tank wall shall be measured in accordance with EN ISO 1133-1:2011, using Condition D.

5.2.2.3 Tensile strength at yield

5.2.2.3.1 Preparation of compression-moulded specimens

Use a moulding press and a mould in accordance with EN ISO 293:2005, respectively.

The mould thickness shall be appropriate to obtain a final thickness of the compression-moulded specimens of (3 ± 0,2) mm.

Cut a square plate from the tank wall of a mass calculated to fill 105 % of the volume of the cavity of the mould.

The compression-moulded specimens shall be prepared using the conditions specified in EN ISO 1872-2:2007, Table 2, except for the moulded temperature to be applied which shall be 200 °C, to obtain a final thickness of (3 ± 0,2) mm.

5.2.2.3.2 Testing

The tensile strength at yield test shall be carried out in accordance with EN ISO 527-2:2012 at a testing speed of 100 mm/min, using Type 1BA test pieces, prepared by machining plates prepared as described in 5.2.1.3.1.

5.2.2.4 Mass

The mass of the tank shall be measured with all moulded-in inserts, without reinforcements and accessories to an accuracy of ± 0,5 %.

5.2.2.5 Wall thickness

The wall thickness shall be measured, rounded to the nearest 0,1 mm, using ultrasonic wall thickness measurement equipment calibrated in accordance with the manufacturer's instructions.

A reference test piece of similar thickness, manufactured by the same process and from the same raw material as the tank shall be used for calibration.

5.2.2.6 Brimful capacity

The tank shall be conditioned at (20 ± 5) °C for 48 h and then be filled to the point of overflow at a rate of (150 ± 40) l/min with water at (15 ± 5) °C.

After 10 min the tank shall be filled again to overflow and the brimful capacity shall be measured to an accuracy of ± 1 %.

5.2.2.7 Elongation at yield

The elongation at yield test shall be carried out in accordance with EN ISO 527-2:2012 at a testing speed of 100 mm/min, using Type 1BA test pieces, prepared by machining plates prepared as described in 5.2.2.3.1.

For the determination of elongation at break after artificial weathering (see 5.2.7), the type 1BA test pieces shall be prepared by machining plates prepared as described in 5.2.2.3.1 after the exposure of those plates to artificial weathering.

5.2.3 Internal pressure

5.2.3.1 Elongation

The elongation test shall be carried out on the lightest tank from the samples at (23 ± 2) °C.

At points on the tank where the greatest deformation is expected, a minimum of five expansion measurement strips shall be fitted (use the results from the pressure resistance test in accordance with 5.2.6.2 to determine the measuring point).

The tank shall be filled with water at a temperature not exceeding 23 °C.

The test pressure shall correspond to 1,3 times the hydrostatic pressure at the deepest part of the tank and shall be kept constant for 1 000 h.

The expansion shall be measured per decade at least three times in logarithmically equal intervals (at least nine measurements in 1 000 h).

5.2.3.2 Deformation

The deformation test shall be carried out on the lightest tank from the samples at (23 ± 2) °C.

The tank shall be placed on flat ground with reference to a measurement grid so as to be able to determine its length and width.

The tank shall be stabilized by filling it with 30 cm of water.

The initial length (l_i), and height (h_i) shall be measured once and the width (w_i) of the tank shall be measured in at least three cross-sections where the deformation, due to the hydrostatic pressure, is most critical.

The tank shall be filled to its brimful capacity at a filling rate of (150 ± 40) l/min with water at (15 ± 5) °C and pressured to a test pressure corresponding to 1,3 times the hydrostatic pressure at the deepest part of the tank.

The total amount of water added to the tank at filling and pressuring stage shall be measured.

The length and width of the tank shall be measured at the same locations after 5, 18 and 27 days. From day 28 the volume variation shall be measured.

The tank is stabilized when the volume variation measured for 2 successive days is not greater than:

— 0,015 % per day for tank up to and including 3 800 l maximum filling capacity; or

— 0,020 % per day for tank over 3 800 l maximum filling capacity

After tank stabilization or a maximum of 42 days, the length (l_d) and width (w_d) shall be measured.

5.2.4 Impact resistance

The tank shall be filled to overflow with water at a temperature of (15 ± 5) °C.

An impact hammer or pendulum shall be used, in the form of an equilateral triangle with rounded tips and edges having radii of 3 mm (see Figure 1).

The five most vulnerable surfaces of the tank (normally corners or stiff sections) shall be subjected to an impact of 30 J.

5.2.5 Permeability (resistance to fuels)

5.2.5.1 Change in mass

The change in mass shall be measured by immersing a compression-moulded specimen taken from the tank wall of 50 mm × 50 mm × 1 mm thick in fuel (see 3.3) until it reaches equilibrium at 40 °C, (equilibrium point is reached when the change in mass after a one-week interval is less than 0,5 %).

The change in mass shall be determined in accordance with EN ISO 175:2010.

5.2.5.2 Change in tensile strength at yield

The change in tensile strength at yield shall be measured by repeating the test according to 5.2.2.3 on a compression-moulded specimen taken from the tank wall immersed in fuel (see 3.3) at 40 °C until it reaches equilibrium, (equilibrium point is reached when the change in mass after a one-week interval is less than 0,5 %).

Where the test is carried out with fuel having a flash point below 55 °C, for safety reasons, the test shall be carried out at 30 °C.

5.2.5.3 Change in elongation at yield

The change in elongation at yield shall be measured by repeating the test according to 5.2.2.7 on a compression-moulded specimen taken from the tank wall immersed in fuel (see 3.3) at 40 °C until it reaches equilibrium, (equilibrium point is reached when the change in mass after a one-week interval is less than 0,5 %).

Where the test is carried out with fuel having a flash point below 55 °C, for safety reasons, the test shall be carried out at 30 °C.

5.2.6 Tightness: gas and liquid

5.2.6.1 Visual appearance

Visual inspection is conducted on the internal and external surfaces of each tank with a light source with a minimum light intensity of 350 lx.

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.

5.2.6.2 Water leak tightness

The water leak tightness test shall be carried out on the second lightest tank from the samples at (23 ± 2) °C.

Reinforced tanks shall be tested with their reinforcements. The opening shall be closed with reinforced or metal caps.

The tank shall be filled with water at (15 ± 5) °C.

After the tank is filled the pressure shall be increased using a filling rate of 10 l/min up to five times the pressure resulting from the hydrostatic pressure based on the height of the tank. The test pressure shall be limited to 100 kPa for tank with a maximum filling capacity of over 3 500 l.

The test pressure shall be measured at the base of the tank and shall be held for 5 min.

During the pressure increase the condition of the reinforcements shall be observed up to twice the hydrostatic pressure.

For tank with a maximum filling capacity of over 3 500 l, a support framework which restrains the tank vertically between its base and its top is permitted during testing. The top part of the framework do not support more than 20 % of the surface area of the top of the tank and the framework do not restrain the deformation of the sides of the tank during testing.

5.2.6.3 Air leak tightness

The air leak tightness test shall be carried out at (23 ± 2) °C.

The tank shall be subjected to a pneumatic pressure of:

— 30 kPa for at least 15 s; or

— 10 kPa for at least 60 s.

5.2.7 Durability (elongation at break after weathering)

The outer surface of plates cut from the tank shall be exposed to UV radiation in accordance with EN ISO 4892-1:2016 and EN ISO 4892-2:2013.

The test shall be carried out under the following conditions:

— xenon arc lamp;

— black standard temperature: 65 °C;

— relative humidity: 65 %;

— spray cycle: (duration of spray:18 min and dry interval between spraying: 102 min);

— For external installations exposure to global radiant shall be 34 GJ/m^2 (corresponding to a radiant exposure of 2,3 GJ/m^2 for the band from 300 nm to 400 nm); and

— For internal installations exposure to global radiant shall be 3,4 GJ/m^2 (corresponding to a radiant exposure of 0,23 GJ/m^2 for the band from 300 nm to 400 nm).

The manufacturer shall ensure that changing the additive package does not decrease weather resistance of the tank.

5.3 Static rotationally moulded anionically polymerized polyamide 6 tank

5.3.1 Reaction to fire

The reaction to fire of the material from the tank shall be carried out using the test methods relevant to the class, according to EN 13501-1:2007+A1:2009, claimed by the manufactured.

5.3.2 Mechanical resistance and stability

5.3.2.1 Tensile strength at yield

The tensile strength at yield test shall be carried out in accordance with EN ISO 527-2:2012 at a testing speed of 100 mm/min, using Type 1BA test pieces, prepared by machining specimens taken from the tank wall.

5.3.2.2 Mass

The mass of the tank shall be measured with all moulded-in inserts, without reinforcements and accessories to an accuracy of ± 0,5 %.

5.3.2.3 Wall thickness

The wall thickness shall be measured, rounded to the nearest 0,1 mm, using ultrasonic wall thickness measurement equipment calibrated in accordance with the manufacturer's instructions.

A reference test piece of similar thickness, manufactured by the same process and from the same raw material as the tank shall be used for calibration.

5.3.2.4 Brimful capacity

The tank shall be conditioned at (20 ± 5)°C for 48 h and then be filled to the point of overflow at a rate of (150 ± 40) l/min with water at (15 ± 5) °C.

After 10 min the tank shall be filled again to overflow and the brimful capacity shall be measured to an accuracy of ± 1 %.

5.3.2.5 Elongation at yield

The elongation at yield test shall be carried out in accordance with EN ISO 527-2:2012 at a testing speed of 100 mm/min, using Type 1BA test pieces, prepared by machining specimens taken from the tank wall.

For the determination of elongation at break after artificial weathering (see 5.3.7), the type 1BA test pieces shall be prepared by machining specimens taken from the tank wall after the exposure of those plates to artificial weathering.

5.3.2.6 Colour bleed

Cylindrical specimens of 3 mm diameter and (4 ± 0,5) mm in height shall be taken perpendicular to the surface of the tank wall with a moisture content not exceeding 0,7 %.

The test shall be conducted in specimen glasses of (4 ± 0,1) mm internal diameter and 80 mm in length.

The following test media shall be used:

a) 96 % solution of sulphuric acid, and

b) 96 % solution of sulphuric acid stained blue/green by the addition of 0,19 ml of diphenylamine and 0,19 ml of a 65 % solution of nitric acid per litre.

The specimen glass shall be filled to a height of 33 mm with unstained sulphuric acid and the cylindrical specimen shall be immersed in the liquid with the aid of a glass rod (taking care that the sulphuric acid is free of bubbles).

The glass shall be placed in a hot bath at (90 ± 2) °C and shall be steeped for 3 h. After steeping 22 mm of stained sulphuric acid shall be poured in and the glass shall be left in the hot bath for not less than a further 2,5 h.

The steeped specimen shall be examined to detect any obvious delineation between specimen and stained sulphuric acid (ensuring stained sulphuric acid has not penetrated the lower unstained sulphuric acid).

The test shall be repeated for at least six representative test samples.

5.3.3 Internal pressure

The elongation test shall be carried out on the lightest tank from the samples at (23 ± 2) °C.

At points on the tank where the greatest deformation is expected, a minimum of five expansion measurement strips shall be fitted (use the results from the pressure resistance test in accordance with 5.3.6.2 to determine the measuring point).

The tank shall be filled with water at a temperature not exceeding 23 °C.

The test pressure shall correspond to 1,3 times the hydrostatic pressure at the deepest part of the tank and shall be kept constant for 1 000 h.

The expansion shall be measured per decade at least three times in logarithmically equal intervals (at least nine measurements in 1 00 h).

5.3.4 Impact resistance

The tank shall be filled to overflow with water at a temperature of (15 ± 5) °C.

An impact hammer or pendulum shall be used, in the form of an equilateral triangle with rounded tips and edges having radii of 3 mm (see Figure 1). The dimensions given in Figure 1 are in millimetre (mm).

The five most vulnerable surfaces of the tank (normally corners or stiff sections) shall be subjected to an impact of 30 J.

5.3.5 Permeability (resistance to fuels)

5.3.5.1 Change in mass

The change in mass shall be determined by immersing compression-moulded specimens taken from the tank wall of 5 mm × 50 mm × 1 mm thick in fuel (see 3.3) until it reaches equilibrium at 4°C, (equilibrium point is reached when the change in mass after a one-week interval is less than 0,5 %).

The change in mass shall be determined in accordance with EN ISO 175:2010.

5.3.5.2 Change in tensile strength at yield

The change in tensile strength at yield shall be measured by repeating the test according to 5.3.1.1 on a specimen taken from the tank wall immersed in fuel (see 3.3) at 40 °C until it reaches equilibrium, (equilibrium point is reached when the change in mass after a one-week interval is less than 0,5 %).

Where the test is carried out with fuel having a flash point below 55 °C, for safety reasons, the test shall be carried out at 30 °C.

5.3.5.3 Change in elongation at yield

The change in elongation at yield shall be measured by repeating the test according to 5.3.2.5 on a specimen taken from the tank wall immersed in fuel (see 3.3) at 40 °C until it reaches equilibrium, (equilibrium point is reached when the change in mass after a one-week interval is less than 0,5 %).

Where the test is carried out with fuel having a flash point below 55 °C, for safety reasons, the test shall be carried out at 30 °C.

5.3.6 Tightness: gas and liquid

5.3.6.1 Visual appearance

Visual inspection is conducted on the internal and external surfaces of each tank with a light source with a minimum light intensity of 350 lx.

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.

5.3.6.2 Liquid leak tightness

The liquid leak tightness test shall be carried out on the second lightest tank from the samples at (23 ± 2) °C.

Reinforced tanks shall be tested with their reinforcements. The opening shall be closed with reinforced or metal caps.

The tank shall be filled with a suitable hydrocarbon at (15 ± 5) °C.

After the tank is filled the pressure shall be increased using a filling rate of 10 l/min up to five times the pressure resulting from the hydrostatic pressure based on the height of the tank. The test pressure shall be limited to 100 kPa for tank with a maximum filling capacity of over 3 000 l.

The test pressure shall be measured at the base of the tank and shall be held for 5 min.

During the pressure increase the condition of the reinforcements shall be observed up to twice the hydrostatic pressure.

The liquid leak tightness test may be carried out using any fuel under the scope mentioned in Clause 1 of this standard.

5.3.6.3 Air leak tightness

The air leak tightness test shall be carried out at (23 ± 2) °C.

The tank shall be subjected to a pneumatic pressure of:

— 30 kPa for at least 15 s; or

— 10 kPa for at least 60 s.

5.3.7 Durability (elongation at break after weathering)

The outer surface of plates cut from the tank shall be exposed to UV radiation in accordance with EN ISO 4892-1:2016 and EN ISO 4892-2:2013.

The test shall be carried out under the following conditions:

— xenon arc lamp;

— black standard temperature: 65 °C;

— relative humidity: 65 %;

— spray cycle: (duration of spray: 18 min and dry interval between spraying: 102 min);

— for external installations exposure to global radiant shall be 34 GJ/m² (corresponding to a radiant exposure of 2,3 GJ/m² for the band from 300 nm to 400 nm);

— for internal installations exposure to global radiant shall be 3,4 GJ/m² (corresponding to a radiant exposure of 0,23 GJ/m² for the band from 300 nm to 400 nm).

The manufacturer shall ensure that changing the additive package does not decrease weather resistance of the tank.

6 Assessment and Verification of Constancy of Performance (AVCP)

6.1 General

The compliance of static thermoplastic tanks for internal and external installations for above ground storage of fuels with the requirements of this standard and with the performances declared by the manufacturer in the Declaration of Performance (DoP) shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for

declaring them without performing tests (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE Same AVCP system means testing by an independent third party under the responsibility of a notified product certification body.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family

Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified static thermoplastic tanks for internal and external installations for above ground storage of fuels; or

— at the beginning of a new or modified method of production (where this may affect the stated properties);

they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the static thermoplastic tanks for internal and external installations for above ground storage of fuels, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the static thermoplastic tanks for internal and external installations for above ground storage of fuels manufacturer to ensure that the static thermoplastic tank for the above ground storage of fuels as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

6.2.2.1 Static blow moulded polyethylene tanks

The number of samples of static blow moulded polyethylene tanks for internal and external installations for above ground storage of fuels to be tested/assessed for type test shall be in accordance with Table 4.

For product modifications according to 6.3.6, the number of samples needed and the tests to be achieved are listed in Annex A.

Table 4 — Number of samples to be tested and compliance criteria for static blow moulded polyethylene tank

Product characteristic	Subclause	Assessment method	No. of samples	Expression of results
Reaction to fire				
Reaction to fire	4.1.1	5.1.1	Specimens from tank sample 1	Table 1
Mechanical resistance and stability				
Density	4.1.2.1	5.1.2.1	Specimens from tank sample	Table 1
Melt flow rate	4.1.2.2	5.1.2.2	Specimens from tank sample	Table 1
Tensile strength at yield	4.1.2.3	5.1.2.3	Specimens from tank sample	Table 1
Mass	4.1.2.4	5.1.2.4	Tank sample 1 and 2	Table 1
Wall thickness	4.1.2.5	5.1.2.5	Tank sample 1	Table 1
Brimful capacity	4.1.2.6	5.1.2.6	Tank sample 1	Table 1
Elongation at yield	4.1.2.7	5.1.2.7	Specimens from tank sample	Table 1
Internal pressure				
Elongation	4.1.3.1	5.1.3.1	Tank sample 1	Table 1
Deformation	4.1.3.2	5.1.3.2	Tank sample 1	Table 1
Impact resistance				
Impact resistance	4.1.4	5.1.4	Tank sample 2	Table 1
Permeability (resistance to fuels)				
Change in mass	4.1.5.1	5.1.5.1	Specimens from tank sample	Table 1
Change in tensile strength at yield	4.1.5.2	5.1.5.2	Specimens from tank sample	Table 1
Change in elongation at yield	4.1.5.3	5.1.5.3	Specimens from tank sample	Table 1
Tightness: gas and liquid				
Visual appearance	4.1.6.1	5.1.6.1	Tank sample 1 and 2	Table 1
Water leak tightness	4.1.6.2	5.1.6.2	Tank sample 2	Table 1
Air leak tightness	4.1.6.3	5.1.6.3	Tank sample 2	Table 1
Durability				
Elongation at break after weathering	4.1.7	5.1.7	Specimens from tank sample	Table 1

6.2.2.2 Static rotationally moulded polyethylene tanks

The number of samples of static rotationally moulded polyethylene tanks for internal and external installations for above ground storage of fuels to be tested/assessed for type test shall be in accordance with Table 5.

For product modifications according to 6.3.6, the number of samples needed and the tests to be achieved are listed in Annex A.

Table 5 — Number of samples to be tested and compliance criteria for type test for static rotationally moulded polyethylene tank

Product characteristic	Subclause	Assessment method	No. of samples	Expression of results
Reaction to fire				
Reaction to fire	4.2.1	5.2.1	Specimens from tank sample 2	Table 2
Mechanical resistance and stability				
Density	4.2.2.1	5.2.2.1	Specimens from tank sample	Table 2
Melt flow rate	4.2.2.2	5.2.2.2	Specimens from tank sample	Table 2
Tensile strength at yield	4.2.2.3	5.2.2.3	Specimens from tank sample	Table 2
Mass	4.2.2.4	5.2.2.4	Tank sample 1 and 2	Table 2
Wall thickness	4.2.2.5	5.2.2.5	Tank sample 1	Table 2
Brimful capacity	4.2.2.6	5.2.2.6	Tank sample 1	Table 2
Elongation at yield	4.2.2.7	5.2.2.7	Specimens from tank sample 1	Table 2
Internal pressure				
Elongation	4.2.3.1	5.2.3.1	Tank sample 1	Table 2
Deformation	4.2.3.2	5.2.3.2	Tank sample 1	Table 2
Impact resistance				
Impact resistance	4.2.4	5.2.4	Tank sample 2	Table 2
Permeability (resistance to fuels)				
Change in mass	4.2.5.1	5.2.5.1	Specimens from tank sample	Table 2
Change in tensile strength at yield	4.2.5.2	5.2.5.2	Specimens from tank sample	Table 2
Change in elongation at yield	4.2.5.3	5.2.5.3	Specimens from tank sample	Table 2
Tightness: gas and liquid				
Visual appearance	4.2.6.1	5.2.6.1	Tank sample 1 and 2	Table 2
Water leak tightness	4.2.6.2	5.2.6.2	Tank sample 2	Table 2

Air leak tightness	4.2.6.3	5.2.6.3	Tank sample 2	Table 2
Durability				
Elongation at break after weathering	4.2.7	5.2.7	Specimens from tank sample	Table 2

6.2.2.3 Static rotationally moulded anionically polymerized polyamide 6 tank

The number of samples static rotationally moulded anionically polymerized polyamide 6 tank for internal and external installations for above ground storage of fuels to be tested/assessed for type test shall be in accordance with Table 6.

For product modifications according to 6.3.6, the number of samples needed and the tests to be achieved are listed in Annex A.

Table 6 — Number of samples to be tested and compliance criteria for type test for static rotationally moulded anionically polymerized polyamide 6 tank

Product characteristic	Subclause	Assessment method	No. of samples	Expression of results
Reaction to fire				
Reaction to fire	4.3.1	5.3.1	Specimens from tank sample 1	Table 3
Mechanical resistance and stability				
Tensile strength at yield	4.3.2.1	5.3.2.1	Specimens from tank sample 1	Table 3
Mass	4.3.2.2	5.3.2.2	Tank sample 1 and 2	Table 3
Wall thickness	4.3.2.3	5.3.2.3	Tank sample 1 and 2	Table 3
Brimful capacity	4.3.2.4	5.3.2.4	Tank sample 1	Table 3
Elongation at yield	4.3.2.5	5.3.2.5	Specimens from tank sample 1	Table 3
Colour bleed	4.3.2.6	5.3.2.6	Specimens from tank sample 1	Table 3
Internal pressure				
Elongation	4.3.3	5.3.3	Tank sample 1	Table 3
Impact resistance				
Impact resistance	4.3.4	5.3.4	Tank sample 1	Table 3
Permeability (resistance to fuels)				
Change in mass	4.3.5.1	5.3.5.1	Specimens from tank sample 1	Table 3
Change in tensile strength at yield	4.3.5.2	5.3.5.2	Specimens from tank sample 1	Table 3
Change in elongation at yield	4.3.5.3	5.3.5.3	Specimens from tank sample 1	Table 3
Tightness: gas and liquid				
Visual appearance	4.3.6.1	5.3.6.1	Tank sample 1	Table 3

Liquid leak tightness	4.3.6.2	5.3.6.2	Tank sample 1	Table 3
Air leak tightness	4.3.6.3	5.3.6.3	Tank sample 1	Table 3
Durability				
Elongation at break after weathering	4.3.7	5.3.7	Specimens from tank sample 1	Table 3

6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the static thermoplastic tanks for internal and external installations for above ground storage of fuels to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted[1] to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type and,

  — keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called "system houses") which supply or ensure the supply of, on the basis of an agreement some or all of the components to an assembler who then manufactures the finished product (referred to below as the "assembler") in his factory.

[1] The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an "assembled product" using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

— the assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way, as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;

— the system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;

— the assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;

— the instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the determination of the product type report;

— the assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house's determination of the product type report);

— regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter's responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001:2015 standard and which addresses the provisions of the present European standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.4 Traceability and marking

Individual static thermoplastic tanks for internal or external installations for above ground storage of fuels (kerosene, heating oil, diesel, fatty acid methyl ester (FAME) and bioliquids (containing up to 15 % FAME)) shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.6 Product testing and evaluation

6.3.2.6.1 Static blow moulded polyethylene tank

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The relevant characteristics for factory production control for static blow moulded polyethylene tank, and the means of control, are listed accordingly in Table 7.

Table 7 — Factory production control for static blow moulded polyethylene tank

Product characteristic	Assessment method	Frequency
Mechanical resistance and stability		
Melt flow rate	5.1.2.2	Once every working week on a program that covers all machines Every new batch[a]
Mass	5.1.2.4	Every tank
Wall thickness	5.1.2.5	Every tank at its critical points as identified by the manufacturer
Tightness: gas and liquid		
Visual appearance	5.1.6.1	Every tank
Air leak tightness	5.1.6.3	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.		

6.3.2.6.2 Static rotationally moulded polyethylene tank

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The relevant characteristics for factory production control for static rotationally moulded polyethylene tank, and the means of control, are listed accordingly in Table 8.

Table 8 — Factory production control for static rotationally moulded polyethylene tank

Product characteristic	Assessment method	Frequency
Mechanical resistance and stability		
Melt flow rate	5.2.2.2	Once every working week on a program that covers all machines Every new batch[a]
Mass	5.2.2.4	Every tank
Wall thickness	5.2.2.5	Every tank at its critical points as identified by the manufacturer
Tightness: gas and liquid		
Visual appearance	5.2.6.1	Every tank
Air leak tightness	5.2.6.3	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.		

6.3.2.6.3 Static rotationally moulded anionically polymerized polyamide 6 tank

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The relevant characteristics for factory production control for static rotationally moulded polyethylene tank, and the means of control, are listed accordingly in Table 9.

Table 9 — Factory production control for static rotationally moulded anionically polymerized polyamide 6 tank

Product characteristic	Assessment method	Frequency
Mechanical resistance and stability		
Mass	5.3.2.2	Every tank
Wall thickness	5.3.2.3	Every tank at its critical points as identified by the manufacturer
Colour Bleed	5.3.2.6	One at beginning of every production batch and one in every hundred tanks
Tightness: gas and liquid		
Visual appearance	5.3.6.1	Every tank
Air leak tightness	5.3.6.3	Every tank

6.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, disposing of or repairing product) shall be indicated in the records.

6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration of the product.

6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan, and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls, tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Initial inspection of factory and of FPC

For AVCP system 1, Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of Subclauses 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European standard are in place and correctly implemented, and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice, and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

For AVCP system 1, surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented.

6.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The static thermoplastic tanks for internal and external installations for above ground storage of fuels (kerosene, heating oil, diesel, fatty acid methyl ester (FAME) and bioliquids (containing up to 15 % FAME)) produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities [ten] per year shall be assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

a) in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer; and

b) on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

c) the FPC-documentation; and

d) the factory.

In the initial assessment of the factory and FPC it shall be verified:

e) that all resources necessary for the achievement of the product characteristics included in this European standard will be available, and

f) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and

g) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European standard has been verified.

Once series production is fully established, the provisions of Subclause 6.3 shall apply.

7 Marking, labelling, packaging and transportation

7.1 Marking

The following information shall be marked legibly, visibly and durably on the tank so that it can be accessed, understood and used by the widest range of possible users:

a) installation location (internal and/or external);

b) month and year of manufacture;

c) brimful capacity;

d) indication of maximum filling capacity;

e) a reference to this European standard, i.e. “EN 13341”;

f) description of the product to be stored e.g. ”For storage of fuels”;

g) details covering relevant installation instructions e.g. “Shall be installed in accordance with the manufacturer’s instructions and local regulations”;

h) serial number;

i) identification of manufacturer; and

j) material type.

Markings should be positioned so they can be easily read from ground level.

The location of markings and the angle between their surface and the vertical plane should be such that they can be easily read and understood by users from their position(s) during use of the product.

The layout shall make it easy to distinguish the various elements of information.

7.2 Transport and handling

Instructions regarding transportation, storage, mounting and maintenance of the tank shall be provided by the manufacturer. Instructions should be designed so that they can be accessed, understood and used by the widest range of possible users.

Annex A
(normative)

Product modifications

A.1 General

Table A.1 describes the interdependencies between product characteristics of a family of static thermoplastic tanks that should be reviewed for testing when any of the following are altered:

— when the manufacturer changes the raw material used;

— when the method of production is altered;

— when changes are made in the tank design, including dimensions of wall thickness, diameter, length, width or shape of any tank.

A.2 Change of raw material

The testing of each tank model in a family in accordance to Clause 4 and Clause 6 defines the interdependencies of the range. When the manufacturer changes the raw material it is only necessary to retest, as per Table A.1, the model, which had the lowest performing results in the family to verify the proposed alternative material does not affect the performance of the product.

A.3 Change in production method

The testing of each tank model in a family in accordance to Clause 4 and Clause 6 defines the interdependencies of the range. When the manufacturer changes the production method it is only necessary to retest, as per Table A.1, the model, which had the lowest performing results in the family to verify the proposed production method change, does not affect the performance of the product..

A.4 Change in tank geometry

The testing of each tank model in a family in accordance to Clause 4 and Clause 6 defines the interdependencies of the range. When the manufacturer changes the geometry of the tank it is only necessary to retest, as per Table A.1, the model in the family, which has incurred the greatest negative impact to verify that the proposed geometric change does not affect the performance of the product.

Table A.1 — The interdependencies between product characteristics of a family of static thermoplastic tanks

Essential characteristic	Product characteristic	Raw material change	Production method change	Tank design change
Reaction to fire	Reaction to fire	Y	(Y)	N
Mechanical resistance and stability	Density[a]	Y	(Y)	N
	Melt flow[a]	Y	Y	N
	Tensile strength at yield	Y	(Y)	N
	Mass of tank	Y	(Y)	Y
	Wall thickness	Y	(Y)	Y
	Brimful capacity	Y	(Y)	Y
	Colour bleed[b]	Y	(Y)	N
	Elongation at yield	Y	(Y)	N
Internal pressure	Elongation	Y	Y	N
	Deformation	Y	Y	N
Impact resistance	Impact resistance	Y	Y	Y
Permeability (resistance to fuels)	Change in mass	Y	N	N
	Change in tensile yield	Y	N	N
	Change in elongation at yield	Y	N	N
Tightness: gas and liquid	Visual appearance	Y	Y	Y
	Water leak tightness[a]	Y	Y	Y
	Liquid leak tightness[b]	Y	Y	Y
	Air leak tightness	Y	Y	Y
Durability	Elongation at break after weathering	Y	N	N

Y Testing of this product characteristic compulsory

(Y) Testing of product characteristics optional

N Testing of this product characteristic not required

[a] Not for anionically polymerized polyamide 6.

[b] Not for blow moulded or rotationally moulded polyethylene.

Annex B
(informative)

Environmental aspects

B.1 Materials should be selected to optimize product durability and lifetime and consideration should be made to avoiding the selection of rare or hazardous materials.

B.2 Consideration should be made to using regrind materials, and to the selection of materials which can then be subsequently recycled for other applications.

B.3 The possibility of marking components to aid to their sorting for disposal/recycling at end of life should also be reviewed.

B.4 Packaging design should consider using recycled materials, and materials that need little energy for their manufacture, and should minimize waste.

B.5 Packaging design should consider subsequent re-use and recycling.

B.6 The size and weight of packaging should be minimized whilst protecting the products to minimize waste through damage. Packaging should be designed to optimize capacity of transportation vehicles whilst facilitating safe loading and unloading.

B.7 Consideration should be made to reducing the volume of water required for production operations, for example cooling processes.

B.8 Maximum use should be made of high efficiency motors, compressors, heating ovens, lighting and displays.

B.9 Components intended to move in normal use, for example motors and pumping units, should be selected and mounted to minimize noise and vibration.

B.10 Products should be computer designed to minimize the use of material and to optimize production, transportation and installation.

Table B.1 — Environmental checklist

Environmental issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End—of—Life			
	Raw materials and energy	Pre—manufactured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/material and energy recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs	**Clause**										
Materials	B.1, B.2	B.1, B.2	—	B.5	—	—	—	B.2, B.3, B.5	B.2, B.3, B.5	B.2, B.3, B.5	B.1, B.2
Water	—	—	B.7	—	—	—	—	—	—	—	—
Energy	—	—	B.10	B.4	B.8	—	—	—	—	—	B.6
Land	—	—	—	—	—	—	—	—	—	—	—
Outputs											
Emissions to air	—	—	—	—	—	—	—	—	—	—	B.10
Discharges to water	—	—	B.7	—	—	—	—	—	—	—	—
Discharges to soil	—	—	—	—	—	—	—	—	—	—	—
Waste	—	—	—	B.4	—	—	—	—	—	B.2, B.3, B.5, B.6	—
Noise, vibration, radiation, heat	—	—	—	—	B.9	—	—	—	—	—	—
Other relevant aspects											
Risk to the environment from accidents or unintended use	—	—	—	—	—	—	—	—	—	—	—

Environmental issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End—of—Life			
	Raw materials and energy	Pre—manufactured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/material and energy recovery	Incineration without energy recovery	Final disposal	Transportation
Customer information	—	—	—	—	7.2	—	—	—	—	—	—

Annex C
(informative)

Design

C.1 Filling systems

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

C.2 Venting systems

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

C.3 Suction/outlet system

The tank shall be equipped with an opening permitting the safe and reliable connection of withdrawal systems. All fittings shall be corrosive resistant. The tank outlet may be installed above or below the liquid level.

C.4 Overfill prevention system

The tank shall have provision for an overfill prevention system according to EN 13616-1:2016 and/or EN 13616-2:2016.

C.5 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.

Annex ZA
(informative)

Relationship of this European Standard with Regulation (EU) 305/2011

(When applying this standard as a harmonized standard under Regulation (EU) 305/2011, manufacturers and Member States are obliged by this regulation to use this Annex.)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under standardization request M/131 – pipes, tanks and ancillaries not in contact with water intended for human consumption given to CEN and CENELEC by the European Commission (EC) and the European Free Trade Association (EFTA).

When this European Standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No 305/2011, as amended, contains provisions for the DoP and the CE marking.

Table ZA.1.1 — Relevant clauses for static blow moulded polyethylene tanks for internal or external installations for above ground storage of fuels

Product:	Static thermoplastic tanks made of blow moulded polyethylene		
Intended use:	Internal and external installations for above ground storage of heating fuels limited to kerosene, heating oil, diesel, fatty acid methyl ester (FAME) and bioliquids (containing up to 15 % FAME)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
Reaction to fire			
Reaction to fire	4.1.1	Classified according to EN 13501-1.	The results are expressed according to EN 13501-1:2007+A1:2009
Mechanical resistance and stability			
Density	4.1.2.1	≥ 938 kg/m^3	Tested according to 5.1.2.1 and expressed in kg/m^3
Melt flow rate	4.1.2.2	≤ 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.	Tested according to 5.1.2.2 and expressed in g/10 min
Tensile strength at yield	4.1.2.3	≥ 21 MPa at yield	Tested according to 5.1.2.3 and expressed in MPa
Mass	4.1.2.4	The mass of the lightest tank of the samples measured is the declared mass	Tested according to 5.1.2.4 and expressed in kg
			Tested according to 5.1.2.5 and expressed in mm

<table>
<tr><td>Product:</td><td colspan="3">Static thermoplastic tanks made of blow moulded polyethylene</td></tr>
<tr><td>Intended use:</td><td colspan="3">Internal and external installations for above ground storage of heating fuels limited to kerosene, heating oil, diesel, fatty acid methyl ester (FAME) and bioliquids (containing up to 15 % FAME)</td></tr>
<tr><td>Essential Characteristics</td><td>Clauses of this European Standard related to essential characteristics</td><td>Classes and/or threshold levels</td><td>Notes</td></tr>
<tr><td>Wall thickness</td><td>4.1.2.5</td><td colspan="2" rowspan="2">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 5.1.3.1, 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 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:
<table><tr><th>Maximum filling capacity
l</th><th>Minimum wall thickness
mm</th></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><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></td><td></td></tr>
<tr><td>Brimful capacity</td><td>4.1.2.6</td><td>Maximum filling capacity, declared by manufacturer</td><td>Tested according to 5.1.2.6 and expressed in l</td></tr>
<tr><td>Elongation at yield</td><td>4.1.2.7</td><td>≤ 15 % at yield.</td><td>Tested according to 5.1.2.7 and expressed in %.</td></tr>
<tr><td colspan="4">Internal pressure</td></tr>
<tr><td>Elongation</td><td>4.1.3.1</td><td>≤ 1,5 % after 1 000 h</td><td>Tested according to 5.1.3.1 and expressed in %.</td></tr>
<tr><td>Deformation</td><td>4.1.3.2</td><td>$w_d \leq w_i + 100$ mm</td><td>Tested according to 5.1.3.2 and expressed in mm</td></tr>
</table>

Product:	Static thermoplastic tanks made of blow moulded polyethylene
Intended use:	Internal and external installations for above ground storage of heating fuels limited to kerosene, heating oil, diesel, fatty acid methyl ester (FAME) and bioliquids (containing up to 15 % FAME)

Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
		$l_d \leq l_i + 200$ mm w_d width of the tank after deformation in mm w_i width of the tank in mm l_d length of the tank after deformation in mm l_i initial length of the tank in 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.	
Impact resistance			
Impact resistance	4.1.4	Leak tight.	Tested according to 5.1.4 and expressed as "tight" or "not tight".
Permeability (resistance to fuels)			
Change in mass	4.1.5.1	≤ 10 % of initial mass.	Tested according to 5.1.5.1 and expressed in %
Change in tensile strength at yield	4.1.5.2	≤ 20 % of initial tensile strength at yield.	Tested according to 5.1.5.2 and expressed in %
Change in elongation at yield	4.1.5.3	≤ 150 % of initial elongation at yield.	Tested according to 5.1.5.3 and expressed in %
Tightness: gas and liquid			
Visual appearance	4.1.6.1	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.	Tested according to 5.1.6.1 and see clause expressed as "tight".
Water leak tightness	4.1.6.2	Leak tight.	Tested according to 5.1.6.2 and expressed as "tight".
Air leak tightness	4.1.6.3	Leak tight.	Tested according to 5.1.6.3 and expressed as "tight".
Durability			
Elongation at break after weathering	4.1.8	> 50 % of the initial elongation at break	Tested according to 5.1.8 and expressed in %

Table ZA.1.2 — Relevant clauses for static rotationally moulded polyethylene tanks for internal and external installations for above ground storage of fuels

<table>
<tr><td colspan="2">Product:</td><td colspan="2">Static thermoplastic tanks made of rotationally moulded polyethylene</td></tr>
<tr><td colspan="2">Intended use:</td><td colspan="2">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)</td></tr>
<tr><th>Essential Characteristics</th><th>Clause of this European Standard related to essential characteristics</th><th>Classes and/or threshold levels</th><th>Notes</th></tr>
<tr><td colspan="4">Reaction to fire</td></tr>
<tr><td>Reaction to fire</td><td>4.2.1</td><td>Classified according to EN 13501-1.</td><td>The result shall be classified and expressed according to EN 13501-1:2007+A1:2009</td></tr>
<tr><td colspan="4">Mechanical resistance and stability</td></tr>
<tr><td>Density</td><td>4.2.2.1</td><td>≥ 934 kg/m³.</td><td>Tested according to 5.2.1.1 and expressed in kg/m³</td></tr>
<tr><td>Melt flow rate</td><td>4.2.2.2</td><td>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><td>Tested according to 5.2.1.2 and expressed in g/10 min</td></tr>
<tr><td>Tensile strength at yield</td><td>4.2.2.3</td><td>≥ 15 MPa at yield.</td><td>Tested according to 5.2.1.3 and expressed in MPa</td></tr>
<tr><td>Mass</td><td>4.2.2.4</td><td>The mass of the lightest tank of the samples measured is the declared mass.</td><td>Tested according to 5.2.1.4 and expressed in kg</td></tr>
<tr><td rowspan="2">Wall thickness</td><td rowspan="2">4.2.2.5</td><td></td><td>Tested according to 5.2.1.4 and expressed in mm</td></tr>
<tr><td colspan="2">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 5.2.3.1, 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 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
l</th><th>Minimum wall thickness
mm</th></tr>
<tr><td>≥ 400 and ≤ 1 000</td><td>3,3</td></tr>
<tr><td>> 1 000 and ≤ 1 500</td><td>3,5</td></tr>
</table>
</td></tr>
</table>

Product:	Static thermoplastic tanks made of rotationally moulded polyethylene		
Intended use:	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)		
Essential Characteristics	**Clause of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
		> 1 500 and ≤ 2 000	3,9
		> 2 000 and ≤ 2 500	4,1
		> 2 500 and ≤ 3 000	4,3
		> 3 000 and ≤ 3 500	4,4
		> 3 500 and ≤ 5 000	4,8
		> 5 000 and ≤ 7 500	5,1
		> 7 500 and ≤ 10 000	5,4
Brimful capacity	4.2.2.6	Maximum filling capacity declared by the manufacturer	Tested according to 5.2.1.6 and expressed in l
Elongation at yield	4.2.2.7	≤ 25 % at yield and shall not be less than 200 % at break.	Tested according to 5.2.1.6 and expressed in %
Internal pressure			
Elongation	4.2.3.1	≤ 1,5 %.	
Deformation	4.2.3.2	$w_d \leq w_i + 100$ mm $l_d \leq l_i + 200$ mm w_d width of the tank after deformation in mm w_i width of the tank in mm l_d length of the tank after deformation in mm l_i initial length of the tank in 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.	Tested according to 5.2.3.2 and expressed in mm
Impact resistance			
Impact resistance	4.2.4	Leak tight.	Tested according to 5.2.4 and expressed as “tight” or “not tight”.
Permeability (resistance to fuels)			
Change in mass	4.2.5.1	≤ 10 % of initial mass.	Tested according to 5.2.5.1 and expressed in %

Product:	Static thermoplastic tanks made of rotationally moulded polyethylene		
Intended use:	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)		
Essential Characteristics	**Clause of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
Change in tensile strength at yield	4.2.5.2	≤ 20 % of initial tensile strength at yield.	Tested according to 5.2.5.2 and expressed in %
Change in elongation at yield	4.2.5.3	≤ 150 % of initial elongation at yield	
Tightness: gas and liquid			
Visual appearance	4.2.6.1	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.	Tested according to 5.2.6.1 and expressed as "tight" or "not tight".
Water leak tightness	4.2.6.2	Leak tight.	Tested according to 5.2.6.2 and expressed as "tight" or "not tight".
Air leak tightness	4.2.6.3	Leak tight.	Tested according to 5.2.6.3 and expressed as "tight" or "not tight".
Durability			
Elongation at break after weathering	4.2.7	> 50 % of the initial elongation at break	Tested according to 5.2.7 and expressed in %

Table ZA.1.3 — Relevant clauses for static rotationally moulded anionically polymerized polyamide 6 tanks for internal and external installations for above ground storage of fuels

Product:	Static thermoplastic tanks made of rotationally moulded anionically polymerized polyamide 6		
Intended use:	Internal and 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)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
Reaction to fire			
Reaction to fire	4.3.1	Classified according to EN 13501-1.	The result shall be classified and expressed according to EN 13501-1:2007+A1:2009
Mechanical resistance and stability			
Tensile strength at yield	4.3.2.1	≥ 30 MPa at yield.	Tested according to 5.3.2.1 and expressed in MPa
Mass	4.3.2.2	The mass of the lightest tank of the samples measured is the declared mass.	Tested according to 5.3.2.2 and expressed in kg
Wall thickness	4.3.2.3	The minimum wall thickness of the tank shall be as follows:	Tested according to 5.3.2.3 and expressed in mm

Product:	Static thermoplastic tanks made of rotationally moulded anionically polymerized polyamide 6		
Intended use:	Internal and 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)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
		Maximum filling capacity l / **Minimum wall thickness** mm ≤ 1 500 / 2,0 > 1 500 and ≤ 3 000 / 3,5	
Brimful capacity	4.3.2.4	The maximum filling capacity as declared by the manufacturer shall be checked.	Tested according to 5.3.2.4 and expressed in l
Elongation at yield	4.3.2.5	Shall not be less than 200 % at break	Tested in accordance to 5.3.2.5 and expressed in %
Colour bleed	4.3.2.6	Shall not be less than 2,5 h after the conditioning time (3 h)	Tested in accordance to 5.3.2.6 and expressed in h
Internal pressure			
Elongation	4.3.3	**Water content** % / **Maximum elongation** % ≥ 2,0 and ≤ 2,5 / 1,1 > 2,5 and ≤ 3,0 / 1,3 > 3,0 and ≤ 3,5 / 1,6	Tested according to 5.3.3.1 and expressed in mm
Impact resistance			
Impact resistance	4.3.4	Leak tight.	Tested according to 5.3.4 and expressed as “tight” or “not tight”.
Permeability (resistance to fuels)			
Change in mass	4.3.5.1	≤ 0,4 % of initial mass.	Tested according to 5.3.5.1 and expressed in %
Change in tensile strength at yield	4.3.5.2	≤ 5 % of initial tensile strength at yield.	Tested according to 5.3.5.2 and expressed in %
Change in elongation at yield	4.3.5.3	≤ 20 % of initial elongation at break.	Tested according to 5.3.5.3 and expressed in %
Tightness: gas and liquid			
Visual appearance	4.3.6.1	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.	Tested according to 5.3.6.1 and expressed as “tight” or “not tight”.
Liquid leak tightness	4.3.6.2	Leak tight	Tested according to 5.3.6.2 and expressed as “tight” or “not tight”.
Air leak tightness	4.3.6.3	Leak tight	Tested according to 5.3.6.3 and

Product:	Static thermoplastic tanks made of rotationally moulded anionically polymerized polyamide 6		
Intended use:	Internal and 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)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
			expressed as “tight” or “not tight”.
Durability			
Elongation at break after weathering	4.3.7	> 50 % of the initial elongation at break	Tested according to 5.3.7 and expressed in %

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP system(s) of static thermoplastic tanks made of blow moulded polyethylene, or rotationally moulded polyethylene, or rotationally moulded anionically polymerized polyamide 6 indicated in Tables ZA.1.1, to ZA.1.3 can be found in the EC legal act(s) adopted by EC: EC Decision(s) 99/472/EC (OJEU L184 of 17.7.1999) as amended by EC Decision 2001/596/EC (OJEU L209 of 02.08.2001).

Micro-enterprises are allowed to treat products under AVCP system 3 covered by this standard in accordance with AVCP system 4, applying this simplified procedure with its conditions, as foreseen in Article 37 of Regulation (EU) No.305/2011.

ZA.3 Assignment of AVCP tasks

The AVCP system(s) of static thermoplastic tanks made of blow moulded polyethylene, or rotationally moulded polyethylene, or rotationally moulded anionically polymerized polyamide 6 as provided in Tables ZA.1.1 to ZA.1.3 is defined in Tables ZA.3.1 and ZA.3.2 resulting from application of the clauses of this or other European Standards indicated therein. The content of the tasks assigned to the notified body shall be limited to those essential characteristics, if any, as provided for in Annex III of the relevant standardization request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses the following tasks are to be undertaken by the manufacturer and the notified body respectively for the assessment and verification of the constancy of performance of the product.

Table ZA.3.1 — Assignment of AVCP tasks for static thermoplastic tanks made of blow moulded polyethylene, or rotationally moulded polyethylene, or rotationally moulded anionically polymerized polyamide 6 under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1.1 to ZA.1.3 relevant for the intended use which are declared	6.3
	Further testing of samples taken at the manufacturing plant by the manufacturer in accordance with the prescribed test plan.	Essential characteristics of Table ZA.1.1 to ZA.1.3 relevant for the intended use declared	6.3.2.6
Tasks for the notified product certification body	An assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product;	Essential characteristics of Table ZA.1.1 to ZA.1.3 for the intended use which are declared. Documentation of the FPC	6.2.2
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1.1 to ZA.1.3 relevant for the intended use which are declared. Documentation of the FPC	6.3.4
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1.1 to ZA.1.3 relevant for the intended use which are declared. Documentation of the FPC	6.3.5

Table ZA.3.2 — Assignment of AVCP tasks for static thermoplastic tanks made of blow moulded polyethylene, or rotationally moulded polyethylene, or rotationally moulded anionically polymerized polyamide 6 under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1.1 to ZA.1.3 relevant for the intended use which are declared	6.3
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product.	Essential characteristics of Table ZA.1.1 to ZA.1.3 relevant for the intended use which are declared	6.2.2

Bibliography

[1] EN ISO 9001:2015, *Quality management systems - Requirements (ISO 9001:2015)*

[2] EN 13616-1:2016, *Overfill prevention devices for static tanks for liquid fuels – Part 1: Overfill prevention devices with closure device*

[3] EN 13616-2:2016, *Overfill prevention devices for static tanks for liquid fuels – Part 2: Overfill prevention devices without a closure device*

[4] EN ISO 2719:2016, *Determination of flash point - Pensky-Martens closed cup method (ISO 2719:2016)*

[5] EN ISO 15512:2016, *Plastics - Determination of water content (ISO 15512:2016)*