



RAT.con VZW

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Evaluation guideline

Product certification procedure for above ground unpressurized, vertical or horizontal stationary tanks with or without spill container made from rotationally moulded or blow moulded polyethylene, having a maximum nominal capacity of 10.000 l, for the indoor or outdoor storage of kerosene, diesel fuels, heating oils, waste oils and lubricants with density $\leq 1.000 \text{ kg/m}^3$



Introduction

The additional value of a voluntary quality label is the confidence it creates in the quality of the product the customer wants to use. The manufacturer of the product guarantees the continuity of the compliance of the product (or service) by continuous industrial or sectoral self-control. In addition, licensed manufacturers are periodically submitted to an external evaluation by the certification body who confirms its confidence in the manufacturer by means of assigning the quality label.

To establish its role as guardian of quality in the tank construction sector, being as such the sector operator, RAT.con vzw has surrounded itself with experts and functions also as a certification body for the BENOR quality label for tanks. The respect for the certification rules, the evaluation of the maintenance of self-control are tasks assigned to certification bodies, while the external product tests are executed by independent laboratories.

The quality of these services together with their objectivity and impartiality guarantees the authenticity of the quality label. These are the reasons why accreditation according to ISO 17065 is a requirement for the certification body.

This guideline describes the provisions of external control that must be respected by the collaborators and the subcontractors of RAT.con vzw in order to, with a sufficient level of confidence, confirm the compliance of the manufacturer to the requirements for continued qualification of the voluntarily BENOR-quality label.

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1. General

The requirements in the product certification procedure (PCP) shall be taken into account by RAT.con VZW for both the evaluation of the initial request for certification and the continuance of a product certificate for above ground unpressurized, vertical or horizontal stationary tanks with or without spill container made from rotationally moulded or blow moulded polyethylene, having a maximum nominal capacity of 10.000 liters, for the indoor or outdoor storage of kerosene, diesel fuels, heating oils, waste oils and lubricants having a density $\leq 1.000 \text{ kg/m}^3$. The spill containers can be made of rotationally moulded or blow moulded PE (or from carbon steel).

1.1 Field of application

The tanks and spill containers are designed for the atmospheric above ground storage of kerosene, diesel fuels, heating oils, (waste) oils and lubricants having a density $\leq 1.000 \text{ kg/m}^3$. They can be installed indoor or outdoor. Partial certification is possible.

Note: Products with higher densities ($> 1.000 \text{ kg/m}^3$) may be approved by the certification body. This shall be documented and included in the product certification with technical approval. Non-static tanks may also be approved by the certification body.

1.2 Acceptance of test reports

When the manufacturer provides the certification body with test reports in order to demonstrate the compliance with the requirements of the PCP, the certification body or laboratory shall meet one of the applicable accreditation standards:

NBN EN ISO/IEC 17020: 2012 Conformity assessment - Requirements for the operation of various types of bodies performing inspection

NBN EN ISO/IEC 17021: 2011 Conformity assessment – Requirements for bodies providing audits and certification of management systems

NBN EN ISO/IEC 17024: 2012 Conformity assessment – General requirements for bodies operating certification of persons

NBN EN ISO/IEC 17025: 2017 General requirements for the competence of testing and calibration laboratories

NBN EN ISO/IEC 17065: 2012 Conformity assessment – Requirements for bodies certifying products, processes and services.

The institution must always work with the latest version of the applicable standard.

The institution meets these criteria when a valid certificate of accreditation can be submitted. This certificate shall be relevant for the required testing.

When no certificate of accreditation can be submitted, the certification body can verify whether the accreditation standard is fulfilled, or retest the samples in an accredited laboratory. In case, there is no possibility of testing under accreditation, the certification body shall clearly indicate its acceptance of the test results in the process of the certification.

Historic test results shall be maintained when this evaluation guideline uses newer versions of the standard. If the tests change radically, the certification body shall notify the manufacturer that certain tests have to be added.

1.3 Product certificate

A model of the under this Evaluation Guideline BENOR product certificate issued has been included in Annex 4.

1.4 Modifications to an approved design

Any modification to an approved design shall be submitted to the certification body prior to taking effect. The certification body will decide whether the changes can be accepted or rejected under the active product certification.

2. Terms and definitions

<i>Nominal capacity</i>	<i>Capacity specified by the tank builder. This is the value used in tank calculations.</i>
<i>Brim full capacity</i>	<i>Volume of water held by the tank filled through the filling device to the point of overflowing. The volume shall never be less than the nominal capacity.</i>
<i>Maximum filling capacity</i>	<i>95% of the nominal capacity.</i>
<i>Tank</i>	<i>A container for fluids, which can retain its designed shape and function in any stage of its designed working life as a stationary storage container. The tank is made from rotationally moulded or blow moulded PE.</i>
<i>Spill container</i>	<i>Container which is designed to enclose a tank to prevent leakage from the tank to the environment. The spill container can be made out of rotationally moulded PE, blow moulded PE or carbon steel.</i>
<i>Spill container cover</i>	<i>The upper part of the spill container which protects all fittings connected to the storage tank from rainwater.</i>
<i>Inspection cover</i>	<i>An operating access lid provides access to the fill line of the tank and other equipment. This will normally form part of the spill container cover.</i>
<i>Stationary storage of fluids</i>	<i>This term is applicable when tank/spill containers are installed in one location (can only be moved to a new location when completely empty and cleaned) and filled at location.</i>
<i>Tank battery</i>	<i>Two or more tanks installed parallel or in series, whereby use is made of common suction, filling and venting lines without the possibility of isolating any individual tank.</i>
<i>Conformity assessment</i>	<i>A number of tests and inspections to determine whether all the requirements of the Evaluation Guideline are met.</i>
<i>Product certification audit</i>	<i>Tests and inspections carried out after the product certificate has been granted in order to determine whether the certified products continue to meet the requirements in the Evaluation Guide.</i>
<i>Compliance certificate</i>	<i>Document provided with a unique number, which is delivered by the certification body, for each BENOR tank, spill container or double wall.</i>
<i>Raw material</i>	<i>Polyethylene virgin material with pigments and additives.</i>
<i>Virgin material</i>	<i>Raw polyethylene material without additives, pigments or other substances.</i>
<i>Recycled material</i>	<i>Material which has already been processed regrinded in order to use once more in the production process.</i>

3. Legal requirements

The valid European standard for this Evaluation Guideline: NBN EN 13341+A1: 2011: Static thermoplastics tanks for above ground storage of domestic heating oils, kerosene and diesel fuels - Blow moulded rotationally moulded polyethylene tanks and rotationally moulded tanks made of anionically polyamide 6 - Requirements and test methods.

There is no standard for the construction of the spill container and thus a code of good practices shall be applied.

The tanks must be made of material that is provided with a factory inspection report similar to the standard NBN EN 10204 type 2.2 or a test report according to the standard NBN EN 10204 type 3.1: Metallic products - Types of inspection documents, as is applicable in the steel industry.

If any welding is applied it must be carried out by certified welders, in accordance to the standard NBN EN 13067: Plastics welding personnel - Qualification testing of welders - Thermoplastics welded assemblies.

For rotationally moulded and blow moulded PE tanks used for the storage of kerosene, diesel fuels and heating oils for the supply of building heating/cooling solely the requirements of Annex ZA as specified in the standard NBN EN 13341+A1:2011 are applicable (attestation of conformity system 3). Only tanks complying with these requirements shall be affixed with the CE-marking. For those tanks BENOR can only be affixed if the tanks do comply with the CE-marking.

The Evaluation Guideline will always follow the latest version of the proposed standards. As a result, the version number of the Evaluation Guideline (as well as a part of the content) may vary over time. Manufacturers will be notified when drastic changes are made in the Evaluation Guideline.

Note: Receiving the BENOR-brand shall not exempt the manufacturer of other legal requirements imposed by specific regional governmental rules.

Note: Equivalent standards can be accepted by the certification body. The manufacturer has to prove the equivalence of the standard.

4. Normative references

This list contains the normative references necessary for the correct application of this document. Reference is made to the most recent version of the standards listed at present.

Should any of the standards become obsolete or has been cancelled, the standard replacing it, is to be used.

<u>Standard number</u>	<u>Title</u>
NBN EN 13341+A1	Static thermoplastic tanks for above ground storage of domestic heating oils, kerosene and diesel fuels Blow moulded and rotationally moulded polyethylene tanks and rotationally moulded tanks made of anionically polymerized polyamide 6 - Requirements and test methods.
NBN EN ISO 527-2	Plastics - Determination of the tensile properties - Part 2: Test conditions for moulding and extrusion plastics.
NBN EN ISO 1133	Plastics - Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
NBN EN ISO 1183-1	Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method.
NBN EN ISO 1183-2	Plastics – Methods for determining the density of non-cellular plastics - Part 2: Density gradient column method.
NBN EN 1991-1-4+A1	Eurocode 1 - Actions on structures - Part 1-4: General actions - Wind actions
NBN EN 1991-1-3+A1	Eurocode 1 - Actions on structures - Part 1-3: General actions - Snow loads.
NBN EN ISO 11357-6	Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT).
NBN EN ISO 11357-5	Plastics - Differential scanning calorimetry (DSC) - Part 5: Determination of characteristic reaction-curve temperatures and times, enthalpy of reaction and degree of conversion.
NBN EN ISO 175	Plastics - Methods of test for the determination of the effects of immersion in liquid chemicals.
NBN EN 13501-1+A1	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
NBN EN ISO 15494	Plastics piping systems for industrial applications - Polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), polypropylene (PP) - Metric series for specifications for components and the system.
NBN EN 682+A1	Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids.
NBN EN 13067	Plastics welding personnel - Qualification testing of welders - Thermoplastics welded assemblies.
NPR-CLC-IEC/TR 60079-32-1	Explosive atmospheres - Part 32-1: Electrostatic hazards-guidance.
ASTM D975	Standard specification for diesel fuel oils.
NBN EN 590	Automotive fuels - Diesel - Requirements and test methods.

BRL-K21002

Kiwa product certificate with technical approval for tanks made from rotational moulded polyethylene (PE), with an integrated spill container, for the above ground storage of kerosene, (bio) diesel fuels, heating oil, waste oil and lubricants

NBN EN 14214+A1

Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods.

5. Product certification procedure

When applying for certification under this Evaluation Guideline, the manufacturer has to read this document together with the product certification procedure regulation document (CR). The CR will always be available on the website of the certification body as well as the latest version of the Evaluation Guideline.

Upon his decision to proceed with the certification, the certificate applicant needs to send his application to the certification body in writing.

The certification body shall then provide the manufacturer with a number of documents to allow him to proceed and will provide a copy of the financial regulation (FR) for the certification.

The conformity assessment shall be carried out as described in the product and construction requirements in this Evaluation Guideline, including the test methods.

Depending on the type of product to be certified the conformity assessment shall pertain to the following inspections:

- *sample testing for product requirements and performance requirements (ITT= initial type testing);*
- *evaluation of the production process;*
- *evaluation of the quality system and the factory production control (FPC);*
- *evaluation of the functionality of other required procedures.*

Prior to the conformity assessment, the internal quality system has to be operational for at least three months.

On a mutually agreed date the conformity assessment will take place on the manufacturer's premises.

Upon conclusion of the conformity assessment by the auditor, an audit report will be issued by the auditor. In this report possible shortcomings will be listed.

This audit report shall be evaluated by a revisor. He/she shall evaluate the results of this report.

Upon reception of the audit report, the manufacturer is to react on the comments made by the auditor within the time frame indicated under art. 8.4 of the CR, with a maximum duration of six months.

Once the comments have been reacted to and the proposed modification to the internal quality system have been agreed upon by the certification body, a product certification decision will be made by a person that has not been involved in the conformity assessment. The manufacturer will be notified in writing (with eventual reason of decline). If the certification is granted, the manufacturer will receive a Product Certificate to make the certification official (see annex 4).

The certification body will publish the certified companies on the website (www.ratcon.be) including the date of the validity of the certification.

After having been granted the product certificate, the manufacturer may start the production of BENOR- labelled tanks.

The manufacturer (now certification holder) shall provide the (series of) tank number(s) produced under product certification to the certification body.

Each tank and/or spill container or double wall shall have a compliance certificate provided by the certification body with a unique BENOR number. The manufacturer shall label the BENOR tanks in accordance with the requirements of BENOR as indicated under Annex 5.

Once the product certification under this Evaluation Guideline is obtained, the certification holder will be subject to regular audits. The frequency of these product certification audits is determined under part 7 of this Evaluation Guideline.

6. Technical requirements

This chapter contains the product/performance requirements to be met by the tanks and spill containers made as well from rotationally moulded polyethylene as from blow moulded polyethylene.

If required there will be a specified split between these two kinds of procedures.

The legal requirements (chapter 3) as well as the quality requirements (chapter 7) remain applicable for all kinds of procedures.

6.1 Field of application

6.1.1 Tanks with integrated spill container from rotationally moulded PE

The tanks are designed for:

- *storage of kerosene, diesel fuels, heating oils, waste oils and lubricants with maximum density $\leq 1.000 \text{ kg/m}^3$;*
- *above ground installation;*
- *atmospheric pressure;*
- *nominal capacity: $\leq 10.000 \text{ l}$;*
- *maximum filling capacity: 95 % of the nominal capacity;*
- *indoor and outdoor installation;*
- *stationary container filled at location.*

The spill containers with cover are designed for:

- *secondary containment of kerosene, diesel fuels, heating oils, waste oils and lubricants with maximum density $\leq 1.000 \text{ kg/m}^3$;*
- *above ground installation;*
- *atmospheric pressure;*
- *indoor or outdoor installation;*
- *110 % of the brimful capacity of the tank.*

The manufacturer is responsible for the correct functioning of the tank and the spill container as a combined unit. The operation of the combined unit shall be documented and approved by the manufacturer.

6.1.2 Tanks with/without spill container from blow moulded PE

The tanks are designed for:

- *storage of kerosene, diesel fuels, heating oils, waste oils and lubricants with maximum density $\leq 1000 \text{ kg/m}^3$;*
- *above ground installation;*
- *atmospheric pressure;*
- *nominal capacity: $\leq 10.000 \text{ l}$;*
- *maximum filling capacity: 95 % of the nominal capacity;*
- *indoor or outdoor installation;*
- *stationary container filled at location;*
- *combined installation such as battery arrangements.*

The spill containers with cover are designed for:

- *secondary containment of kerosene, diesel fuels, heating oils, waste oils and lubricants with maximal density $\leq 1000 \text{ kg/m}^3$;*
- *above ground installation;*
- *atmospheric pressure;*
- *indoor and outdoor installation;*
- *110 % of the brimful capacity of the tank.*

The manufacturer is responsible for the correct functioning of the tank and/or spill container. The operation of tank and/or spill container shall be documented and approved by the manufacturer.

6.2 Documentation

6.2.1 Design drawings

The manufacturer shall define and submit for approval all tank types for certification to the certification body.

The details of the design, materials to be used, and the dimensional tolerances used in the production shall be specified in technical drawings by the manufacturer.

Following items have to be included in the drawing:

- date of issue;
- version;
- connections.

The certification body shall evaluate the designs for approval.

6.2.2 Calculations/parameters

The design details shall be according to NBN EN 13341+A1: 2011. The manufacturer shall determine the minimum, average and rejection parameters and tolerances.

The design is based on a life expectancy of a minimum of 10 years, an ambient temperature between -5 °C and +25 °C, a maximum wind speed of 26 m/s depending on the region of installation (NBN EN 1991-1-4+A1:2015) and a snow load of 50 to 120 kg/m² according to NBN EN 1991-1-3+A1:2015).

The manufacturer shall refer to the temperature, snow load and wind speed in the installation and user instructions.

6.2.3 Installation and user instructions

The manufacturer shall provide proper written installation- and user instructions as well as transporting and maintenance instructions in Dutch, French and German.

For installations abroad, the different instructions may also be written in English.

These requirements shall be in compliance with the national environmental regulations for the storage of fuels.

6.2.4 Marking of tank and/or spill container

Every tank/spill container shall be marked with the following:

- name and number of the certification body;
- manufacturer's name and trade mark;
- serial number of tank and spill container;
- month and year of construction;
- nominal capacity of the tank in litres or m³;
- medium to be stored;
- location of the tank: indoor or outdoor;
- life expectancy;
- construction standard;
- dimensions;
- material.

The identification plate is designed to permanently mark the data, meaning it can't be removed from the tank and spill container.

The manufacturer can add other data to the marking if needed for other regulations.

6.3 Requirements and test methods of PE material characteristics

6.3.1 Material properties

The materials used for the manufacturing of the tank, spill container and the cover shall be only virgin material.

Material certificates shall be provided by the manufacturer.

All material characteristics listed in the standard NBN EN 13341+A1:2011 shall be implemented:

6.3.1.1. The density shall be determined according to the standard NBN EN ISO 1183-1: 2012 Method B and NBN EN ISO 1183-2:2004.

For rotationally moulded polyethylene the density shall be no less than 934 kg/m³.

For blow moulded polyethylene the density shall be no less than 938 kg/m³.

- 6.3.1.2. The melt flow rate shall be determined according to the standard NBN EN ISO 1133:2012. For rotationally moulded polyethylene the melt mass-flow rate (MFR) of the raw material shall be $4,0 \pm 3,0$ g/10 min at 190 °C (2,16 kg). The MFR of material taken from the moulded tank and spill container can have a maximum variation of 20 % compared to the raw material. For blow moulded polyethylene MFR of the raw material shall be < 12 g/10 min at 190°C and 21,6 kg. The MFR of material taken from the moulded tank can have a maximum increase of 15 % compared to the raw material.
- 6.3.1.3 The tensile strength shall be determined according to the standard NBN EN ISO 527-2:2012 type 1BA test pieces. For rotationally moulded polyethylene the tensile strength at yield shall not be less than 15 MPa, elongation at yield (%) shall not be more than 25 % and elongation at break shall not be less than 200 %. For Blow moulded polyethylene the tensile strength at yield shall be minimal 21 MPa and elongation at yield (%) shall not be more than 15 %.
- 6.3.1.4 Thermal stability (Oxidation Induction Time OIT): The OIT tested according to the standard NBN EN ISO 11357-6:2014 with a test temperature of +200 °C shall not be less than 20 minutes.
- 6.3.1.5. Melt temperature (NBN ISO 11357-5:2014) measured by means of the Differential scanning Calorimetric method shall be no less than +120 °C (certificate of conformity by the supplier of the virgin material)
- 6.3.1.6. Dangerous substances: the manufacturer can use normal legal contracts between himself and the supplier to control whether all applicable requirements on dangerous substances for the components used have been fulfilled (according to Guidance Paper H–A harmonized approach relating to dangerous substances under the construction product directive-2002)
Note: The use of 'no performance determined' option can be maintained in the prescribed form of declaration to accompany the CE-marking.

6.3.2 Resistance to the stored medium.

Test shall be according to the standard NBN EN 13341+A1:2011 (resistance to annex A). Test specimens shall be taken from a section of the moulded tank and spill container.

The stored liquids shall all be tested in according to the standard NBN EN ISO 175.

We can divide those liquids into 4 separate product groups:

- 6.3.2.1. Kerosene and diesel and/or heating oil: test liquids shall be according to the standard NBN EN 13341+A1:2011.
- 6.3.2.2 Bio-diesel: The test liquid for testing the resistance to bio diesel B20 shall consist of 80 % Diesel Fuel (according to NBN EN 590:2013) and 20 % Rapeseed Oil Methyl Ester (FAME)(according to EN 14214:2012+A1:2014). For B5, B10 and B15 bio diesels the composition of the test liquids shall be adjusted appropriately.

6.3.2.3 Waste oil

Liquid	Specification
5 % petrol	ASTM Fuel B diesel
5 % ethanol	GPR Ethanol
5 % Battery acid	GRP 96 % Sulphuric Acid
5 % transmission fuel	Ford Auto transmission fluid 5 014 519: A85SX 19547 AA
5 % brake fluid	DOT 4 brake oil
75 % engine oil	IRM 903 lubrication oil

6.3.2.4 Lubricants: the test liquid shall be 100 % engine oil.

The scope has to be provided by the manufacturer.

6.3.3 Resistance to UV-ageing.

Test according to the standard NBN EN 13341+A1:2011 Annex A.1.5 (for blow moulded PE) or A.2.5 (for rotationally moulded PE): for external installations elongation at break shall be greater than 50 % of the initial value after exposure to total irradiance of 34 GJ/m², for internal installations elongation at break shall be greater than 50 % of the initial value after exposure to total irradiance of 3,4 GJ/m².

6.3.4 Reaction to fire

Where the tank is subject to regulatory requirements, it shall either be declared as Class F without the need for testing, or the material shall be tested and classified according to the standard NBN EN 13501-1+A1:2010, mounted and tested in conditions representative of the tank's intended use.

6.3.5 Welding techniques

If any welding is applied it should be according to the standard NBN EN 13067. There has to be proof of education for the personnel of all machines and techniques.

Welding procedures will be in accordance with standard CEN/TS 16892.

6.3.6 Electrostatic behavior

NPR-CLC-IEC/TR 60079-32-1 Explosive atmospheres - Part 32-1: Electrostatic Hazards – Guidance.

This requirement only applies to tanks used for the storage of liquids with a flashpoint ≤ 55 °C. These tanks should always be equipped with an earth connection.

The installation and user instructions have to accentuate that the filling speed must be adapted in order to prevent an electrostatic accumulation.

6.4 Requirements and test methods of the tank

The design of the tank shall be according to the legal requirements as in chapter 3 of this Evaluation Guideline. For the tanks the test methods of the standard NBN EN 13341+A1:2011 shall be carried out.

There are some extra requirements that must be fulfilled in order to get certified. They are described in the following paragraphs.

6.4.1. Visual inspection

Carried out in compliance to the standard NBN EN 13341+A1:2011.

6.4.2. Mass of the tank

The measurement of the mass of the tank shall be in compliance with the standard NBN EN 13341+A1:2011. Predetermined, minimum, maximum and actual values need to be recorded.

6.4.3. Wall thickness

The wall thickness of the tank (and the tolerances) shall be in compliance with the standard NBN EN 13341+A1:2011. At least 30 measurements within the critical areas of the tank shall be recorded.

6.4.4. Lifting lugs or handles

These are not obligatory for stationary tanks, but mandatory for yard refueling tanks.

The mass of the tank tested shall be equal to twice the maximum tolerated gross mass (tank filled to brimful capacity with water). This weight shall be lifted vertically for 5 minutes by using the two diagonal lifting supports.

The same load shall be lifted vertically by using the other two diagonal lifting supports.

The test shall be repeated for both pair of diagonal lifting supports when lifting under an angle of 45°.

There shall be no loss of liquid nor shall there be deformation of the lifting lugs of the tank.

6.4.5. Resistance to impact

The impact test according to the standard NBN EN 13341+A1:2011 shall be used. When the manufacturer agrees this impact test can be extended to a destructive test.

6.4.6. Resistance to pressure

The resistance to pressure shall be in compliance to test method B.7 of the standard NBN EN 13341+A1:2011.

6.4.7. Deformation and elongation

The deformation and elongation shall be in compliance to test method B.6 of the standard NBN EN 13341+A1:2011.

6.4.8. Leak tightness

Leak tightness shall be in compliance to test method B.8. of the standard NBN EN 13341+A1:2011.

6.4.9. Capacity test

The capacity test shall be in compliance to test method B.1 of the standard NBN EN 13341+A1:2011.

6.4.10. Connections to the tank

As a general rule there are no connections below the maximum liquid level.

The only exception to this rule can be made for emergency generators where it is mandatory to subject the filling line to static pressure in order to ensure a continuous flow of the stored medium in case of an emergency.

Connections (above the maximum liquid level) must be provided as in the standard NBN EN 13341+A1:2011. A minimum of 4 openings on the tank is mandatory to allow for the following connections:

- filling line;
- suction;
- overflow protection (if applicable);
- fluid level indicator;
- vent.

6.4.11 Internal piping in the tank

The internal pipes are an integral part of the tank.

The following connections are allowed to have internal piping in the tank:

- Filling pipe: if provided, this pipe shall have a minimal 3 mm diameter hole as high as possible;
- Suction pipe: distance of the lowest point of this pipe to the bottom of the tank shall be at least the diameter of the used pipe
- Fluid level indicator: if provided, this pipe shall have a minimal 3 mm diameter hole as high as possible.

6.4.12 Inspection facilities and manholes

According to the standard NBN EN 13341+A1:2011 § 4.2.9.

6.4.13 Elastomeric sealing elements

The seal manufacturer provides a written declaration based on test reports and resistance lists for the stored medium. Tests are in compliance with the requirements of the standard NBN EN 682+A1:2005.

The test results shall be inspected by the certification body.

6.5 Requirements and test methods of the spill container

6.5.1 Visual inspection

The inner and outer surface of all spill containers shall be smooth and shall show no holes, bubbles, blisters or other defects. The material shall be free of contamination.

6.5.2 Mass of the spill container

The prescribed minimum weight of the empty tank and spill container, complete with lid if provided, must be no less than 5 % below the determined weight in its type test for a tank and a spill container.

6.5.3 Wall thickness

For storage of kerosene, the minimum wall thickness for the spill container shall be 4,5 mm.

For storage of diesel fuels, heating oils, waste oil and lubricants the minimum wall thickness for the spill container shall be:

- 3,3 mm for a tank capacity from 400 l to 999 l;
- 3,5 mm for a tank capacity from 1.000 l to 1.499 l;
- 3,9 mm for a tank capacity from 1.500 l to 1.999 l;
- 4,1 mm for a tank capacity from 2.000 l to 2.499 l;
- 4,3 mm for a tank capacity from 2.500 l to 2.999 l;
- 4,4 mm for a tank capacity from 3.000 l to 10.000 l.

A maximum of 10 % of the minimum wall thickness is permitted in zones clearly defined by the manufacturer on a specification document submitted to the test lab, with justification that it has no effect on the physical properties of the bund.

6.5.4 Lifting lugs or handles

These are not obligatory for stationary tanks, but mandatory for yard refueling tanks with spill container. The mass of the tank tested shall be equal to twice the maximum tolerated gross mass (tank filled to brimful capacity with water). This weight shall be lifted vertically for 5 minutes by using the two diagonal lifting supports. The same load shall be lifted vertically by using the other two diagonal lifting supports. The test shall be repeated for both pair of diagonal lifting supports when lifting under an angle of 45°. There shall be no loss of liquid nor shall there be deformation of the lifting lugs of the tank.

6.5.5 Resistance to impact

A volume of water (110 % of the brimful capacity of the tank) at $15\text{ °C} \pm 5\text{ °C}$ shall be filled in the assembled combination of the tank and spill container so that the liquid level in the tank and in the spill container are equal in height. A pendulum impact test of 30 J shall be carried out at vulnerable areas of the spill container as identified by the test lab. The impact hammer of the pendulum shall be in form according to the standard NBN EN 13341.

Note: the tank does not have to be perforated for this test to ensure that the liquid levels are the same. Both tank and spill container have to be filled at the same time, while ensuring that the difference between the liquid levels is minimized during filling.

6.5.6. Deformation and elongation

The spill container and the tank shall be set up under normal assembled conditions. The spill container and tank shall be conditioned at $23\text{ °C} \pm 2\text{ °C}$ for 48 hours. The length and width of the spill container while empty shall be measured and these dimensions will be taken as the original dimensions. A volume of water at a temperature of $15\text{ °C} \pm 5\text{ °C}$ and equal to 110 % of the brimful capacity shall be filled through the top of the tank. The new length and width of the bund shall be measured when full. The length and width shall be measured on the day 5, 10 and 15. On day 15 the final length and width shall be obtained and the difference in length and width shall be calculated. The maximal increase in length is 12,5 % and in width is 13,5 %.

Note: the tank does not have to be perforated for this test to ensure that the liquid levels are the same. Both tank and spill container have to be filled at the same time, while ensuring that the difference between the liquid levels is minimized during filling.

6.5.7. Capacity

The spill container shall be tested for capacity on testing tank and spill container together. A volume of water at $15\text{ °C} \pm 5\text{ °C}$, equal to 110 % of the brimful capacity of the tank shall be poured through the tank. The spill container shall not leak.

Note: the tank does not have to be perforated for this test to ensure that the liquid levels are the same. Both tank and spill container have to be filled at the same time, while ensuring that the difference between the liquid levels is minimized during filling.

6.5.8 Inspection facilities and manholes

According to the standard NBN EN 13341 §4.2.9. Additionally inspection openings shall have a diameter of not less than 100 mm and must be provided with a means of being secured in place so that they are only used for their intended purpose. The manhole is obligatory for tank sizes above 3.500 l.

6.5.9 Elastomeric sealing elements

The seal manufacturer provides a written declaration based on test reports and resistance lists of the stored medium. Tests are in compliance to the requirements of the standard NBN EN 682.

The test results shall be inspected by the certification body.

6.5.10 Overflow

This test has to be applied only in case of tanks for storage of environmentally dangerous liquids which are not equipped with an overflow protection system.

- The combined tank shall be able to withstand flash filling without leaking in the environment. The overflow of the combined tank shall be tested as follows:

- *the combined tank shall be set up under its normal assembled condition;*
- *a volume of water at $15\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, equal to 110 % of the brimful capacity of the tank shall be fitted at a rate of 120 l/min $\pm 5\%$ through a 50 mm diameter hose connected to the combined tank fitting;*
- *the overflow shall allow to pass through the combined tank vent into the bund. The vent shall be fitted under the normal fitting instructions to the combined tank.*

7 Quality system requirements

7.1 General

This chapter contains the requirements that have to be fulfilled by the manufacturer's quality system.

7.2 Quality system

The manufacturer shall appoint a quality system manager (internal or external).

The manufacturer has to implement an internal quality system.

Before the pre-certification conformity assessment can take place, the internal quality system has to be operational for at least three months.

This quality system has to include the following items:

7.2.1 Identification of documents

The manufacturer shall have a procedure for the identification of documents, which includes the following:

- *How the identification of the documents is done;*
- *How changes to documents shall be done;*
- *Where documents are archived.*

All documentation have to be archived for a minimum period of ten years and preferably the life of the tank.

The manufacturer shall have an overview list of all documents and their latest review.

7.2.2 Procedures and working instructions

The manufacturer shall identify all processes for the production and self-control and shall have procedures and working instructions for all the processes.

Which include at least the following:

- *Procedure inspection incoming materials;*
- *Inspection during production;*
- *Inspection of final products;*
- *Registration of test results (internally and externally);*
- *Procedure for non-conforming products;*
- *Procedure for repairs.*

7.2.3 Complaints, corrective and preventive actions

The manufacturer shall have a procedure and keep registrations for the handling of complaints, corrective and preventive actions, which include the following:

- *Identification of the complaints;*
- *Registration of the complaints (and an overview list);*
- *How complaints are handled;*
- *Responsible person for handling the complaints.*

7.2.4 Personnel

The manufacturer shall have a procedure and keep registrations for the qualification of personnel, which includes the following:

- *Determine the criteria for the competence of personnel for each function;*
- *Identify training needs and provide, as necessary, training programs;*
- *Demonstrate that the personnel has the required competencies for each function.*

7.2.5 Calibration and maintenance

The manufacturer shall have a procedure and keep registrations for the calibration and maintenance of equipment, which include the following:

- Identification of production equipment;
- Calibration/maintenance scheme;
- Overview of all equipment and status;
- Acceptance criteria after calibration/maintenance.

7.3 Design changes

Design changes of the certified products shall always be reported to the certification body prior to the start of production.

The certification body shall evaluate the drawing and designs for approval.

7.4 Pre-certification conformity assessment

The pre-certification conformity assessment covers all aspects of the Evaluation Guideline.

The maximum duration of this pre-certification conformity assessment period is set at six months.

Upon completion of the conformity assessment, the manufacturer will receive a product certificate from the certification body (see Annex 4).

Once the product certification is obtained, the manufacturer will be subjected to periodical product certification audits.

7.5 Product certification audits

The product certification audits shall be conducted as summarized in the table in 7.8 (Test and Inspection Plan).

The auditor shall at random choose a tank, produced under this TRA. All the requirements for the tank under this TRA shall be checked.

The auditor also has the possibility to choose to visit the end user, where a BENOR-tank has been installed. The appointment at the client's premises will then be made in mutual consultation.

Depending on the availability of a tank at the manufacturer, the auditor can decide to perform control measurements to evaluate the measurements taken by the manufacturer.

Initially, three audits a year will be planned. The frequency can be reduced to two audits after the first year if all requirements are fulfilled and if production is limited to fifty tanks a year.

Whenever more tanks are produced, the frequency of the audits can stay at three audits a year.

7.6 External lab testing

Periodically, the documents on the material properties shall be submitted to further testing by taking some samples. Testing (according to the table in 7.8) shall be executed by an external lab (every fifty tanks and at least once per year).

7.7 Use of BENOR-logo and certificates

The correct use of the BENOR-logo (Annex 5) and use of issued certificates shall be examined.

7.8 *Test and Inspection Plan (TIP)*

Features	Artikel TRA	Factory Production Control		Visit Certification Body (***)
		Internal Control	External Control	
General documentation				
<i>Design drawings</i>	6.2.1			1x/year
<i>Calculations/parameters</i>	6.2.2			1x/year
<i>Installation and user instructions</i>	6.2.3			1x/year
<i>Marking of tank and spill container</i>	6.2.4			1x/year
Requirements and test methods of PE material characteristics(****)				
<i>Density</i>	6.3.1.1	<i>Every batch</i>	1x/year	1x/year
<i>Melt mass flow rate</i>	6.3.1.2	<i>Every batch for base material /once a week for tanks</i>	1x/year	1x/year
<i>Tensile strength</i>	6.3.1.3		1x/year	1x/year
<i>Thermal stability</i>	6.3.1.4			1x/year
<i>Melt temperature</i>	6.3.1.5			1x/year
<i>Dangerous substances</i>	6.3.1.6			1x/year
<i>Resistance to the stored medium</i>	6.3.2		<i>When material/medium changes</i>	1x/year
<i>Resistance against UV ageing</i>	6.3.3			1x/year
<i>Reaction to fire</i>	6.3.4			1x/year
<i>Welding techniques</i>	6.3.5			1x/year
<i>Electrostatic behavior</i>	6.3.6			1x/year
Requirements and test methods of tank				
<i>Visual inspection</i>	6.4.1	<i>Every tank</i>		<i>Each audit</i>
<i>Mass of the tank</i>	6.4.2	<i>Every tank</i>		<i>Each audit</i>
<i>Wall thickness</i>	6.4.3	<i>Every tank</i>		<i>Each audit</i>
<i>Lifting lugs and handles</i>	6.4.4			1x/year
<i>Resistance to impact</i>	6.4.5			1x/year
<i>Resistance to pressure</i>	6.4.6			1x/year
<i>Deformation and elongation</i>	6.4.7			1x/year
<i>Leak tightness</i>	6.4.8	<i>Every tank</i>		<i>Each audit</i>
<i>Capacity test</i>	6.4.9			1x/year
<i>Connections to the tank</i>	6.4.10			1x/year
<i>Internal piping in the tank</i>	6.4.11			<i>Each audit</i>
<i>Inspection facilities and manholes</i>	6.4.12			<i>Each audit</i>
<i>Elastomeric sealing elements</i>	6.4.13			1x/year
Requirements and test methods of spill container				
<i>Visual inspection</i>	6.5.1	<i>Every tank</i>		<i>Each audit</i>
<i>Mass of the tank</i>	6.5.2	<i>Every tank</i>		<i>Each</i>

				<i>audit</i>
Wall thickness	6.5.3	<i>Every tank</i>		<i>Each audit</i>
Lifting lugs and handles	6.5.4			<i>1x/year</i>
Resistance to impact	6.5.5			<i>1x/year</i>
Resistance to pressure	6.5.6			<i>1x/year</i>
Deformation and elongation	6.5.7			<i>1x/year</i>
Capacity	6.5.8			<i>1/year</i>
Inspection facilities and manholes	6.5.9			<i>Each audit</i>
Elastomeric sealing elements	6.5.10			<i>1x/year</i>
Overflow	6.5.11			<i>1x/year</i>
Internal quality control				
Identification of documents	7.2.1	X		<i>Each visit</i>
Procedures and working instructions	7.2.2	X		<i>Each visit</i>
Complaints, corrective and preventive actions	7.2.3	X		<i>Each visit</i>
Personnel	7.2.4	X		<i>Each visit</i>
Calibration and maintenance	7.2.5	X		<i>Each visit</i>
Design changes	7.3			<i>Each visit</i>
External lab testing	7.6			<i>1x/year</i>
Use of logo and certificates	7.7			<i>1x/year</i>

(*) the internal control shall be conducted by the manufacturer for each tank. Except for the tank properties, most self-control is purely administrative.

(**) external controls: frequency at least once a year.

(***) once the product certification is obtained.

(****) The certification body can, in case of doubt about certain figures, ask for an extra lab test to confirm the result.

The audit report will contain three types of remarks (CR art. 8.5):

- A-remark: subparts that show deviations in a way that the quality of the product can no longer be guaranteed.
- B-remark: subparts that show deviations, but do not compromise the quality of the product immediately.
- C-remark: subparts that show deviations, but do not compromise the quality of the product in any way.

After the audit, the manufacturer will receive an audit report according to CR art. 8.4.1.

The certification regulations (art. 15) gives an overview of the penalties whenever remarks made during the audit are not resolved.

Annex 1

After the calculated life expectancy of a tank has been achieved the tank must be evaluated to determine whether the requirements to continue its use as a BENOR-tank are still fulfilled.

The tank must be evaluated on following items:

- *general condition: corrosion, damages;*
- *deformation;*
- *wall thickness control;*
- *also the placement of the tank shall be evaluated (protected from sunlight, no exposure to damage risks,...).*

As a result of these findings, the possible remaining life expectancy will be estimated and the control schemes shall be adapted.

Annex 2

Whenever a BENOR-tank shall change from owner, the certification body shall be notified from this change.

The seller of the tank shall provide the new owner with the complete BENOR-file of the tank

Annex 3

When a BENOR-tank is designed, the intended liquid that will be stored is always taken into consideration.


Whenever a different liquid is going to be stored, the certification body needs to be notified prior to the product change.

The certification body will decide whether the product change can take place or not.


In any case documents like resistance verification (according to 6.3.2) will need to be presented to the certification body. As a result of this product change, further inspection as under annex 1 may be required.

Annex 4: Product certificate


Certificaat



RAT.con VZW
Gustaaf Papastraat 65
9300 Kalm
Tel: 053/703485
Email: info@ratcon.be



BENOR
TROUW AAN KWALITEIT
LA QUALITÉ EN CONFIANCE



BE LAC
602-PR0D

Certificate number:

Date of issue:

Product certificate

Above ground unpressurized, vertical or horizontal stationary tanks with/without spill container made from rotationally moulded or blow moulded polyethylene, having a maximum nominal capacity of 10.000 l, for the indoor or outdoor storage of kerosene, diesel fuels, heating oils, waste oil and lubricants with density $\leq 1.000 \text{ kg/m}^3$




Based on the initial conformity assessment and periodical certification audits by RAT.con, the tanks produced under the submitted scope by marked with the BENOR quality label, comply with the evaluation guideline TRA02 (revision xx) issued by RAT.con.

RAT.con VZW

Certified company:

Production site:

Valid until:

Annex 5: BENOR label



Use of the BENOR-label

If the BENOR label relates to a product, it should, if possible, be fixed to that product itself. If this is impossible, eg in the case of bulk goods, the BENOR label is at least used in the delivery note.

The BENOR label may also be used for all kinds of trade documents and publications of the certificate holder. The application of the BENOR label may never give rise to confusion with regard to the products, processes or services to which the certification applies and the manufacturer or supplier to whom the certificate was issued.

The application of the BENOR label on the product, on the delivery note or on other commercial documents and publications in no way prevents the marking or use of another individual or collective brand, insofar as any ambiguity is excluded here.

The dimensions of the BENOR label are at least in the order of magnitude of the other indications that appear on the product, on the delivery note or the commercial documents or publications.

Marking the BENOR-label

The BENOR quality label on the product shall be supplemented by the standard and the identification number of the production unit.

The supplemental data should be placed as follows:

- Directly beside or underneath the logo
- Either in the following way:
 - o in the box to the left of the logo, the pointer of the standard or at least the serial number of the standard in the standard series;
 - o in the box to the right, the identification number of the production unit.

If necessary, the identification number may be replaced by the name of the license holder, provided that the production unit is uniquely identified below.

In principle, the BENOR label must be applied to every unit of the product itself. If this method is impossible or impractical, the logo is either fixed to each individual packaging or wrapping of the product or to a label attached to the product.

Marking

The word BENOR appears in the midfield of the mark. The identification number of the certificate holder and the product, process or service can be indicated in the rounded end fields of the mark.

The font for the word BENOR and the identification number is Helvetica. The mark is monochrome. The color of any additional information to the mark is the same as the mark itself.