

**GRP paagid ja anumad kasutamiseks
ülalpool maapinda. Osa 1:
Toormaterjalid. täpsustustingimused ja
aktsepteerimistingimused**

GRP tanks and vessels for use above ground - Part
1: Raw materials - Specification conditions and
acceptance conditions

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 13121-1:2003 sisaldab Euroopa standardi EN 13121-1:2003 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 06.06.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 13121-1:2003 consists of the English text of the European standard EN 13121-1:2003.</p> <p>This document is endorsed on 06.06.2003 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This European Standard gives requirements for specification and acceptance conditions of raw materials for GRP tanks and vessels with or without lining for storage or processing of fluids, factory made or site built, non pressurised or pressurised, for use above ground</p>	<p>Scope: This European Standard gives requirements for specification and acceptance conditions of raw materials for GRP tanks and vessels with or without lining for storage or processing of fluids, factory made or site built, non pressurised or pressurised, for use above ground</p>
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English version

GRP tanks and vessels for use above ground - Part 1: Raw materials - Specification conditions and acceptance conditions

Réservoirs et récipients en PRV pour applications hors sol -
Partie 1: Matières premières - Conditions de spécifications
et conditions d'utilisation

Oberirdische GFK-Tanks und -Behälter - Teil 1:
Ausgangsmaterialien - Spezifikations- und
Annahmebedingungen

This European Standard was approved by CEN on 17 March 2003.

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Foreword

This document (EN 13121-1:2003) has been prepared by Technical Committee CEN/TC 210, "GRP tanks and vessels", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU directive(s).

For relationship with EU-Directive(s), see informative Annex ZA, which is an integral part of this document.

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

Introduction

EN 13121 consists of the following parts under the general title "GRP tanks and vessels for use above ground":

Part 1 — Raw materials – Specification conditions and acceptance conditions

Part 2 — Composite materials – Chemical resistance

Part 3 — Design and workmanship

Part 4 — Delivery, installation and maintenance

These four Parts together define the responsibilities of the tank or vessel manufacturers, the materials manufacturers or suppliers and the purchasers.

The design and manufacture of GRP tanks and vessels involve a number of different materials such as resins, plastics and reinforcing fibres and a number of different manufacturing methods. It is implicit that tanks and vessels conforming to this European Standard should be made only by manufacturers and operators who are competent and suitably equipped to fulfil all requirements, using materials manufactured by competent and experienced material manufacturers.

Part 1 of this standard specifies the requirements for specification conditions and acceptance conditions for raw materials — resins, curing agents, thermoplastic linings, reinforcing materials and additives — in terms of both material technical properties and the manufacturing process. These requirements are necessary in order to establish the chemical resistance properties determined in Part 2 and the mechanical, thermal and design properties determined in Part 3. Together with the workmanship principles determined in Part 3, specification conditions and acceptance conditions for raw materials ensure that the tank or vessel will be able to meet its design requirements, particularly in terms of its chemical/thermal resistance and pressure and load supporting requirements. Part 4 of this standard specifies requirements for delivery, handling and installation and recommendations for maintenance of GRP tanks and vessels.

1 Scope

This European Standard gives requirements for specification and acceptance conditions of raw materials for GRP tanks and vessels with or without lining for storage or processing of fluids, factory made or site built, non pressurised or pressurised, for use above ground.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 59, *Glass reinforced plastics — Measurement of hardness by means of a Barcol impressor.*

EN 10204:1991, *Metallic products — Types of inspection documents.*

prEN 13121-2:1999, *GRP tanks and vessels for use above ground — Part 2: Composite materials — Chemical resistance.*

prEN 13121-3:2001, *GRP tanks and vessels for use above ground — Part 3: Design and workmanship.*

EN 29092, *Textiles — Nonwovens — Definition.*

EN ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite (ISO 75-2:1993).*

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178:2001).*

EN 13121-1:2003 (E)

EN ISO 306, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST) (ISO 306:1994).*

EN ISO 472:2001, *Plastics — Vocabulary (ISO 472:1999).*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994).*

EN ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003).*

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

EN ISO 1163-1:1999, *Plastics — Unplasticized poly (vinyl chloride) (PVC-U) moulding and extrusion materials — Part 1: Designation system and basis for specifications (ISO 1163-1:1995).*

EN ISO 1675, *Plastics — Liquid resins — Determination of density by the pycnometer method (ISO 1675:1985).*

EN ISO 1889 *Reinforcement yarns - Determination of linear density (ISO 1889:1997).*

EN ISO 2114:2000, *Plastics (polyester resins) and paints and varnishes (binders) - Determination of partial acid value and total acid value (ISO 2114:2000).*

EN ISO 2535:2002, *Plastics — Unsaturated polyester resins — Measurement of gel time at ambient temperature (ISO 2535:2001).*

EN ISO 2554, *Plastics — Unsaturated polyester resins — Determination of hydroxyl value (ISO 2554:1997).*

EN ISO 2555, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity by the Brookfield Test method (ISO 2555:1989).*

EN ISO 2592:2001, *Determination of flash and fire points -- Cleveland open cup method (ISO 2592:2000).*

EN ISO 3001, *Plastics — Epoxy compounds — Determination of epoxy equivalent (ISO 3001:1999).*

EN ISO 3219, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate (ISO 3219:1993).*

EN ISO 3251:2003, *Paints, varnishes and plastics - Determination of non-volatile-matter content (ISO 3251:2003).*

EN ISO 3344, *Reinforcement products — Determination of moisture content (ISO 3344:1997).*

EN ISO 6721-2, *Plastics — Determination of dynamic mechanical properties — Part 2: Torsion-pendulum method (ISO 6721-2:1994, including Technical Corrigendum 1:1995).*

EN ISO 9073-1, *Textiles - Test methods for nonwovens - Part 1: Determination of mass per unit area.*

EN ISO 9073-2, *Textiles - Test methods for nonwovens - Part 2: Determination of thickness (EN ISO 9073-2:1995).*

EN ISO 9073-3, *Textiles - Test methods for nonwovens - Part 3: Determination of tensile strength and elongation.*

EN ISO 9702, *Plastics — Amine epoxide hardeners — Determination of primary, secondary and tertiary amine group nitrogen content (ISO 9702:1996).*

EN ISO 9771, *Plastics — Phenolic resins — Determination of the pseudo-adiabatic temperature rise of liquid resols when cured under acid conditions (ISO 9771:1995).*

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

ISO 1887, *Textile glass — Determination of combustible-matter content.*

ISO 2113, *Reinforcement fibres — Woven fabrics — Basis for a specification.*

ISO 2211, *Liquid chemical products — Measurement of colour in Hazen units (platinum-cobalt scale).*

ISO 2559, *Textile glass — Mats (made from chopped or continuous strands) — Designation and basis for specifications.*

ISO 2797, *Textile glass — Rovings — Basis for a specification.*

ISO 3374, *Reinforcement products – Mats and fabrics — Determination of mass per unit area.*

ISO 5661, *Petroleum products — Hydrocarbon liquids — Determination of refractive index.*

ISO 6271, *Clear liquids — Estimation of colour by the platinum-cobalt scale.*

ISO 11359-2, *Plastics – Thermomechanical analysis (TMA) – Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature.*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this European Standard the terms and definitions given in prEN 13121-3:2001 and EN ISO 472:2001 apply.

3.2 Symbols and abbreviations

For the purposes of this European Standard, the symbols and abbreviations given in Table 1 apply.

Table 1 — Symbols and abbreviations

Symbol/abbreviation	Unit	Abbreviation
<i>HDT</i>	°C	Heat deflection temperature
<i>MFR</i>	g/10 min	Melt flow rate
T_g	°C	Glass transition temperature
ε_t	%	Elongation at break in tension
σ_f	MPa	Flexural strength
σ_t	MPa	Tensile strength
<i>ShD</i>	—	Shore Hardness D
ρ	g/ml	Density
E_t	MPa	Modulus of elasticity in tension
E_f	MPa	Modulus of elasticity in flexure

4 Thermosetting resins

4.1 General

The resins used for GRP tanks or vessels are liquid or liquefiable, thermosetting in nature and cure by polymerisation (polyaddition or polycondensation) with or without curing agents (initiators, accelerators/promoters).

The production procedure and cure schedule of thermosetting resin laminates shall be in accordance with the resin manufacturer's recommendations. Most thermosetting resins require an elevated temperature post cure to enhance chemical and thermal resistance.

Most unsaturated polyester resins and vinyl ester resins may be classified in accordance with Table 2.

In order that a specific resin may be given a classification according to Table 2 then the resin manufacturer shall state that the specific resin conforms with the property requirements given in Table 2 and meets the chemical resistance requirements given in prEN 13121-2.

When required, flammability and electrical conductivity shall be taken into account.

Table 2 — Classification scheme for UP- and VE-resins

Resin group	Resin type	Type of glycols	Type of acids	Content of styrene mass-% max.	T_g °C min.	HDT °C min.	σ_t MPa min.	ϵ_t % min.	σ_f MPa min.
1A	UP	Standard glycols ^{a, b}	Orthophthalic acid Ethylenedicarboxylic acids	45	85	60	60	2,0	90
1B	UP	Standard glycols ^{a, b}	Orthophthalic acid Ethylenedicarboxylic acids	45	120	90	50	1,5	75
2A	UP	Standard glycols ^{a, b}	Isophthalic acid, HET acid Ethylenedicarboxylic acids	50	85	60	60	2,0	90
2B	UP	Standard glycols ^a	Isophthalic acid, HET acid Ethylenedicarboxylic acids	50	120	90	50	1,5	75
3	UP	Standard glycols ^a	Terephthalic acid Ethylenedicarboxylic acids	50	140	110	75	3,0	120
4	UP	Neopentyl and halogenated neopentyl glycol (min. 80 mol-%) ^c and a diol with at least one secondary OH-group (max. 20 mol-%) ^c	Isophthalic acid Orthophthalic acid Ethylenedicarboxylic acids	55	120	90	65	3,0	110
5	UP	Bis (hydroxymethyl)-tricyclodecan	Orthophthalic acid Ethylenedicarboxylic acids	45	120	90	50	1,5	100
6	UP	Dipropoxy-Bisphenol A and halogenated Bisphenol A (min. 90 mol-%)	Ethylenedicarboxylic acids	55	130	110	60	2,0	110
7A	VE	Epoxidised Bisphenol A and halogenated Bisphenol A	Methacrylic-/Acrylic acid	55	110	90	75	4,0	130
7B	VEU	Dialkoxy — Bisphenol A and halogenated Bisphenol A (min. 90 ml-%), Alkoxy (meth)acrylate	Ethylenedicarboxylic acids	50	120	105	75	3,5	130
8	VE	Epoxidised-Novolak	Methacrylic-/Acrylic acid	50	150	120	75	2,5	130

^a Ethylene-, 1,2-propylene-, diethylene-, dipropylene-, neopentylglycol, 1,3-butanediol, 1,4-butanediol and corresponding halogenated glycols

^b May also contain cyclic unsaturated hydrocarbons.

^c Related to the sum of the diol components.