Kiudmähitud FRP surveanumad. Materjalid, konstruktsioon, tootmine ja katsetamine

Filament-wound FRP pressure vessels - Materials, design, manufacturing and testing

EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN 13923:2005 sisaldab Euroopa standardi EN 13923:2005 ingliskeelset teksti. Käesolev dokument on jõustatud 28.12.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 13923:2005 consists of the English text of the European standard EN 13923:2005. This document is endorsed on 28.12.2005 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This European Standard specifies the requirements for the design including raw materials, calculation, manufacturing including composite materials, and testing of seamless Glass Reinforced Plastic (GRP) pressure vessels with protective layer, using only multi-directional filament winding, made in a factory and for use above ground and for storage and processing of fluids.	**Scope:** This European Standard specifies the requirements for the design including raw materials, calculation, manufacturing including composite materials, and testing of seamless Glass Reinforced Plastic (GRP) pressure vessels with protective layer, using only multi-directional filament winding, made in a factory and for use above ground and for storage and processing of fluids.

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

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

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Foreword

This European Standard (EN 13923:2005) 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 May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

This European Standard falls under the Pressure Equipment Directive (PED) and supports essential requirements of this EC Directive.

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

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

Introduction

This European Standard specifies two design methods for filament wound GRP pressure vessels. In this European Standard only the winding is considered in the calculation of the strength and the stiffness of the shell.

Method A, describes the calculation of the reinforcement of the cylindrical shell and the end domes based on netting theory. The design is verified by prototype testing.

Method B, describes the calculation of the reinforcement of the cylindrical shell and the end domes based on laminate theory.

The design and manufacture of filament wound GRP pressure vessels involve a number of different materials, such as resins, thermoplastics and reinforcement fibres. It is implicit that 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.

This European Standard specifies stress and strain limits and the requirements for the acceptance testing.

1 Scope

This European Standard specifies the requirements for the design including raw materials, calculation, manufacturing including composite materials, and testing of seamless Glass Reinforced Plastic (GRP) pressure vessels with protective layer, using only multi-directional filament winding, made in a factory and for use above ground and for storage and processing of fluids.

This European Standard covers vessels subject to pressures below 20 MPa and temperatures between – 30 °C and 120 °C.

Excluded from this European Standard are transportation vessels, double wall vessels, vessels under negative pressure, vessels which are subjected to the risk of explosion or failure of which may cause an emission of radioactivity.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13121-1:2003, *GRP tanks and vessels for use above ground — Part 1: Raw materials — Specification conditions and acceptance conditions*

EN 13121-2:2003, *GRP tanks and vessels for use above ground — Part 2: Composite materials — Chemical resistance*

prEN 13121-3:2004, *GRP tanks and vessels for use above ground — Part 3: Design and work-manship*

EN ISO 527-4, *Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites (ISO 527-4:1997)*

EN ISO 14129, *Fibre-reinforced plastic composites — Determination of the in-plane shear stress/shear strain response, including the in-plane shear modulus and strength, by ± 45° tension test method (ISO 14129:1997)*

EN ISO 75-2:2004, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite and long-fibre-reinforced composites (ISO 75-2:2004)*

EN ISO 75-3, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates (ISO 75-3:2004)*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

3 Terms and definitions

For the purpose of this European Standard, the following terms and definitions apply.

3.1
manufacturer
organisation that manufactures the vessel in accordance with this European Standard

3.2
material manufacturer
organisation that manufactures the specific material (e.g. resin, glass fibre or catalyst). The material manufacturer may also be the “supplier”

3.3
purchaser
organisation or individual that purchases the vessel