SLOVENSKI STANDARD
SIST EN 15507:2009

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Embalaža - Transportna embalaža za nevarne snovi - Preskušanje in primerjava kakovosti polietilena

Packaging - Transport packaging for dangerous goods - Comparative material testing of polyethylene grades

Verpackung - Verpackungen zur Beförderung gefährlicher Güter - Vergleichende Werkstoffprüfung von Polyethylensorten

Emballage - Emballages pour le transport des marchandises dangereuses - Essais comparatifs de diverses qualités de polyéthylene

Ta slovenski standard je istoveten z: **EN 15507:2008**

ICS:

13.300	Varstvo pred nevarnimi izdelki	Protection against dangerous goods
55.040	Materiali in pripomočki za pakiranje	Packaging materials and accessories

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Packaging - Transport packaging for dangerous goods - Comparative material testing of polyethylene grades

Emballage - Emballages pour le transport des marchandises dangereuses - Essais comparatifs de diverses qualités de polyéthylène

Verpackung - Verpackungen zur Beförderung gefährlicher Güter - Vergleichende Werkstoffprüfung von Polyethylensorten

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Foreword

This document (EN 15507:2008) has been prepared by Technical Committee CEN/TC 261 “Packaging”, the secretariat of which is held by AFNOR.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2009 and conflicting national standards shall be withdrawn at the latest by June 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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

Introduction

This European Standard was developed to provide requirements and test procedures for comparative testing of grades of high and medium molecular weight high density polyethylene, used for the manufacture of packagings and IBCs for the transport of dangerous goods. These specific material parameters relate to the test procedures described in the standards:

EN ISO 16101, *Packaging — Transport packaging for dangerous goods — Plastics compatibility testing (ISO 16101:2004)*

EN ISO 16104, *Packaging — Transport packaging for dangerous goods — Test methods (ISO 16104:2003)*

EN ISO 16467, *Packaging — Transport packaging for dangerous goods — Test methods for IBCs (ISO 16467:2003)*

The use of the test methods described in this European Standard is to facilitate usage in selective testing procedures, as described in Clause 8 eliminating or reducing the requirement to carry out the full test procedures described in the standards above each time a new grade of high density polyethylene is used for the manufacture of the same design type.

The test requirements and procedures in the standards above for plastics packagings and IBCs meet the provisions set out in the multimodal United Nations Recommendations on the transport of Dangerous Goods [1]. These UN Recommendations are given legal entity by the provisions of a series of modal agreements and regulations for the international transport of dangerous goods, details of which can be found in the Bibliography.

These international agreements include:

— the European Agreement concerning the International Carriage of Dangerous goods by Road (ADR), (covering most of Europe as well as parts of Asia and Northern Africa) [2];

— the International Civil Aviation Organisation's Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TIs), (world-wide) [3];

— the International Maritime Dangerous Goods Code (IMDG Code), (world-wide) [4];

— regulations concerning the International Carriage of dangerous Goods by Rail (RID), (covering most of Europe, parts of North Africa and the Middle East) [5].

The application of this standard will need to take account of the requirements of these international agreements and the relevant national regulations [6], [7] for domestic transport of dangerous goods.

It is important to note that there will be certain modal differences from the UN Recommendations and that the schedule for revision of the UN Recommendations and modal provisions may lead to temporary inconsistencies with this European Standard, which is regularly updated to reflect the latest version of the UN Recommendations.

This European Standard has been submitted for reference into the RID and/or the technical annexes of the ADR.

1 Scope

This European Standard specifies material parameters, test requirements and procedures for the comparative testing of grades of high molecular weight high density polyethylene (PE-HD-HMW) and medium molecular weight high density polyethylene (PE-HD-MMW), used for the manufacture of packagings and IBCs for the transport of dangerous goods. It is intended to be used in conjunction with selective testing for packagings for liquids. The standard is not intended to be used for comparative testing of recycled plastics material.

NOTE This European Standard is intended to be used in conjunction with one or more of the international regulations set out in the Bibliography.

2 Normative references

The following referenced documents are indispensable for the application 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 ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test (ISO 179-1:2000)*

EN ISO 1133:2005, *Plastics — Determination of the mass flow rate (MFR) and the melt volume flow rate (MVR) of thermoplastics (ISO 1133:2005)*

EN ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2004)*

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 16101:2004, *Packaging — Transport packaging for dangerous goods — Plastics compatibility testing (ISO 16101:2004)*

EN ISO 16104:2003, *Packaging — Transport packaging for dangerous goods — Test methods (ISO 16104:2003)*

EN ISO 16467:2003, *Packaging — Transport packages for dangerous goods — Test methods for IBCs (ISO 16467:2003)*

EN ISO 23667:2007, *Packaging — Transport packages for dangerous goods — Rigid plastics and plastics composite IBCs — Compatibility testing (ISO 23667:2007)*

ISO 16770:2004, *Plastics — Determination of environmental stress cracking (ESC) of polyethylene (PE) — Full-notch creep test (FNCT)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Annex A of EN ISO 16101:2004 and the following apply:

3.1
high molecular weight high density polyethylene
(PE-HD-HMW)
natural Polyethylene with a density of > 940 kg/m^3, when measured at 23 °C after annealing at 100 °C for 30 min, and a melt flow rate at 190 °C per 21,6 kg load of < 12 g / 600 s when measured according to EN ISO 1133:2005, Condition G

3.2
medium molecular weight high density polyethylene
(PE-HD-MMW)
natural polyethylene with a density of > 940 kg/m^3, when measured at 23 °C after annealing at 100 °C for 30 min, and a melt flow rate at 190 °C per 2,16 kg load of < 0,5 g per 600 s and > 0,1 g per 600 s in accordance with EN ISO 1133:2005, Condition D, or a melt flow rate at 190 °C per 5 kg load < 3,0 g per 600 s and > 0,5 g per 600 s in accordance with EN ISO 1133:2005, Condition T

NOTE Natural Polyethylene refers to material with no pigments or colorants.

4 Test requirements

4.1 General

When a manufacturer of a plastics packaging or IBC wants to change to a new grade of high density polyethylene for its manufacture, test results to the following requirements may be used in conjunction with a selective testing procedure to reduce the amount of design type testing of the design type with the new grade.

As a minimum requirement, a test with water as the test medium in accordance with EN ISO 16104 or EN ISO 16467 shall be carried out for the packaging design type manufactured from the new grade.

The following test requirements in 4.2 to 4.6 shall be met in the comparative testing of the grade with existing approvals, (Material A), and the replacement grade, (Material B).

The comparative testing of the grades to the procedures defined in 7.1 to 7.5 shall be carried out concurrently in a single laboratory. For the procedures 7.2 to 7.5, test sheets (see 5.2) compression moulded by the same mould type (e.g. using a positive mould or semi-positive mould) shall be used.

4.2 Melt flow rate

When tested in accordance with 7.1 the value of melt flow rate shall be within the following limits:

— MFR Material B ≥ 70 % MFR Material A;

— MFR Material B ≤ 130 % MFR Material A.

NOTE The determination of melt flow rate is solely intended as a classification test for the grade and does not relate to any of the tests for packaging described in EN ISO 16101, EN ISO 16104, EN ISO 16467 or EN ISO 23667.

4.3 Density

When tested in accordance with 7.2 the density in kg/m^3 shall be:

— Density Material B (D_B) ≥ Density Material A (D_A) – 2.

NOTE The determination of density is intended to relate to the performance of packaging and IBCs produced from the grades under test in the following tests in EN ISO 16104:2003:

7.1 Drop test
7.2 Stacking test
7.4 Hydraulic pressure test

and the following test in EN ISO 16101:2004:

8 Permeability test

or the following tests in EN ISO 16467:2003:

7.4 Stacking test
7.6 Hydraulic pressure test

following conditioning with standard liquids as described in Clause 7 of EN ISO 16101:2004 or Clause 7 of EN ISO 23667:2007.

4.4 Low temperature notched impact strength

When tested in accordance with 7.3 the low temperature notched impact strength (N.I.S.) shall be:

— N.I.S. Material B (NIS_B) ≥ 90 % N.I.S. Material A (NIS_A).

NOTE The determination of low temperature notched impact strength is intended to relate to the performance of packaging and IBCs from the grades in the following test in EN ISO 16104:2003:

7.1 Drop test at – 18 °C

or in EN ISO 16467:2003:

7.7 Drop test at -18 °C

following conditioning with standard liquids as described in Clause 7 of EN ISO 16101:2004 or Clause 7 of EN ISO 23667.

4.5 Environmental stress crack resistance

When tested in accordance with 7.4 the environmental stress crack resistance by full notch creep test (FNCT) shall be:

— FNCT Material B ($FNCT_B$) ≥ 80 % FNCT Material A ($FNCT_A$).

NOTE The determination of environmental stress crack resistance by FNCT is intended to relate to the performance of packaging and IBCs from the grades in the following test in EN ISO 16101:2004

7.2 Stacking test

and the following test in EN ISO 16467:2003:

7.4 Stacking test

when carried out containing standard liquids wetting solution, acetic acid and n-butyl acetate as described in Annex A of EN ISO 16101:2004 or Annex A of EN ISO 23667.

4.6 Molecular degradation

When tested in accordance with 7.5, the molecular degradation by melt flow rate (MFR) increase method shall be:

— MFR increase Material B (Ox_B) ≤ 120% MFR increase Material A (Ox_A),

— or Ox_B ≤ Ox_A + 20 %

where the initial melt flow rates (of non-immersed specimens) of Material A and Material B are defined as 100 in each case. The result is determined from the comparison of percentage increase of MFR after immersion against the MFR of non-immersed samples. This is a measure of the relative oxidation Ox_B versus Ox_A.

NOTE The determination of molecular degradation by melt flow rate increase is intended to relate to the performance of packaging and IBCs from the grades in the following tests in EN ISO 16104:2003:

7.1 Drop test
7.2 Stacking test