SVENSK STANDARD
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Förpackningar – Transportförpackningar för farligt gods – Jämförande materialprov av polyetylenkvalitet

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

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Europastandarden EN 15507:2017 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 15507:2017.

Denna standard ersätter SS-EN 15507:2008, utgåva 1.

The European Standard EN 15507:2017 has the status of a Swedish Standard. This document contains the official version of EN 15507:2017.

This standard supersedes the Swedish Standard SS-EN 15507:2008, edition 1.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

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Denna standard är framtagen av kommittén för Provningsmetoder för farligt gods, SIS/TK 164/AG 16.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15507

November 2017

ICS 13.300; 55.040

Supersedes EN 15507:2008

English Version

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

Emballages - Emballages pour le transport des marchandises dangereuses - Essais comparatifs de divers grades de polyéthylène

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

This European Standard was approved by CEN on 11 September 2017.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 15507:2017) has been prepared by Technical Committee CEN/TC 261 “Packaging”, the secretariat of which is held by AFNOR.

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 2018, and conflicting national standards shall be withdrawn at the latest by May 2018.

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

This document supersedes EN 15507:2008.

The main changes with respect to the previous edition are listed below:

a) The introductory texts for "Normative references" and “Terms and definitions” have been modified.

b) Clause 2 “Normative references” has been revised.

c) The references to withdrawn standards EN ISO 16101, EN ISO 16104, EN ISO 16467 and EN ISO 23667 have been replaced by current standards EN ISO 16495 and EN ISO 13274.

d) Editorial changes were made.

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

Introduction

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

EN ISO 13274:2013, *Packaging — Transport packaging for dangerous goods — Plastics compatibility testing for packaging and IBCs* (ISO 13274:2013 + Cor. 1:2014)

EN ISO 16495:2013, *Packaging — Transport packaging for dangerous goods — Test methods* (ISO 16495:2013)

The aim of the test methods described in this European Standard is to provide information for consideration as part of a selective test procedure. Selective testing procedures, are described in Clause 8 in the standards above and can eliminate or reduce the requirement to carry out the full test procedures described 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 packaging 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 Organization'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 polyethylene 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 packaging and IBCs for the transport of dangerous goods. It is intended to be used in conjunction with selective testing for packaging 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 179-1:2010, *Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test (ISO 179-1:2010)*

EN ISO 1133-1, *Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics - Part 1: Standard method (ISO 1133-1)*

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)*

EN ISO 13274:2013, *Packaging - Transport packaging for dangerous goods - Plastics compatibility testing for packaging and IBCs (ISO 13274:2013)*

EN ISO 16495:2013, *Packaging - Transport packaging for dangerous goods - Test methods (ISO 16495:2013)*

EN ISO 17855-2:2016, *Plastics - Polyethylene (PE) moulding and extrusion materials - Part 2: Preparation of test specimens and determination of properties (ISO 17855-2:2016)*

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

3 Terms and definitions

For the purposes of this document 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 mass-flow rate at 190 °C/21,6 kg load of < 12 g/600 s when measured according to EN ISO 1133-1

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 mass-flow rate at 190 °C/2,16 kg load of < 0,5 g/600 s and > 0,1 g/600 s in accordance with EN ISO 1133-1, or a melt mass-flow rate at 190 °C/5 kg load < 3,0 g/600 s and > 0,5 g/600 s in accordance with EN ISO 1133-1

Note 1 to entry: 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 polyethylene grade.

As a minimum requirement, a test with water as the test medium in accordance with EN ISO 16495 shall be carried out for the packaging design type manufactured from the new polyethylene grade.

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

The comparative testing of the polyethylene 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 mass-flow rate (MFR)

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

70 % MFR Material A ≤ MFR Material B ≤ 130 % MFR Material A.

NOTE The determination of melt mass-flow rate is solely intended as a classification test for the polyethylene grade and does not relate to any of the tests for packaging described in EN ISO 13274 or EN ISO 16495.

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 polyethylene grades, such as those tested in accordance with EN ISO 16495:2013, following conditioning with standard liquids described in EN ISO 13274:2013, Clause 8:

EN ISO 16495:2013, Annex F Drop test;

EN ISO 16495:2013, Annex I Stacking test;

EN ISO 16495:2013, Annex H Hydraulic pressure test

and the Permeability test in EN ISO 13274:2013, 4.11.

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 polyethylene grades in EN ISO 16495:2013, Annex F Drop test at – 18 °C following conditioning with standard liquids as described in EN ISO 13274:2013, Clause 8.

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 polyethylene grades, such as those tested in accordance with EN ISO 16495:2013, Annex I Stacking test when carried out containing standard liquids wetting solution, acetic acid and n-butyl acetate as described in EN ISO 13274:2013, Table 1.

4.6 Molecular degradation

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

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

where the initial melt mass-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 polyethylene grades, such as those tested in accordance with EN ISO 16495:2013:

EN ISO 16495:2013, Annex F Drop test;

EN ISO 16495:2013, Annex I Stacking test;

EN ISO 16495:2013, Annex H Hydraulic pressure test

following conditioning in standard liquid 55 % nitric acid as described in EN ISO 13274:2013, Clause 8.

4.7 Test report

The test laboratory shall supply a test report giving comparative test results to the procedures described in 7.1 to 7.5 also giving details of batch numbers and source of samples of the polyethylene grades tested. The test report shall include a reference to this European Standard.

NOTE National regulations can require that the test report should be submitted to the national competent authority for decision.