SLOVENSKI STANDARD
SIST EN 13431:2004

01-september-2004

Nadomešča:
SIST EN 13431:2001

Embalaža - Zahteve za embalažo, primerno za energetsko predelavo, vključno z določitvijo najnižje spodnje kurilne vrednosti

Packaging - Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value

Verpackung - Anforderungen an Verpackungen für die energetische Verwertung, einschließlich Spezifikation eines Mindestheizwertes

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Emballage - Exigences relatives aux emballages valorisables énergétiquement, incluant la spécification d'une valeur calorifique inférieur minimale

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Ta slovenski standard je istoveten z: **EN 13431:2004**

ICS:

13.030.99	Drugi standardi v zvezi z odpadki	Other standards related to wastes
55.020	Pakiranje in distribucija blaga na splošno	Packaging and distribution of goods in general

SIST EN 13431:2004 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13431

July 2004

ICS 13.030.99; 55.020

Supersedes EN 13431:2000

English version

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This European Standard was approved by CEN on 5 May 2004.

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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 13431:2004) 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 January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document supersedes EN 13431:2000.

This document has been prepared under two mandates given to CEN by the European Commission and the European Free Trade Association, and supports the essential requirements of EU Directive(s).

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

This document forms one of a series of standards and reports prepared under mandates M 200 rev.3 and M/317 given to CEN by the European Commission and the European Free Trade Association to support the European Council and Parliament Directive on Packaging and Packaging Waste [94/62/EC]. The procedure for applying this document in conjunction with the other mandated standards and reports, is specified in EN 13427.

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Introduction

The Directive on Packaging and Packaging Waste (94/62/EC) defines requirements for packaging to be considered recoverable. This document amplifies these requirements with respect to energy recovery. The European Standard EN 13427 provides a framework within which this and four other standards may be used together to support a claim that a packaging is in compliance with the essential requirements for packaging to be placed on the market as required by the Directive.

NOTE The Directive 94/62/EC is amended by European Parliament and Council Directive 2004/12/EC of 11 February 2004.

The purpose of packaging is the containment, protection, handling, delivery and presentation of products. Energy recovery of used packaging is one of several recovery options within the overall life cycle of packaging. In order to save resources and minimise waste, the whole system in which the packaging takes part should be optimised. This includes prevention as well as reuse and recovery of packaging waste.

This document presents a framework for assessment to determine whether the requirements of this document have been met. Its approach is similar to that of systems standards such as the EN ISO 9000 series or an environmental management system such as EN ISO 14001.

Since packaging waste used for energy recovery substitutes for other fuels, total system optimisation includes production of heat and/or power. This document defines and specifies the thermodynamic requirements for packaging to allow the incineration with energy recovery of packaging waste, but does not consider the transformation and use of the produced energy. Both packaging and recovery technologies are subject to continuous improvement.

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Annex A derives the theoretical concept of calorific gain. Annexes B and C set out supporting regulations as well as conclusions reached during the preparation of the text. It is assumed that the heat generated during the incineration process shall be recovered as far as practicable, but it is outside the Scope of this document to take any standpoint on plant efficiency.

Requirements for substances and materials liable to have a negative influence on the energy recovery process are specified in EN 13428. According to the discussion in Annex C, there is no need for further requirements.

Materials, combinations of materials or design of packaging liable to create problems during energy recovery are discussed in Annex C. It is concluded that packaging design and combination of materials do not create problems for the energy recovery process.

Annex D is an aid to prove compliance with the requirements.

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1 Scope

This document specifies the requirements for a packaging to be classified as recoverable in the form of energy and sets out procedures for assessment of conformity with those requirements. The scope is limited to factors under the control of the supplier.

This document cannot by itself provide presumption of conformity. The procedure for applying this document is contained in EN 13427.

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 13193, *Packaging - Packaging and the Environment - Terminology.*

EN 13427, *Packaging - Requirements for the use of European Standards in the field of packaging and packaging waste.*

EN 13428, *Packaging – Requirements specific to manufacturing and composition - Prevention by source reduction.*

CR 13695-1, *Packaging - Requirements for measuring and verifying the four heavy metals and other dangerous substances present in packaging, and their release into the environment - Part 1: Requirements for measuring and verifying the four heavy metals present in packaging.*

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CEN/TR 13695-2, *Packaging - Requirements for measuring and verifying the four heavy metals and other dangerous substances present in packaging, and their release into the environment - Part 2: Requirements for measuring and verifying dangerous substances present in packaging, and their release into the environment.*

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EN 14182, *Packaging - Terminology - Basic terms and definitions.*

ISO 1171, *Solid mineral fuels - Determination of ash.*

ISO 1928, *Solid mineral fuels - Determination of gross calorific value by the bomb calorimetric method, and calculation of net calorific value.*

Directive 2000/76/EC on the incineration of waste. Directive 2000/76/EC repeals Directive 94/67/EC from December 28, 2005 also for old plants.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13193, EN 13427, EN 14182 and the following apply.

3.1

inferior calorific value (net calorific value), q_{net}

inferior calorific value is a term used in Mandate M 200 rev.3 for the net calorific value, which is defined in ISO 1928 and measured at constant volume

3.2

required energy, H_a

energy necessary to adiabatically heat the post combustion substances of a material and excess air from ambient temperature to a specified final temperature

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3.3
calorific gain
positive difference between the energy released on combustion of a material and H_a

3.4
theoretical minimum inferior calorific value (theoretical minimum net calorific value), $q_{net,\ min,theor.}$
fraction of the energy released on combustion sufficient to adiabatically heat the post-combustion substances of a material or product and excess air from a specified ambient temperature to a specified final temperature

3.5
available thermal energy
fraction of the energy released on combustion in a real industrial system which is transferred for example to the steam cycle of a boiler, i.e. the total released energy minus the thermal losses

3.6
combustion
oxidation reaction covering both combustion of organic materials and oxidation of metals

3.7
packaging component
part of packaging that can be separated by hand or by using simple physical means (from EN 13193)

3.8
packaging constituent
part from which packaging or its components are made and which cannot be separated by hand or by using simple physical means (from EN 13193)

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4 Specification of Minimum Inferior Calorific Value (Minimum Net Calorific Value)

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The theoretical minimum inferior calorific value (theoretical minimum net calorific value), $q_{net,min,theor.}$, is material specific. It depends on the temperature and other conditions required by the combustion process. In this document it is identified as H_a and may be determined by the method described in Annex A. This Annex specifies the theoretical minimum inferior calorific value (minimum net calorific value) through the technical concept of calorific gain.

The real minimum inferior calorific value (real minimum net calorific value), $q_{net,min,real,}$ is set to allow optimisation of energy recovery in a real industrial system and is defined in Annex B.

5 Requirements

To allow optimisation of energy recovery in a real industrial system, the theoretical calorific gain should be well above zero. To claim energy recovery q_{net} shall be equal to or greater than 5 MJ/kg.

NOTE 1 Packaging composed of more than 50 % (by weight) of organic content, e.g. wood, cardboard, paper and other organic fibres, starch, plastics, provides calorific gain and meets the requirement of q_{net} equal to or greater than 5 MJ/kg.

NOTE 2 A packaging consisting of more than 50 % by weight of inorganic constituents, e.g. inorganic fillers and layers, is recoverable in the form of energy, provided q_{net} is equal to or greater than 5 MJ/kg.

NOTE 3 Thin gauge aluminium (typically up to 50 μm thick) contributes to q_{net} of the packaging and is deemed to be energy recoverable. Aluminium over 50 μm is deemed to be not combustible.

NOTE 4 A packaging consisting of more than 50 % by weight of inorganic components, e.g. glass or rigid metal containers with a plastic closure, is deemed to be not energy recoverable.

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6 Procedures

6.1 Application

The application of this document to any particular packaging shall be as specified in EN 13427.

6.2 Assessment

Packaging may be assessed for recoverability in the form of energy by calculation from data given in Annex B or use of the methodology in Annex A.

6.3 Claims of conformity

The supplier shall prepare a written statement of compliance with the requirements stated in Clause 5 as referred to in EN 13427. Annex D may be used as guidance.

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Annex A
(normative)

Determination of Calorific Gain and specification of the theoretical minimum inferior calorific value (minimum net calorific value)

The determination of calorific gain is based on standard procedures for calculating the adiabatic final temperature in combustion chemistry and thermodynamics.

The inferior calorific value (net calorific value), q_{net}, of a material is the amount of heat released when it burns and when all water remains in the gas phase. In order to be recoverable in the form of energy, packaging shall provide a calorific gain in the energy recovery process. For the purpose of this document, this is assumed to be fulfilled when q_{net} exceeds the amount of required energy, H_a, to raise adiabatically the temperature of the post-combustion substances (including excess air) from ambient temperature to the specified final temperature. A calorific gain is obtained when equation (1) is fulfilled:

$$q_{net} - H_a > 0 \qquad (1)$$

The inferior calorific value (net calorific value) of a packaging consisting of different components and/or constituents can be calculated according to equation (2):

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$$q_{net} = \sum_{i=1}^{n} f_i q_{net,i} \qquad (2)$$

where

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q_{net} inferior calorific value (net calorific value) of the packaging;

f_i mass fraction of component or constituent "i" in the packaging;

$q_{net,i}$ inferior calorific value (net calorific value) of component or constituent "i" in the packaging.

A combustible packaging may contain non-combustible components and/or constituents of inert or reactive nature, which may have a negative effect on calorific gain.

The theoretical minimum inferior calorific value (minimum net calorific value) specified as H_a can be determined by the application of equations (3) and (4):

$$q_{net,min,theor.} = H_a = \sum_{i=1}^{n} f_i H_{a,i} \qquad (3)$$

where

H_a the energy required to heat adiabatically combustion products, residues and excess air from T_0 to T_a;

$H_{a,i}$ the energy required to heat adiabatically combustion products, residues and excess air from T_0 to T_a of component or constituent "i" of the packaging.

$$H_{a,i} = \sum_{j=1}^{m} g_j C_{pj} \left(T_a - T_0 \right) \qquad (4)$$