SLOVENSKI STANDARD

oSIST prEN 14243-3:2018

01-februar-2018

Snovi iz izrabljenih avtomobilskih gum - 3. del: Drobci, odrezki in lističi - Metode za ugotavljanje njihovih mer, vključno z merami štrlečih vlaken

Materials obtained from end of life tyres - Part 3: Shreds, cuts and chips - Methods for determining their dimension(s) including protruding filaments dimensions

Materialien aus Altreifen - Teil 3: Reifenschnitzel, Abschnitte und Chips - Methode zur Bestimmung der Abmessungen und Verunreinigungen einschließlich vorstehender Fasern

Matériaux produits à partir de pneus usagés non réutilisables (PUNR) - Partie 3 : Broyats, coupes et chips - Méthodes de détermination de leur(s) dimension(s) y compris les dimensions des barbules

Ta slovenski standard je istoveten z: prEN 14243-3

ICS:

13.030.50	Recikliranje	Recycling
83.160.01	Avtomobilske pnevmatike na splošno	Tyres in general

oSIST prEN 14243-3:2018 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 14243-3

November 2017

ICS 83.160.01

Will supersede CEN/TS 14243:2010

English Version

Materials obtained from end of life tyres - Part 3: Shreds, cuts and chips - Methods for determining their dimension(s) including protruding filaments dimensions

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 366.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. prEN 14243-3:2017 E

Contents

Page

European foreword

This document (prEN 14243-3:2017) has been prepared by Technical Committee CEN/TC 366 “Materials obtained from End-of-Life Tyres (ELT)”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede CEN/TS 14243:2010.

prEN 14243, *Materials obtained from end of life tyres*, consists of the following parts:

— *Part 1: General definitions related to the methods for determining their dimension(s) and impurities*;

— *Part 2: Granulates and powders — Methods for determining their dimension(s) and impurities, including free steel and free textile content*;

— *Part 3: Shreds, cuts and chips — Methods for determining their dimension(s) including protruding filaments dimensions*;

— *Part 4: Steel wires and textile fibres — Methods for their characterization*.

Introduction

This Standard will be used in conjunction with the other parts of the prEN 14243 series. Such series is intended to cover the testing programs needed to characterize each product category as shown on the figure below.

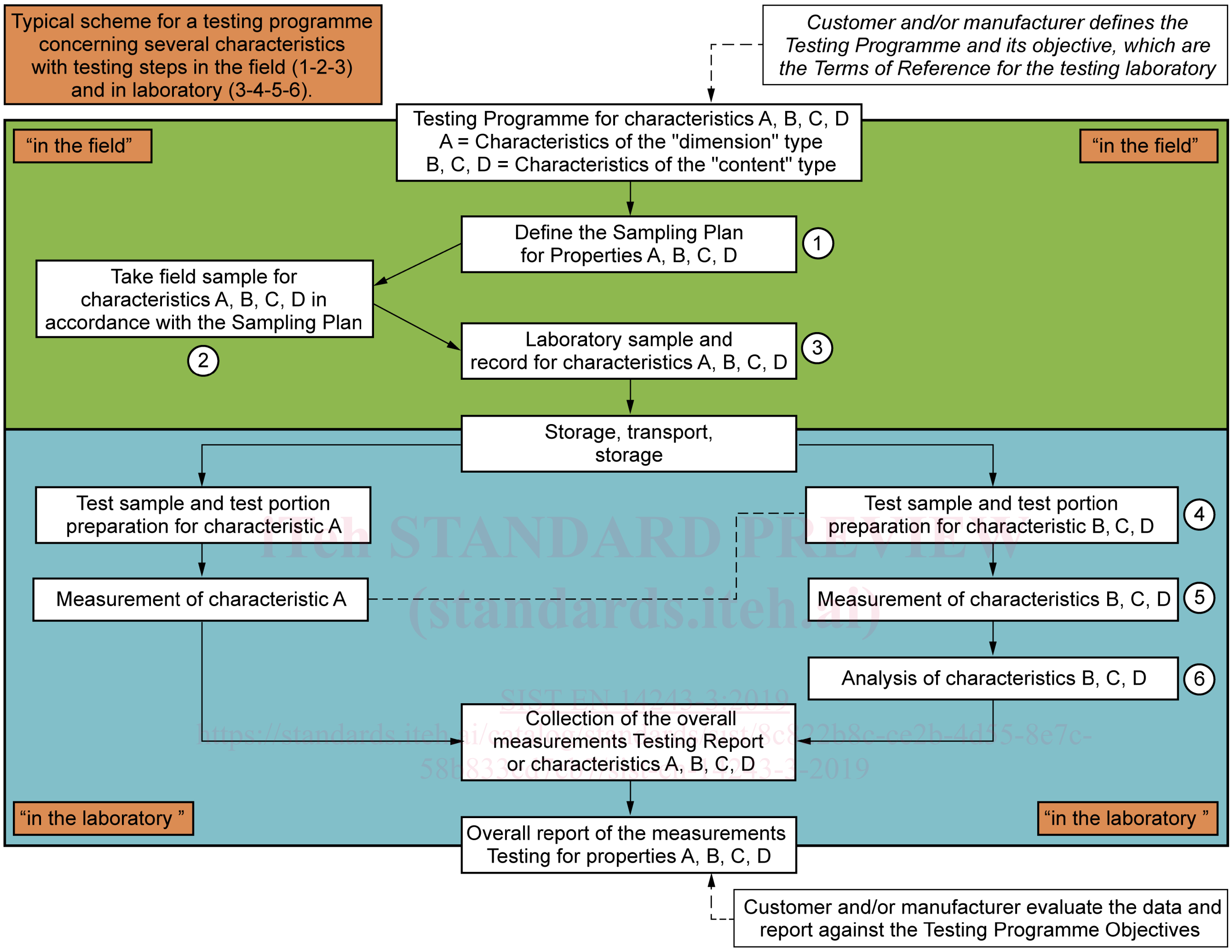

Figure 1 — Typical scheme for a testing programme concerning several characteristics with testing steps in the field and in the laboratory

End-of-life tyres consist mainly of passenger and commercial vehicle tyres, truck, earthmover and agricultural tyres manufactured for distribution in the European market that are no longer suitable for their original purpose. Products from end-of-life tyres are used as a secondary raw material finding a wide range of applications. The principal categories of materials from end-of-life tyres are defined on the basis of their dimension(s) according to prEN 14243-1.

European Standards are needed for the production, trade and use of the materials from end-of-life tyres. They are also useful for buyers, regulators, controllers and laboratories.

1 Scope

This European Standard provides test methods for the determination of the dimension(s) of shreds, cuts and chips (including protruding filaments) produced from all categories of end-of-life tyres at all steps of the treatment processes.

The methods described in this Standard include sample collection and the preparation of a representative sample based on a sampling plan for the purpose of determining dimensions.

This Standard does not cover the operational performance or fitness for use of the materials which are deemed to be a function of agreements between the manufacturer and the customer.

This Standard does not purport to address all of the safety concerns, if any, associated with its use. This standard does not establish appropriate safety and health practices and does not determine the applicability of regulatory limitations prior to use.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

prEN 14243-1:2017, *Materials obtained from end of life tyres — Part 1: General definitions related to the methods for determining their dimension(s) and impurities*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 5725-5, *Accuracy (trueness and precision) of measurement methods and results — Part 5: Alternative methods for the determination of the precision of a standard measurement method*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 14243-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.2 Symbols and abbreviated terms

For the purposes of this part, the following symbols apply.

ANPF Average Number per Piece of Filaments longer than *MLF1*

HDF Higher Dimension of the Format (millimetres)

L Maximum projected Length (millimetres)

LDF Lower Dimension of the Format (millimetres)

MF Mass of the Fine pieces (grams)

MLF Minimum length of a filament (in millimetres)

MLF1 Minimum length of a filament (in millimetres) for the criterion average number of filaments per piece

MLF2 Minimum length of a filament (in millimetres) for the criterion number percentage of pieces having at least one filament;

MLM Mass of the Loose Metal wires (grams)

MPC Mass Percentage of the *NCC* Central Classes (optional)

MPF Mass Percentage of the Fine pieces

MPL Mass Percentage of Large pieces (optional)

MPM Mass Percentage of the loose Metal wires

MS Mass of the laboratory Sample (grams)

NCC Number of Central Classes

NCR Number of Classes in the Range LDF — HDF

NPC Number Percentage of the NCC Central Classes

NPF Number Percentage of pieces having at least one Filament longer than MLF2

NPL Number Percentage of Large pieces

TNP Total Number of Pieces in the sample not including the fine pieces

4 Categories of products obtained from end-of-life tyres based mainly on their dimensions

For categories and testing program, refer to prEN 14243-1:2017, Clause 4.

5 Determination of dimensions for shreds, cuts and chips

5.1 General

Shreds, cuts and chips are materials produced from end-of-life tyres by primary shredding. Primary shredding corresponds to the processing of end-of-life tyres by shredding, crushing or fragmenting, while maintaining in the obtained output material an average global composition similar to that of the end-of-life tyres.

Depending on the agreed test programme between the producer and the customer, or at the producer's own will, the determination of dimensions specified in this clause for shreds, cuts and chips if required shall be followed by the additional determination of filaments as specified in Annex A.

Producer and customer may also agree to determine the dimentions of chips considered as large granulates, using the methods described in prEN 14243-2.

5.2 Sampling plan

5.2.1 Principles of sampling

The main principle of sampling is to obtain a representative sample(s) from a whole lot (of defined material) from which a characteristic is to be determined. If the lot is to be represented by a sample then every particle in the lot shall have an equal probability of being included in the sample (i.e. probabilistic sampling). When these principles cannot be applied in practice, the sampler shall define a procedure as close as possible to probabilistic sampling in his judgement (i.e. judgemental sampling) and note the limitations in the sampling plan and sampling report.

To take samples in a way that is truly representative of the material produced is easier when the material is moving (for example in a stockpile, big bag or silo). Regarding shreds, it is necessary to take samples when the material is in movement.

The determination of other properties than dimensions may result in different sampling requirements. This is the case for the determination of physical properties (such as apparent density) or chemical composition.

5.2.2 Preparation of the sampling plan for determining dimensions

The first step is to identify the properties required in the testing programme and the lot in relation to which they are defined, for instance "maximum projected length on a shreds production of 300 t".

The lot size is based on production quality management decisions or specific customer requirements. The lot size may be defined by the producer as a fixed quantity produced between machine settings or a fixed quantity in a production day/shift/week or a fixed quantity. With regards to certain pieces exhibiting large dimensions, the tools for taking an increment shall be sufficiently large in order that the large pieces are equally sampled. For shreds, this typically results in increments of more than 200 pieces (3 kg to 15 kg).

NOTE 1 Larger increments would slightly improve the sampling quality, while increasing the size of the field sample, therefore complicating the size reduction into laboratory sample(s). It is preferable to increase the number of increments, thus increasing directly the representativeness.

For reference testing (contractual or pre-contractual) concerning shreds dimension(s) the field sample is a composite sample constituted of three increments taken at dates selected randomly along the period of time during which the lot is produced. When at one date there are no shreds at the sampling location, the increment is taken at another date preselected prior to sampling, unless this is caused by a major change in the production process (see below).

For routine testing concerning the dimension(s) of shreds the field sample consists of one increment taken at a date selected randomly along the period of time during which the lot is produced. When at this date there are no shreds at the sampling location, the increment is taken at another date preselected prior to sampling, unless this is caused by a major change in the production process (see below).

During a sampling step the production process may be interrupted by a major change. Such a major change would induce in the sample two different subpopulations, before and after the major change. Therefore it is necessary to consider a lot before and a lot after the major change. Major changes may occur on the feed and on the production process.

NOTE 2 The random taking of three increments allows having a first approximation of the variability inside the considered lot. The random taking of one increment in routine testing allows also another evaluation of the variability when considering the lots obtained under comparable conditions.

5.3 Procedure for taking the field sample and producing the laboratory sample(s)

Taking increment(s) at the output of the conveyer in the falling zone. The used tool is typically a rectangular open scoop, i.e. without an edge on one of the long side so as to be capable of "cutting" the entire flow. Such a scoop (see Annex B) shall have:

a) a width L at least 1.5 times the width of the falling flow;

b) a depth P at least 2/3 of the width L and at least 2.5 times the higher dimension HDF;

c) an edge height H equal at least to 1/3 of the width L and at least two times the higher dimension HDF.

This scoop is moved for instance with a loader according to a detailed procedure adapted to the site condition. This scoop can be the bucket of a loader, provided that its cleanliness is compatible with the requirement of the dimension measurement, i.e. the absence of deposit. The taken increment is considered as valid if both criteria are fulfilled:

— the increment consists of at least 200 pieces for shreds (after sieving of fines);

— the mass of the increment does not exceed 15 kg for shreds.

NOTE The minimum size of the increment is specified as a minimum number of pieces in view of the statistical evaluation of the measurements of the maximum projected length of each piece. A specification in mass would result in significant differences depending on the size of the pieces.

For the determination of dimension(s), each increment constitutes a laboratory sample for such determination. If there are several increments, the dimension of each increment is determined and the average is calculated. This is easier than reducing the size of the field sample prior to measurement of the dimension.

5.4 Principle of determining the dimension(s)

A laboratory sample of at least TNP > 200 that do not pass through the LDF mm sieve is taken for the test. The MS mass (in grams) of this laboratory sample is weighed to within ± 0,01 kg. Any elements consisting solely of metal wires released from the pieces of end-of-life tyre are not counted in the TNF pieces. They are collected and weighed together (MLM kg).

After passing through a LDF mm sieve, the mass (in grams) of the fine pieces (MF) is weighed to within ± 0,01 kg. The pieces that do not pass through the sieve (without loose metal wires) are used to determine the maximum lengths and constitute the test portion for determination purposes.

Each piece of this test portion is treated individually. As these pieces are not usually flat, the largest length is defined as the largest length projected onto a plane on which the piece in question lies. This length is measured to within ± 5 mm, without deforming the piece and excluding filaments.

The measurements of the different maximum projected lengths L are used to build a histogram that is characteristic of the distribution of the pieces of the test portion, i.e. the laboratory sample without the fine pieces and without the loose metal wires. This histogram consists of the large pieces class (larger than the HDF threshold dimension of the large pieces) and NCR = 7 classes of the same width between the LDF and HDF dimensions.

Three characteristics of the histogram are extracted from these measurements:

a) the number percentage of large pieces (NPL) (%) (and optionally, the mass percentage of large pieces (MPL) (%)) corresponding to the pieces larger than the higher dimension of the HDF format (HDF is one of the characteristics of the format of the product under consideration, for example 350 mm);

b) the mass percentage of the fine pieces (MPF) (%) = 100 × MF/MS (mass percentage of the pieces passing through the sieve with a mesh of LDF mm) (LDF is one of the characteristics of the product format under consideration, for example 25 mm);

c) the number percentage (NPC) (%) (and optionally the mass percentage (MPC) (%)) of the pieces in the number of NCC central classes (2-3-4-5-6) amongst the NCR = 7 classes between the lower and higher dimensions of the format (LDF and HDF).

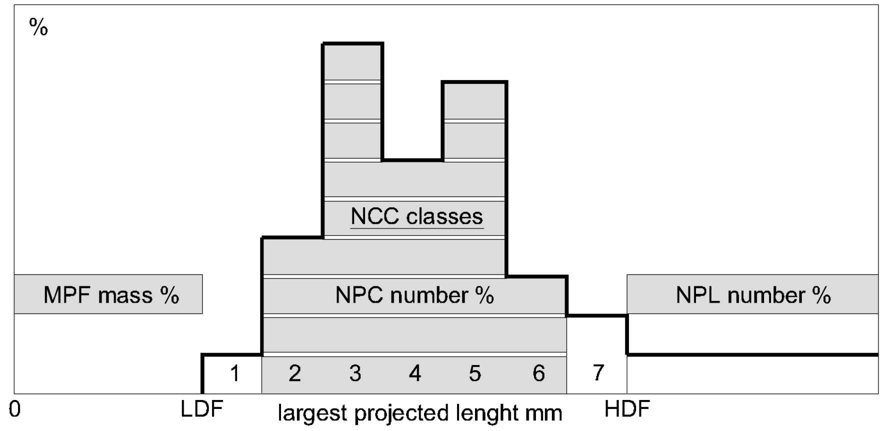

Figure 2 — Example of a histogram

5.5 Equipment

a) Vessel large enough to contain at least 200 pieces;

b) Illuminated measurement plane with a ruler graduated in mm that can measure lengths up to 500 mm (1000 mm for cuts) on this measurement plane;

c) Scales to within 0.01 kg;

d) Circular mesh sieve in accordance with ISO 565 or ISO 3310-1 with a mesh of *LDF* (in millimetres).

5.6 Procedure for quantification of maximum projected length (manual)

Identify the LDF and HDF dimensions in the test specifications and calculate the limits of the seven classes of the same width. Deduce the limits of the central range defined by NCC classes 2-3-4-5-6.

HDF and LDF should be different enough in order to define in practice the seven classes.

Take a laboratory sample of the shredded material, in accordance with the sampling scheme (a vessel can be used to check that for the site in question, the TNP criterion > 200 elements after sieving at LDF mm is satisfied).

Weigh the laboratory sample (MS) (in grams).

Sieve the laboratory sample at LDF mm.

Remove the loose metal wires.

NOTE 1 To make the sieving easier, the coarsest fractions can be removed manually, ensuring that they do not contain any fines.

NOTE 2 For the removal of loose metal wires to be easier, a magnet can be used at the end of the procedure, ensuring that they do not contain ant rubber particles (see Annex D).

Weigh the undersized material, i.e. the MF fine pieces (in grams) small enough to pass through the LDF mm sieve.

The elements that do not pass through the sieve are used to determine the maximum lengths as follows: place each element not passing through the sieve on the flat measurement surface and use the ruler to measure to within ± 5 mm the largest length projected onto the measurement plane, without deforming the piece and excluding filaments.