SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 14541-2:2022

01-januar-2022

Polimerne cevi in fitingi - Uporaba recikliranih plastomerov - 2. del: Priporočila za ustrezne značilnosti

Plastics pipes and fittings - Utilisation of thermoplastics recyclates - Part 2: Recommendations for relevant characteristics

Kunststoff-Rohrleitungen und -Formstücke - Verwendung von thermoplastischen Rezyklaten - Teil 2: Empfehlungen für relevante Eigenschaften

Tubes et raccords en plastique - Utilisation de recyclats thermoplastiques - Partie 2 Caractéristiques

Ta slovenski standard je istoveten z: **FprCEN/TS 14541-2**

ICS:

23.040.20	Cevi iz polimernih materialov	Plastics pipes
23.040.45	Fitingi iz polimernih materialov	Plastics fittings

kSIST-TS FprCEN/TS 14541-2:2022 **en,fr,de**

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

FINAL DRAFT
FprCEN/TS 14541-2

November 2021

ICS 83.140.30

Will supersede CEN/TS 14541:2013

English Version

Plastics pipes and fittings - Utilisation of thermoplastics recyclates - Part 2: Recommendations for relevant characteristics

Tubes et raccords en plastique - Utilisation de recyclats thermoplastiques - Partie 2 Caractéristiques

Kunststoff-Rohrleitungen und -Formstücke - Verwendung von thermoplastischen Rezyklaten - Teil 2: Empfehlungen für relevante Eigenschaften

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 155.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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 Technical Specification. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a Technical Specification.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (FprCEN/TS 14541-2:2021) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This document is currently submitted to the Vote on TS.

This document, together with part 2 and 3 of the EN 14541 series, will supersede CEN/TS 14541:2013.

The EN 14541 series consists of the following parts under the general title *Plastics pipes and fittings — Utilisation of non-virgin thermoplastics materials:*

— *Part 1: Vocabulary;*

— *Part 2: Recommendations for relevant characteristics* (this document)*;*

— *Part 3: Recommendations for Assessment of Conformity* (to be developed).

Introduction

The EN 14541 series is intended to give recommendations to the value chain of thermoplastics piping systems to stimulate the use of thermoplastics recyclates as defined in the European circular economy policy.

Part 1 of the EN 14541 series defines the relevant terms and definitions related to the use of thermoplastics recyclates in thermoplastics piping systems.

Part 3 of the EN 14541 series (to be developed) gives recommendations about sampling procedures and conformity assessment for thermoplastics recyclates to be used in thermoplastics piping systems.

This document (part 2 of the EN 14541 series) is a CEN Technical Specification in which recommendations are given for product standards related to the relevant characteristics for defining (e.g. fingerprinting) commonly used thermoplastics recyclates intended to be used in thermoplastics piping systems.

This document is intended to support specification writers of product standards within CEN TC 155 in defining the relevant characteristics for thermoplastics recyclates (PVC-U, PVC-C, PE, PP, and ABS) to be specified in the relevant product standards for use in thermoplastics piping systems. The product standards should specify relevant characteristics and applicable tolerances to be included within the agreed specification. For a specific application, specification writers may specify additional characteristics.

This document introduces the Cracked Round Bar (CRB) test for slow crack growth resistance of recycled PE, PP and PVC-U material.

This document is extended, compared with the CEN/TS 14541:2013, and covers next to PE, PP and PVC-U also PVC-C and ABS.

This document is not intended as a standalone specification for use of recyclates in plastic piping systems.

Different CEN Technical Committees are dealing with recycled Plastics. In particular TC 249 "Plastics". TC 249 “Plastics” developed a series of CEN publications on ‘Plastics Recycling’ which consists of: EN 15343 [1], EN 15344 [2], EN 15345 [3], EN 15346 [4], CEN/TS 16010 [5] and CEN/TS 16011 [6].

Other documents touching recycling are e.g. ISO 15270 [7] and Waste Framework Directive [8].

1 Scope

This document provides guidance and information for drafting product standards to specify characteristics and test methods for the utilization of thermoplastics recyclates (PVC-U, PVC-C, PE, PP, ABS) in pipes, fittings and ancillaries for thermoplastics piping systems.

This document covers recyclates with an agreed specification from all sources.

NOTE 1 This document does not cover characteristics for reworked material.

NOTE 2 This document does not cover recycling processes (e.g. chemical or mechanical).

NOTE 3 This document does not define if recycled material can be used in a specific application. The possible use of recyclates will be defined in the applicable product standard.

This document provides guidance about the relevant characteristics to be included in the agreed specification for recyclates.

This document is applicable without prejudice to any existing legislation.

For the recycling process, the transport, the testing and the use of thermoplastics recyclates, National and/or European regulations (e.g. hygienic aspects) can apply.

NOTE 4 For example, threshold levels for substances of very high concern (SVHC) as defined in the REACH-legislation which can possibly be present in thermoplastic recyclates.

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.

FprEN 14541-1, *Plastics pipes and fittings -Utilisation of thermoplastics recyclates - Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in FprEN 14541-1 apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Abbreviations

ABS	acrylonitrile butadiene styrene
CRB	cracked round bar
MFR	melt mass-flow rate
PE	polyethylene

PP polypropylene

PVC-C chlorinated poly(vinyl chloride)

PVC-U unplasticized poly(vinyl chloride)

OIT oxidation induction time

5 General requirements

5.1 General

The conditions for the use of recyclates should be defined in the applicable product standard.

This document provides recommended characteristics (see Clause 6.2, 6.3, 6.4, 6.5 and 6.6) to be considered for inclusion in the agreed specification(s) of a product standard. Additional characteristics may need to be considered depending on the application.

The product standard should define the documentation that should be used to cover all deliveries and to verify conformity with the agreed specification.

Depending on the application of the products, different requirements regarding the use and/or quality control of reworked material and recyclates may apply.

5.2 Agreed specification

A specification should be agreed, between the supplier of the recyclate and the manufacturer, for each grade of thermoplastic recyclates.

The following minimum information should be included in the agreed specification:

— the relevant characteristics as specified in the referring product standard;

— the values, units and tolerances for each characteristic;

— the defined batch size(s);

— the agreed sampling procedures, sample preparation methods, and testing frequencies.

When drafting an agreed specification the following should be considered:

— the recycling process and sources of the material because of risk of impurities;

— the processing of the material into the end product;

— the required characteristics of the end product;

— possible limitations of sources for the recyclable material;

— the intended dosage level of the material

NOTE Guidance on sampling procedures, sample preparation and testing can be found in CEN/TS 16010 [5] and CEN/TS 16011 [6].

5.3 Requirements for the supplier

It is recommended that the quality plan of the supplier of recyclates is not less stringent than the relevant requirements of EN ISO 9001 [9].

5.4 Reworked material

In FprEN 14541-1, reworked material is defined as “plastics material from rejected unused products or trimmings capable of being reclaimed within the same process that generated it”.

This is a general definition, where the responsible product standard writers should specify detailed conditions for the use of reworked material within the material clause of the Product standards.

The requirements for the use of reworked material in a product standard, will vary depending on the application area, which means there may be more options for use in non-pressure application area than in the pressure application area.

6 Characteristics of recyclates

6.1 General

Clauses 6.2 to 6.6 give guidance for characteristics and corresponding test methods suitable for an agreed specification between the supplier of recyclates and the product manufacturer. The Certificate of analysis to demonstrate conformity with the agreed specification shall be made by either the supplier of recyclates or the product manufacturer as agreed between the parties.

6.2 PVC-U

Recommended characteristics for the agreed specification for PVC-U recyclates are shown in Table 1.

NOTE Other characteristics can be relevant depending on application.

Table 1 — Characteristics for PVC-U recyclates

Characteristic	Unit	Test method	Comment
Density	kg/m³	EN ISO 1183-1 or EN ISO 1183-2	--
Bulk density	kg/m³	EN 15346:2014, Annex B	Only applicable for micronized material or granules
PVC-content	--	EN ISO 1158	PVC content is calculated from chlorine content result of EN ISO 1158 according to EN 1905
Filler content by ash rest	% by mass	EN ISO 3451-5	--
Particle size	mm	The applicable test method should be stated in the agreed specification	--
Source of the material	--	--	To be specified by the recyclate supplier
Impurities (solid contaminants content)	--	The test method (such as EN 15346:2014, Annex C), evaluation of sheets or evaluation of micronized material, or mesh/melt filtering should be stated in the agreed specification	CEN/TS 17627:2021 could also be considered.

Characteristic	Unit	Test method	Comment
Slow crack growth resistance	--	Annex A	If referred to in the product standard to gain experience, the Annex A should be used.
Vicat softening temperature	°C	EN ISO 2507-1 [20]	--
Impact strength	KJ/m²	EN ISO 179-1 [14] or EN ISO 180 [16]	--
Tensile properties	--	EN ISO 527-2 [37]	Tensile modulus, tensile stress at yield, strain at yield etc. can all be derived from the test given.

6.3 PVC-C

Recommended characteristics for the agreed specification for PVC-C recyclates are shown in Table 2.

NOTE Other characteristics can be relevant depending on application.

Table 2 — Characteristics for PVC-C recyclates

Characteristic	Unit	Test method	Comment
Density	Kg/m³	EN ISO 1183-1 or EN ISO 1183-2	--
Bulk density	kg/m³	EN 15346:2014, Annex B	Only applicable for micronized material or granules
Chlorine content	% by mass	ISO 1158	--
Particle size	mm	Sieve analysis	--
Impurities (solid contaminants content)	--	The test method (such as EN 15346:2014, Annex C), evaluation of sheets or evaluation of micronized material or mesh/melt filtering should be stated in the agreed specification	--
Source of the material	--	--	To be specified by the recyclate supplier
Vicat softening temperature	°C	EN ISO 2507-1	--
Impact strength	KJ/m²	EN ISO 179-1 or EN ISO 180	--
Tensile properties	--	EN ISO 527-2	Tensile modulus, tensile stress at yield, strain at yield etc. can all be derived from the test given.

6.4 PE

Recommended characteristics for the agreed specification for PE recyclates are shown in Table 3.

PE recyclate shall not contain uncoated $CaCO_3$ (calcium carbonate).

NOTE Other characteristics can be relevant depending on application.

Table 3 — Characteristics for PE recyclates

Characteristic	Unit	Test method	Comment
Density	kg/m³	EN ISO 1183-1 or EN ISO 1183-2	--
Thermal Stability OIT	min	EN ISO 11357-6	Test temperature should be specified within the agreed specification
MFR	g/10 min	EN ISO 1133-1	--
Ash residue	%	EN ISO 3451-1	Temperature should be specified within the agreed specification
Extraneous polymers	--	IR analyses or DSC	Attention should be paid to the maximum level of PP
Volatile matter	mg/kg	EN 12099	Although the scope of EN 12099 is limited, it is considered relevant.
Shape	--	Visual inspection	For example, ground, micronized, pellets, flakes.
Moisture	mg/kg	EN ISO 15512	--
Bulk Density	kg/m³	See Annex B in EN 15344:2021	Only applicable for powder or granules
Impact strength	KJ/m²	EN ISO 179-1 or EN ISO 180	--
Tensile properties	--	EN ISO 527-2	Tensile modulus, tensile stress at yield, strain at yield etc. can all be derived from the test given.
Flexural Modulus	MPa	EN ISO 178	--
Slow crack growth resistance	--	Annex A	If referred to in the product standard to gain experience, the Annex A should be used.
Impurities (solid contaminants content)	--	A test method (described in EN 15344:2021, Annex A), and/or mesh/melt filtering should be stated in the agreed specification	CEN/TS 17627:2021 could also be considered.
Source of the material	--	--	To be specified by the recyclate supplier